

# **The Influence of Parenting Practices and Behaviors in the Relationship between Social Disadvantage and Physical Inactivity Risk in the Transition to Young Adulthood**

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## **Abstract**

Family context plays a crucial role in developmental and health trajectories during adolescence and in the transition to young adulthood. Social disadvantage can operate via parenting styles and practices with implications for child developmental and health outcomes. This paper uses nationally representative data from the National Longitudinal Study of Adolescent Health (Add Health) to investigate the mediating role of parenting practices in the relationship between social disadvantage and physical inactivity patterns in the transition from adolescence into young adulthood. Multiple dimensions of parenting practices and behaviors are measured that represent various pathways through which parenting can work to mediate the relationship between social disadvantage and physical activity. Longitudinal measures of change in physical activity are also created. Preliminary results indicate statistically significant relationships between social disadvantage (measured by parental education, income and welfare status) and physical inactivity, and parenting measures and physical inactivity in both adolescence and young adulthood.

## **The Influence of Parenting Practices and Behaviors in the Relationship between Social Disadvantage and Physical Inactivity Risk in the Transition to Young Adulthood**

Family context plays a pivotal role in influencing developmental trajectories and health behaviors and outcomes in adolescence and in the transition to young adulthood (Baumrind 1991; Bronte-Tinkew 2005; Collins et al. 2000; Harris, Furstenberg and Marmer 1998; Harris and Marmer 1996; NRC 2002; Riesch, Anderson and Krueger 2006; Steinberg 2001). Children rely upon on their parents to provide them with the resources they require to develop into healthy adults. In addition, parents serve as important socializing agents within the household. Their behaviors, attitudes, beliefs can substantially affect their children's health behaviors (Gustafson and Rhodes 2006; Lindsay et al. 2006; Pugliese and Tinsley 2007; Sallis et al. 2006).

Social disadvantage can operate via parenting styles and practices with implications for child developmental and health outcomes (Aber et al. 1997; Brooks-Gunn and Duncan 1997; Conger and Donnellan 2007; Crosnoe, Mistry and Elder 2002; Elder et al. 1995; Grant et al. 2003; Guo and Harris 2000; Lareau 2002; McLeod and Shanahan 1993; McLoyd 1998; Smetana, Campione-Barr and Metzger 2006; Mistry et al. 2002). Parenting styles and practices have also been linked to physical activity behavior, eating behavior and obesity outcomes in childhood, adolescence and the transition to adulthood (Adkins 2004; Birch and Fisher 1998; Crossman, Sullivan and Benin 2006; Davison and Birch 2001; Davison, Francis and Birch 2005; Hart, Bishop and Truby 2003; Mattocks 2007; Moore et al. 1991; Rhee et al. 2006; Robinson et al. 2001). For example, children engage in higher amounts of physical activity when supported by their parents, via the encouragement parents provide their children to be physically active, the time parents spend with their children engaging in physical activity, the provision of transportation to physical activities by parents, and the time parents spend watching their children engage in physical activities and monitoring other activities related to physical activity, such as TV viewing (Adkins et al. 2004; Davison, Cutting and Birch 2003; Gustafson and Rhodes 2006; Norman et al. 2005; Prochaska, Rodgers and Sallis 2002; Pugliese and Tinsley 2007; Sallis et al. 1992; 1999; Sallis, Prochaska and Taylor 2000; Trost et al. 2003).

It is particularly important to study physical activity in adolescence because it is highly related to the short and long-term health of individuals (Barnowski et al. 1994). Low levels of physical activity in adolescence have been linked to obesity, Type II diabetes mellitus, hypertension, colon cancer, depression and osteoporosis (Pate et al. 1995; Trost et al. 2001). Physical activity also tracks significantly from adolescence to young adulthood (Raitakari et al. 1994), having implications for health in adulthood.

Parenting behavior may serve as a particularly important influence of adolescent physical activity to study in poor families. Because there is a well-established link between socioeconomic disadvantage and physical activity outcomes for adolescents and adults (Brownson, Tegan and Luke 2005; Gordon-Larsen, Nelson and Popkin 2004; Gordon-Larsen, McMurray and Popkin 2000), parenting may be an important pathway through which socioeconomic status (SES) in adolescence influences physical activity in adolescence and the transition to adulthood. Family disadvantage affects parenting behaviors in multiple ways. Disadvantaged parents may not have resources, such as adequate health information, time to engage with their children in physical activity or monitor their children's inactivity, or money for

children to be able to engage in organized activities. This lack of resources, in addition to economic insecurity, may lead to parenting practices that discourage physical activity and encourage inactivity. Thus, family poverty may operate through the mediating process of parenting to affect adolescents' physical activity behaviors and maintenance of physical activity behaviors into young adulthood.

Although a growing amount of empirical research supports the idea that parenting practices mediate the relationship between poverty and various child outcomes, the relationship is generally weak showing that parenting practices do not mediate much, if any, of the effect between SES and child outcomes (For reviews see Aber et al. 1997; Brooks-Gunn and Duncan 1997; Conger and Donnellan 2007; Hoff, Laursen and Tardiff 2002; McLoyd 1998). Parenting practices and behaviors are theoretically important predictors of child outcomes and can be captured well in ethnographic studies, but they remain an elusive concept to measure in empirical research in a way to support theory and replicate qualitative research. It is also difficult to measure standardized parenting behaviors that are beneficial to children given the variation in parenting behaviors according to race, ethnicity, and SES (Lareau 2003).

Using nationally representative data from the National Longitudinal Study of Adolescent Health (Add Health), this paper will investigate the mediating role of parenting practices in the relationship between social disadvantage and physical inactivity patterns in the transition from adolescence into young adulthood. This analysis will determine whether and which parenting practices play a role in mediating the relationship between poverty in adolescence on physical activity patterns over time. I will measure multiple dimensions of parenting practices and behaviors that represent various pathways through which parenting can work to mediate the relationship between poverty and physical activity outcomes in adolescence and the transition to young adulthood. To my knowledge no other study has investigated how poverty might influence physical activity outcomes through parenting practices, so this will be the first study to test this particular mediating relationship. In addition, this paper will be able to decipher what elements of parenting practices are most salient in linking disadvantage in adolescence to physical activity patterns in the transition from adolescence to young adulthood.

### **The Influence of Disadvantage and Race/Ethnicity on Parenting Practices**

Parent-child interactions are an important aspect of a child's social environment and have profound direct and indirect influences on children's development and health behaviors well into adolescence (Baumrind 1991; Birch and Fisher 1998; Collins et al. 2000; Elder 1999; Harris et al. 1998; Harris and Marmer 1996; NRC 2004). Parenting styles and practices differ by race/ethnicity (García Coll and Pachter 2002; Steinberg et al. 1992; Wu et al. 2003) and socioeconomic status (SES) (Burton and Jarrett 2000; Elder et al. 1995; Hoff et al. 2002; Lareau 2002; Pinderhughes et al. 2001). The effectiveness of parenting styles and behaviors on child outcomes may also differ across cultural and socioeconomic groups (Baumrind 1972; García Coll and Pachter 2002; Darling and Steinberg 1993).

There are a number of reasons why parenting practices are influenced by socioeconomic status and race/ethnicity. Poor adults encounter a larger number of chronic conditions and

negative life events than nonpoor adults. Work and income instability, inability to pay bills, food insecurity, poor housing, and lack of other basic needs characterize everyday life for many poor families (McLoyd 1998). Ethnic minority parents, especially African American parents, are disproportionately impoverished because they are overrepresented among the low paid and unemployed and in single-parent homes (Iceland 2003). In addition poor blacks enter poverty with fewer economic resources (McLoyd 1990) and are more likely than poor whites to live in isolated urban ghettos (Wilson 1987), which increases the severity of economic deprivation.

### *The Family Process Model*

The family process model (Conger et al. 2002; Conger and Conger 2002; Conger and Donnellan 2007; Elder 1999; McLoyd 1990, 1998) provides an important framework to understand the role disadvantage plays in influencing how parents interact with their children. The family process model is a framework originating from the child and adolescent development and social psychology literature, which argues that some economic disadvantage is filtered through family dynamics, such as parenting behaviors and practices which has implications for child outcomes. More specifically, the model provides for a specific pathway through which economic hardships of daily life (e.g. low income and unstable work) result in felt economic pressures (e.g. unmet material needs; inability to pay bills), which lead to emotional distress and lack of confidence and self-efficacy, which adversely affects parenting. Because parents become consumed by their economic problems, they become less involved in their children's daily activities, they demonstrate less affection toward their children and are more harsh, irritable, and inconsistent in their disciplinary practices (Conger and Donnellan 2007). Previous research provides evidence that negative life events and poverty heighten inconsistent, punitive and harsh parenting and less parental investment and affection (Brooks-Gunn and Duncan 1997; Grant et al. 2003; Elder et al. 1995; McLoyd 1998) and that this relationship is similar in both white and black families (Conger et al. 2002). However, associations between socioeconomic status and poor monitoring and supervision have been less consistent (Hoff et al. 2002)

### *Ethnic and Minority Parenting*

Ethnic minority parenting has been an understudied area in the parenting literature. However, there are some unique conditions under which ethnic minority parents must operate. As discussed above, ethnic minority parents are not only disproportionately poor and segregated, but their everyday lives are also influenced by their cultural orientations and racism. Because of this, it is difficult to disentangle what aspects of minority parenting are influenced by social class (many ethnic minority families are poor), cultural orientation (parents may have different childrearing customs given their different cultural heritage from the majority), or minority status (the impact of being in the non-majority group due to racism and other factors) (García Coll and Pachter 2002; McLoyd 1990; 1998). Despite these complexities, research documents cultural traditions unique to each racial/ethnic group do influence parenting practices, beliefs and attitudes. For example, African Americans and Hispanics have different conceptions of a healthy body weight, and may not encourage their children who are overweight by medical standards to become more physically active because they are not overweight by their cultural standards (Harris and Koehler 1992; Kumanyika and Grier 2006). In addition to different cultural orientations, minority parents have the unique responsibility to socialize their children in

ways of coping and reacting to prejudice and discrimination. These more nuanced aspects of minority parenting are difficult to capture in large-scale surveys but have important implications for child outcomes (García Coll and Patcher 2002).

### *Intersections of Race/Ethnicity and Class in Parenting*

Researchers now argue that minority parenting, just like all parenting, must be studied in the context in which it occurs (García Coll and Patcher 2002; Kaufman 2007). For the purposes of this paper, the context of most relevance is social disadvantage. Annette Lareau's (2002) ethnographic research of white and black families provides a good example of this type of research. She found that childrearing practices differed markedly by social class. Middle-class parents, regardless of race, used extensive reasoning and enrollment in organized leisure activities to foster their children's talents. Working-class and poor parents used directives instead of reasoning and left the children to engage in informal leisure activities. In addition middle-class parents were more comfortable in engaging in discussions with representatives of major social institutions and allowing their children to do so. These differences in parenting practices had implications on children's sense of entitlement or advantage.

Lareau observed that class differences in childrearing practices and attitudes were due to parents' economic and educational resources, as well as occupational conditions. Middle class families had money for enrollment fees (for schools, summer camps and other extracurricular activities), equipment, clothing, and other activities. These were seen as daunting expenses for less affluent families. Unlike middle-class children who took part in adult-organized activities, poor children spent most of their free time in informal play and watched more TV. The superior levels of education of most middle-class parents gave them a large vocabulary and confidence to communicate with and criticize professionals in social institutions, such as schools and doctors' offices, influencing how parents were able to intervene and advocate for their children. Educators and doctors were viewed as social superiors by working-class and poor parents, reducing parents' ability to interact with important individuals in the lives of their children.

These differential parenting behaviors can also have implications for a child's physical activity. Children of middle class parents are able to engage in more organized activities that would ensure they are physically active during those times. Because children of poor parents are less likely to engage in adult organized activities and more apt to watch TV, these children might not be as active as middle class children. In addition, because of middle class parents' higher levels of education and comfort in dealing with representatives of social institutions, they can more easily discuss with teachers and doctors what might be best for their children, including recommendations regarding the appropriate level of physical activity. These conversations might be less likely to occur between poor parents and doctors or teachers, thwarting their ability to learn how more physical activity and other healthy behaviors might improve the well-being of their children.

It is important to note that not all aspects of family life and parenting are influenced by socioeconomic status (García Coll and Patcher 2002; Laureau 2002). All parents share universal goals of parenting based on their need to enable their children to successfully transition from complete dependency in childhood to relative self-sufficiency as an adult. These goals include

providing an environment that enables successful development, ensuring their children's physical safety and modeling and teaching normative social values (LeVine 1977). How these goals are accomplished (or fail to be accomplished) are influenced by economic resources and cultural orientation, as well as other factors.

This discussion of socioeconomic disadvantage, race/ethnicity, and parenting practices highlights the need for research to determine how economic disadvantage is related to physical activity through the influence of parenting practices while controlling for the effects of race/ethnicity.

### **The Mediating Role of Parental Practices**

Parents can influence their children's physical activity in several ways. They can encourage and support their children's physical activity through parent-child communication and emotional support in ways that encourage competence. They can play an instrumental role to facilitate physical activity such as providing transportation and access to organized sports. Parents can also serve as healthy physically active role models by engaging in physical activity with their children, such as walking or playing a sport and involvement in physical activities such as coaching and watching their children at sports events. In addition, parents can also monitor their children's activities and inactivity (Anderson and Butcher 2006; Davison and Birch 2001; Gustafson and Rhodes 2006; Sallis et al. 2000; Lindsay et al. 2006; Pugliese and Tinsely 2007). Socioeconomic status is related to all of these aspects of parenting with implications for the health and well-being of children.

#### *The Family Process Model*

As discussed earlier, the family process model has been used to link negative parenting practices due to economic disadvantage to adverse child outcomes in education, mental and physical health. It has also been used to examine whether behaviors and attitudes of parents link disadvantage in adolescence to outcomes in young adulthood (e.g. Crosnoe et al. 2002). This research has found that the ineffective, harsh and unaffectionate parenting of poor parents has detrimental effects on children's development, problem behavior, educational success and mental and physical health in childhood and adulthood. Although family process models have been used extensively in social psychology and developmental research, they have not been used to examine health behaviors related to obesity such as physical activity. However, certain parenting practices due to lack of economic resources and stress may affect physical activity outcomes for adolescents that endure into young adulthood. If disadvantaged parents' ability to control and monitor their children is reduced, they might not be able to ensure that their children are engaging in physical activity, rather than watching TV or partaking in other sedentary behaviors, which are unhealthy habits that can carry into adulthood (Gordon-Larsen et al. 2004; Pate et al. 1999; Thompson, Humbert and Mirwald 2003). Low parent-child communication and poor quality relationships due to disadvantage may diminish parents' ability to facilitate children's physical activity and feelings of competence and self-efficacy through such activities.

## *Socialization Theory*

Socialization theory provides another framework for the ways in which parenting processes are linked to physical activity outcomes. The socialization perspective views the family as the central source of socialization in the lives of children (Maccoby 1992). Parents serve as socializing agents and role models and their presence, parenting skills and relations with their children have an important influence on child outcomes (McLanahan, Astone and Marks 1991). In early childhood, teaching children socially-appropriate values and behavior is the main task of socialization. In later childhood as children move into adolescence, children are provided with more autonomy and are allowed to play a larger role in decision-making. Parents help their teens to engage in proper decisions and behaviors by using parenting elements such as monitoring, supervision and control. In addition socialization works via communicating and reasoning with adolescents as well as setting rules. The transmission of values from parents to children is heavily influenced by stable, nurturing and accepting parent-child relations (McLanahan et al. 1991), especially in adolescence when peer influences become stronger.

Socialization theory aligns well with Baumrind's (1971) classic typology of parenting styles. According to this typology parenting behaviors have two main dimensions: responsiveness, which refers to elements of involvement, warmth and acceptance, and demandingness, which encompasses supervision, strictness and control. Baumrind defined three types of parenting styles derived from combinations of these two dimensions: 1) authoritative (high responsiveness and high demandingness); 2) authoritarian (low responsiveness and high demandingness); permissive (high responsiveness and low demandingness). The authoritative style was determined to be the optimal for effective parenting. Proper socialization of children required a combination of attentiveness with clear rules for correct behavior and affection.

Previous research has supported the contention that authoritative parenting styles are the most useful in supporting positive adolescent development, especially in regards to emotional adjustment (Smetana, Campione-Barr and Metzger 2006). Similar to research using the family process model, research based on socialization theory finds that parenting styles differ by socioeconomic status and race/ethnicity. Poor parents and ethnic minority parents are more likely to use an authoritarian parenting style and physical discipline and are less affectionate than non-poor and white parents (Grant et al. 2003; Spencer 1990; Vega 1990). Other researchers argue that these typologies fail to take into account how the effectiveness of parenting styles might differ by socioeconomic status and race/ethnicity, especially when they are based on samples of white middle class families (Bradley 1998; Weiss 2002). In fact, some researchers argue that highly restrictive authoritarian parenting styles may be a necessary parenting strategy in poor, unsafe high-risk neighborhoods where strict monitoring is necessary to protect children from an adverse social environment (Elder et al. 1995; Furstenberg et al. 1999).

It should be noted that socialization theory and the family process model differ in how parenting processes are conceptualized to mediate the relationship between disadvantage and adolescent outcomes. The family process model contends that economic strains and stress due to economic hardship inevitably lead to diminished parenting skills and ineffective parenting practices that negatively affect children. Socialization theory argues that poor parents deliberately engage in certain practices that they feel will help to protect their children from and

overcome the risks in their environment and hopefully lead to positive development. Because this paper will examine physical activity outcomes, highly restrictive parenting, even as a strategy to protect children from neighborhood risk, may be more detrimental to adolescents if it prevents or reduces their ability to engage in physical activity.

In addition, because socialization theory identifies parents as role models that expose and teach their children norms of behaviors, parents who are inactive and/or obese may serve to reduce or impede physical activity in their children. Role models shape the perceptions of adolescents and young adults regarding current and future lifestyles (Maccoby 1992). As models, they support and reinforce the acquisition and maintenance of exercise behaviors or lack thereof (Lindsay et al. 2006). If a child lives with parents who fail to exercise and engage in sedentary behavior, youth are likely to mimic the lifestyles they see and retain these habits into adulthood (Fogelholm et al. 1999; Mcguire et al. 2002). Because poverty is associated with an increased risk of obesity in all age groups, poor parents are also more likely to be obese and inactive and therefore, model unhealthy behaviors.

### *Social Capital*

Another avenue of socialization important to parent-child relations is represented by the theoretical concept of social capital. Coleman's (1988) concept of social capital captures the resources embedded in the context of social relationships and ties that facilitates action. An important context of social relations, with strong implications for adolescent outcomes, is the family context. Social capital in the family is dependent upon parent-child relations. The quality and quantity of relations between adolescents and their parent facilitates healthy behaviors and can be seen as a social capital resource. A parent's time, attention and affection are important dimensions of parent-child relationships that will benefit children (Bourdieu 1985). Parents would be ineffective in encouraging positive healthy behaviors such as physical activity if they did not share close emotional bonds with their children. Opportunities to engage in physical activities as a family or discuss the importance of staying active would not occur without shared activities and time together. Within the family context, these social capital resources facilitate healthy behavior in children by serving as a source of family support and social control. As discussed earlier, poverty diminishes a parents' ability to spend time with children, share closeness or communicate.

### *Summary*

The family process model, parenting styles, role-modeling and social capital all highlight the important ways that that parents' behavior and practices can mediate the relationship between disadvantage and physical activity outcomes. Poverty not only limits the material resources parents can provide their children to engage in healthy behavior but it affects parents ability to communicate, discipline and monitor their children, advocate for them and model healthy lifestyles. Together these theoretical frameworks will serve to guide the conceptualization of how the behaviors and practices of parents link disadvantage in adolescence to physical activity outcomes in adolescence and in the transition into young adulthood



## **Conceptual Model**

The conceptual model (see Figure 1) provides the longitudinal relationship between poverty status and change in physical activity from adolescence into young adulthood. In this conceptual model, parenting practices and styles during adolescence mediate the relationship between disadvantage and change in physical activity from adolescence into young adulthood.

Adolescents either increase or decrease their levels of physical activity or maintain medium/high or low levels of physical activity into adulthood. Poverty is conceptualized as having enduring effects on physical activity through parenting practices. Data from all three waves in Add Health are utilized, where poverty status is measured in childhood and adolescence, parenting practices and behaviors are measured in adolescence (Wave I), and physical activity trajectories are constructed from data in adolescence (Wave II) and young adulthood (Wave III). All controls are measured at Wave I, the first data point in adolescence.

## **Specific Aims of Analysis**

This paper will examine the relationship between social disadvantage and obesity by investigating the mediating role of parenting styles and practices during adolescence on physical inactivity patterns in the transition from adolescence into young adulthood; something previous research on the effects of parenting on physical activity has not done. Theory in parenting emphasizes the large role that parents play in influencing their children's health behaviors and well being through socialization and instrumental forms of support. The deleterious effects of disadvantage in preventing parents from providing the kinds of support and relationships necessary for child well-being have also been well documented.

The specific aims of this paper are to:

- (1) Create measures of parenting styles and behaviors.
- (2) Determine how parenting styles/behaviors differ by race/ethnicity and SES.
- (3) Investigate the relationships between different parenting practices and styles and physical activity patterns.
- (4) Within a longitudinal framework, determine if parenting style/practices play a role in mediating the relationship between SES and physical activity patterns from adolescence and into young adulthood.

## **Data**

Data come from the National Longitudinal Study of Adolescent Health (Add Health), which is an ongoing nationally representative, school-based study of adolescents in grades 7 to 12 that began in 1994. It was designed to explore the causes of health-related behaviors, with an

emphasis on the influence of social context. In 1994 Add Health administered an In-School Questionnaire to every student attending school from a nationally representative sample of schools. A sample of 80 high schools and 52 middle schools from the U.S. was selected using a stratified cluster design. A subsample of individuals in these schools participated in the In-Home Interview in 1995 (Wave I), given an average of eight months after the In-School Survey, and again in 1996 (Wave II). In Wave III (2001-02), Wave I respondents were re-interviewed.

A parent, generally the mother, was also interviewed in Wave I. In-home adolescent questionnaires were administered by computer-assisted personal-interview (CAPI), as well as computer-assisted self-interview (CASI) for more sensitive questions. Ultimately, 20,745 in-home interviews were completed in Wave I; 17,713 parents answered child specific questions and 17,669 answered parent specific questions (more than one child was interviewed in some households). 14,738 in-home interviews were completed in Wave II (the seniors in Wave I were not followed). In Wave III 15,197 eligible original Wave I respondents completed the survey. In Wave I (WI), the age of participants ranged from 12 to 19 years, in Wave II (WII) from 13 to 20 years and Wave III (WIII) from 18 to 26 years.

Over 70% of the schools originally selected for the survey participated. Of the adolescents sub-sampled for the in-home questionnaires, 78.9% participated in WI. Parent interviews are available for 85% of these respondents. Of those eligible for participation in WII, 88.2% completed in-home interviews. Of those eligible for participation in WII, 77.4% completed in-home interviews.

The fact that the data set is longitudinal and nationally representative, with extensive measures of socioeconomic status, health, family structure, composition and social interaction, race and ethnicity among other factors, makes it an ideal data set to investigate the relationship between disadvantage and physical activity in adolescence. Harris and colleagues (2003) provides a more detailed description on the Add Health Study.

This study uses data from the Wave I In -Home and Parent Questionnaires as well as the follow-up Wave II and III surveys. This analysis is therefore limited to adolescents who participated in all three waves of the study and have completed Parent Questionnaires. Exclusions included seriously disabled respondents and pregnant females. After applying these data constraints and deleting the cases with missing data on covariates, the final study sample contains 8,245 (4,268 females and 3,977 males) respondents.

## **Measures**

Table 1 provides means and standard errors of all measures used in this analysis for the total sample and by sex.

### *Control Measures*

**Race/Ethnicity:** Add Health allows for rich detail in measures of race and ethnicity. Race/ethnicity is self-reported at Wave I and is classified into five race and ethnic groups: non-

Hispanic white (reference group), non-Hispanic black, Hispanic, Asian, or other racial/ethnic group. I control for race/ethnicity because of its possible confounding effects with socioeconomic status.

**Sex:** This measure is constructed from responses in the Wave I In-Home Questionnaire. This measure was crosschecked with WII and WIII responses. Research consistently shows that females exhibit lower levels of physical activity than males and that parental support differs by sex (Gustafson and Rhodes 2006).

**Age:** Age is a continuous measure of self-reported age at WI. Age ranges from 11 to 21 years of age. Levels of physical activity decrease with age (Davison and Birch 2001; Harris et al. 2006; Sallis et al. 2000).

**Maternal Work Status:** Maternal work status is measured by whether the mother worked full time using both WI respondent and parent reports. Respondents were asked to report if their mother worked for pay and approximately how many hours a week. Mothers who worked 35 hours or more per work were coded as working full time. For those adolescent reports that were missing on mother's work status, the parent reports of work status from the parent questionnaire was used. The parent and adolescent reports of mother's work status was also cross-checked for validity for cases with data from both interviews (giving preference to the parent report if inconsistent). Consistent with census data, 58% of the adolescents at Wave I had a mother who worked full-time.

Maternal work status serves as a proxy for presence in the home. Mothers who work, especially if they work full-time, are less able to monitor their children due to a decrease in maternal presence and availability during the day (Jacobson and Crockett 2000). Because it is mainly the mother who supervises children's activities during the day, since a majority of fathers (in two parent households) work full time, monitoring is more affected by the mother's work status (Seltzer 1994). Poor working mothers, in particular, are often in difficult and unstable work situations that often increase stress and decrease maternal availability, which reduce parental monitoring and involvement, weakens mother-youth communication and thus increases youth risk (Morris et al. 2001). Poor working mothers may not be able to take an active role in the decision making of their child's choice of physical activities because of time constraints due to workload and/or the stress associated with being in poverty.

**Family Size:** Family size is measured by using the respondent's reported count of number of siblings from Wave I Household Roster (thus, only siblings present in the household at Wave I). Family size can influence the ability of parents to monitor their children and the time they can devote to each of their children's activities.

**Parent Obese:** Using self-reports from the Parent In-Home Questionnaire, a respondent was coded as having an obese parent if either their biological mother and/or biological father were reported as being obese. Parental obesity is used as a control to account for the genetic predisposition for engaging in low levels of physical activity under the assumption that obesity is associated with less physical activity (Lauerdale et al. 1997). In addition, it serves as a proxy for parental role-modeling of low levels of physical activity. 24% of the sample has an obese parent.

### *Socioeconomic Disadvantage*

Socioeconomic disadvantage is measured in two ways using welfare/poverty status and parent education. Family structure is used as a control. Although welfare/poverty status provides a more direct measure of deprivation than education, education is a socioeconomic indicator that is particularly likely to capture aspects of behavior and lifestyle (Shavers 2007). People with higher education levels have a greater awareness of health issues and are better able to make healthy choices and facilitate opportunities for physical activity. Parental education may also affect parental monitoring, with more educated parents doing a better job at monitoring their children (Lareau 2002), especially behaviors that directly relate to physical activity. This is especially relevant during adolescence when future lifestyle and health-related behaviors are often established.

**Welfare/Poverty Status:** Welfare/Poverty status is a dichotomous indicator of any welfare receipt before the age of eighteen or family income less than poverty level. This measure is constructed from data on the family's receipt of public assistance or welfare from WI and WII during adolescence in combination with a retrospective report at WIII on the receipt of welfare and public assistance prior to the age of eighteen. Using data from the WI Parent Questionnaire on reported annual income from 1994, family income is categorized as below poverty level if income was less than \$16,000 (roughly the poverty level for a family of four in 1994). I chose a welfare- and income-based measure of poverty over an only income-based measure due to the large proportion of missing data on income ( $\approx 20\%$ ). About 28% percent of the total sample received welfare prior to the age of eighteen and/or was living below poverty at WI.

**Parental Education High School Diploma (or Equivalent) or Less:** Using data from the Wave I Parent Questionnaire, parents' education is measured as the higher of either mother's or father's education. A respondent is considered disadvantaged if their highest educated parent has high school degree or equivalent (i.e., GED) or less. I substituted missing parental reports of education with adolescent reports of their parent education. About 62% of the sample has a parent with a high school degree or less.

**Family Structure:** There is rich detail on family of origin living arrangements. Adolescents are classified as those who live with two biological or adoptive parents (reference category), a stepfamily (biological mother and step father or a biological father and step mother), single mother, single father, and surrogate or foster parents (including grandparents, aunts and uncles, other adult relatives, or nonrelative adults). I control for family structure because of its possible confounding effects with socioeconomic status. In addition, the presence of only one parent in a household reflects a lower ability to provide monitoring of children's activities and less time and parental presence to serve as role-models and socialize children in a way that can form valuable parent-child relations (Amato 1993; McLanahan 1997).

### *Parenting Practices*

Two dimensions of parenting practices will be measured for this analysis: parental control

(supervision and monitoring) and parent-child relations (parental-child activity sharing, shared decision making, share meals, parental-child communication, and parental closeness and warmth). Each dimension is represented by multiple measures. These measures draw from the previous work of Harris and Ryan (1999) and Ryan (2001) and reflect socialization and social capital theories of parenting, as well as instrumental measures of parenting that are influenced by poverty. I will measure multiple dimensions of parenting because separate domains have important independent effects in influencing adolescent development and well being (Harris and Ryan 1999). All measures come from respondent reports at WI.

**Parental Control (Supervision and Monitoring):** Parental control has two components: monitoring and supervision. Parental monitoring is measured using a validated additive scale (Harris and Ryan 1999). The scale is based upon seven items that ask if a respondent is permitted to make his/her own decisions about amount of TV watched, television shows viewed, what to eat, weeknight bedtime, weekend curfew, friends and clothes. The index is reverse coded such that high measures indicate high control by the parent. The supervision measure represents the amount of parental presence in the home. Parental supervision is measured using an additive index that is based upon three questions that ask the respondent if a parent is present most or all of the time when he/she leaves for school in the morning, returns from school in the afternoon, and goes to sleep at night.

**Parent-Child Relations (Shared Activities, Shared Decision-Making, Shared Meals, Parent-Child Communication and Closeness and Warmth):** Parent-child relations are represented by five separate measures: shared activities, shared decision-making, shared meals, communication, and closeness and warmth. Shared activities is a count of the activities a parent and child did together in the previous four weeks including: attended sports events, gone shopping, attended religious or church events, gone to the movies and worked on a school project together. Shared decision-making refers to whether or not the parent and child make decisions together regarding the child's life. This is the only parent reported measure used in this analysis. Shared dinners represents the frequency with which the adolescent and parent eat dinner during the week. Parent-child communication are created by summing respondent reports of engaging in the following discussions with parents within the past 4 weeks: talking about someone the respondent is dating or party he/she went to; talking about a personal problem; talking about school work or grades; and talking about other things the respondent doing at school. The closeness indicator is a summary measure based upon the adolescent's mean response to four items: level of closeness, satisfaction with relationship, if parent is warm and loving, and satisfaction with communication. These questions were asked separately for resident mothers and resident fathers. For respondents living in a two-parent- household the average of responses for both parents is used. The available response is used when the teen only lives with one parent. Questions about shared activities and parent-child communication were also asked for nonresident mothers and fathers. For individuals who reported activities with their nonresident parents these responses were averaged with the responses for resident parents.

Because some of the items used to construct these parenting measures have not been directly linked to physical activity outcomes in the literature, bivariate relationships between these items and physical activity will initially be explored.

### *Physical Inactivity Trajectories*

Physical activity is measured by a standard physical activity behavior recall in Add Health that is similar, although not identical, to other self-report questionnaires that have been used and validated in other large-scale epidemiological studies (Andersen et al. 1998; Sallis et al. 1993). In WII and WIII, a series of questions ask about participation in moderate to vigorous physical activity (MVPA), including skating and cycling, exercise and active sports (5-8 metabolic equivalents or METs), in units of times per week. One MET represents the energy expenditure associated with quiet sitting. Each question represented a group of similar/related MVPA activities. Respondents indicated the number of times in which they engaged in moderate to vigorous physical activity for each group of activities according to the following four categories: 0; 1-2; 3-4; and 5+ times per week. After converting the categorical frequency response into a metric frequency, the number of times that the respondent engaged in moderate to vigorous physical activity is then summed across the three groups of activities listed at WII.<sup>1</sup>

The Wave III questionnaires added questions applicable to young adults (e.g., weightlifting, walking for exercise) in addition to the activities from the WII questionnaire, resulting in seven groups of activities.<sup>2</sup> A standardized sum of MVPA was created to avoid reporting an artificial increase in reported activities levels in young adults resulting from the addition of these activities. The total sum of MVPA reported in WIII was standardized to be equivalent to that of WII by dividing by the total number of groups of activities at WIII [7] and then multiplying by the total number of groups of activities in WII [3], similar to the approach used by Gordon-Larsen and colleagues (1999, 2004).

Overall activity frequency was summed to determine total weekly MVPA at each wave. These sums were used to determine whether individuals met national recommendations for physical activity (Ainsworth et al. 1993) at each wave (five or more weekly bouts of MVPA). At WII, when respondents were adolescents, 40% of females and 25% of males did not meet national recommendations for physical activity. At WII I, when adolescents were young adults, these numbers increased to 89% and 79% respectively. The dependent variable contains four trajectories that capture change and continuity in meeting national recommendations for physical activity from WII to WIII: *Become Physically Active* (WII < 5 weekly bouts of MVPA; WIII ≥ 5 weekly bouts of MVPA) *Stay Physically Active* (WIII ≥ 5 weekly bouts of MVPA); *Become Physically Inactive* (WII ≥ 5 weekly bouts of MVPA; WIII < 5 weekly bouts of MVPA); *Stay Physically Inactive* (WII < 5 weekly bouts of MVPA; WIII < 5 weekly bouts of MVPA). Because the percentage of individuals who becomes physically active is very small (3%), this category is grouped with *Stay Physically Active* for analysis. Over 50% of males and females become inactive in young adulthood. It should be noted that physical inactivity is equivalent to less than five or more bouts of MVPA in these analyses. Other research equates inactivity with sedentary behaviors, such as TV viewing (Gordon-Larsen et al. 2000; 2004; Norman et al. 2005;

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<sup>1</sup> In order to sum the frequencies of engaging in the 3 different groups of activities which are reported as categories of frequency, I assigned the midpoint of the range of frequency for each response category as follows: the response category 1-2 was assigned 1.5; response category 3-4 was assigned 3.5; and response category 5 or more was assigned 6.

<sup>2</sup> At WIII response options were true frequency counts of activities ranging from 0 to 6, and 7 or more. For the response category 7 or more, I assigned the value of 7.

Strauss et al. 2001), which differs from how inactivity is defined in these analyses.

## **Analytical Approach**

All analyses will use STATA survey procedures with sampling weights to adjust for the clustered sample design and unequal probability of selection to ensure the results are nationally representative and that bias in standard errors are reduced. Analysis will be guided by the four research aims of this paper. To explore variation in parenting practices, I will calculate mean levels of parental control and parent child relations by race/ethnicity and SES subgroups. Bivariate regression analyses will be performed to test for differences between subgroups.

Bivariate logit models will then be used to determine the relationship between parenting styles/practices and the risk of being physically active or inactive in adolescence and young adulthood (i.e., WII and WIII activity/inactivity). Exploratory analysis continues by using bivariate multinomial logistic regression models to test the relationship between parenting practices and the risk of becoming or staying inactive from adolescence into young adulthood.

Multinomial logistic regression is then employed to examine the relationships displayed in the conceptual model (Figure 1). Multinomial regression is appropriate when the dependent variable is an unordered nominal variable with n categories. The procedure estimates the log of the ratio of the probability of being in the n<sup>th</sup> category relative to a base category (stay active/become active), where the effects of independent variables are measured by the relative risk or odds (Long 1997). I focus individuals who stay or become inactive, because these groups are most at risk for becoming obese as well as developing other adverse health outcomes.

### **The fundamental model takes the form:**

$$\text{logit}(P_j) = \log\left[\frac{P_j}{P_0}\right] = \beta_{j0} + \beta_{j1}X_1 + \beta_{j2}X_2 + \beta_{j3}X_3 + \beta_{j4}X_4 + \dots + \beta_{jk}X_k$$

Multivariate analysis begins with a baseline model of the relationship between family poverty (welfare/poverty status) and physical activity trajectories. Model 2 enters parent education. Model 3 enters race/ethnicity to establish the relationship between family disadvantage and obesity independent of race/ethnicity. Model 4 enters parenting measures to determine if parenting practices mediate the impact of poverty. Before analyzing a model with all the parenting variables included, I will enter them individually in order to examine their separate effects on the poverty coefficient. This approach will be used to more accurately determine which parenting elements act as mediators of poverty. Model 5 enters control measures. To the extent that parenting practices mediate the effects of poverty, we add to our understanding of the ways in which social disadvantage operates via parenting behaviors to influences physical activity trajectories from adolescence into young adulthood. Analysis adjusts for design effects inherent in the complex stratified cluster sampling used by Add Health.

The Bayesian Information Criterion (BIC) will be used to assess the overall fit of the model and to compare nested and nonnested models (Raftery 1996). In addition, Likelihood Ratio (LR) tests will test if a variable has no (zero) effect and Wald tests will determine if outcome categories can be combined (Long 1997). Similar tests will be employed for AIM 1 analyses.

## **Preliminary Findings**

Preliminary analysis (See Table 2) indicates a positive relationship between poverty and physical inactivity at both WII and WIII. Parent education is also significantly related to physical activity at both waves. The likelihood of being inactive is higher for individuals who lived in poverty or were on welfare before the age of eighteen and whose highest educated parent received a high school diploma (or equivalent) or less. Similar relationships are evidenced when examining the relationship between social disadvantage and change in physical activity measures. The likelihood of staying obese (versus stay active/become active) is higher for those who lived in poverty or were on welfare and whose highest educated parent received a high school diploma or less. The likelihood of becoming obese (versus stay active/become active) is also higher for individuals whose highest educated parent received a high school diploma or less.

Parenting measures are also related to physical activity outcomes. Parent-child relationship measures have a stronger influence on physical activity than parental control measures. Among parental control measures only monitoring influences physical activity at WII but not at WIII, with higher amounts of monitoring reducing the likelihood of inactivity at WII. Supervision is not significantly related to physical activity at either wave. Among parent-child relations, shared activities, shared dinners and closeness and warmth were related to physical activity at both waves. Higher levels of activities, meals and closeness reduced the likelihood of inactivity at both waves. Shared decision making was only related to physical activity at WII and parent-child communication was only related to physical activity at WIII. Similar relationships are evidenced when examining the relationship between parenting and change in physical activity measures.

These preliminary results reproduce previous research on the relationship between SES and physical activity and highlight the importance of parent behaviors on influencing physical activity in adolescence and young adulthood. They also establish the potential for parenting behaviors to mediate family disadvantage effects on physical activity.

## **Contributions of Study**

To my knowledge this is the first study of its kind to use nationally representative data to investigate the mediating effects of parenting in the relationship between poverty and physical activity outcomes. In addition, I use a nationally representative, ethnically and socioeconomically diverse sample to investigate the relationship between parenting and physical activity behaviors, something that very few other researchers have done. Parenting behavior has been shown to affect levels of physical activity in youth that endure into adulthood. Parenting behavior is one of the most important modifiable factors for youth physical activity, and physical activity is a health behavior directly linked to obesity and other health outcomes. This analysis will be able to provide some insight how to reduce large socioeconomic disparities in physical activity and obesity among our youth.



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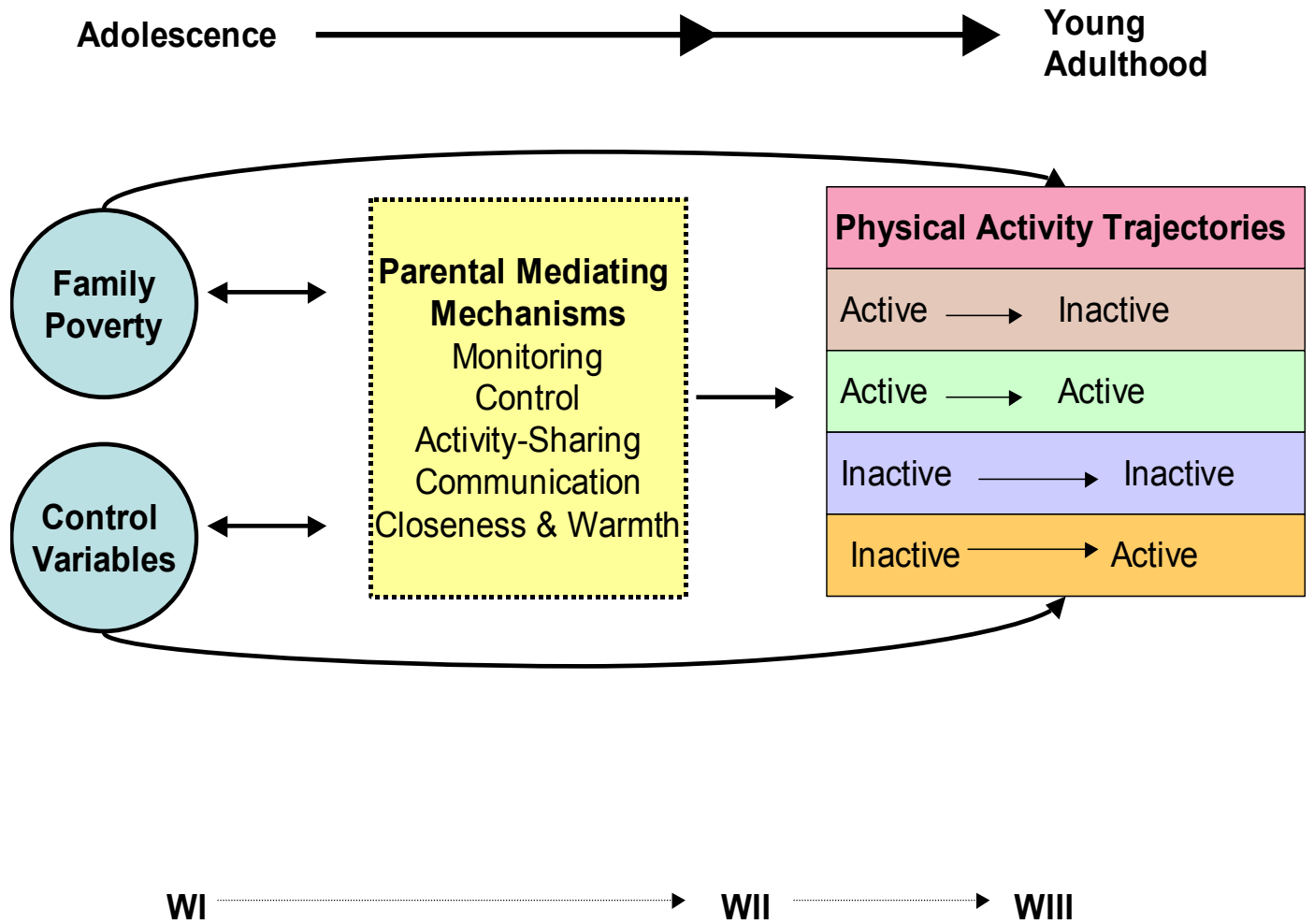
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Figure 1. Conceptual Model



**Table 1. Variable Descriptions, Means and Standard Deviations by Sex**

Variable	Description	Total		Female		Male	
		Mean	SE	Mean	SE	Mean	SE
<b>Outcomes</b>							
<b>Change in Physical Activity</b>							
Become Inactive	Active at WII but not active at WIII	0.55	0.010	0.52	0.015	0.57	0.01
Stay Inactive	Not active at WII & not active at WIII	0.29	0.010	0.37	0.014	0.22	0.01
Become Active or Stay Active	Not Active at WII but active at WIII or Not active at WII & not active at WIII	0.16	0.007	0.11	0.008	0.21	0.009
<b>Static Measures of Physical Activity</b>							
Inactive at Wave II	Inactive at Wave II	0.32	0.010	0.40	0.015	0.25	0.011
Inactive at Wave III	Inactive at Wave III	0.84	0.007	0.89	0.008	0.79	0.009
<b>Disadvantage Measures</b>							
<b>Welfare/Poverty Status</b>							
	Welfare receipt prior to the age of 18 and/or Family Income less than \$16,000/year	0.28	0.016	0.28	0.017	0.29	0.018
<b>Parent Education High School or Less</b>							
	Highest educated parent completed a high school degree (or equivalent) or less	0.62	0.019	0.63	0.020	0.62	0.020
<b>Control Measures</b>							
<b>Ethnic Minority Status</b>							
Non-Hispanic White (Reference Category)	Respondent reported white	0.71	0.028	0.72	0.029	0.71	0.028
Non-Hispanic Black	Respondent reported black	0.13	0.019	0.14	0.020	0.13	0.019
Hispanic	Respondent reported Hispanic	0.11	0.017	0.11	0.017	0.12	0.017
Asian	Respondent reported Asian	0.03	0.007	0.03	0.007	0.03	0.007
Other	Respondent reported other race.	0.01	0.003	0.01	0.002	0.01	0.004
<b>Female</b>							
	Respondent reported female	0.49	0.008	-----	-----	-----	-----
<b>Age</b>							
	Self-reported age at WI.	14.94	0.115	14.83	0.115	15.04	0.12
<b>Parent Obese</b>							
	Report of mother or father being obese	0.24	0.007	0.23	0.008	0.24	0.010
<b>Family Structure</b>							
2 Biological Parents (Reference Category)	2 Biological/Adoptive Parents	0.63	0.013	0.62	0.014	0.63	0.015
Step family	Step family	0.17	0.006	0.17	0.009	0.16	0.007
Single mother	Single mother	0.20	0.011	0.21	0.011	0.20	0.014
Single father	Single father	0.001	0.001	0.001	0.001	0.002	0.001
Other family structure	Other family structure	0.01	0.001	0.005	0.002	0.01	0.001
<b>Full-time Working Mother</b>							
	Mother works full time	0.58	0.011	0.57	0.012	0.58	0.014
<b>Family Size</b>							
	Number of Siblings	1.48	0.031	1.49	0.041	1.46	0.030
<b>Mediating Parenting Measures</b>							
<b>Parental Control</b>							
<b>Monitoring</b>							
	Seven item additive scale of parental monitoring of amount and type of, TV watched, eating, curfew, bedtime, friends and clothes	2.03	0.053	2.02	0.052	2.04	0.060
<b>Supervision</b>							
	Three item additive index of parental presence when respondent leaves and comes home from school and goes to bed at night.	2.41	0.014	2.40	0.016	2.41	0.018
<b>Parent Child Relations</b>							
<b>Shared Activities</b>							
	A count of activities of the activities a parent and child did together in the previous four weeks (5 Items).	1.52	0.029	1.49	0.031	1.54	0.035
<b>Shared Decision-Making</b>							
	Parent report of whether or not the parent and child make decisions regarding the child's life	3.96	0.016	4.00	0.022	3.93	0.021
<b>Shared Meals</b>							
	The frequency with which the respondent and parent eat dinner during the week.	5.03	0.062	5.00	0.074	5.05	0.068
<b>Parent-Child Communication</b>							
	Sum of four types of discussions with parents in the previous four weeks including dating, parties, personal problems and school.	1.74	0.024	1.85	0.030	1.63	0.028
<b>Closeness and Warmth</b>							
	Summary measure based on mean response to four items: level of closeness, satisfaction with relationship, if parent is warm and loving and satisfaction with communication.	4.29	0.016	4.19	0.019	4.37	0.020
N		8,245		4,268		3,977	

Data are weighted.

**Table 2. Associations Between Disadvantage Measures, Parenting Measures and Physical Inactivity at Waves II and III (Bivariate Odds Ratios) And Change in Physical Activity (Multinomial Odds Ratios: Reference Category is "Stay Non-Obese or Reduce Obese") N= 8,245**

	Static Measures of Physical Activity		Change in Physical Activity	
	Inactive Wave II	Inactive Wave III	Become IA WII	Stay IA WIII
<i>Disadvantage Measures</i>				
<b>Welfare/Poverty Status</b>	1.17* (0.085)	1.21* (0.096)	1.16 (0.090)	1.31* (0.135)
<b>Parent Education High School or Less</b>	1.30*** (0.084)	1.29** (0.110)	1.20* (0.195)	1.29*** (0.148)
<i>Parental Control</i>				
<b>Monitoring</b>	0.86*** (0.019)	0.96 (0.023)	1.02 (0.025)	0.87*** (0.027)
<b>Supervision</b>	0.92 (0.044)	0.91 (0.050)	0.95 (0.098)	0.90 (0.087)
<i>Parent Child Relations</i>				
<b>Shared Activities</b>	0.66*** (0.021)	0.74*** (0.025)	0.83*** (0.030)	0.56*** (0.023)
<b>Shared Decision-Making</b>	0.91** (0.030)	0.93 (0.044)	0.96 (0.048)	0.87* (0.046)
<b>Shared Meals</b>	0.90*** (0.013)	0.96* (0.032)	1.00 (0.019)	0.90*** (0.017)
<b>Parent-Child Communication</b>	0.95 (0.026)	0.92* (0.032)	0.93* (0.034)	0.90** (0.036)
<b>Closeness and Warmth</b>	0.68*** (0.032)	0.72*** (0.054)	0.82* (0.068)	0.58*** (0.044)

Data are weighted.

Standard errors are in parentheses

\* significant at .05 level

\*\* significant at .01 level

\*\*\* significant at .001 level