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**INDIVIDUAL AND FAMILY LEVEL CORRELATES OF OBESITY AMONG
AFRICAN AMERICAN ADOLESCENTS**

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by

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ABSTRACT

Study One

The goal of the first study was to examine the links between patterns of African American parents' feeding practices and adolescents' weight status and related psychosocial outcomes. Adolescents and parents in 145 families participated in home interviews during which adolescents provided information regarding their parents' (mother and father collectively) feeding practices. Adolescents also self-reported their height and weight, overweight concerns, depressive symptoms, and autonomy in decision making. Parents provided information regarding family background characteristics and other information as relevant to the study. Using latent profile analysis, three classes of parental feeding practices emerged: high autonomy, high restriction, and undifferentiated. There were differences in BMI across feeding classes. Youth in the high restriction class were heavier than youth in the high autonomy and undifferentiated classes. Girls and boys in the high restriction and girls in the undifferentiated classes were at an increased risk for heightened weight concerns relative to other youth. African American parents' feeding practices are diverse and are associated with adolescent physical and psychosocial health. Targeting these behaviors in obesity and eating disorder interventions may have a positive impact on youth's outcomes.

Study Two

The overarching goal of the second study was to examine whether patterns of youth out of school time use in physically active, media, and non-media sedentary activities were associated with adolescent BMI and related psychosocial outcomes. During a series of seven nightly phone-calls, youth reported their daily involvement (in minutes) in out of school activities and were then categorized based on whether or not they met current national recommendations time use. Only 25% of youth met the current recommendations for physical activity—whereas media and sedentary related pursuits were dominant. Girls were less physically active than boys; whereas boys spent more time in media related activities as compared to girls. Three activity groups emerged based on the number of recommendations that youth and dominant activities that youth were engaged in: (1) low activity (met two or more national recommendations); (2) high physical activity (met one recommendation); or (3) high sedentary/media (met no recommendations). Although, on average youth who took part in the study were of elevated weight status, youth in the high sedentary/media group had a greater proportion of overweight and obesity relative to youth in the low activity and high physical activity groups. After controlling for adolescent BMI, the activity groups did not differ in overweight concerns or depressive symptoms. The results of this study indicate that it is the overall pattern of involvement in various types of activity that is linked to adolescent health. Further, the results of this study suggest that there are two pathways to non-obesity—high physical activity or limited non-media sedentary activity. Future research and obesity prevention programming should consider how to promote developmental competencies in both areas among African American youth.

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PREFACE

Obesity is now at the forefront of national attention given that its prevalence has risen precipitously in just three decades. Currently, 66% of the American population is classified as being overweight (Ogden et al., 2006). Although the prevalence of obesity at the population level is alarming, such statistics only give a limited view of the overall problem. More detailed investigations highlight the fact that particular subgroups of the population are disproportionately affected by the obesity epidemic, namely African Americans and adolescents. The current work sought to examine the links between family and individual characteristics and African American adolescents' risk for obesity and related health outcomes.

There are a variety of factors that contribute to the onset of obesity. At the most general level, obesity is the result of a chronic imbalance between the amount of calories consumed and the amount of energy expended (e.g., physical activity). Specifically, obesity occurs when the amount of energy consumed *exceeds* the amount expended. Although it appears to be straightforward, the concept of energy imbalance is quite complex and the manner in which it contributes to obesity may be heavily rooted in environmental/contextual factors. During adolescence, autonomy and independence exercised over both food choices and physical activity increase. Choices that adolescents make during this period of development, especially in the area of diet and out of school time use, are influenced by the broader family ecology in which youth are embedded—including family and culture. The goals of the current work are to examine individual behaviors and family level correlates of obesity among African American adolescents. Specifically, the current work is comprised of two studies. The objective of the first study

is to examine the links between parents' feeding practices and adolescent weight status. The objective of the second study is to examine the association between African American adolescents' time use and adolescent weight status. In providing a rationale for the aforementioned objectives, this work begins with an overview of the extent of the problem of obesity among African American adolescents followed by a description of current relevant theoretical perspectives.

Obesity among African Americans

Currently, over 17% of American adolescents are classified as being overweight (Ogden et al., 2006), which is more than three times greater than the targeted rate of 5% last observed during the 1970s (Anderson & Butcher, 2006). Although childhood obesity tracks into adulthood (Rolland-Cachera et al., 1987; Serdula et al., 1993; Siervogel, Roche, Guo, Mukherjee, & Chumlea, 1991), for youth who are overweight as adolescents, the risk obesity in adulthood is even greater (Guo, Wu, Chumlea, & Roche, 1994; Guo, Wu, Chumlea, & Roche 2002).

Similar to other chronic illnesses, there are substantial racial/ethnic disparities in the prevalence of obesity, which further highlight the gravity of the problem for African Americans. Among this group, the prevalence of obesity is 37% (Hedley et al., 2004), greater than the prevalence observed among any other racial/ethnic group in the U.S. Like African American adults, African American adolescents (12-19 years of age) are disproportionately affected by the obesity epidemic—approximately 21% of these youth are obese (Anderson & Butcher, 2006).

There are also within-group differences in the prevalence of overweight among African American youth such that adolescent girls are more likely to be obese as

compared to boys (Anderson & Butcher, 2006): The prevalence of obesity among African American adolescent girls is 25.4%, compared to 18.5% among African American boys (Ogden et al., 2006). This may be related to the fact that in general, among boys and girls of the same age and sexual maturation status, girls have a higher percentage of body fat than boys (Daniels, Khoury, & Morrison, 1997). Additionally, girls have greater increases in fat mass and deposit less free fat mass than boys during puberty (Bandini, 2002). Advanced levels of sexual maturation among girls along with other risk factors (e.g., poor diet, low physical activity) have been linked to an increased risk for obesity (Wang, 2002).

Not only is adolescence a critical period in the development of obesity, but it is also a critical period in the onset of obesity-related co-morbidities (Morrison, Barton, Biro, Daniels, & Sprecher, 1999; Morrison, Sprecher, Barton, Waclawiw, & Daniels, 1999). Even though the prevalence of obesity is higher among African American girls as compared to boys, there is a disproportionate prevalence of obesity-related co-morbidities experienced by African Americans in general—another reason for targeting this socio-cultural group. In particular, African American youth are at an increased risk for metabolic syndrome (Quintos et al., 2006), and type 2 diabetes mellitus (Dabelea, Pettitt, Jones, & Arslanian, 1999) among other negative outcomes (Berenson & Srivivasan, 2005). During adolescence in particular, obesity-related hormonal changes in combination with the physiological and hormonal changes that occur during puberty, place African American youth at an increased risk for obesity-related illnesses. Health disparities in obesity-related illnesses highlight the fact that there is a need for a better understanding of potentially modifiable risk factors, including obesity itself, among

African American girls *and* boys. These statistics provide a clear picture about the extent of the problem among African American youth. The rationale for targeting adolescents is outlined below.

Obesity among American Adolescents

Marked by major physical and psychological changes in both boys and girls, adolescence includes the transition from childhood to adolescence. During adolescence, youth move from living in a world that is primarily shaped by the decisions of parents and caregivers, towards the period of adulthood, which is marked by autonomy and explorations in behaviors, thoughts, and emotions (Petersen, 1999). With this growing autonomy comes an increase in responsibility and accountability that is more critical than earlier in development (Lerner & Lerner, 1999). For example, in the case of obesity, adolescence marks a time of increasing autonomy and independence over time use activities and food choices/intake.

In spite of the evidence presented on the importance of studying obesity among African Americans during adolescence, our understanding of the specific factors that may promote the onset and maintenance of obesity among these youth is limited and has received little focus in research relative to other obesity-related areas of study. First, few studies have examined correlates of obesity specifically among adolescents. This is a major problem given the unique characteristics of this period of development; the health risks that emerge during adolescence may be different from those of childhood and adulthood (Williams, Holmbeck, & Greenley, 2002). Additionally, extant studies are mostly epidemiological, charting the overall prevalence of overweight or the bivariate links between weight status and physical activity or nutrition. Although such studies are

important in helping to determine the extent of the problem and its correlates, epidemiological studies of obesity lack depth and detail. In order to move the field forward, what is needed are studies that explore modifiable, ecological influences embedded in adolescents' daily experiences that may influence the onset and maintenance of obesity. The current work is aimed at illuminating such contributors to obesity among African American youth.

Theoretical Perspectives on Obesity

In order to better understand and alleviate the problem of obesity, it is important that research have a sound theoretical framework (Crawford & Ball, 2002; Owen & Crawford, 1998). Extant research is limited however, in the degree to which theoretical frameworks have been used. Of the limited number of obesity-related studies that have been designed around theoretical perspectives, most have been grounded in social cognitive and behavioral theories. This may be related to that fact that obesity has in large part been viewed as an individual-level problem. To some extent, such a perspective is accurate given that choices about food intake and physical activity, the major contributors to obesity, are often made by individuals. As acknowledged in the Institute of Medicine's Healthy Behavior Report (Smedley & Syme, 2000) and elsewhere (e.g., Healthy People 2010 (USDHHS., 2000), however, there is a complex interplay between the individual level causes and the characteristics of contexts that influence individuals' choices and lead to the onset and maintenance of obesity. As such, asserting that obesity is solely the negative consequence of poor choices made by an individual would be inaccurate, especially given that youth are still influenced by their parents. In the case of youth, who are embedded in multiple contexts (e.g., family, school, larger communities) that may

influence their behaviors and outcomes, including obesity, a model highlighting contextual influences on eating, physical activity and weight status is critical. Such an approach also may help to highlight modifiable risk factors and further inform prevention efforts (Owen, Leslie, Salmon, & Fotheringham, 2000). Although researchers have previously suggested studying obesity among youth using a comprehensive contextual model (Booth et al., 2001; Swinburn, Egger, & Raza, 1999), such an approach has not been given adequate attention in the literature. Recently, per the urging of leaders in the field and recent groundbreaking reports (Koplan, Liverman, & Kraak, 2005), researchers have begun to re-consider this possibility using Ecological Systems Theory (EST), as a useful framework for examining the multiple contextual influences on adolescent obesity.

At the most general level, the basic premise of EST is that the individual's interactions with others (e.g., parents) are embedded in multiple, larger ecologies (Bronfenbrenner, 1981). The levels included in the model are as follows: the individual (including individual behaviors and characteristics such as age, gender); the microsystem (systems with which the child directly interacts such as the family, school); the mesosystem (the relation between microsystems such as family-school); the exosystem (larger systems that the individual does not have direct contact with such as a parent's workplace); the macrosystem (broad ideological and institutional patterns that define a culture); and the chronosystem (external/internal timing of events such as parents' divorce or puberty onset) (Bronfenbrenner, 1981). This framework adds another element to the person-contextual models that predated it: "process", to aid in the understanding of development. "Process" represents the influences that are most proximal to the individual

(e.g., parenting strategy) that may vary across contexts (e.g., social class) in which individuals are situated.

Using the principles of EST, Davison and Birch (Davison & Birch, 2001) extended prior work (Bronfenbrenner, 1981) to develop the Ecological Model of Overweight. This model includes four levels, embedded in one another. From the innermost level the model includes: child weight status, child characteristics and child risk factors (e.g., age, gender, dietary intake, sedentary behavior, physical activity, familial susceptibility to weight gain), parenting styles and family characteristics (e.g., parents' feeding practices). This model also highlights community demography and broader societal influences including cultural values and practices that may contribute to youth weight status or weight related behaviors. Interactions across all levels of the model are important, however within this framework, the individual and the most proximal microsystem contexts should have the greatest impact on the adolescent.

Other researchers argue, however, that social position variables, such as race/ethnicity permeate all aspects of the family ecology and have a direct impact on adolescent development across multiple contexts (Garcia-Coll et al., 1996). As such, the focus of the current work will focus on individual and family influences on African American adolescent weight status as implicated in parent-adolescent feeding practices and the time adolescents spend in various out of school activities.

The Current Work

The current work included two studies. The primary goal of the first study was to measure the links between African American parent-adolescent feeding practices and adolescent weight status and well-being. Toward this end, this study had four objectives:

(1) to introduce and factor analyze a measure designed to assess parent-adolescent feeding practices in African American families; (2) to develop a typology of parent-adolescent feeding practices; (3) to examine the association between patterns of parent-adolescent feeding practices with the broader family ecology; and (4) to examine the association between patterns of parent-adolescent feeding practices and adolescent weight status and related psychosocial characteristics of youth. The goal of the second study was to identify and assess the links between adolescent out of school activities and adolescent weight status and well-being. This study had two objectives: (1) to identify the percentage of youth meeting national recommendations for time use and to describe the amount of time African American adolescents spent in out of school activities and (2) to measure the links between the amount of time adolescents spent in out of school activities and their weight status and weight related psychosocial well-being.

Although they differed in their focus on contributing factors (e.g., the roles of eating versus physical activity), the objectives of these studies and their associated aims were centered around a major threat to the health of African American youth—obesity. Accordingly, this work study makes several contributions to the extant literature. First, this work focuses on African American youth which in itself is a major contribution to the extant literature given how little is known about this socio-cultural group. Another strength of this work is that the sample is exclusively African American allowing for analysis of within group differences, which may further aid in the development of prevention programs and public health initiatives (e.g., Centers for Disease Control and Prevention’s VERB Campaign) aimed to promote healthy lifestyles.

There are additional advantages to this work that center around the two aforementioned studies. Specifically, prior work in this area has relied on measures established and validated for use with children and European American samples (May et al., 2007); the first study in contrast extends prior research to address current measurement limitations of the field as they pertain to parent-adolescent feeding practices among African American youth. Further, in a field that has been in large part focused on individual level behaviors and characteristics, the first study will bring to light the importance family level influences and their impact on adolescent obesity. Finally, out of school time use, especially among minority adolescents, has received little attention in the obesity literature. The second study lays the foundation for such research by describing the extent to which African American youth spend time in various out of school activities and examined whether the amount of time that youth spend in various activities were associated with African American adolescents' obesity status and other correlates.

Results from these studies may assist researchers and clinicians in conceptualizing obesity and developing new insights on prevention programming. These studies may lead to an increased focus on both youth and families and contribute to the development of a theoretical framework on the ecology and etiology of overweight.

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“And we know that in all things God works for the good of those who love him, who have been called according to his purpose.” Romans 8:28

Study One: Parent-Adolescent Feeding Practices and Adolescent Obesity

INTRODUCTION

Food intake is perhaps the most widely studied contributor to obesity. The factors that promote excess consumption of food, especially among adolescents, however, are poorly understood. What is known is that parents provide the primary context for socializing their children (Bronfenbrenner, 1981) and by virtue of their charge to care for and protect their children, parents create first the context for eating (Davison & Birch, 2001). Parents' socialization of children's eating may occur in a number of ways including providing youth with the opportunity to learn what is acceptable to eat and when (Birch, 1999). Parents may teach their children about food and eating through encouraging/pressuring their children to eat or by limiting their children's intake through restrictive feeding practices. In some families, the feeding practices that parents use with their children lead to positive outcomes for youth in that such practices help youth to regulate their eating, and over time may help youth to maintain a healthy weight status (Birch & Fisher, 1998). Studies of U.S. youth also suggest however, that parental feeding practices may be one contributing factor in the onset of obesity (Birch & Fisher, 1998). As implied by the Ecological Model of Obesity (Davison & Birch, 2001), parents' use of specific feeding practices may be influenced by a number of factors, including child weight and parents' own weight. Parents' approaches and motivations in their feeding interactions with children may also be influenced by other factors within the broader ecology of the family, including culture.

For European American families, parents' interactions with their children center on assuring that their children adhere to mainstream societal norms for health and fitness. These parents, according to Costanzo and Woody's (Costanzo & Woody, 1985) obesity

prone model, may utilize certain feeding strategies (e.g., restriction) to discourage excess weight gain if they view their obese children as being deviant from the norm. In contrast, among minority parents, parents' food oriented interactions with their children have centered on historical threats of undernutrition and survival, as such, parents' feeding strategies may reflect these threats (e.g., encouragement/pressure to eat food when available). In contemporary U.S. society, where foods, especially low price, high fat foods are abundant and among subgroups of the population that value higher weight status (e.g., African Americans), indulgent feeding practices may be counterproductive. Rather than promoting health, such practices promote obesity (Eckel, 2003).

As noted, nearly all of the research investigating the link between parents' feeding practices and their children's weight status has focused on European American youth and young children (Fisher & Birch, 1999). Few studies have included African American youth (e.g., May et al, 2007) and those that do have all have failed to use culturally validated measures (Anderson, et al., 2005; Kaur et al., 2006) to assess the association between feeding practices used with minority youth and youth weight status. Although Kaur and colleagues (2006) developed a measure of parent-adolescent feeding practices, their measure is limited given that it was not exclusively developed for African American youth and is based on parents' reports of feeding practices. These are important issues given that there are known differences in parents' feeding practices across race/ethnicity as mentioned earlier. Further, while parents' reports of their feeding practices are important, knowing how adolescents interpret parents' feeding practices may be even more important in helping to understand obesity among youth. In this study, we aimed to

test the validity and the factor structure of a new child feeding questionnaire among parents of a multi-ethnic sample of adolescents.

The fact that parents' feeding practices with adolescent youth have not been studied to a great degree in the extant literature may be related to the fact that, from a developmental perspective, peers become increasingly important during adolescence due to increases in youth's independence and autonomy (Lerner & Lerner, 1999). This argument is called into question. For example, results from the Continuing Survey of Food Intake of Individuals indicate that nearly 70% of adolescents' meals take place within the home, with 65% of adolescents' total energy intake taking place in the home (Lin, Guthrie, & Frazao, 1999). Furthermore, parents' actions mediate adolescent food intake by the types and amount of foods that are made available in the home and the values and preferences that they impart on adolescents about food and eating (Story, Neumark-Sztainer, & French, 2002). In racially/ethnically diverse focus groups, adolescents have reported that parents remain influential factors in their eating (Neumark-Sztainer, Story, Perry, & Casey, 1999), suggesting that while adolescents begin to make more decisions during this period of development, the home environment especially parental influences, remain important.

It has been suggested that parental feeding practices may be influenced by culture and that parents may have different motivations for their feeding practices (Birch & Fisher, 1995). It may be that there is a cultural basis to parents' selection of feeding practices, and these practices may be associated with differences in youth' weight status across race/ethnicity. As such, there is a need to examine feeding practices among

African American parents and the extent to which feeding practices in this group may have positive or negative influences on adolescent weight status.

Another limitation of the present literature is that specific feeding practices are commonly studied in isolation (e.g., restriction versus pressure to eat), however feeding practices may be used in concert with one another. It is possible that parents may restrict some foods, but encourage or pressure their children to eat others across different feeding situations or at the same time. Thus, there may be a complex interplay between various feeding practices that warrant further consideration. As such, it is important that researchers identify patterns of feeding practices among African American families and examine how these patterns relate to various outcomes among youth including obesity.

Still, knowing that specific feeding practices or combinations thereof are differentially associated with African American adolescent obesity does not fully underscore *how* patterns of feeding practices may give rise to obesity. In order for prevention and treatment programs in the area of obesity to be effective, researchers must have a clear understanding of the underlying factors that distinguish patterns of parent-adolescent feeding practices from one another. Which factors might distinguish youth whose parents use various patterns of feeding practices from one another is unclear, however present research regarding family ecology and adolescent development provides some indication of what these discriminating factors might be among adolescents and their parents.

Family Correlates of Parent-Adolescent Feeding Practices

Family Mealtime Rituals. Family rituals are symbolic representations of who families are as a group (Fiese, 2007) and are not to be confused with family routines (e.g.,

bedtime routines, chores, etc) which focus more on the structure of everyday life. Rituals foster a sense of belonging to one's group (e.g., racial group, family, etc) and may promote family closeness and belonging. The developmental course of family rituals becomes increasingly important with age, as parents tend to share and encourage rituals more as their children grow older and become more active participants in the rituals (Fiese et al., 2002). For African American families in particular, ritualistic gatherings often focus on times when families come together to share meals (Poe, 1999). Among African Americans who have experienced severe oppression, food takes on a central and highly symbolic role (Mintz, 1996). Prior research on youth from other ethnic groups, has indicated that family rituals have a positive impact on adolescent psychological functioning and identity development (Fiese et al., 2002). How family rituals, especially those centered around food, are related to parents' feeding practices, adolescent physical health and the meaning of family rituals for African American adolescents however has not been thoroughly examined. To some extent rituals centered on food may be linked to pressure to eat or otherwise indulgent feeding practices. Having an understanding of the relative importance of family rituals may be important to the development of obesity prevention programs for this subgroup of the population.

Parental Warmth. At the most general level, parenting styles reflect personal traits of parents that serve as the foundation for child socialization (Baumrind, 1989; Darling & Steinberg, 1993). Prior work has suggested that feeding practices are associated with parenting styles which in turn are associated with youth BMI (Hughes, Power, Fisher, Mueller, & Nicklas, 2005). Thus, parenting styles may be reflective of family life and have a greater impact on shaping daily activities such as eating behavior

and ultimately obesity risk than do feeding practices (Hughes et al., 2005). Prevention and treatment strategies that address parenting style as well as specific feeding behaviors may be more successful in preventing adolescent obesity than current efforts focusing on feeding practices alone.

Adolescent Correlates of Parent-Adolescent Feeding Practices

Psychosocial Correlates. Whether or not psychosocial correlates are associated with parent-adolescent feeding practices is not clear because much of the research on parents' feeding practices has focused on younger children who have a reduced risk of experiencing psychological distress. Adolescence, however, is a time in development when psychosocial problems, especially, *depression* and *excessive concerns about overweight* begin to emerge in many youth, especially in girls, indicating that further research in this area is warranted. Whether or not particular patterns of parent-feeding practices are detrimental to or protective of the psychosocial health of African American youth has not been established in the extant literature. On one hand, regardless of parents' feeding practices, African American youth may not be at risk for elevated overweight concerns and depression given a higher tolerance of overweight, higher prevalence of overweight, and increased value placed on food in the African American community. However, the association between parent-adolescent feeding practices and adolescent weight concerns or depression may differ for youth as a function of gender, given the known gender differences in the prevalence of both weight concerns and depression among adolescents across racial/ethnic groups.

Additional Correlates of Parent-Adolescent Feeding Practices

Adolescent Autonomy in Decision Making. As previously mentioned, adolescence represents a time of increased autonomy and decision making among youth. Prior studies have indicated that, in general, it is during this time youth also begin to make more decisions regarding what and when they eat (Contento, Williams, Michela, & Franklin, 2006). The ability to make such decisions may be reflective of overall family life. For example, in families where parents' feeding patterns are more restrictive, youth may make fewer decisions in general, whereas youth whose parents allot for greater autonomy in eating may allow youth to make more decisions in other areas of life.

Parent Conformity Values. In accordance with their social and historical experiences rooted in both community and collectivism, African American families value conformity as opposed to individualistic and autonomous behaviors (Garcia-Coll, Meyer, & Brillon, 1995). Known cultural differences such as this are important especially when considering feeding practices used during adolescence, a time when autonomy becomes increasingly important. The link between parents' conformity values, feeding practices and ultimately adolescent weight is unknown. On one hand, conformity-typed behaviors, have been linked to negative outcomes among European American youth, but more positive outcomes among African American youth (Garcia-Coll et al., 1995). However, for African American adolescents, such values may be linked to parent-adolescent feeding practices that promote obesity and make it difficult for youth to make sound and independent decisions about eating as they move towards adulthood.

Research Goals

To this end, the aims of this first study were four fold. The first aim was to extend the work of Birch and colleagues (Birch et al., 2001) and Anderson and colleagues (Anderson et al., 2005) to develop a culturally and developmentally appropriate feeding measure for African American adolescents. The second aim was to identify patterns of parental feeding practices among African American families. Aims three and four were exploratory and sought (1) to determine whether there were differences across parent-adolescent feeding classes based on parents' conformity values, parents' warmth in their relationships with adolescents, adolescent autonomy, and dinner time rituals and (2) to determine whether there were differences across patterns of parent-adolescent feeding practices in adolescent weight status, overweight concerns and depressive symptoms.

METHOD

Participants. The data came from a larger, short-term longitudinal study of African American family relationships and adolescent development. Two recruitment methods were used to enlist the sample. For the first procedure, African Americans living in the areas of interest were hired to recruit families from the targeted communities in the form of flyers distributed at youth events, places of worship and businesses. This method resulted in the recruitment of about one half of the sample for the larger study. For the second approach, a marketing firm list, which included the contact information of African American families with children in 4th through 7th grades, was purchased. Families were contacted via letter and telephone calls to determine those who were interested. Given our focus on adolescent development and family ecology, the sample was not nationally representative, instead it included families in which parents were married and parents and adolescents resided in the same household.

Of the 187 families in the sample, 15 adolescents were excluded from the analyses presented here due to missing height and weight data needed to calculate body mass index (BMI) z-scores. An additional 27 youth were excluded from the present analyses due to missing data on key variables of interest. Analyses revealed that youth with missing data did not differ from youth with complete data. Thus, the final sample included a total of 145 adolescents ($n = 65$ girls, $n = 80$ boys). Table 1 provides background characteristics for the 145 adolescents and their parents included in the analyses.

Table 1
Demographic Characteristics for Full Sample

Variable	Mean	SD
Age (in Years)	15.06	1.85
Average Parent Education ^a	14.60	1.76
Average Job Prestige ^b	49.68	9.62
Family Income	\$88,289	\$59,771

^a Rated on a 20 point scale: 12=high school graduate; 14=some college/associate's degree; 16=college graduate

^b Rated on a 79 point National Population Research Council Code (NORC)scale: 49 = locomotive engineer; 50 = office supervisor

Families were recruited from two northeastern urban centers, which according to census data included approximately 38% married African American households with at least one child between 6 to 17 years of age (Census Bureau, 2001). Census data from the northeastern region from which the sample was drawn, indicated that households within the same region had lower incomes (median = \$51,186) than those of families in the current study (median = \$ 80, 250). For families in the current study the percentage of parents who completed some college (18.20%) was slightly lower than the percentage of adults with the same level of education in the region from which the sample was drawn (Census Bureau, 2006).

Procedures

Home Interviews. Data for the current study were collected during home interviews. During these interviews, adolescents and parents individually completed a series of questionnaires about individual characteristics and behaviors as well as family relationships. Youth self-reported their height and weight, and parents reported family background information relevant to the current study. Families received an honorarium of \$200 for their participation.

Measures

Background Information. Background information including mother and father educational attainment (e.g., 12 = high school graduate; 14 = some college/associate's degree; 16 = college graduate), parent occupation, family income, and adolescents' ages were reported by parents. Given missing data on mother and father job prestige and income due to unemployed parents and those who were not willing to share their income information, parental education (average of mother and father) was used as a proxy for SES for subsequent analyses. Mothers' and fathers' education was significantly correlated ($r = .46, p < .001$). Correlational analyses also indicated that parental education was significantly correlated with parental job prestige ($r = .62, p < .001$) and family income ($r = .60, p < .001$). Parental job prestige and family income were significantly correlated ($r = .46, p < .001$).

Parent-Adolescent Feeding Practices. We developed a 20 item scale of parent-adolescent feeding practices based on prior work (Birch et al., 2001; Kaur et al., 2006). Adolescents responded to each item rated on a 5-point scale (1=*never* to 5=*always*) to indicate how often their parents (mothers and fathers collectively) used various feeding strategies. Example items include: "My parents make sure I eat enough healthy foods"; "My parents let me eat whatever I want"; "My parents buy a lot of my favorite snack foods even though they aren't healthy"; and "I have to eat candy secretly because my parents don't usually let me have them". Appendix 1 includes a complete listing of the questionnaire items.

Adolescent Autonomy. The proportion of decisions that adolescents were involved in was adapted from a questionnaire developed by Smetana (1998) and was used as a

proxy for adolescent autonomy. Youth responded to items regarding decisions made in nine domains (e.g., chores, social life). For each domain, youth indicated the individual(s) responsible for making decisions in the domain by responding with one of the following response options: “I alone”, “mother”, “father”, “both parents”, “father and I”, “mother and I”, “other person(s)”, and “does not apply”. The proportion of decisions that the child was involved in was equal to the total number of decisions the adolescent reported taking part in divided by the total number of decisions. Cronbach’s alpha was .73 for girls and .59 for boys.

Parental Warmth. Parental warmth was assessed based on adolescents’ responses to the Child’s Report of the Parents’ Behavior Inventory (Schwarz, Barton-Henry, & Pruzinsky, 1985). The scale included 8 items rated on a 5-point scale (1 = *not at all* to 5 = *very much*) that were averaged to create a mean score, such that higher scores indicated greater levels of parental warmth. Example items include: “My mother/father tells or shows me that she likes me just the way I am”; or “My mother/father sees my good points more than my faults.” Cronbach’s alphas ranged from .89 (mothers’ warmth) to .94 (fathers’ warmth), and adolescents’ ratings of mothers and fathers were correlated, $r = .43, p < .01$.

Family Meal Time Rituals. To assess family mealtime rituals mothers and fathers completed the dinner time ritual subscale of the Family Rituals Questionnaire (Fiese & Kline, 1993). The dinner time ritual subscale contained 8 items, based on a 4-point scale, that reflected various aspects of family dinner time including flexibility, occurrence, roles attendance, affect, symbolic significance, deliberateness and continuation (Fiese & Kline, 1993). Respondents selected from two sentences that they felt best described their family

(e.g., “Some families regularly eat dinner together” or “Other families rarely eat dinner together”) and then indicated whether the statement was “sort of true” or “really true” of their family. Items were summed for a total score, where higher scores reflected higher levels of family meal time ritualization. Parents’ reports of dinner time rituals were correlated $r = .36, p < .001$. Cronbach’s alpha was .80 for mothers and for fathers.

Parental Conformity Values. Parents’ conformity values were assessed using the conformity subscale of a measure of values developed for adults (Curtner-Smith, Bennett, & O’Rear, 1995). This measure was adapted from a measure originally developed by for use with children (Schaefer & Egerton, 1985). The conformity subscale includes 6 items (e.g., “How important is it to you to follow orders/requests of supervisors?”; “How important is it to you to keep your appearance neat?”). To increase variability, the rating scale for this measure was expanded to 7 points and strong anchor words (e.g., 1 = *not a concern*, 7 = *essential*) were assigned for this study. Items were summed for a total score such that higher scores indicated greater conformity values. Cronbach’s alpha for this sample ranged from .78 (fathers’ conformity values) to .82 (mothers’ conformity values). Mothers’ and fathers’ reports of conformity values were correlated $r = .23, p < .03$.

Adolescents’ Body Mass Index (BMI) z-scores. Adolescent BMI z-scores were calculated based on self-reports of height and weight. Using the anthropometry component in Epi Info 2000 version 3.3, adolescents’ height and weight were converted to age and sex specific BMI z-scores according to the most recent Centers for Disease Control (CDC) growth charts (Kuczmarski et al., 2000).

Adolescent Weight Concerns. The Stanford Weight Concerns Scale (Killen et al., 1994) was used to assess adolescents’ concerns about being overweight. The scale which

focused on adolescents' concerns about overweight, body dissatisfaction and dieting, included 5 items (e.g., "How afraid are you of gaining three pounds?"). Due to the fact the rating scales for the questionnaire items varied, responses for all items were standardized on a 100-point scale and averaged. Higher scores reflected heightened weight concerns. Cronbach's alpha was .76 for girls and .71 for boys.

Adolescent Depressive Symptoms. The short form of the Children's Depression Inventory (CDI-S) was used to assess adolescent depressive symptoms (Kovacs, 1981). This questionnaire contained 10 of the 24 items used on the original Children's Depression Inventory. There were no subscales for this measure; however items focused on various aspects of depressive symptomology (e.g., negative mood, anhedonia, ineffectiveness, and negative self-esteem). Items were summed for a total depressive symptoms score. Higher scores reflected increased severity of depressive symptomology. Cronbach's alpha was .70 for girls and .61 for boys.

Statistical Analysis

In order to assess the dimensionality of items related to parent-adolescent feeding, in a conceptually meaningful manner a factor analysis was used. Specifically, Exploratory Factor Analysis (EFA) was conducted using SAS 9.1.

To address the second aim of this objective, which was to determine the typology of parent-adolescent feeding practices across families, a normal mixture model (latent profile analysis; LPA) was used. Previously, cluster analysis was suggested as an appropriate approach to use in studies of development (Bergman & Magnusson, 1997). This method has received much criticism. Among the noted problems is the fact that the determination of the best cluster solution is considered arbitrary given that no set

statistical criterion is used is used to determine the best solution. Thus, use of methodological approaches that incorporate formal statistical criteria to determine the number of clusters and their fit is needed. As such, LPA, was used to address our second aim. The use of LPA is advantageous given that the number of class solutions and the best class solution are based on the minimization of the Bayesian information criteria parsimony index (BIC) and Akaike's Information Criterion (Burnham & Anderson, 2002; Sclove, 1987). The indicator variables used to create the class solution for this study were the parent adolescent feeding factors obtained from the EFA conducted for the first aim. These analyses were conducted using Mplus version 3.12.

To address the third and fourth aims of this study, differences across the resulting LPA classes were tested among both family and adolescent characteristics. Specifically, for the third aim of this study, recognizing that parent-adolescent feeding practices may be influenced by the family life in general, we tested whether there were differences in family level influences on parental feeding practices across classes. Finally, adolescent BMI z-scores and related psychosocial characteristics were examined across the LPA classes in an effort to further differentiate between the classes.

RESULTS

The results of the current are organized around four aims: (1) to factor analyze and describe a new parent-adolescent feeding measure for African American adolescents, (2) to describe patterns in parent-adolescent feeding practices, (3) to determine whether there are differences across parent-adolescent feeding classes based on family and adolescent characteristics, and (4) to determine whether there are differences across parent-adolescent feeding classes based on adolescent BMI z-scores and related psychosocial characteristics.

Preliminary Analyses

As a preliminary step, we examined the frequency distribution of adolescent BMI z-scores. BMI z-scores were used as opposed to percentile scores given the potential for ceiling effects. A BMI z-score of 0 corresponds to a BMI percentile score at the 50th percentile. BMI z-scores of 1.03 and 1.64 correspond to the 85th and 95th BMI percentiles, respectively. Figures 1, 2, and 3 show the distribution of adolescent BMI z-scores for the entire sample and girls and boys separately. For all youth, BMI z-scores were clustered at the higher end of the distribution. The mean BMI z-score for the sample was .78 ($SD = 1.03$). Results of a one-way analysis of variance (ANOVA) indicated there was a marginally significant difference in girls' and boys' BMI z-scores. Girls' BMI z-scores ($M = .89$, $SD = 1.02$) were higher than those of boys' ($M = .60$, $SD = 1.03$), $F(1, 143) = 2.81$, $p = .10$.

Figure 1.
Frequency Distribution of BMI Z-Scores for the Full Sample

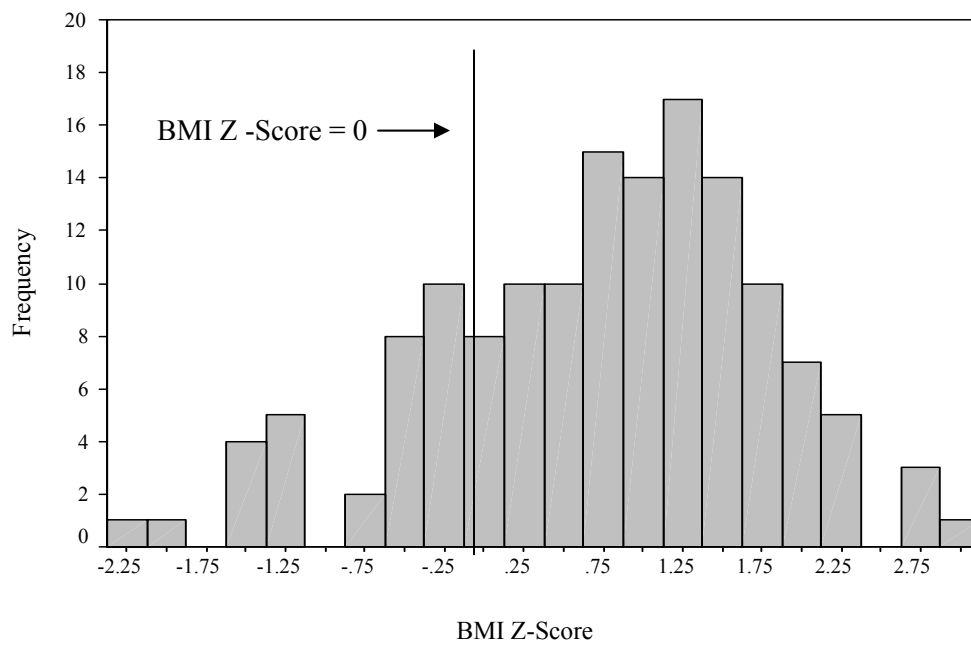


Figure 2.
Frequency Distribution of BMI Z-Scores for Girls

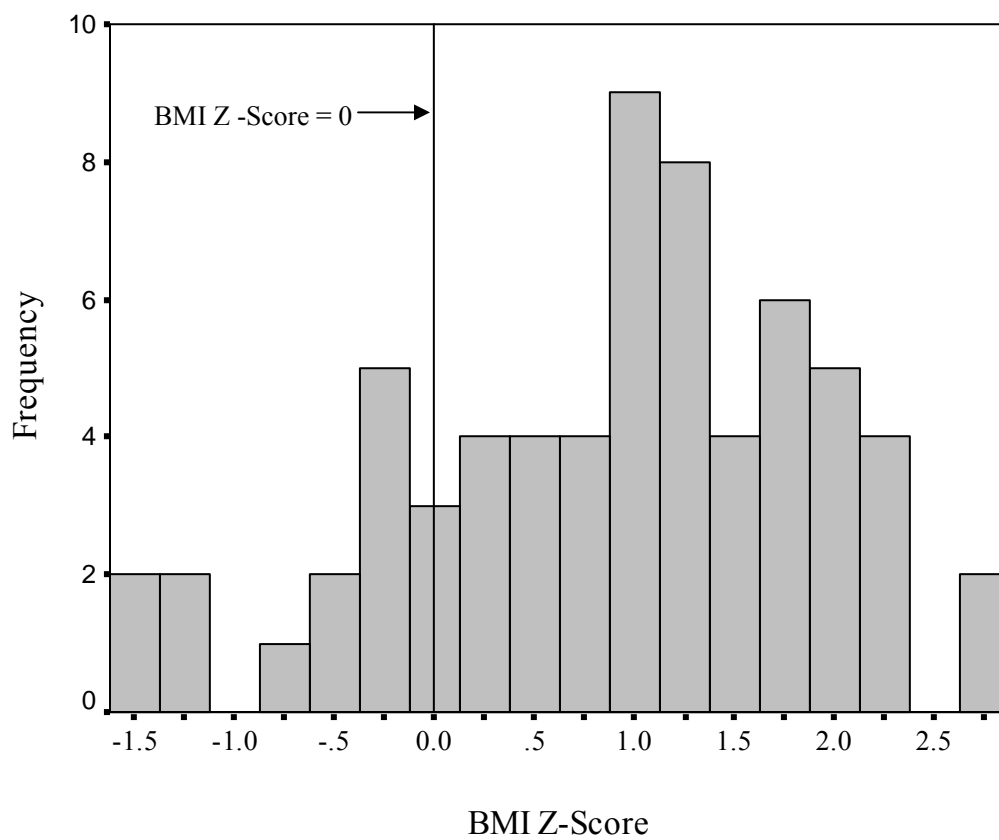
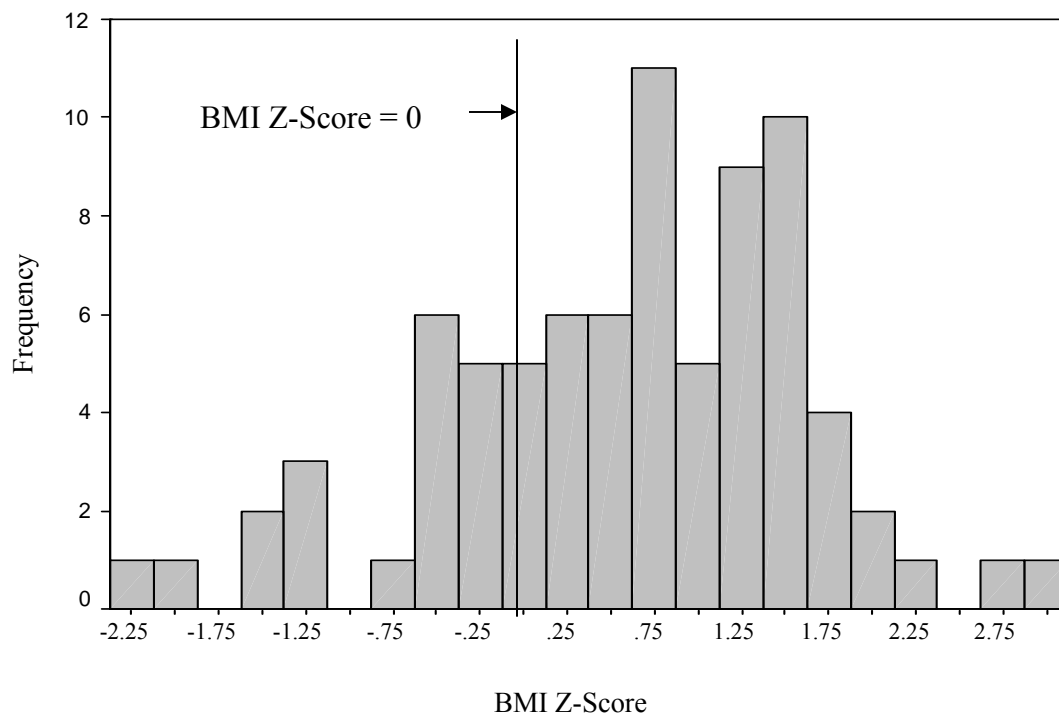


Figure 3.
Frequency Distribution of BMI Z-Scores for Boys



Aim 1: Factor Analyze and Describe a New Parent-Adolescent Feeding Measure for African American Adolescents

Using all 20 items (see Appendix A) developed to describe African American parents' feeding practices with their adolescent children, an EFA was conducted. Specifically, using varimax rotation, along with a scree plot, and Eigen values (considered sufficient at 1.0), a four factor solution was selected.

In the interest of reliability for the measure, items with factor loadings $\geq .32$ were considered adequate (Tabachnick & Fidell, 2001) and were retained in the solution (Kim & Mueller, 1978). Items with high cross-loadings (loading $> .32$ on more than one factor) were deleted if their loading could not be easily determined. This exclusion criterion applied to one item, "My parents keep track of the foods I eat". A second item, "When I say I'm not hungry, my parents say that I should eat more", was deleted from the analyses given that its high loading on the restriction factor was not aligned with other items loading highly on that factor. Following these adjustments, a second EFA was conducted retaining four factors and using the remaining 18 items from the initial questionnaire.

Eigen values for each factor were as follows: 4.75 (Autonomy), 2.52 (Restriction), 1.63 (Indulgence), and 1.38 (Pressure to Eat). The four resulting factors accounted for 51.36% of the variance. Table 2 shows the factor loadings for each item and Cronbach alphas for each factor.

Table 2
Exploratory Factor Solution for 18 Items of Parent Adolescent Feeding Practices

<i>Item Number</i>		Pressure $\alpha=.46$	Autonomy $\alpha=.72$	Indulgence $\alpha=.69$	Restriction $\alpha=.72$
9	My parents make sure I eat enough healthy foods	.75			
6	I am not allowed to have dessert until I finish the food on my plate	.68			
14	In my family, my parents give their kids the amount of food they think they should have	.58			
1	My parents tell me to eat all of the food on my plate	.55			
16	In my home we have low fat and fat free snacks like pretzels, yogurt, and fruit	.55			
12	My parents limit the amount of snack food that I eat	.52			
18	I can have snacks whenever I am hungry		.76		
15	My parents let me eat whatever I want		.72		
10	When I eat with my family I help myself to the food that I want		.67		
3 ^a	I have to ask my parents for permission before eating a snack		.58		
8	My parents buy a lot of my favorite snack foods even though they aren't healthy			.81	
5	We have junk food like chips and soda in our house			.78	
11	My parents take me to fast food restaurants			.65	
2 ^a	My parents don't buy junk food like cookies and chips because they think it's not healthy			.63	
13	My parents give me treats like candy and cookies as a reward when I have done something good.			.42	
19	I have to eat candy secretly because my parents don't usually let me have them				.80
7	I eat foods that I know are not healthy when my parents are not around.				.62
17	My parents worry that I will get fat if I eat too much				.44

Note: Items 4 and 20 from the original measure deleted due to high cross loadings and non-interpretable loadings, respectively

^a Item reversed scored from original measure

Factor correlations ranged between $r = -.39$ and $r = .34$ and are presented in Table 3. There was a significant negative correlation between pressure to eat and autonomy. Autonomy was negatively correlated with restrictive feeding practices, but positively correlated with indulgence.

Table 3
Correlation Coefficients between Parent Feeding Practice Factors

Feeding Variable	Pressure	Autonomy	Indulgence	Restriction
Pressure	1.00			
Autonomy	-.39*	1.00		
Indulgence	-.07	.20*	1.00	
Restriction	.34	-.23*	.05	1.00

* $p < .05$

Association between Adolescent BMI, Weight Concerns, and Feeding Practice Factors. Next, we examined the association between the feeding practice factors and adolescent BMI z-scores and adolescent concerns about overweight (Table 4). Adolescent BMI z-scores were marginally associated with indulgent feeding and autonomy granting feeding practices. Additionally, there was a positive correlation between adolescent overweight concerns and feeding restriction, and a marginally significant, positive correlation between overweight concerns and autonomous feeding practices.

Table 4
Correlation Coefficients between Adolescent BMI z-score and Overweight Concern with Parent Feeding Practices.

Variable	Pressure	Autonomy	Indulgence	Restriction
BMI z-score	.00	-.13 [†]	-.13 [†]	.05
Overweight Concern	.12	-.16 [†]	-.05	.25*

* $p < .05$

[†] $p = .10$

Aim 2: Determine the Typologies of Parent-Adolescent Feeding Practices

Next, LPA was used to determine the typology of feeding practices of African American parents. Models were fitted with a total of four continuous indicators (pressure, autonomy, restriction, indulgence). In all, four LPA models were tested to determine which solution best suited the data. Model parameters (AIC, BIC and entropy values) are presented in Table 5 and were used to compare models. Entropy values reflected the quality of the selected model, and were based on the degree to which the model distinguished between the resulting class solutions. Entropy values ranged from 0 to 1, with higher entropy values being desirable.

Table 5
Goodness of Fit Statistics and Class Frequencies for LPA Solutions with 1 to 4 Latent Classes.

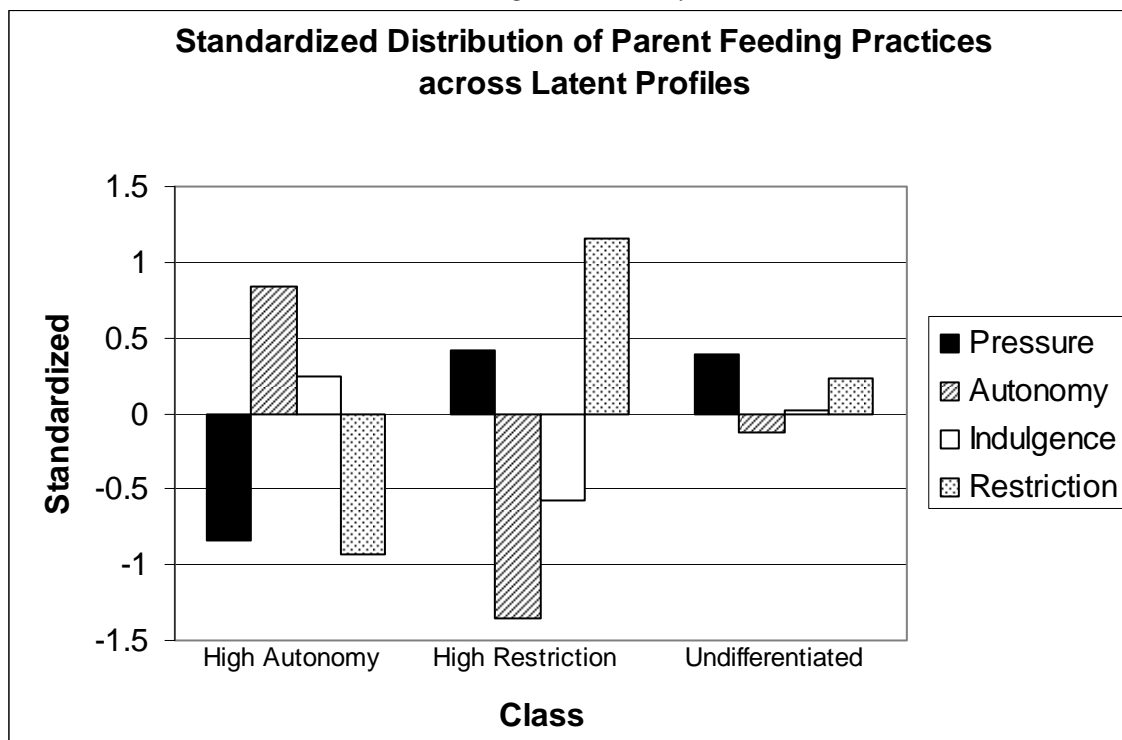
Fit Statistic	Cluster Solution 1	Cluster Solution 2	Cluster Solution 3	Cluster Solution 4
Number of Parameters	8	17	26	35
AIC	1657.96	1552.77	1528.19	1519.28
BIC	1681.77	1603.37	1605.58	1623.467
Entropy	--	.83	.78	.88
n per class (%)				
n1	145 (100)	51(35.17)	48 (33.10)	14 (9.6)
n2	--	94(64.83)	18(12.41)	81 (5.58)
n3	--	--	79(54.48)	46 (31.70)
n4	--	--	--	4 (2.75)

The results of the LPA suggested that the solution with three latent classes provided the best fit for the data. The three class solution provided lower BIC values and a more equal distribution of the cases across classes as compared to the four class solution. As compared to the two class solution, the three class solution had similar BIC

values, but lower AIC parameter values. Finally, the entropy measures for three solutions were comparable.

Describing Parent-Adolescent Feeding Classes. The results indicated that the three class solution (see Figure 4) included: (1) a high autonomy class ($n = 21$ girls, $n = 27$ boys), characterized by high autonomy and moderate indulgence and low pressure and restriction; (2) a high restriction class ($n = 8$ girls, $n = 10$ boys), characterized by high restriction, moderate pressure and low indulgence and autonomy; and (3) an undifferentiated class ($n = 36$ girls, $n = 43$ boys), characterized by average levels of pressure, restriction, autonomy and indulgence.

Figure 4.
Standardized Parent-Adolescent Feeding Practices by Class



Aim 3: Determine Differences in Family and Adolescent Characteristics Across Parent-Adolescent Feeding Classes

Class Differences in Parent Education, Adolescent Age and Gender. Chi-square analysis and ANOVAs were used to determine how the resulting classes differed on the basis of background variables including parent education, adolescent gender, and adolescent age. There were marginal class differences in parent education ($F(2, 142) = 2.52, p = .08$). Parents of youth in the high autonomy class ($M = 14.79, SD = 1.90$), had more education than those in the high restriction ($M = 13.75, SD = 1.62$) and undifferentiated ($M = 14.68, SD = 1.67$) classes. The results indicated that there were no differences across classes in gender composition, ($\chi(2, N = 145) = .041, p > .05$). Classes differed based on adolescents' age ($F(2, 142) = 7.81, p < .001$). Tukey post hoc analyses revealed that youth in the high restriction ($M = 13.99, SD = 1.86$) class were younger than youth in the high autonomy ($M = 15.79, SD = 1.64$) and the undifferentiated ($M = 14.87, SD = 1.82$) classes. The difference in age between youth in the high autonomy and undifferentiated classes was marginal such that youth in the high autonomy class were older than youth in the undifferentiated class. Given the differences observed with regard to background variables and class membership, adolescent age and parent education, were treated as covariates in all subsequent analyses.

Additional Correlates of Parent Adolescent Feeding Practices. Next, we examined whether there were differences across feeding classes in additional adolescent and parent correlates. Specifically, a 3 (class) x 2 (gender) ANOVA was conducted to test whether adolescent autonomy in decision making differed across parent-adolescent feeding classes. The results, presented in Table 6 indicate that there was a significant

main effect for feeding class. Youth in the high restriction class reported significantly less autonomy in decision making than youth in the high autonomy and undifferentiated classes.

Next, a series of repeated measures ANOVAs were conducted to test whether there were differences across classes in mothers' and fathers' warmth, conformity values, and dinner time rituals. Results are included in Table 6. With regard to mothers' and fathers' warmth in their relationships with their child, the results of these analyses indicated that there was a significant main effect for class. Based on Tukey post hoc comparisons, youth in the undifferentiated class reported more parental warmth than youth in the high autonomy and high restriction classes. There was a marginally significant main effect for mothers' and fathers' conformity values across feeding classes. Tukey post hoc comparisons indicated that mothers and fathers of youth in the high autonomy class reported fewer conformity values than mothers and fathers of youth in the high restriction and undifferentiated classes. There were no differences across classes in family dinner time rituals.

Table 6
Mean Differences in Family Characteristics Across Parent Adolescent Feeding Practice Classes

Variable	High Autonomy		High Restriction		Undifferentiated	
	M	SD	M	SD	M	SD
Adolescent Autonomy	0.74 ^a	.23	0.46 ^b	.25	.66 ^a	.24
Parent Warmth	3.04 ^a	.63	3.05 ^b	.56	3.36 ^a	.47
Mothers' Warmth	3.23	.65	3.08	.71	3.47	.51
Fathers' Warmth	2.86	.86	3.01	.82	3.26	.55
Parent Conformity Values [†]	34.76 ^a	3.82	36.92 ^b	2.70	36.11 ^b	3.51
Mothers' Conformity Values	36.96	5.14	37.33	3.68	36.71	4.15
Fathers' Conformity Values	34.56	4.73	36.50	3.84	35.52	4.69
Dinner Time Rituals	20.06 ^a	4.05	22.14 ^a	3.61	21.14 ^a	4.21
Mothers' Dinner Time Rituals	20.04	4.65	22.80	4.41	21.59	5.24
Fathers' Dinner Time Rituals	20.08	4.76	21.48	4.22	20.68	5.28

Note: Within each activity group, bars with different letters are significantly different at $p < .05$

[†] $p = .10$

Aim 4: Assess Differences Across Parent-Adolescent Feeding Classes in Adolescent BMI and Related Psychosocial Correlates

In order to determine whether there were differences among the three classes of the parent-adolescent feeding practices in adolescent BMI z-scores and related psychosocial correlates a series of 3 (class) x 2 (gender) ANOVAs were conducted. Adolescent BMI z-scores, overweight concerns, and depressive symptoms were included as dependent variables, each in separate models.

Results of these analyses (see Table 7) indicated that, in the case of BMI z-scores there was a marginally significant main effect ($F(7, 137) = 2.66, p = .08$). Results of follow-up comparisons indicated that youth in the high restriction class had higher BMI z-scores than youth in the high autonomy and undifferentiated classes. There was also a

significant main effect of class for youth overweight concerns. Tukey post hoc comparisons indicated that youth in the high restriction class had higher overweight concerns than youth in the high autonomy and undifferentiated classes. This finding was qualified by a significant class x gender interaction, ($F(8,136) = 7.81, p < .001$). Post hoc comparisons indicated that, girls in the high restriction class ($M = 22.89, SD = 4.09$) had greater overweight concerns than all other youth. Girls in the undifferentiated class ($M = 15.74, SD = 6.74$) had greater overweight concerns than boys ($M = 11.64, SD = 7.04$) and girls ($M = 12.86, SD = 6.54$) in the high autonomy class and boys ($M = 9.90, SD = 3.73$) in the high restriction class. After controlling for adolescent BMI z-score the main effect for class on weight concerns became marginally significant, and the class x gender interaction remained significant with a similar pattern of results as reported when BMI z-scores were not included as a covariate. There were no significant class differences in adolescents' depressive symptoms.

Table 7
Mean Differences in Adolescent BMI and Related Psychosocial Outcomes Across Parent-Adolescent Feeding Practice Classes

Adolescent Characteristics	Parent-Adolescent Feeding Solution Group					
	High Autonomy^a		High Restriction^b		Undifferentiated^c	
	M	SD	M	SD	M	SD
BMI z-score [†]	.56 ^a	1.04	1.25 ^b	1.13	.72 ^a	.98
Girls' BMI z-score	.69	1.04	1.67	.92	.83	.98
Boys' BMI z-score	.46	1.04	.91	1.22	.62	.98
Weight Concerns	12.18 ^a	6.78	17.55 ^b	6.98	12.56 ^a	6.04
Girls' Weight Concerns	12.86	6.54	22.89	3.09	15.71	6.74
Boys' Weight Concerns	11.64	7.03	13.29	5.79	9.90	3.73
Depressive Symptoms	2.02 ^a	2.01	2.06 ^a	2.55	1.58 ^a	1.95
Girls' Depressive Symptoms	1.81	2.09	2.75	3.06	1.75	1.92
Boys' Depressive Symptoms	2.19	1.96	1.50	2.07	1.44	1.98

Note: Within each row, activity groups with different letters are significantly different at $p < .05$
[†] $p = .10$

DISCUSSION

This is the first study to examine parent-adolescent feeding practices based on African American youth's responses to a parent-adolescent feeding measure. Further, this study is the first to show that *patterns* of parent-adolescent feeding practices are linked to differences in family characteristics, adolescent BMI and related psychosocial characteristics. The first aim of the current study was to describe and factor analyze a new parent-adolescent feeding measure. The results of an EFA indicated that there were four factors/parental feeding practices used by African American parents which are similar to those presented in prior research (Birch et al., 2001). The second aim of this study was to describe patterns of parent-adolescent feeding practices using LPA. The results of the current study indicated that there were three classes of African American feeding practices: high autonomy, high restriction, and undifferentiated. Each class was linked in different ways to family characteristics, adolescent weight status, and related psychosocial outcomes. Youth whose parents engaged in high autonomy feeding practices in the context of moderate levels of indulgence had lower BMI z-scores and fewer weight concerns as compared to youth whose parents engaged in high restriction or undifferentiated feeding practices.

With few exceptions (Birch et al., 2001; Hughes et al., 2006), prior studies of parental feeding practices have focused primarily on the practices that European American parents use with their young children. The current study is the first to introduce a feeding questionnaire in which youth, particularly African American adolescents, reported on their parents' feeding practices. Further, this study extends prior work because it focused not only on whether and how parents' feeding practices and adolescent

weight status were associated, but also examined how parental feeding practices were linked to family characteristics and adolescent psychosocial outcomes.

The feeding constructs that emerged in the present study (restriction, pressure to eat, autonomy, indulgence) are similar to those presented in prior research of European American families and families with young children (Birch et al., 2001). Thus, the results of the present study indicate that the feeding practices used by parents of African American adolescents are similar to those of parents of other racial/ethnic backgrounds.

A key finding of this study is that we did not find that *individual* feeding practices were strongly correlated with adolescent weight status or overweight concerns. This suggests that a focus on individual feeding practices does not adequately capture the complexities in the association between feeding practices and health related outcomes. Recognizing that African American parents' may use multiple feeding practices and that the degree to which parents used feeding practices may vary across families, the current study incorporated a pattern-analytic approach to determine which patterns of parent adolescent feeding practices would emerge among African American families. The fact that the three patterns of feeding practices (high restriction, undifferentiated, and high autonomy) that emerged were not solely characterized by one feeding practice may help to explain why the association between parents' feeding practices and adolescent BMI has been inconsistent across studies (May et al., 2007). The results of the present study help to move the field of obesity research forward as they indicate that parent-adolescent feeding practices do not take place in isolation nor do parents rely on only one feeding practice to guide their food based interactions with their children.

The emergence of a high restriction class was not surprising and it is in agreement with prior research indicating that high levels of feeding restriction are common among African American families (Anderson et al., 2005). Additionally, the fact that these youth experienced less autonomy in decision making, in general, relative to youth in the high autonomy and undifferentiated classes, indicated that restrictive feeding practices may be reflective of the broader family climate and to some extent reflect what is known in developmental research about African American parenting practices. Prior work has suggested that African American parenting is characterized as authoritarian, such that parenting practices are high in control and organized around parent-centered goals (Garcia-Coll et al., 1995). In many instances, such practices have been found to be protective and lead to positive, social and behavioral outcomes for African American youth (Garcia-Coll et al., 1995). The results of the present study suggest however, that with respect to adolescents' weight status, a more controlling style may have negative effects given that youth who reported high levels of restriction were heavier than youth in other feeding classes. In light of these findings, it should be noted however, that we found that in this study parents who used restrictive feeding practices represented a small portion of the total sample ($n = 18$). By using a pattern analytic approach, we were able to expand on prior work to find that the typology of feeding practices used by African American parents is diverse and included other classes.

The results of the current study indicate that the parents of youth in the undifferentiated class may engage in feeding practices that are rooted in authoritative parenting. Recall that youth in the undifferentiated class experienced average levels of all feeding practices, with slightly higher levels of restriction, in the context of high levels of

warmth, relative to youth in the high restriction and high autonomy classes. This description closely mirrors that of authoritative parenting in which parents are able to maintain an appropriate balance of warmth and control. Prior studies of European American families (Grigorenko & Sternberg, 2001) indicate that youth reared in authoritative homes are well-adjusted in that they are better able to self-regulate their behaviors and are more socially competent as compared to youth reared in homes where other parenting styles are used. The results of the present study are novel in that they suggest that with respect to adolescent weight status, average levels of feeding practices with slightly elevated restriction and high warmth may have positive implications for youth given that youth in the undifferentiated class weighed less than youth in high restriction classes and did not differ significantly in weight status from youth in the high autonomy class.

We found that there were marginal differences between parent-adolescent feeding classes and parental conformity, such that parents of youth in the high autonomy class reported fewer conformity values as compared to parents of youth in the high restriction and undifferentiated classes. Adolescence is a period of development that has been characterized as a time of increasing independence and autonomy as well as a time when youth begin to distinguish themselves from their parents and families. Prior research has suggested that food/diet related autonomy during adolescence may be expressed as an act of defiance (Hill, 2002), such that adolescents will select foods of poor nutritional value placing them at risk for overweight and obesity. The findings of the present study, however suggest that such an assertion may not be true for all youth. Recall that while the youth in the high autonomy class reported having more independence over their food

choices (example item: “I can have snacks whenever I am hungry”), they also experienced relatively low levels of indulgence (example item: “We have junk food like chips and soda in our house”), had parents who were less vested in conformity (suggesting they may have valued individualism), and weighed less than youth in the high restriction class. Although food availability in the home was not examined in the current study, the findings presented suggest that parents of youth in the high autonomy class may have allowed their children to make their own decisions regarding what they ate, how much, and when, but these parents seem to have taken responsibility for making healthful food options available in the home and thereby limiting fast food consumption of youth (Satter, 1986). This approach may help youth to better regulate their food intake and weight status over time. It is important to note that youth in the high autonomy feeding class did not have decision making autonomy scores that were greater than all other youth, they only differed from those in the high restriction class. This finding suggests that youths’ autonomy in eating is domain-specific and to some extent highlights prior work indicating that parents may begin to relinquish control over certain areas of youth lives during adolescence such as those related to eating (Zimmer-Gembeck & Collins, 2008).

We did not find a significant association between parents’ reports of dinner time rituals and patterns of parent-adolescent feeding practices. The fact that parents’ feeding practices were not associated with family rituals, to some extent suggests that the motivation behind African American parents’ feeding practices and family rituals may extend beyond specific food related activities and interactions. Feeding practices, like

other parenting behaviors, may be a reflection of the larger family context in which youth are embedded (Harkness & Super, 1994).

In addition to differences in weight status, we found that youth in the high restriction and undifferentiated classes, especially girls, were at greater risk for elevated overweight concerns. That girls in the high restriction class had elevated weight concerns was not surprising especially given their weight status. While a direct association between parental feeding practices and adolescent overweight concerns has not been established, what is known is that restrictive feeding is linked to higher weight status among youth (Fisher & Birch, 1999). Other studies have indicated that overweight individuals are also at risk for elevated weight concerns (Neumark-Sztainer et al., 1997). The results of the present study provide evidence that in the case of adolescent girls, restrictive feeding practices are linked to elevated weight concerns.

The fact that girls in the undifferentiated class experienced elevated levels of weight concerns in the context of relatively high parental warmth was a surprising finding, given that prior work has suggested that low levels of parental warmth place youth at risk for eating disorders (Jonesa, Harrisa, & Leung, 2005), which are known to be preceded by overweight concerns. One reason that this finding may have emerged is because in the present study youth weight status was elevated. While we did not find that the feeding class X gender interaction was statistically significant, girls in the undifferentiated class did have BMI z-scores that were higher than all other youth, with the exception of boys and girls in the high restriction class. Accordingly, the weight concerns of girls in the undifferentiated class reflected a similar pattern.

A major contribution of the present study to the extant literature is that we found that there were no differences across feeding classes in adolescent depressive symptoms, an association that has not been explored elsewhere. Why this finding emerged may be explained in a number of ways. It is possible that this finding emerged due to the fact that African American youth are less depressed as compared to youth of other racial/ethnic background. It could be that the low group means for adolescents' depressive symptoms to some degree suggest that regardless of parents' feeding practices, such practices were not negative enough to lead to increased depressive symptoms. Further research is needed to determine why this finding holds true for African American youth and under what conditions. Given that depressive symptoms did not differ across feeding classes despite the fact that some youth in the present study experienced elevated weight concerns suggests that overweight concerns and depressive symptomology are not associated. This finding gives rise to the possibility that in the context of accepting attitudes to overweight, such as those of the African American community, depressive symptoms may not emerge for youth.

There were limits to the current study. First, we used adolescent reports of height and weight to calculate youth's BMI z-scores. It is possible that youth may have misestimated one or both of these measurements, which may have influenced the outcomes of this study. Additionally, the present study did not include data on parents' own weight which may have influenced feeding practices that parents choose to use. Extant research suggests, for example, that parents' own weight status may mediate the association between parental feeding practices and adolescent weight status (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). With respect to the sample of the current study,

most of the parents had completed an associate's degree or some college, which is a relatively high level of education compared to African American families in the general U.S. population. Future studies are needed to determine whether the patterns of feeding and the links between feeding practices hold true for African Americans of varying socioeconomic positions. Additionally, the results of the current study are based on cross-sectional data which limits our ability to infer causality. It is possible that adolescent weight status and other psychosocial characteristics influence the feeding practices that parents use with their children. Longitudinal research is needed to determine the directionality of the associations we observed. Finally, the current study provides a limited window into the processes linking adolescent feeding practices and adolescent weight status and related psychosocial outcomes. Parents also determine the foods made available to youth in the home and may model healthful or unhealthful eating behaviors. Given the developmental tasks of adolescence, that is the development of independence and autonomy, it is important that future studies consider how other dimensions of parents' food and dietary behaviors are linked to adolescent health.

Despite the aforementioned limitations, the current study makes several contributions to the literature. First, this study expounds upon extant research by examining *patterns* of parent-adolescent feeding practices among African American youth. The findings of the current study indicate that African American parents' practices are more complex and diverse than previously acknowledged. The results of the present study indicate that while there is some evidence that restrictive feeding practices are used, parents who use such feeding practices may not be representative of a majority of African Americans. Still, the results of the present study indicate that the use of

restrictive feeding practices may be detrimental to youths' physical and psychosocial outcomes, especially for girls. Finally, the patterns of feeding practices observed may be reflective of parenting practices and broader family life and indicate that prevention programs, especially those related to obesity should consider taking a multi-dimensional approach which may contribute to the long-term effectiveness of such programs.

APPENDIX A

Parent-Adolescent Feeding Measure

		Never	Almost Never	Sometimes	Usually	Always
1.	My parents tell me to eat all the food on my plate.	1	2	3	4	5
2.	My parents don't buy junk food like cookies and chips because they think it's not healthy.	1	2	3	4	5
3.	I have to ask my parents for permission before eating a snack.	1	2	3	4	5
4.	My parents keep track of the foods I eat.	1	2	3	4	5
5.	We have junk food like (like chips and soda) in our house.	1	2	3	4	5
6.	I am not allowed to have dessert until I finish the food on my plate.	1	2	3	4	5
7.	I eat foods that I know are not healthy when my parents are not around.	1	2	3	4	5
8.	My parents buy a lot of my favorite snack foods even though they aren't very healthy.	1	2	3	4	5
9.	My parents make sure I eat enough healthy foods.	1	2	3	4	5
10.	When I eat with my family I help myself to the food that I want.	1	2	3	4	5
11.	My parents take me to fast food restaurants (like McDonalds or KFC) to eat.	1	2	3	4	5
12.	My parents limit the amount of snack food I can eat.	1	2	3	4	5
13.	My parents give me treats like candy and cookies as a reward when I have done something good.	1	2	3	4	5

Parent-Adolescent Feeding Measure (continued)

		Never	Almost Never	Sometimes	Usually	Always
14.	In my family, my parents give their kids the amount of food they think kids should have.	1	2	3	4	5
15.	My parents let me eat whatever I want.	1	2	3	4	5
16.	In my home we have low fat and fat free snacks to eat like pretzels, yogurt, and fruit.	1	2	3	4	5
17.	My parents worry that I will get fat if I eat too much.	1	2	3	4	5
18.	I can have snacks whenever I am hungry.	1	2	3	4	5
19.	I have to eat candy and treats secretly because my parents don't usually let me have them.	1	2	3	4	5
20.	When I say I'm not hungry, my parents say that I should eat more.	1	2	3	4	5

Study Two: Adolescent Out of School Time Use and Obesity

INTROCUCTION

The time adolescents spend outside of school is substantial, accounting for approximately 6-8 hours per day (Larson, 2001). An important question is how youth choose to spend their time in a period of growing autonomy. In the area of obesity, adolescent time use can be characterized into two broad categories of physical activity and sedentary activity. Cross-cultural research has indicated from an international perspective that there are cultural differences in how youth spend their time such that American youth spent more time engaged in television viewing and hanging out with friends, whereas east Asian adolescents spent more time doing school- related work (Larson & Verma, 1999). Within the U.S., comparative studies of African American and European American girls suggest that there are differences in youth activity selection and activity levels (Dowda et al., 2004) such that African American girls spend more time in activities such as watching television and attending church, whereas European American girls spent more time physically active activities. Such differences in time use as well as differences in the prevalence of obesity across cultural groups suggest that there may be culturally-specific patterns in the association between youth BMI and activities that warrant greater attention in research.

Time Use Activity Categories

Physical activity involvement is an important aspect of healthy physical development and is a major deterrent of obesity among adolescents (USDHHS., 2000) such that higher levels of physical activity may reduce the risk for obesity. Much of what is known about adolescent activity levels comes from large scale epidemiological studies. For example, Pate and colleagues (Pate et al., 2002) reported that only 30% of U.S. youth

meet the minimum requirements for daily physical activity. Even more alarming than the overall prevalence of physical activity among youth is the fact that physical activity decreases across this period of development (Sallis, 1993). The most pronounced declines in physical activity are observed among minority youth. African American adolescents, especially girls, have the lowest levels of physical activity involvement across all racial/ethnic groups (Andersen, Crespo, Bartlett, Cheskin, & Pratt, 1998).

Only one study of Portuguese adolescents has categorized physically active based on the amount of time that youth spent in either structured (e.g., team sports) or unstructured (e.g., free play) activities. Results from the study indicated clear differences have been reported across gender with active girls and older youth more likely to take part in structured activities as compared to boys, inactive girls, and younger youth (Mota & Esculcas, 2002). Thus, there is a need to examine whether such patterns related to physical activity time (total, structured, and unstructured) hold true for American, specifically, African American youth to determine optimal points for obesity prevention programming.

High levels of physical activity, albeit structured or unstructured, do not necessarily translate into low levels of sedentary activities or vice versa. In fact, sedentary and physical activity engagement have been reported as being only weakly correlated, if at all (Gorely, Marshall, & Biddle, 2004). Thus, results from population based studies suggest a different pattern in the area of sedentary versus physically active time use pursuits. While physical activity declines for youth during adolescence, participation in inactive leisure, especially television viewing, the most commonly studied sedentary behavior, increases during this period. Although the current suggestion

for television is that youth should watch fewer than two hours of television per day, nearly one-third of youth exceed this recommendation (Andersen et al., 1998). Estimates suggest that television viewing is highest among African American youth—more than 40% watch more than four hours of television per day (Andersen et al., 1998).

As a sign of the innovations made in technology and the availability of such technology to youth, researchers have begun to examine television in concert with other media-related activities. Other media-related activities include playing videogames, computer time (except homework), listening to music, and reading. An executive summary by the Kaiser Family Foundation (Rideout, Roberts, & Foehr, 2005) indicates that on average, children and adolescents (ages 8-18) spend approximately six and one half hours per day engaged in media-related activities, a figure that far exceeds the current national recommendation of two hours per day. What is not known is how much time African American adolescents, in particular, spend in media-related activities. However, given that African American youth exceed the recommendations for television viewing, one might expect to see similar trends when other media-related activities are considered.

Although television viewing and other media-related activities occupy a large proportion of youths' free time, sedentary activity may include other behaviors such as (e.g., hobbies, artwork, etc). A shortcoming of the extant literature is that little is known about the amount of time that youth spend in these other kinds of activities or about how sedentary activity and physically active leisure are linked.

Adolescent Time Use and BMI

The extant literature provides consistent evidence that television viewing is positively associated with adolescent BMI (Sallis, Prochaska, & Taylor, 2001; Francis, Lee, & Birch, 2003; J.F. Sallis, Prochaska, & Taylor, 2000). A key question that has not been adequately addressed is whether or not youths' sedentary, physically active, and media-related time use are associated with their BMI and if so, in what ways. A number of studies have revealed that low levels of physical activity are inversely, but weakly associated with youth weight status (Gortmaker, Sobal, Peterson, Colditz, & Dietz, 1996). In contrast, results of other studies have contradicted these, indicating no association between adolescent weight status and physically active time use (Sallis, 2000). The association between adolescent BMI and media time has not been addressed in the literature.

Inconsistencies with regard to the link between physical activity and BMI may be related to the fact that there is no set standard across studies for measuring and analyzing youths' time use. Problems with the methods currently available for assessing youth activity levels include low validity (Sallis & Zabinski, 2002), high time and financial costs, and the reliance on the use of recall and self report data (Sallis, Buono, Micale, & Nelson, 1993). Daily diary procedures used to assess adolescent activities, such as the one used in this study, address these limitations (McHale, Crouter, & Tucker, 1999), and may provide more precise information about the complexities of adolescents' daily activities including physically active, media, and sedentary behaviors.

Psychosocial Correlates of Adolescent Time Use

While BMI is a commonly studied correlate of youths' time use, the impact of time use may extend beyond physical health related benefits. The psychosocial changes that occur during adolescence suggest that mental health correlates warrant greater attention in the study of obesity. Two possible correlates of out of school activities that are relevant to the period of adolescence are depression and excessive concerns about overweight.

Depression. The risk for depression during adolescence is substantial. Based on current estimates, 15-30% of adolescents will experience a depressive episode (Birmaher et al., 1996; Kessler & Walters, 1998; Lewinsohn, Rohde, & Seeley, 1998). Adolescent girls have a higher prevalence of depression than adolescent boys (Ge, Lorenz, Conger, Elder, & Simmons, 1994). There is little information however, regarding the prevalence of depression among racial/ethnic minority adolescents. Studies of adolescent depression have failed to include minority youth, or findings have not been stratified by race given inadequate sample size (McGee et al., 1990).

Prior work with primarily European American populations has indicated that youth free time activity use, particularly physical activity, have benefits that extend into the psychosocial realm. According to the Department of Health and Human Services (DHHS, 1996) physical activity reduces symptoms of depression among American youth. Given lower levels of physically active leisure pursuits compared to youth of other socio-cultural backgrounds, African American youth may be at an elevated risk for depression. Thus, for African American adolescents, physical activity may have a positive impact

with regards to alleviating the burden of obesity and possibly depression experienced by this subgroup of the population.

While at a general level, the association between adolescent physical activity and depression is clear, how sedentary activities, including media-related activities, are linked to depression is less clear, and in part is due to the lack of literature available in this area. Only one known study has examined the association between depression and sedentary behaviors. In a study of European college students (Allgower, Wardle, & Steptoe, 2001), those who were sedentary were more likely to be depressed. Whether the same is true for African Americans adolescents is unknown.

Overweight Concerns. The risk for eating disorders increases substantially during adolescence and is more common among girls than boys. While eating disorders are more common among European American youth (Story, French, Resnick, & Blum, 1995), the prevalence of eating disorders among minorities, including African American youth, is on the rise (Crago, Shisslak, & Estes, 1996). One known precursor of eating disorders is excessive concerns about being overweight (Ohring, Graber, & Brooks-Gunn, 2002). Like eating disorders, excessive overweight concerns are more common among girls than boys and older versus younger youth (May, Kim, McHale, & Crouter, 2006). Although African American youth have fewer overweight concerns than European American youth, the rising prevalence of eating disorders among African American youth indicate that weight concerns may be a growing problem among this group as well.

With regards to youth time use, only a limited number of studies have focused on the link between weight concerns and time use. Of these studies, a primary focus has been placed on physical activity, not sedentary or media-related activities. Samples for

such studies have included European American females and adults with the key findings being that that increases in physical activity may contribute to heightened weight concerns especially among women (Davis, 1990; Katz, 1986) given that such activity may make one more aware of weight status or body shape. Whether or not this holds true for African American youth is unclear. It could be the case that if the association between BMI for example is negative among African American youth, then those youth who engage in less physical activity may have greater weight concerns than those youth who are more physically active. However, for a subgroup of the population such as African Americans, who are more tolerant of higher weight status and place less value on weight, it is possible that elevated weight concerns may be less apparent regardless of free time use.

Additional Limitations of the Extant Literature

Given the scarcity of literature on time use among African American adolescents, the role that explanatory variables (e.g., adolescent gender, parent SES) play is unclear. Understanding the link between the aforementioned mentioned variables and adolescent time use may help to clarify the within group variability, if any, in African American adolescents' time use. Prior work has examined single categories of activities and their association with adolescent BMI. Such an approach is informative as it provides researchers with a better understanding of how individual categories of activities are associated with adolescent BMI. However, such an approach may also be misleading given that it does not capture the complexities of the activities in which youth may be engaged. Further, such an approach also suggests that some activities (e.g., physical activity) are associated with more positive effects whereas other (e.g., sedentary, media-

related activities) are not; thus suggesting that there is only one pathway to optimal health. The second objective addresses this aim, by examining patterns of youth out school time use that are based on whether or not youth meet national recommendations for time use in physically active, sedentary and media-related activities.

In sum, this study extends the extant literature to examine the association between African American adolescents' BMI and involvement in out school activities including time spent in physically active, sedentary, and media related activities. Specifically, the first aim was to identify the percentage of youth meeting national recommendations for time use and to describe amount of time African American adolescents spent in active, sedentary and media-related activities relative to national recommendations. The second aim was to examine patterns of youth out of school activities based on the number of current national recommendations that they met and to determine whether there are differences in youth BMI, overweight concerns, and depressive symptoms as a function of activity patterns. Results from this study will make a significant contribution to our understanding of the links between African American adolescents' out of school time use and adolescent health.

METHOD

Participants. Participants were self-identified African American families including mothers, fathers, and adolescents who took part in a larger, short-term longitudinal study of family relationships and adolescent development. Two recruitment methods were used to enlist the sample. For the first procedure, African Americans living in the areas of interest were hired to recruit families from the targeted communities in the form of flyers distributed at youth events, places of worship, and businesses. This method resulted in the recruitment of about one half of the sample for the larger study. For the second approach, a marketing firm list which included the contact information of African American families with children in 4th through 7th grades was purchased. Families were contacted via letter and telephone calls to determine those were interested. Those were interested in taking part in the study responded by calling the project office during which time family eligibility was assessed. Given our focus on normative adolescent development and family life, the sample was not nationally representative, instead it included families in which parents were married and parents and adolescents (siblings at least two years apart in age) resided in the same household.

Of the 179 families from the original sample, 47 were excluded from the present analyses due to missing data. Analyses revealed that youth with missing data did not differ from youth with complete data. The final sample for the analyses presented here included 137 families (boys $n = 75$, girls $n = 62$). Table 8 provides background characteristics for the 137 adolescents included in the analyses. Youth in the current study were on average 14 years of age ($SD = 1.77$). On average, mothers and fathers in the current study completed at least some college or an associate's degree. Parent's

occupational prestige scores suggest that on average parents' were employed in professions similar to that of real estate agent.

Table 8
Demographic Characteristics for Full Sample

Variable	Mean	SD
Adolescent Age (in Years)	14.27	1.77
Average Parent Education ^a	14.55	1.70
Mom Education	14.69	1.79
Dad Education	14.41	2.30
Average Job Prestige ^b	49.06	9.91
Mom Job Prestige	48.95	11.29
Dad Job Prestige	47.56	13.42
Family Income	\$90, 924	\$59, 491

^a Rated on a 20 point scale: 12=high school graduate; 14=some college/associate's degree; 16=college graduate

^b Rated on a 79 point National Population Research Council Code (NORC)scale: 49 = locomotive engineer; 50 = office supervisor

Families were recruited from two northeastern urban centers, which according to census data, included approximately 38% married African American households with at least one child between 6 to 17 years of age (Census Bureau, 2001). Census data from the northeastern region from which the sample was drawn, indicated that households within the same region had lower (median = \$51,186) income levels than that of families in the current study (median = \$ 84,100). For, families in the current study, the percentage of parents who completed some college or an associate's degree (22.99%) was comparable to the percentage of adults in the region from which the sample was drawn (Census Bureau, 2006).

Procedures

Home Interviews. Data for the current study were collected during home interviews. During separate home interviews adolescents, mothers, and fathers completed a series of questionnaires about individual characteristics and behaviors as well as family relationships. Youth self-reported their height and weight, and parents reported on other family background information relevant to the current study. Families received an honorarium of \$200 for their participation.

Phone Interviews. During the two to three weeks after they completed their home interviews, adolescents completed a series of seven telephone interviews (five weeknights and two weekend nights) about their daily activities. Adolescents were interviewed during evening hours to ensure that a majority of their daily activities were reported. Each night, youth were asked to report how much time they spent each day (outside of school hours) in a list of 35 out of school activities during the day of the call.

Each night, using a cued recall procedure, interviewers referred adolescents to an activity list that they received during their home interview. The activity list was comprised of activities categorized under general subheadings (e.g., athletics, etc). Youth were asked to consider whether they had completed any activities under each subgroup heading (e.g., ice skate, working out) and if so, for how long in minutes. Interviewers also asked youth if they took part in additional activities that were not included under each of the subheadings.

Measures

Background Information. Background information including mother and father educational attainment (e.g., 12 = high school graduate; 14 = some college/association;

16 = college graduate), parent occupation, family income, and adolescents' ages were reported by parents. Given missing data on mother and father job prestige and income due to unemployed parents and those who were not willing to share their income information, parental education (average of mother and father, $r = .37, p < .001$) was used as a proxy for SES for subsequent analyses. Analyses indicated that parental education was significantly correlated with parental job prestige (mother and father average prestige $r = .59, p < .001$; mother prestige $r = .36, p < .001$; father prestige $r = .62, p < .001$) and with family income ($r = .65, p < .001$). Parental job prestige and income were significantly correlated ($r = .51, p < .001$).

Adolescents' Body Mass Index (BMI) Percentile Scores. Adolescent BMI percentile scores were calculated based on self-reports of height and weight. Using the anthropometry component in Epi Info 2000 version 3.3, adolescents' height and weight were converted to age and sex specific BMI percentile scores according to the most recent Centers for Disease Control (CDC) growth charts (Kuczmarski et al., 2000).

Adolescent Weight Concerns. The Stanford Weight Concerns Scale (Killen et al., 1994) was used to assess adolescents' concerns about being overweight. This scale, which focuses on adolescents' concerns about overweight, body dissatisfaction and dieting, includes 5 items (e.g., "How afraid are you of gaining three pounds?"). Due to the fact the rating scales for the questionnaire items varied, responses for all items are standardized on a 100-point scale and averaged. Higher scores reflect heightened weight concerns. Cronbach's alpha was .66 for girls and .72 for boys.

Adolescent Depressive Symptoms. The short form of the Children's Depression Inventory (CDI-S) was used to assess adolescent depressive symptoms (Kovacs, 1981).

This questionnaire contains 10 of the 24 items used on the original Children's Depression Inventory. There are no subscales for this measure; however items focus on various aspects of depressive symptomology (e.g., negative mood, anhedonia, ineffectiveness, and negative self-esteem). Items are summed for a total depressive symptomology score. Higher scores reflect more depressive symptoms. Cronbach's alpha was .76 for girls and for boys separately.

Out of School Activities. We computed how much time youth spent in a total of 35 out of school activities using the telephone interview data by aggregating reports of involvement (in hours per day) across seven nightly phone calls to assess time spent in three overarching categories of activities: (1) *active leisure* (team sports, unorganized sports, working out, playing outdoors, swimming, gymnastics/cheerleading, dancing, rollerblading, walking/hiking, skateboarding, ice skating, snowboarding/skiing, bike riding), and (2) *non-media sedentary leisure* (handicrafts, writing, drawing, knitting, playing board games, playing a musical instrument, playing with dolls, playing with action figures, collecting things, homework, homework on computer, other hobbies), and (3) *media leisure* (watching sports, educational, or other programs on television, going to a movie, reading, computer time (such as email/instant messaging, downloading files, internet surfing), video games and listening to music.

To better understand the effects of various types of media and active activities on adolescent outcomes, additional activity groups were created. Specifically, given that media-related activities could also be classified as sedentary behaviors we created a *total sedentary* activity category which was comprised of all media related activities and all sedentary activities previously mentioned. Two subgroups for active leisure, *team sports*

and *unstructured* physical activity, were created as well. The team sports subgroup included time spent in organized team sport activities, whereas unstructured activities included time spent in unorganized sports, playing outdoors, swimming, gymnastics, dancing, walking, skating, bike riding, etc.

Other out of school activities that youth reported (e.g., chores, hanging out with friends, napping, time in religious activities, talking on the phone), which did not readily fit into the previously mentioned categories of interest, were excluded from the initial activity categorization. Pearson correlation coefficients between adolescent and parental (mother and father) reports of adolescent activity involvement were calculated. The strong association between mother-adolescent ($r = .79, p < .05$) and father-adolescent ($r = .70, p < .05$) reports suggests that the measure used to gauge adolescent daily activity involvement was reliable.

RESULTS

The goal of this study was to identify the links between adolescent out of school activities and adolescent characteristics including weight status. The results are organized according to two aims: (1) to identify the percentage of youth meeting national recommendations for time use and to describe amount of time outside of school hours that African American adolescents spent in active, sedentary and media-related activities relative to national recommendations and (2) to measure the links between the amount of time adolescents spent in out of school activities and their weight status and weight related psychosocial well-being.

Preliminary analyses were conducted to describe the sample in reference to national prevalence rates for overweight. Specifically, adolescent BMI percentile scores for the sample were compared to national prevalence rates of overweight and obesity for all youth, African American youth, and African American youth by gender. To address the first aim of this study, we described the amount of time that African American youth spent in active, non-media sedentary, and media related activities and calculated the percentages of youth who met current national recommendations for time use. With regard to the second aim of the study, we first categorized youth according to the number of national recommendations for time use that they met versus did not meet to examine patterns of youth's activities. Finally, based on the categorizations of youth, we tested whether there were differences in adolescent weight status and psychosocial characteristics (overweight concerns and depressive symptoms).

Preliminary Analyses

Figures 5, 6, 7 highlight the distribution of adolescent BMI percentiles for the entire sample and girls and boys separately. For all youth and for boys and girls individually, BMI percentiles were clustered at the higher end of the distribution. The mean BMI percentile for the sample was 73.42 ($SD = 26.15$). Results of a one-way analysis of variance ANOVA indicated that girls' BMI percentiles ($M = 72.13$, $SD = 27.15$) were not significantly different from boys' BMI percentiles ($M = 74.48$, $SD = 25.44$), $F(1, 135) = .27$, $p > .05$.

Figure 5.
Frequency Distribution of BMI Percentiles for the Full Sample

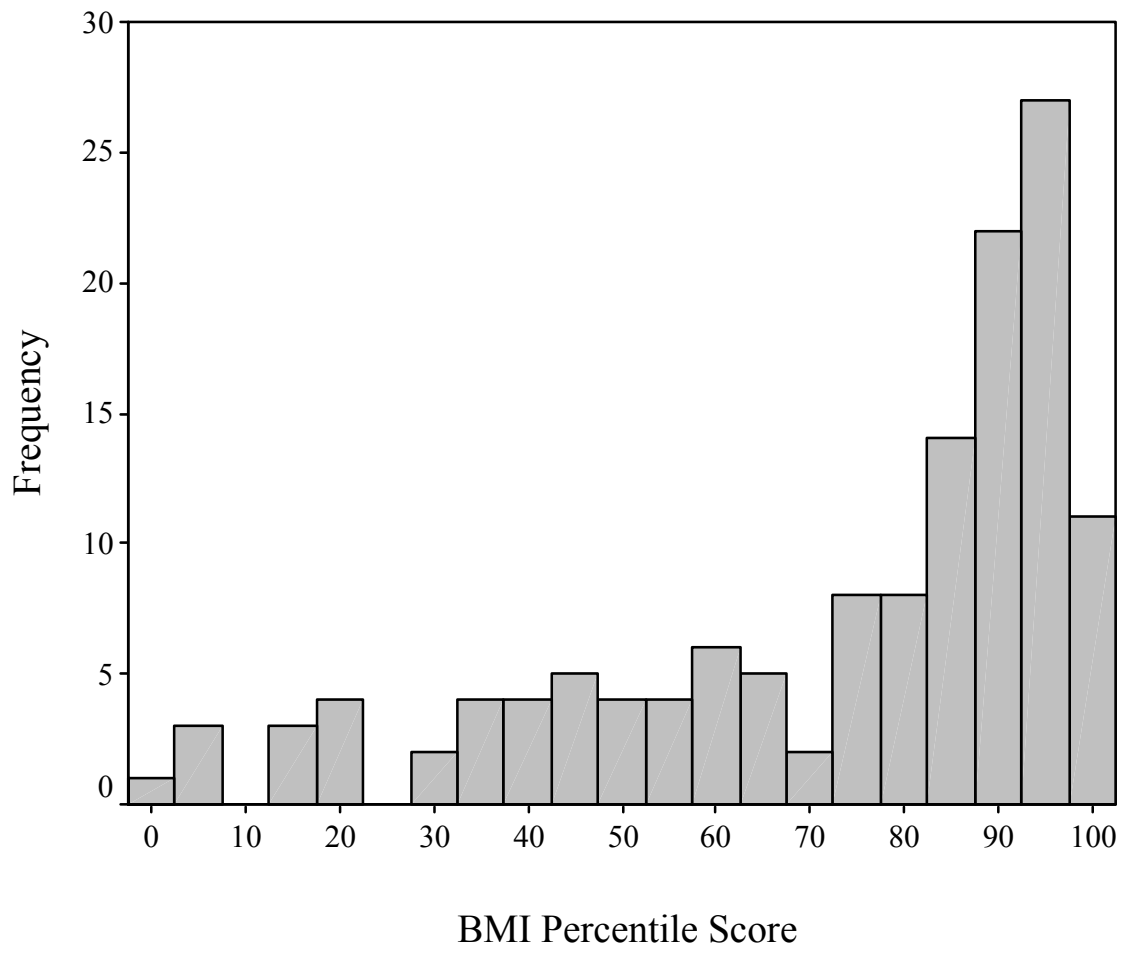


Figure 6.
Frequency Distribution of BMI Percentiles for Girls

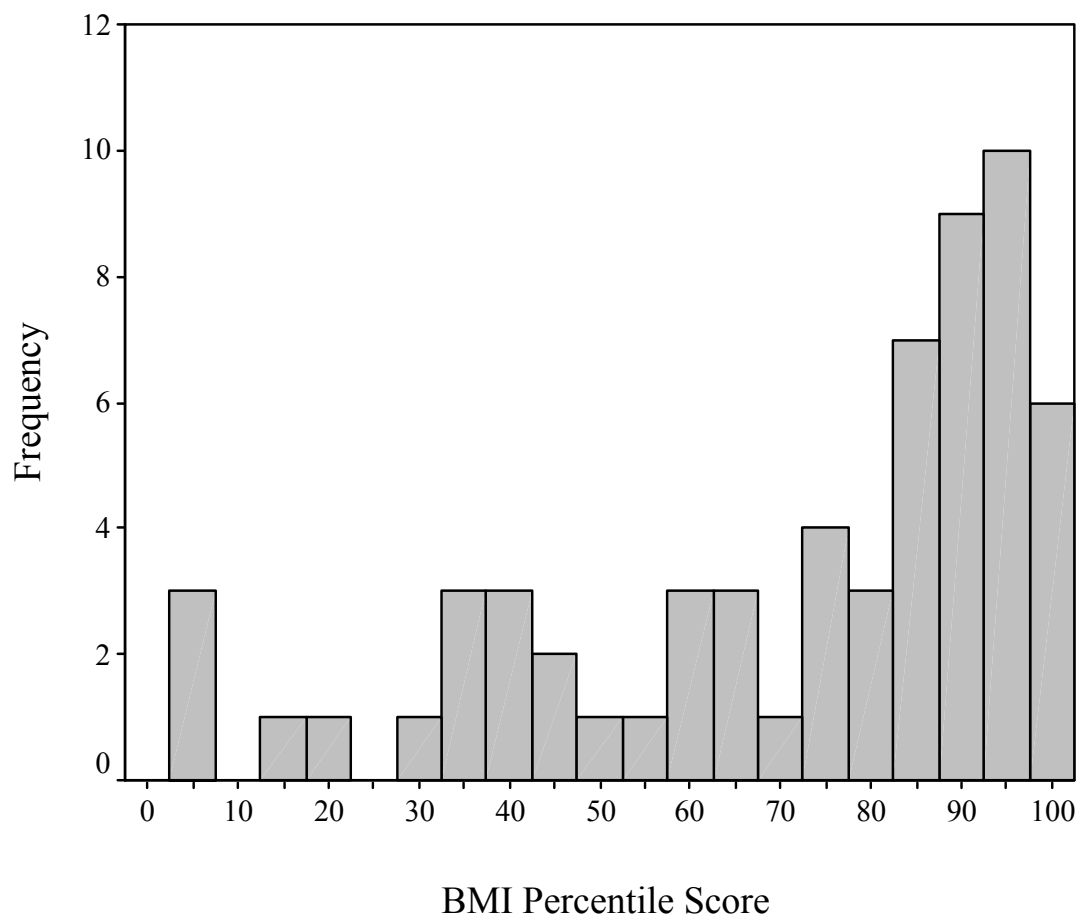
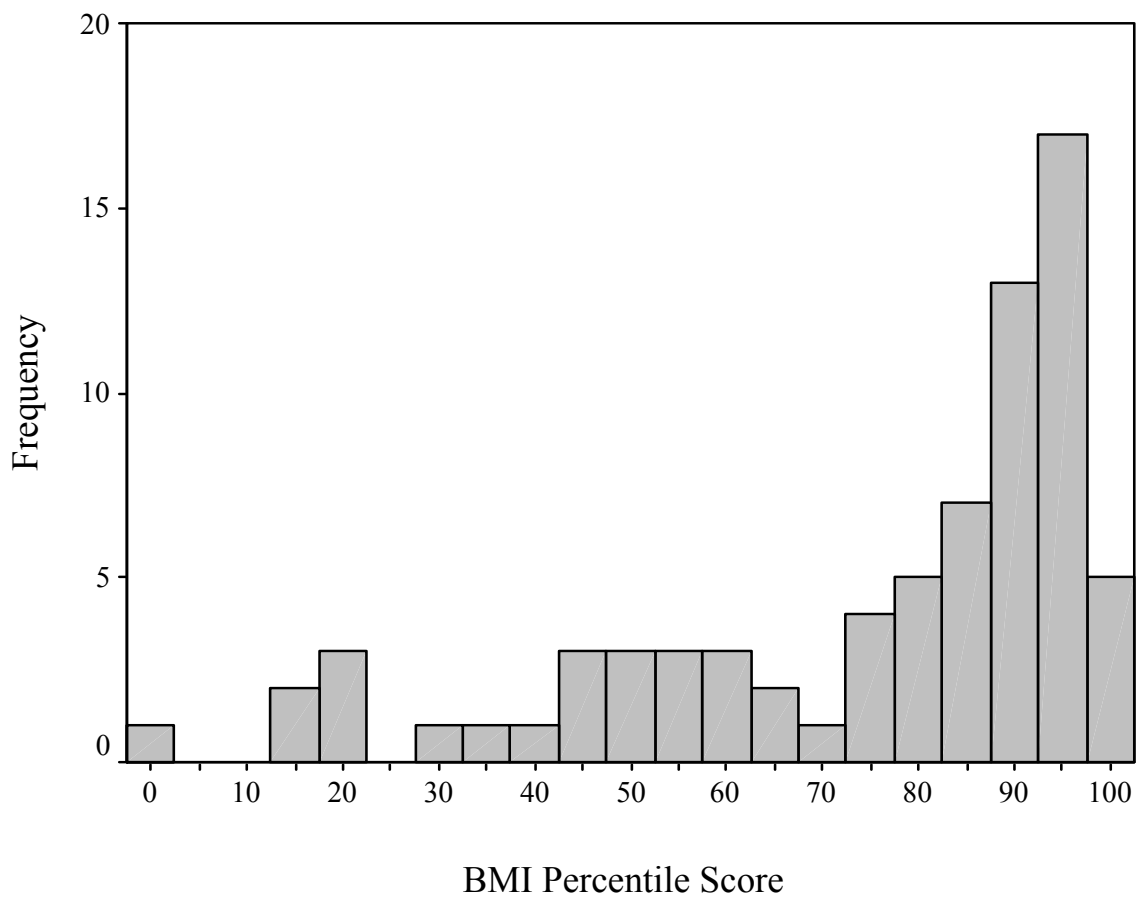


Figure 7.
Frequency Distribution of BMI Percentiles for Boys



National and Sample Prevalence Rates of Overweight and Obesity. As a second preliminary step, we also examined the prevalence of overweight for the present sample as compared to that of nationally representative data on US youth (12-19 years of age) and African American youth. Specifically, Table 9 includes national (Ogden et al., 2006) and sample specific percentages for overweight (BMI percentile \geq 85 percentile) and obesity (BMI percentile \geq 95 percentile). In general, the youth in our sample had a slightly higher prevalence of both overweight and obesity than US adolescents in general and African American adolescents, in particular.

Table 9
Percentage of Youth (Nationally and Sample Specific) who are Overweight and Obese

	National Prevalence (%)	National Prevalence African American Youth (%)	Sample Prevalence (%)
Overweight	34.4	36.5	49.6
Obese	17.4	21.8	22.6

Given known gender differences in the prevalence of overweight and obesity, the next step was to compare the youth in this sample to U.S. youth and African American youth by gender. Compared to all other youth, boys and girls in this sample were heavier than other youth nationally and African American youth in particular. Girls in this sample had a higher prevalence of overweight, but lower prevalence of obesity as compared to boys. Table 10 includes the national and sample specific prevalence of overweight and obesity by adolescent gender.

Table 10

Percentage of Youth (Nationally and Sample Specific) who are Overweight and Obese by Adolescent Gender

	National Prevalence (%)	National Prevalence African American Youth (%)	Sample Prevalence (%)
Boys			
Overweight	36.8	31.4	48.0
Obese	18.3	18.5	24.0
Total	55.1	49.9	72.0
Girls			
Overweight	31.7	42.1	51.6
Obese	16.4	25.4	21.0
Total	48.10	67.5	72.6

Aim 1: Identify the Percentage of Youth Meeting National Recommendations for Time Use and the Amount of Time Spent in Activities

National Recommendations for Adolescent Time Use. Next, we examined the percentage of youth who reported engaging in recommended levels of involvement in media (Rideout et al., 2005), non-media sedentary, and physically active (DHHS, 2005) activities based on national recommendations. As seen in Table 11, in general, a larger percentage of youth met the recommendations for media and non-media sedentary activity engagement as compared to physical activity.

Table 11

Percentage of Youth Meeting National Recommendations for Time Use

Activity Type	National Recommendation	Sample Report (%)
Media	2 hours or less per day	68.61
Sedentary	2 hours or less per day	91.24
Physical Activity	At least 1 hour per day, 7 days per week	25.55

Association between Adolescent Out of School Time Use and Parent Education and Adolescent Age. As a next step, we examined association between the amount of time (hours per day) outside of school hours that youth spent in media, sedentary and physical activities and parent education and adolescent age (Table 12). These correlations were initially conducted separately for boys and girls, however given that there were no statistically significant differences by gender, results are presented for the overall sample. Only one significant finding emerged--adolescent age was positively associated with involvement in total physically active activities (both team sports and unstructured). Parents' education was not associated with the amount of time youth spent in media, non-sedentary, or physically active activities. Given no consistent pattern in these correlations between these background variables and adolescent involvement in various types of activities, these variables were not included as covariates in subsequent analyses.

Table 12
Correlations of Adolescent Out of School Activities with Parent Education and Adolescent Age

Activity Type	Average Parent Education	Average Adolescent Age
Total Sedentary	.07	.11
Non-Media Sedentary	.12	-.13
Media	.00	.03
Total Physical Activity	-.02	.17*
Team Sports	.08	.15
Unstructured	-.13	.07

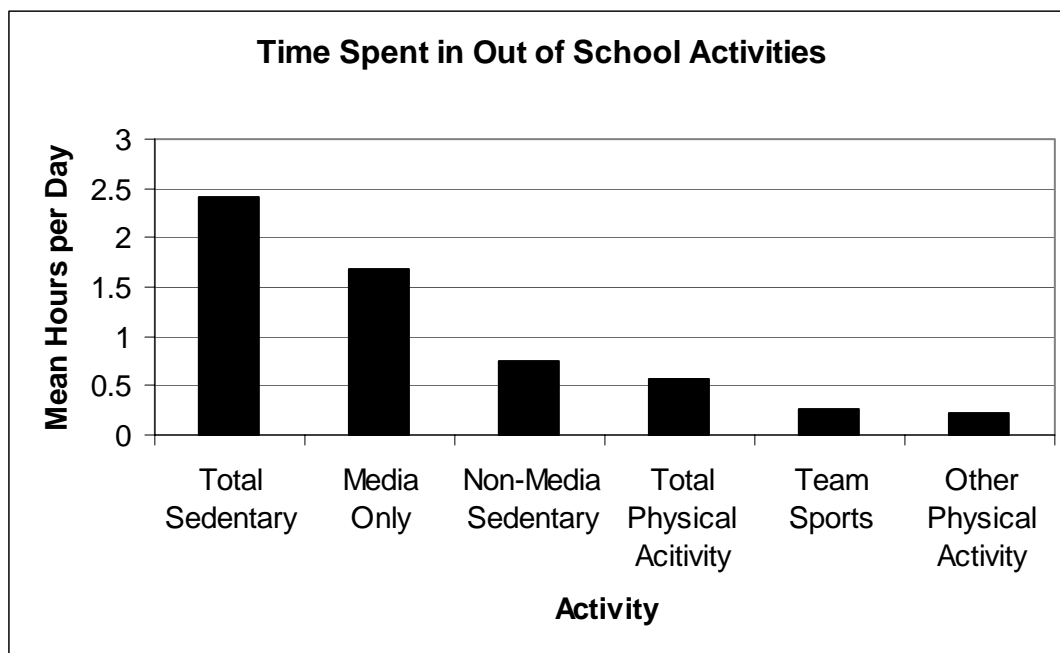
* $p=.05$

Adolescent Involvement in Out of School Activities. Sample means for hours per day outside of school hours spent in media only, non-media sedentary, and physically active activities are presented in Figure 8. Similar to other studies (Rideout et al., 2005),

we found that youth spent a majority of their out of school time engaged in media only related activities.

Figure 8.

Mean Hours per Day Spent in Out of School Activities for Full Sample.

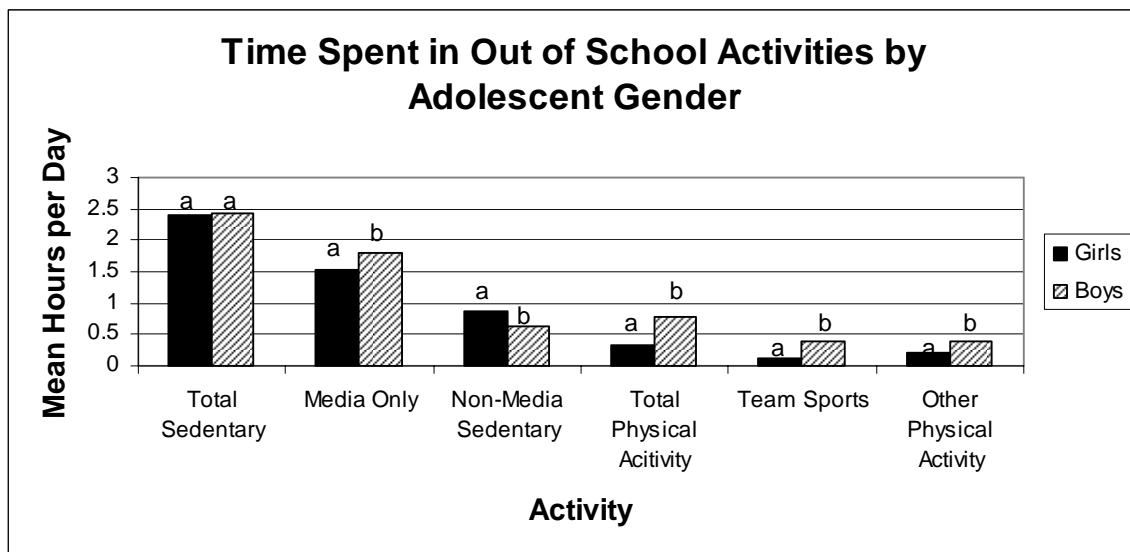


Adolescent Out of School Activity Involvement by Gender. To determine whether there were gender differences in number of out of school hours per day that youth spent in media only, non-media sedentary, and physically active leisure analysis of variance (ANOVA) was used. Since there was a possibility that youth activities would be confounded by the time of year that their families were interviewed, we coded the month of each family's interview (e.g., January = 1, June = 6) to account for possible seasonal differences in adolescents' activities in analyses not presented here. Results revealed that including interview month as a covariate did not have implications for the results; as such this variable was not included in subsequent analyses.

The analyses (see Table 9) revealed that boys were more involved in all physically active related activities and media only related activities, whereas girls were more spent more time each day in non-media sedentary activities. Time spent engaged in total sedentary activities was not different for boys and girls.

Figure 9.

Mean Hours per Day Spent in Out of School Activities by Adolescent Gender.

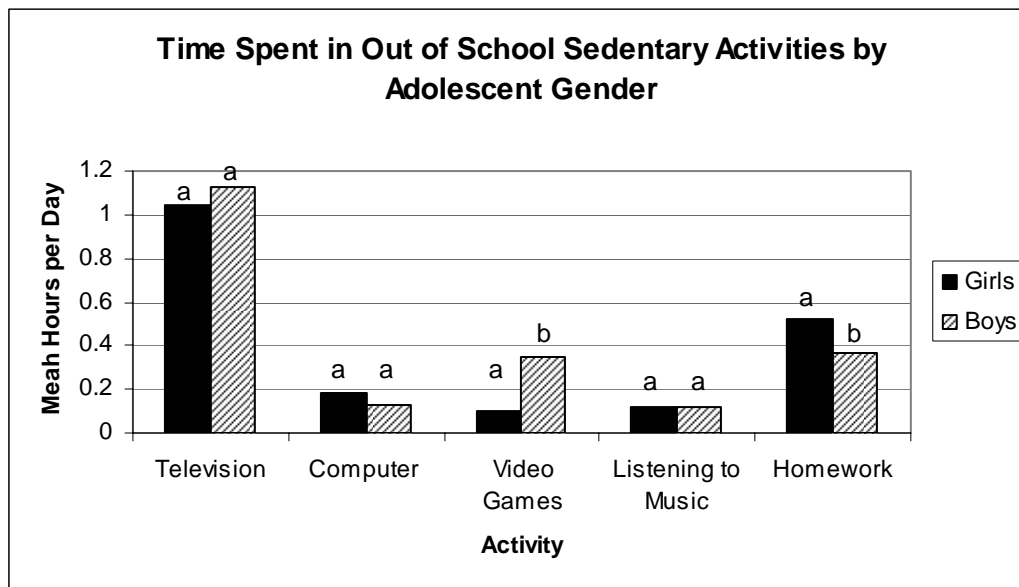


Note: Within each activity group, bars with different letters are significantly different at $p < .05$

Given possible gender differences in specific media and non-media sedentary activities, we examined whether there were differences in the amount of time outside of school hours spent in dominant media and non-media sedentary activities (Rideout et al., 2005) as a function of adolescent gender. The results (see Figure 10) indicate that boys spent more out of school time playing video games than girls, whereas girls spent more time doing homework than boys. There were no differences in the amount of out of school time that boys and girls spent listening to music, watching television, or in computer time (email, internet, instant messenger, downloading).

Figure 10

Mean Hours per Day Spent in Specific Out of School Sedentary Activities by Adolescent Gender.



Note: Within each activity group, bars with different letters are significantly different at $p < .05$

Aim 2: Examine the Association between Time Use Recommendation Groups and Adolescent BMI and Psychosocial Related Characteristics

Prior to testing for differences in adolescent weight status and related psychosocial outcomes as a function of whether or not they met current national recommendations for time use activity we categorized youth based on their activity involvement. Specifically, the total amount of out of school time that adolescents spent in media, non-media sedentary, and physically active activities were dichotomized based on whether youth met or did not meet the current national recommendations as outlined in Table 11. For example, current national recommendations for physical activity indicate that youth should spend at least one hour or more per day engaged in physically active activities. As such, youth who reported spending one hour or more in physical activity were classified as meeting current national recommendations, whereas those who

reported less than one hour of physically active activity involvement each day were categorized as not meeting current national recommendations. Youth were categorized based on the amount of time spent each day in media related and non-media sedentary activities relative to current national recommendations in the same fashion.

Youth were then further categorized into recommendation groups based on the total number of national recommendations that they met across the three activity categories (physical activity, media, and non-media sedentary time) as follows: (1) youth who met 2 or more national recommendations; (2) youth met only one of the three national recommendations; and (3) youth who met none of the current national recommendations. Chi-square analysis revealed that the recommendation groups varied in sex composition, with more girls in the two or more recommendation group and more boys in the one recommendation group, $\chi (2, 137) = 13.11, p < .001$. Table 13 shows the means and standard deviations for family background characteristics for each group. Results from a series of 3 (recommendation group) x 2(gender) ANOVAs revealed non-significant results for the background characteristics across the three groups (see Table 13). As such, parent education and adolescent age were not included as covariates in subsequent analyses.

Table 13
Differences in Adolescent age and Parent Education Across Time Use Recommendation Groups

	Met \geq 2 Recommendations	Met 1 Recommendation	Met No Recommendations
	(n=66)	(n=35)	(n=36)
	38 girls, 28 boys	7 girls, 28 boys	17 girls, 19 boys
Variable	Mean(SD)	Mean(SD)	Mean (SD)
Age	14.03 (1.78) ^a	14.45 (1.77) ^a	14.52 (1.76) ^a
Parent Education	14.57 (1.57) ^a	14.41 (1.96) ^a	14.65 (1.69) ^a

Note: Within each row, groups with different letters are significantly different at $p < .05$

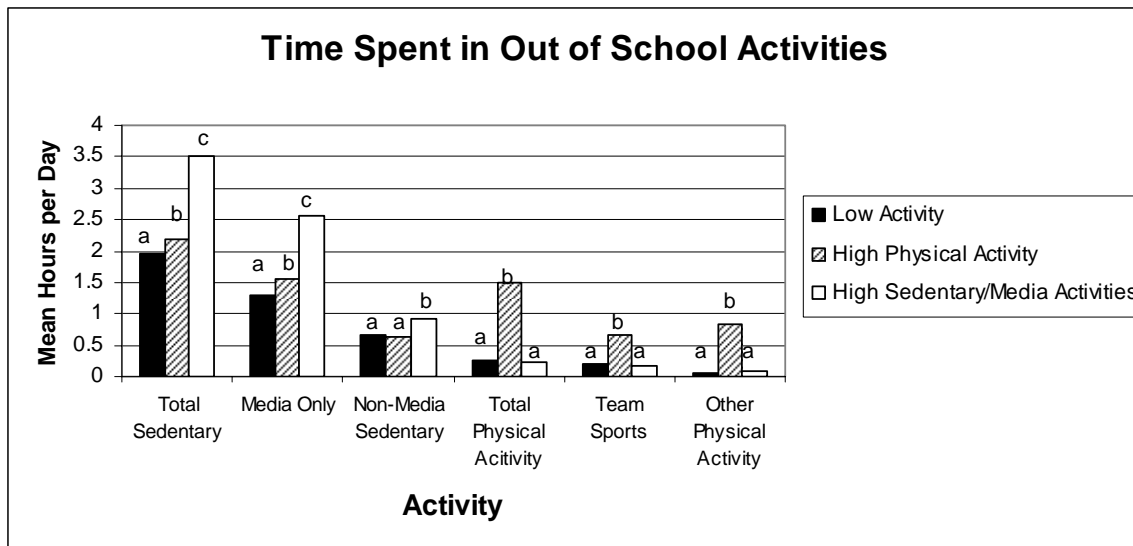
Differences in Time Spent in Physically Active, Media, and Non-Sedentary Media Activities as a Function of the Number of National Recommendations Met for Time Use.

In an effort to further describe the time use recommendation groups, a series of 3 (recommendation group) x 2 (gender) ANOVAs were conducted using the grouping variables, time spent in active, non-media sedentary and media related activities as dependent variables (Figure 11). Youth who met two or more recommendations spent significantly less time than youth who met no recommendations in total sedentary, media only, and non-media related activities. Likewise, youth who met one national recommendation spent significantly less time than youth who met no national recommendations in total sedentary, media only, and non-media sedentary activities and more time than youth who met two or more recommendations in total sedentary and media only activities. Youth who met one recommendation spent more time in physically active related activities than youth in who met two or more recommendations and those who met no recommendations. Given the aforementioned results and for simplification, recommendation groups were renamed to reflect youths' respective activity patterns such

that youth who met two or more recommendations were renamed low activity group, youth who met one recommendation were remained high physical activity group and those who met no recommendations were renamed high sedentary/media activity group.

Figure 11.

Mean Time Spent in Out of School Activities Each Day Across Activity Groups.



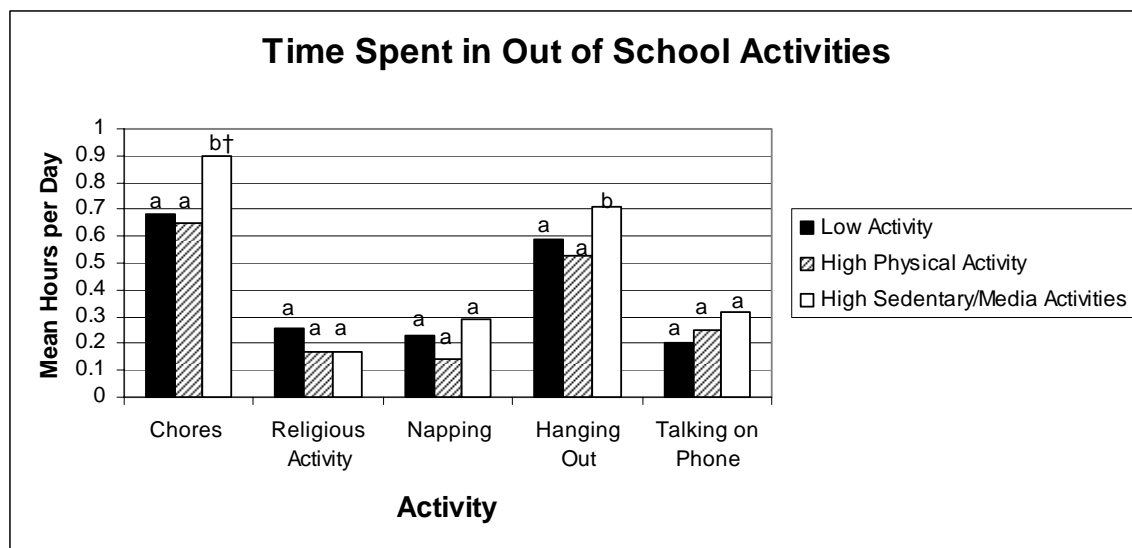
Note: Within each group of activities, bars with different letters are significantly different at $p < .05$

Additional Domains of Time Use across Activity Groups. To supplement the previous analyses, which focused on differences in activity groups, additional analyses were conducted to better differentiate between the activity groups based other types of out of school activities. Specifically, time spent each day in chores, religious activities, napping, hanging out with friends, and talking on the phone were examined. These activities were selected because although they were difficult to categorize as physically active or sedentary, prior work has suggested that U.S. adolescents spend a large amount of time in these pursuits (Rideout et al., 2005).

A series of 3(activity group) x 2(gender) ANOVAs were conducted in which each of the aforementioned activities were included as the dependent variables. Results are presented in Figure 12. There was a marginally significant main effect for activity group based on the amount of time that youth spent doing chores. Youth who met in the high sedentary/media group spent more time engaged in these activities as compared to youth in the high physical activity and low activity groups. There was marginally significant main effect for gender based on the amount of time that youth spent hanging out, such that boys spent more time hanging out than did girls. This was qualified by an activity group x gender interaction—boys in the high sedentary/media activity group spent more time hanging out, than all other youth, $F(5, 131) = 6.58, p < .001$.

Figure 12.

Mean Time Spent in Additional Out of School Activity Domains Each Day across Activity Groups.



Note: Within each group of activities, bars with different letters are significantly different at $p < .05$

† $p = .10$

Differences in Youth BMI Percentiles and the Proportion of Overweight and Obesity Across Activity Groups. To address the second aim of this study which was to determine whether there were group differences in adolescent BMI and related psychosocial outcomes across time use activity groups, we first tested whether there were group differences in adolescent BMI percentile using a 3 (activity group) x 2 (gender) ANOVA. Results from these analyses indicated that there were no differences between youth in the low activity ($M = 70.22, SD = 26.59$), physically active ($M = 73.89, SD = 23.34$), and high sedentary/media ($M = 78.81, SD = 27.68$) groups based on adolescent BMI percentile scores, $F(5, 131) = 1.67, p > .05$. Additionally, there were no differences between boys ($M = 74.48, SD = 25.44$) and girls ($M = 72.13, SD = 27.14$) in their BMI percentile scores, $F(5, 131) = .94, p > .05$.

Differences in the Proportion of Overweight and Obese Youth Across Activity Groups. Next, we examined the percentage of youth within the three activity groups who had a BMI percentile score ≥ 85 percentile (overweight) or ≥ 95 percentile (obese). The results of a chi-square analysis indicated that there differences across activity groups in the proportion of overweight and obesity, $\chi(2, 137) = 7.67, p < .05$. Results are presented in Table 14. Specifically, the proportion of overweight and obese youth in the low activity and high physical activity groups were comparable $\chi(1, 137) = .00, p > .05$, however a greater percentage of youth in the high sedentary/media group were overweight and obese as compared to youth in the low activity ($\chi(1, 137) = 6.81, p < .01$) or high physically activity groups, $\chi(1, 137) = 5.10, p < .05$

Table 14.
Proportion of Overweight and Obesity Across Activity Groups

	Low Activity Group	High Physical Activity Group	High Sedentary/Media Group
% with BMI percentile score \geq 85	42.42 ^a	42.86 ^a	69.44 ^b
% with BMI percentile score \geq 95	18.18 ^a	17.14 ^a	36.11 ^b

Note: Within each row, activity groups with different letters are significantly different at $p < .05$

Differences in Adolescent Weight Concerns and Depressive Symptoms Across Activity Groups. Two, 3 (activity group) x 2 (gender) ANOVAs were conducted to determine whether there were differences across the activity groups in (1) adolescent concerns about being overweight and (2) depressive symptoms. Results from these analyses indicated that there was a marginally significant main effect for activity group, such that youth in the high sedentary/media group ($M = 14.83$, $SD = 6.97$) had greater weight concerns than those youth in the low activity ($M = 13.13$, $SD = 5.25$) and high physical activity groups ($M = 11.41$, $SD = 6.27$), $F(5, 131) = 1.98$, $p = .10$. However, after controlling for adolescent BMI this finding became non-significant, $F(6, 131) = 1.21$, $p > .05$. There were no differences among youth in the low activity ($M = 2.00$, $SD = 2.65$), high physical activity ($M = 1.47$, $SD = 1.72$) and those in the high sedentary/media ($M = 2.26$, $SD = 2.63$) activity groups in depressive symptoms, $F(5, 131) = .69$, $p > .05$. These results remained after controlling for adolescent BMI, $F(6, 130) = .60$, $p > .05$.

DISCUSSION

How adolescent youth spend their time has important implications for their physical and mental well-being. To date few studies have examined this issue in African American youth. This study is the first to show that patterns of youth time use are associated with overweight and obesity. Further, the findings of the present study suggest that there are multiple pathways through which youth activity involvement may protect them from overweight and obesity. The first aim of this study was to determine the percentages of youth in the present sample who met national recommendations for time use. The results of the present study indicate that, in general few of these African American youth met national recommendations for physical activity with great frequency, but a majority of youth met national recommendations for media and non-media sedentary time use. The second aim of this study was to determine whether the extent to which youth met time use recommendations was linked to weight status and related psychosocial correlates. The results suggest that the risk for overweight and obesity was greatest for youth in the high sedentary/media activity group, as compared youth in the low activity and high physical activity groups. Although youth in the high sedentary/media activity group tended to report higher levels of overweight concerns, after controlling for adolescent BMI, youth's overweight concerns did not vary across activity groups. There were no differences in youth's depressive symptomology across activity groups.

Similar to other studies (Jago, Anderson, Baranowski, & Watson, 2005) we found that few youth, only about one quarter of the sample, met current national recommendations of at least 60 minutes of physical activity on five or more days per

week, whereas 91.24% of the sample met the current recommendations for non-media sedentary and 68.61% for media-related activities being limited to 2 hours or less per day based on their reported out of school hours. While on average, youth did not exceed the national recommendations for media-related time during, most youth spent a majority of their time engaged in media-related activities, providing support to research by others (Roberts, Foehr, & Rideout, 1999), suggesting that most African American youth are reared in media centered households. Of great concern is that so few youth met national recommendations for physical activity, a finding that has been reported elsewhere (Eaton et al., 2006).

The second aim of this study was to examine the extent to which youth met national recommendations for time use and adolescent outcomes including weight status and related psychosocial outcomes. Addressing this aim helps to extend our understanding of the links between adolescent time use and adolescent outcomes in the areas of weight status and psychosocial health. A key advantage of our approach is that this study did not simply focus on bivariate associations between adolescent time use and outcomes such as weight status. Instead, this study was grounded in the recognition that youth's activity involvement does not take place in isolation and that it is the combination of a range of all physically active, sedentary, and non-media sedentary activities that contribute to adolescent outcomes in meaningful ways. That is, we sought to examine how *patterns* of established levels of optimal activity involvement were associated with adolescent health.

A greater proportion of youth in the high sedentary/media activity group overweight or obese, suggesting that these youth may also be at a greater risk for other

negative outcomes associated with elevated weight status. The fact that youth in the high physical activity group were less likely to be overweight and obese than youth in the high sedentary/media activity group is more than likely linked to the fact that these youth were also high in physical activity, confirming prior research has linked physical activity to lower weight status for youth (Gortmaker et al., 1996). Additionally, youth in the low activity group on average did not exceed national recommendations for total (media and non-sedentary) activities, indicating that physical activity involvement did not displace physically active time use.

A striking finding was that, although youth in the low activity group spent less out of school time in physically active activities than youth in the high physical activity group, the prevalence of overweight and obesity for the two groups was similar, and less than that of youth in the high sedentary/media activity group. This finding is novel and extends previous research which focuses on high physical activity levels as being beneficial for weight related outcomes (Gortmaker et al., 1996). At the most general level, this finding indicates that there is more than one pathway that is protective against obesity that extant literature examining bivariate associations between single categories of activities and weight status has yet to find. It is difficult to explain why youth in the low activity group who meet all national recommendations for time use, but are still relatively low in physical activity, are protected against overweight and obesity, but may be linked to the fact that youth in the high sedentary/media activity group also reported high levels of media-related activities during out of school hours as compared to other youth. Time spent watching television or taking part in other media-related activities (e.g., listening to music, computer use) may be more conducive to eating as compared to

physically active or non-media sedentary pursuits (e.g., playing a musical instrument) based on the sheer nature of the activities. The results of the present study draw attention to the fact that youth may not simply displace physical activity for sedentary ones, specifically media time (Gorely et al., 2004). It may be that the association between media time and the etiology of obesity is moderated to some degree by adolescent food consumption as opposed to the displacement of physically active activities.

The results of the current study underscore the complexities of youth time use for adolescent boys and girls. Consistent with extant research, we found that boys spent more out of school time each day in physical activity and media-related activities, specifically video games; whereas girls spent less time being physically active than boys and more time engaged in non-media sedentary behaviors, specifically homework, which is in agreement with prior research (Roberts et al., 1999). Boys and girls spent similar amounts of time watching television, using the computer (non-homework related) and listening to music.

It is well established that physical activity begins to decline during early adolescence for all youth, which may explain why in the current study neither boys nor girls met the current national recommendations for physical activity based on their reported time spent in out of school activities. There are several reasons why adolescent girls, especially African American girls engage in less physical activity as compared to adolescent boys. At the most general level, girls receive less encouragement to remain involved in physical activity as they grow older (Gustafson & Rhodes, 2006). To some extent, girls may also perceive fewer long term economic payoffs (e.g., become professional athletes) for remaining physically active, as compared to boys. Additionally,

for African American adolescent girls, there may be less of an incentive to take part in physically active leisure as a method of weight control given the social acceptability of overweight and the fact that among African Americans weight is considered to be an indicator of health and beauty, especially for women. Finally, finding that African American girls reported spending more out of school time engaged in sedentary activities as compared to boys, in particular homework, further substantiates prior work indicating that African American girls place more emphasis on academic pursuits than on physical activity (Dowda et al., 2004). A novel finding of this study is that while girls took part in fewer physically active pursuits than boys and more non-media sedentary out of school activities there were no gender differences in BMI. This finding further supports our prior assertion that non-media sedentary activities may be similar to physical activity in that they are not conducive to food intake. Thus, having reduced food intake may protect youth from energy imbalance which has been linked to excess weight gain.

With regard to psychosocial characteristics, the fact that activity group differences in adolescent weight concerns became non-significant after controlling for BMI suggests that adolescent BMI may explain elevated weight concerns for youth in the high sedentary/media group. What the current study draws attention to is the fact that for African American youth in particular, those who are engaged in high sedentary/media activities may be at greater risk for overweight concerns, but still may not take part in activities that may help to reduce their weight status. Given that both weight status and activity patterns/preferences track into adulthood, these youth may be at greater risk for obesity and increased overweight concerns overtime which are precursors to eating disorders. While the prevalence of eating disorders among African American youth is

low in comparison white youth, the rising rates of obesity and eating disorders among this group suggest that these phenomena may be inextricably linked (Goldschmidt, Vandana, Sinton, Tanofsky-Kraff, & Wilfley, 2008). The findings of present study which suggest that obesity is related to psychosocial health, do not outweigh the fact that obesity in general is linked to a number of negative physical health consequences (e.g., metabolic syndrome, diabetes). The findings of this study reflect prior research showing that for African American adults and youth, there is a failure to acknowledge the links between weight and overall health (Alleyne & LaPoint, 2004). Thus, promoting the reduction of media use and other healthy lifestyle changes may benefit youth by contributing to the reduction of youth's risk for obesity and its related co-morbidities and psychosocial health.

The fact that adolescent BMI did not significantly differ across the three activity groups may reflect the fact that while the proportion of youth who were overweight and obese was slightly higher for youth in the high sedentary/media activity group, actual BMI scores for youth across the three groups were still similar. Recall that on average the BMI percentile scores for youth in the low activity ($M = 70.22$), high physical activity ($M = 73.89$), or high sedentary/media ($M = 78.81$) activity groups were all relatively high. This finding substantiates prior research which indicates that African Americans are more tolerant of higher weight status as compared to other racial/ethnic groups (Alleyne & LaPoint, 2004). Still, an important finding of the current study is that a greater proportion of youth in the high sedentary/media activity group were overweight and obese. Taken together, the findings of the current study with regard to adolescent weight concerns, actual BMI, and proportions of overweight and obesity across activity

groups suggest that a key goal of obesity researchers will be to develop prevention programming for African American youth that will help to preserve positive attitudes about weight but also highlight the links between weight status and activity pursuit engagement. An additional goal of such programming will be to promote the idea that there are multiple pathways through which youth can achieve positive health outcomes.

Although no statistically significant group differences in adolescents' depressive symptomology were observed and the levels of depressive symptomology were low for this sample, it does not necessarily suggest that depressive symptomology should not be examined in the realm of time use among African American youth. Instead, the findings of the current study raise key questions with regard to the association between depressive symptomology and adolescent time use. It is possible that the effects of physical activity on youth's psychosocial outcomes including depressive symptomology may be distal and less evident in the current study given its cross-sectional design. However, understanding youth's time use and depressive symptomology during adolescence is important given that activity patterns and health during this period of development may track into adulthood (Marshall et al., 2007).

This study is not without limitations. One shortcoming is that we did not account for the possibility that youth could have engaged in more than one activity at a time (e.g., watching television *and* using the computer, doing homework *and* listening to music, etc). Thus, the fact that we summed the amount of time that youth spent in each activity may have resulted in over estimation of time spent in various activities. Additionally, we did not examine the day to day variations in youth's activity involvement. It is possible that the effects of physical activity or sedentary activity involvement on youth BMI and

psychosocial outcomes may be sensitive to changes such as these. As such, there is a need for research examining the link between daily routines in time use and adolescent physical and mental health outcomes as such studies will help researchers to determine whether the stability of leisure time activities is also linked to adolescent health.

Although this study had the advantage of examining youth's out of school activity use across five weekdays and two weekend days, this study is cross-sectional and provides a limited window into adolescents' lives at one point in time. Further study is needed to determine the extent to which adolescents' time use patterns remain stable or vary over time and across developmental stages (e.g., early to late adolescence, adolescence into adulthood). In addition, while the amount of time that youth spend in various activities is important, the intensity of the involvement (metabolic equivalent (MET) level), especially in physically active pursuits, is critical to gaining optimal health benefits. The availability of information such as METs may have further aided in being able to distinguish between the activity groups on the basis of BMI. Finally, the current study relied on self reports of adolescent height and weight. It is possible that youth may have misestimated these measurements, and this may have influenced our results.

The aforementioned limitations however do not outweigh the contributions that the current study makes to the extant literature. The results of this study suggest that during adolescence it is not individual types of activities, but rather the *pattern* of out of school activities that are associated with obesity and related psychosocial outcomes. It will be important for future research to examine these associations longitudinally to determine long-term implications for health related outcomes. Further, this study indicates there are multiple pathways through which youth activity involvement may be

linked to adolescent weight status. The fact that this period of development is characterized by emerging autonomy and independence which may have long term implications for activity selection, involvement and health into adulthood suggests that adolescence may be an optimal time for the introduction of obesity prevention programs that target adolescent time use. The results of the present study suggest that such programs should focus on helping adolescents to create their own niches (Lerner & Galambos, 1998; Scarr & McCartney, 1983) and cultivate competencies, especially in physically active and/or non-media-related sedentary leisure as it appears that meeting current recommendations for one or both of these areas of time use may be beneficial to youth.

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RESEARCH INTERESTS

- ❖ Applying developmental theory and concepts to studies of the etiology of obesity among African American adolescents
- ❖ Assessing how parental feeding practices and adolescent free time activities are linked to psychosocial correlates of obesity (e.g., depression, overweight concerns)
- ❖ Examining how the family ecology influence the development of overweight and obesity
- ❖ Longitudinal developmental methodology and measurement issues relevant to obesity
- ❖ Development of obesity prevention programs that are both developmentally appropriate, culturally competent, and rooted in developmental theory

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PUBLICATIONS

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