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NONRESIDENT FATHER INVOLVEMENT, SOCIAL CLASS, AND ADOLESCENT WEIGHT

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Abstract

Body weight issues disproportionately affect children with nonresident fathers. Using data from the National Longitudinal Study of Adolescent Health, we investigate the relationship between nonresident father involvement and adolescent weight, specifically adolescents' risk of being underweight, overweight, and obese. Our results show that nonresident father involvement is associated with adolescent weight and that the effect varies according to social class, fathers' obesity, and the gender of the child. Among both males and females, greater involvement with fathers increases their risk of obesity. Among females, the effect of father involvement on obesity is even greater if her father is obese. Among males, greater father involvement is also associated with lower risk of underweight. The effect of father involvement on adolescent obesity also varies by social class: Involvement with a more highly educated nonresident father is associated with a lower risk of obesity. Child support payments are not associated with being at risk of overweight or underweight among males or females. These results suggest that nonresident fathers must be included in policy discussions of adolescent weight, especially given the positive association between nonresident father involvement and adolescent obesity.

Nonresident Father Involvement, Social Class, and Adolescent Weight

Never before has the weight of American children and adolescents received such scrutiny. One in every six U.S. children is obese, prompting the Institute of Medicine to make the prevention of childhood obesity a national priority (Hedley et al., 2004; Koplan, Liverman, & Kraak, 2005). Receiving much less attention is the fact that many U.S. children are food insecure, hungry, or are underweight for their age. In 2004, 20% of households with children were food insecure, meaning that they did not always have access to enough food for active, healthy living (Nord, Andrews, & Carlson, 2005). Hunger and underweight are less prevalent than food insecurity, affecting less than 5% of children in the United States, but that still amounts to hundreds of thousands of children (Nord et al., 2005; Wang, Monteiro, & Popkin, 2002). Obesity, overweight, hunger, and underweight have been shown to be associated with a range of negative health, academic, emotional, and behavioral outcomes in childhood that can extend into later adulthood (Carr & Friedman, 2005; Dunifon & Kowalski-Jones, 2003; Ferraro & Kelley-Moore, 2003; Kleinman et al., 1998; Swallen, Reither, Haas, & Meier, 2005; Weinreb et al., 2002).

Somewhat paradoxically, childhood overweight/obesity and underweight are two sides of the same coin: Both are associated with social class (i.e., poverty), and both have negative effects on children's physical health as well as social and emotional well-being. Moreover, obesity and food deficiencies are more common among children with nonresident fathers (Nord et al., 2005; Strauss & Knight, 1999). In one study of low-income, multiethnic Canadian children, approximately 40% were overweight, and children in single-parent families consumed significantly more fat than children in traditional two-biological-parent families (Johnson-Down, O'Loughlin, Koski, & Gray-Donald, 1997). Other research has indicated that nearly six million

(33%) children living in single-mother households in the U.S. are food insecure, and 2% are food insecure with hunger (Nord et al., 2005). Despite the association between childhood food deficiencies, overweight, and obesity and the absence of a father in the home, studies have not examined the relationship between nonresident father involvement and children's weight. Therefore, in this study, we investigate the relationship between nonresident father involvement (visits, activities, and closeness) and underweight, overweight, and obesity among adolescents in single-mother homes using longitudinal data from the National Longitudinal Study of Adolescent Health (Add Health). Our results indicate that the effect of nonresident father involvement on children's weight is complex and potentially harmful in that it is associated with a higher risk of adolescent obesity among some populations of children.

Background and Hypotheses

The benefits of nonresident father involvement to children's social and emotional health have been well established. Children's outcomes that have been examined in previous studies include academic achievement (e.g., standardized test scores, grade point averages, and high school graduation), externalizing problems (e.g., behavior problems and delinquency), and internalizing problems (e.g., depression and low self-esteem); see Amato and Gilbreth (1999). Less is known, however, about how nonresident fathers affect children's *physical* health. One study found that visitation with nonresident fathers was associated with less food insecurity among children in single-mother households (Garasky & Stewart, 2007), which is a major determinant of low weight and height for age (Food and Agriculture Organization, 2006). Another study found that adolescents with more involved nonresident fathers were less likely to start smoking (Menning, 2006). These studies suggest that nonresident fathers' positive influence on children, especially through visitation as opposed to child support alone, may be more wide-

ranging than previously thought. In particular, we expect involvement with nonresident fathers to be associated with children's weight, specifically children's risk of underweight, overweight, and obesity.

Nonresident father involvement may benefit children's health by helping to keep children from deviating from normal weight (i.e., from becoming underweight, overweight, or obese). This could happen in different ways. Through frequent visitation, nonresident fathers can monitor their children's mothers' food procurement habits, which may result in more nutritious and regular meals (Seltzer, 1994). Nonresident fathers often provide informal, "in-kind" economic support to their children through visitation, including groceries and dinners out (Hamer, 1997; Johnson & Doolittle, 1998; Stier & Tienda, 1993). Aside from monitoring and in-kind support, close nonresident father–child relationships are linked to better psychosocial health in adolescents (e.g., Stewart, 2003). Children who receive support from others, including fathers, are more likely to practice "body acceptance," which is associated with a lower likelihood of disordered eating, such as binge eating, anorexia, or both (Williams & Germov, 2004a). Adolescents who are involved with their nonresident fathers may also be more physically active, watch less television, and get more sleep, which are factors associated with less obesity in children (Eisenmann, Bartee, & Wang, 2002; Eisenmann, Bartee, & Damori, 2004; Heelan & Eisenmann, 2005; Eisenmann, Ekkekakis, & Holmes, in press). Therefore, we test the following hypotheses:

Hypothesis 1a: Nonresident father involvement is associated with a decreased likelihood of underweight in adolescents.

Hypothesis 1b: Nonresident father involvement is associated with a decreased likelihood of overweight or obesity in adolescents.

However, it is possible for nonresident fathers to unintentionally increase their child's risk of obesity. There are several reasons why this might be the case. First, compared to married men and women, single and divorced men tend to have unhealthy lifestyles—that is, they have a greater tendency to drink alcohol, smoke cigarettes, and maintain a poor diet (Nock, 1998)—that could be transmitted to children. Second, the prevailing pattern of contact between nonresident parents and their children is through so-called "Disneyland" or leisure activities (e.g., picnics, movies, and shopping) that are likely to involve eating away from home (Stewart, 1999), which has been shown to be associated with obesity. Moreover, rules and discipline are often relaxed during father–child visitation, and fathers may be reluctant to push children to eat healthily. As a result, nonresident fathers may repeatedly expose children to poor eating habits, high-calorie restaurant meals, and junk food during visitation. A poor-quality relationship with a nonresident father may cause stress for the child, which may also lead to unhealthy eating habits. Moreover, stress produces changes in children's body chemistry (i.e., increases in cortisol), which has been linked to obesity (Dimitriou, Maser-Gluth, & Remer, 2003). Even if the child's relationship with his or her nonresident father is good, it is also possible that the so-called chaotic lifestyle associated with frequent visitation may increase the child's risk of obesity. That is, involvement with a nonresident father may challenge children's ability to develop and maintain a healthy lifestyle whether at home with their mother or during visitation with their father. Children who visit their fathers frequently may spend a lot of time in the car traveling back-and-forth between parents. Visitation may make it harder for them to exercise and participate in after-school activities, including sports. Thus, we test for the following alternative hypothesis:

Hypothesis 1c: *Nonresident father involvement is associated with an increased likelihood of overweight or obesity in adolescents.*

Moderating Effects: Social Class, Father's Obesity, and Gender of Child

Social class. We anticipate the effect of nonresident father involvement on adolescent weight to vary by fathers' social class—namely, fathers' education and family income. Our hypotheses regarding the effect of class are guided by Brofenbrenner's (1979) ecological framework, which takes into account the social settings within which human relationships occur and within which children develop into adulthood (White & Klein, 2002). Doherty, Kouneski, and Erickson (1998) argued that "responsible fathering" is particularly vulnerable to contextual factors, most notably class considerations, such as education, income, and employment. Indeed, fathers' education has been found to be an important determinant of paternal involvement with children (e.g., King, Harris, & Heard, 2004). However, few studies have examined how social class moderates the relationship between fathering behaviors and children's well-being, especially among children from nontraditional families (Marsiglio, Amato, Day, & Lamb, 2000).

Relative to childhood obesity, few U.S. children (3% of adolescents) are underweight (Swallen et al., 2005). Underweight in children is much more prevalent among low-income, developing countries than high-income, industrialized ones (Food and Agriculture Organization, 1999). Within countries, underweight is generally more common among lower classes, although the United States may be an exception (Wang et al., 2002). Nevertheless, nonresident father involvement may help prevent underweight among adolescents from low-income households. For example, Garasky and Stewart (2007) found that frequent visitation with nonresident fathers is associated with less food insecurity among poor and near-poor children, and food insecurity is associated with childhood underweight (Food and Agriculture Organization, 1999). Low-income, nonresident fathers provide a considerable amount of in-kind support in the form of clothes, dinners, toys, diapers, and formula (Edin & Lein, 1997; Greene & Moore, 2000). In contrast to

formal child-support payments, which go to the mother and which may be spent on housing, etc., these resources go directly to children to meet their daily needs, including their nutritional needs. Thus, we specify the following hypothesis:

Hypothesis 2a: Nonresident father involvement is associated with a decreased likelihood of underweight among children with lower class fathers compared to children with higher class fathers.

Obesity is also a pressing concern for low-income children. Studies based on national samples have consistently shown a negative relationship between income and childhood obesity in that a disproportionate share of low-income children are obese (Anderson & Butcher, 2006). The various mechanisms underlying this relationship have not been fully identified, but a great deal of attention has focused on dietary habits, such as overeating in times of plenty and over-reliance on calorie-dense, processed, and fast foods (Alaimo, Olson, Frongillo, & Briefel, 2001; Dietz, 1995; Drewnowski & Specter, 2004). Indeed, the diets of working and lower class people are often stereotyped as problematic and considered the root cause of the obesity epidemic (Crotty & Germov, 2004). Perceptions of food and food preparation, actual eating habits, and perceptions of the effect of food on weight vary by social class (Bourdieu, 1984; DeVault, 1991), although class differences in food consumption patterns may be declining (Mennell, 1985).

In his study of French families, Bourdieu (1984) found that, whereas lower and working classes value abundant, heavy, filling foods (e.g., fatty meats such as pork, sauces, gravies, casseroles) as well as second helpings associated with keeping up one's strength, middle classes, professionals, and bourgeoisie value expensive, low-calorie, fresh foods, grilled meats, and fish as well as thinness and restraint. Indeed, Bourdieu (p. 190, italics in original) argued that class-based cultural values with respect to food and eating are *embodied* both psychologically and

physiologically in terms of the shape and form of the body, including weight. Parents are children's primary agents of socialization, and interaction with parents (both resident and nonresident) would result in the internalization of distinct sensibilities and tastes about food depending on social class (Bourdieu's concept of *habitus*). Thus, we anticipate that social class will moderate the relationship between nonresident father involvement and adolescent overweight or obesity in the following ways:

Hypothesis 2b: *Nonresident father involvement is associated with an increased likelihood of overweight or obesity among children with lower class fathers compared to children with higher class fathers.*

Father's obesity. The link between parental and childhood obesity in traditional two-parent families is well established: Children whose parents are overweight are more likely to be overweight themselves (Davidson & Birch, 2001). The effect of parental obesity on children's risk of obesity has not been examined for children with nonresident fathers. The relationship between parental and childhood obesity may be weaker when children and parents do not reside in the same household. A Swedish study by Magnusson and Rasmussen (2002) found a stronger correlation in the body mass indexes (BMIs; i.e., kg/m^2) of maternal half-siblings than paternal half-siblings, which they attributed to maternal half-siblings being more likely to have resided together during childhood. We therefore expect that greater involvement with an obese nonresident father would raise the risk of adolescent obesity due to the intergenerational transmission of an unhealthy lifestyle.

Hypothesis 3: The effect of nonresident father involvement on adolescent overweight or obesity is exacerbated if the father is obese.

Gender of child. These effects may vary by the gender of the child. Among adolescents, males and females have the same prevalence of overweight (Anderson, Butcher, & Levin, 2003). However, nonresident fathers may engage in more active types of involvement (e.g., sports or games) with males than females, but empirical evidence for the effect of the sex of the child on types of nonresident father involvement has been mixed (for a discussion, see Seltzer, 1991). Perhaps with fewer common interests between fathers and females than fathers and males, the content of visitation with daughters may resemble that of a "date" (e.g., dinner and a movie). The combined result of more active-type involvement with males and more eating-related activities with females may result in father involvement being associated with a greater likelihood of being obese among females than males. On the other hand, adolescent females are more concerned about weight gain than adolescent males and are more likely to suffer from an eating disorder (Hepworth, 2004). Females' eating patterns are profoundly affected by the "thin ideal" that dominates Western culture (Williams & Germov, 2004b). Men and women also have different food consumption expectations and patterns, with men being more likely to eat coarser, higher calorie foods (i.e., "meat and potatoes") and women being more likely to eat lighter fare (Bourdieu, 1984). Higher class females may also be more susceptible to the thin ideal than lower class females. Studies of body image have indicated that lower income females are less likely than higher class females to perceive themselves as overweight (O'Dea & Caputi, 2001). In that study, lower SES females had higher rates of obesity than higher income females but had higher physical self-esteem. On the other hand, males' self-esteem is much less affected by social class. Therefore, the effect of nonresident father involvement on children's overweight and obesity may be less among higher class than lower class females because they are more concerned about the prevention of obesity. These studies thus lead us to suggest the following hypothesis:

Hypothesis 4: The effect of nonresident father involvement on adolescent weight (risk of being underweight, overweight, or obese) is different for males and females.

Data

Data for this study come from the first two waves of the National Longitudinal Study of Adolescent Health (Add Health), which surveyed adolescents in grades 7–12 in 1994–1995 and again in 1996. The data contain extensive information on various measures of adolescent health, well-being, daily activities, parental involvement, and school and community contextual information. Data are primarily drawn from adolescents' responses to questions from the in-home questionnaires, although financial information and parental obesity is drawn from the parent questionnaire. Control measures and father involvement measures are drawn from wave 1; information used to compute adolescent weight comes from wave 2.

The sample was restricted to adolescents who completed both wave 1 and wave 2 questionnaires, who were not living with their biological fathers but were living with their biological mothers, whose nonresident fathers were still alive, and for whom complete information was available for independent, dependent, and control variables (N = 1,983). Descriptive statistics for all variables discussed below are shown in Tables 1 and 2; all figures account for survey design characteristics. Means of binary variables correspond to proportions predicted to have that trait in the population.

INSERT TABLE 1 ABOUT HERE

INSERT TABLE 2 ABOUT HERE

Dependent Variable

Weight category. The dependent variable is a categorical measure based on body mass index (BMI; i.e., kg/m^2) percentile rank for age and sex and is consistent with criteria specified

by the Centers for Disease Control and Prevention (CDC) and the American Obesity Association (AOA) for determining weight classification among adolescents.[1] Measures were constructed using CDC-supplied SAS code that calculated BMI and associated percentile rank for age and gender from adolescents' gender, age, and measured height and weight at wave 2 (Centers for Disease Control and Prevention, 2004). Adolescents are considered underweight if their BMI falls at or below the 5th percentile for their age and gender, normal weight if they fall between the 5th and 85th percentiles, overweight if they fall between the 85th and 95th percentiles, and obese if their BMI falls at or above the 95th percentile.

Independent Variables

Father involvement. Measures of nonresident father involvement were constructed from 11 measures taken at wave 1. Adolescents were asked how close they were to their fathers (1 = not close at all, 5 = extremely close), how often they had stayed overnight with him during the past year (0 = not at all, 5 = more than once a week), and a series of nine questions about whether they had participated in activities such as going shopping, going to a movie, or working on a project for school with their father (1 = yes, 0 = no). These measures were standardized to have a mean of 0 and a standard deviation of 1 and summed to create an index of father involvement.

Nonresident father obese. The resident parent was asked at wave 1 if the adolescent's biological father suffered from obesity (1 = yes).[2]

Controls

Adolescent's BMI at wave 1 was calculated from the adolescent-reported height and weight for this wave of the survey.[3] Binary variables indicating African American and Latino background are also included. A measure of child support paid on a monthly basis at wave 1 is

also included. Adolescents were coded as living in a high-income household (1 = yes) if the household income fell into the top quintile of the subsample ($50,000/year or more) and as being poor (1 = yes) if the income of the resident household fell within 130% of the poverty line as defined by Federal Poverty Guidelines for 1994 (Social Security Administration, 2004).[4] A series of binary measures of mother's and father's education are included in all models. Adolescent pregnancy is coded as 1 if the adolescent reported ever having been pregnant by wave 1 and 0 otherwise.[5] Depression, which is linked to eating disorders and is negatively associated with healthy eating patterns (Fulkerson et al., 2004), is measured using an averaged scale of 19 items from wave 1; specific items recorded the frequency with which the adolescent experienced various depressive symptoms in the past week (e.g., felt depressed, too tired to do things, or lonely), with higher scores indicating greater frequency ($\alpha = .86$). Because smoking suppresses weight gain (e.g., Pisinger & Jorgensen, 2007), we include a measure of smoking behavior: Adolescents were asked at wave 1 if they had smoked regularly for the last 30 days (1 = yes, 0 = no). Resident parents were asked at wave 1 if the adolescent's biological mother suffered from obesity (1 = yes). Mother's involvement is an index constructed from standardized items from wave 1 that are identical to those used in the construction of the independent variable for father's involvement, minus the measure of overnight visits.

All analyses were performed using multinomial logistic regression. Given the over-sampling of certain groups (e.g., high-income African Americans) in Add Health and other features of the survey's sample design, all analyses take account of sample weights, clustering, and strata using survey commands in Stata 9.2. For further details regarding compensation for survey design effects in Add Health, see Chantala and Tabor (1999).

Results

Hypotheses regarding the overall effects of father involvement on adolescent weight are tested in Table 3. Results suggest that adolescents who are more involved with their nonresident fathers experience significantly higher odds of being obese (but not overweight) and lower odds of being underweight than their peers who are less involved. This supports hypothesis 1a (father involvement is negatively related to adolescent underweight) and partially supports hypothesis 1c because the positive effect of father involvement is limited to obesity (and not overweight). Conversion of the coefficient estimates for father involvement into relative risk ratios (exp[b]) suggests that a one standard deviation increase in nonresident father involvement more than doubles the risk of obesity over being normal weight and cuts the risk of being underweight by about half. In contrast, no support is found for the notion that increased involvement decreases the likelihood of obesity (hypothesis 1b). Additionally, those with higher BMI at wave 1 were less likely to be underweight and had a high risk of overweight and obesity at wave 2, and those with biological mothers who were obese had lower odds of being underweight by wave 2. Adolescents from high-income families had lower odds of being overweight, whereas those from poor families had higher odds of being obese. Compared to those with fathers who did not graduate from high school, those with fathers who had more than a 4-year college degree had lower odds of overweight. Depression is associated with a higher probability of being underweight and lower probability of being obese.

INSERT TABLE 3 ABOUT HERE

Do these effects vary according to social class? To explore this question (which addresses hypotheses 2a and 2b), we include an interaction term between father involvement and father's education in the model presented in Table 4. The results, which are otherwise largely consistent

with those in Table 3, show that the effects of involvement also vary according to social class, as measured by father's education: Those who were more involved with the most highly educated fathers were less likely to be obese. Specifically, a one standard deviation increase in involvement with fathers who had more than a 4-year college degree instead of less than a high school education reduces the relative risk (i.e., $\exp[b_{involvement} + b_{education} + b_{involvement \times education}]$) of obesity by a factor of .06—that is, to nearly $1/20^{th}$ of the risk. A similar interaction exists among those whose fathers have some college education, with a corresponding relative risk of .14. This indicates that class-specific norms regarding food consumption and weight may be internalized through father–child interaction, which supports hypothesis 2b. Although increased father involvement significantly reduces the risk of being underweight (which again supports hypothesis 1a), the effect is not the same for those with fathers of all educational backgrounds. For those whose fathers have had some college education, a one standard deviation increase in involvement more than doubles the relative risk of being underweight. This finding does not support (and is in part contrary to) what was predicted by hypothesis 2a. In additional analyses exploring class differences, we examined interactions between involvement and high- and low-income binary variables. Neither interaction with income was significant, which initially indicates that although the effects of involvement do vary according to education, they do not seem to vary according to youths' household income. (Analyses available upon request.)

INSERT TABLE 4 ABOUT HERE

There is also evidence to suggest the presence of a complex set of relationships that vary according to sex. Comparing results of a baseline model estimating the main effects of father involvement and adolescents' sex with a second model that also includes a father involvement-by-sex interaction shows that the addition of the interaction term improves model fit; the results

of an adjusted Wald test reject the hypothesis that the interaction coefficient is equal to zero ($p < .05$; results not shown). This suggests that there are significant gender differences in the effect of father involvement and that a stratified-by-sex approach may yield additional information. In Table 5, the effect of father involvement on adolescent weight is estimated for males and females separately.

INSERT TABLE 5 ABOUT HERE

This constitutes a revisiting of hypotheses 1a, 1b, and 1c within a preliminary exploration of gender-specific effects (hypothesis 4). Although the results for BMI are similar to those in the previous model, the effect of nonresident father involvement is somewhat different for males than for females. For males, increased father involvement is associated with lower odds of being underweight compared to normal weight, with a one standard deviation increase in involvement reducing the relative risk by a factor of .28, but this effect is not significant for females. The relationship between nonresident father involvement and increased risk of obesity is shared by both males and females, with a one standard deviation increase more than doubling the relative risk for males and more than tripling the relative risk for females. However, the slope of this coefficient does not differ significantly by sex. As such, these findings lend partial support to hypothesis 4 and to the notion that eating and activity patterns during visitation may be gendered.

Gender-specific effects are also associated with race in that African American males are less likely to be obese. As in the previous model, socioeconomic variables are associated with weight classification, but many effects are gender-specific: Being poor is associated with higher odds of obesity, and living in a high-income household is associated with lower odds of being overweight, but these effects are found only among males in this sample. Mother's education is significantly associated with weight classification among females but not males. Higher odds of

being overweight are found among females whose mothers have some college experience and higher odds of obesity among those whose mothers hold a 4-year college degree, whereas those whose mothers have more advanced levels of education see their relative risk of being underweight reduced nearly to zero. Females who have fathers with a similarly high level of education experience a similarly reduced risk of being underweight, whereas males with such fathers experience lower odds of obesity. Among females, depression increases the probability of being underweight and decreases the probability of obesity. The probability of obesity is lower among males who smoke.

Might the effects of father involvement also vary according to father's obesity? To explore hypothesis 3, an interaction between father's obesity and father involvement is included in the model presented in Table 6. Building on the gender-specific results in Table 5, results are again presented by sex of the adolescent. The findings suggest that increased involvement with obese fathers exacerbates the risk of obesity but that this effect is limited to females. An increase of one standard deviation in father involvement with obese fathers increases the relative risk of obesity by nearly 25 times among females. No similar effect is found among males, and the slope of the interaction term differs significantly according to sex. This provides support simultaneously for hypothesis 3 (regarding the effects of fathers' obesity) and hypothesis 4 (regarding gender), indicating that—at least among females—involvement with obese fathers may provide opportunities for the transmission of, or acting out of, unhealthy eating habits.

INSERT TABLE 6 ABOUT HERE

In sum, the effects of fathers' involvement on adolescent weight are intertwined with gender, class, and paternal weight. Not all involvement produces the same outcomes. Rather, parents' own traits—including their education and obesity status—and adolescents' gender

should also be considered.

In supplementary investigations (available upon request), three-way interactions among involvement, SES variables, and obesity were explored, as were interactions between father involvement and education by sex. However, these models were unstable (e.g., yielded null coefficient estimates and missing standard errors) due either to a lack of model convergence or to insufficient variation in outcome among members of the multiple interaction groups and the resulting collinearity. Furthermore, the addition of interactions between resident mother's involvement as well as her education, involvement, and obesity did not yield significant results except for one: Adolescent females who are more involved with obese mothers are significantly less likely to be underweight than to be normal weight.

Other supplementary analyses (available upon request) suggest that the gender-specific effects of involvement on risk of overweight may be a function of gender differences in activity levels during visitation. Although none of the individual measures of father involvement independently predict weight classification among adolescents living separately from their biological fathers in Add Health, it is notable that, in addition to several other measures of involvement (feeling close to dad, staying overnight, and going to a movie, museum, play, concert, or sporting event), males were more likely to report having played a sport with their fathers than were females. In contrast, females were no more likely than males to engage in any form of involvement. This suggests that the overall level of physical activity may be lower during visitation for females than for males. (Results available upon request.)

Conclusion

This study extends our understanding of adolescent well-being on two fronts. First, we have incorporated nonresident fathers' involvement into children's family context as it relates to

adolescent outcomes. In this age of nontraditional families, children's familial influences are not limited to members of the resident household. Second, we have expanded research on the effect of nonresident fathers on children's well-being beyond traditional measures (e.g., academic achievement and depression) and have examined their effects on children's physical health. Indeed, our research demonstrates that involvement with a nonresident father, specifically through visitation, is associated with adolescent weight (underweight, overweight, and obesity) net of aspects of the child's resident family, such as involvement with the mother.

However, as expected, the relationship between father involvement and adolescent weight is complex. It varies by the child's gender, the father's class (as measured by education), and whether the father himself is obese. First, for both males and females, greater involvement with nonresident fathers is associated with an increased likelihood that the child will be obese. We speculate that the "Disneyland" nature of nonresident father involvement (i.e., sharing celebratory foods) may be responsible for this effect or that greater involvement, regardless of content, allows greater opportunities for modeling an overweight nonresident father's unhealthy lifestyle. Another possibility is that a high level of involvement with two parents who live in separate households makes it difficult for adolescents to engage consistently in a healthy lifestyle such as the regular consumption of nutritious meals and participating in after-school activities such as sports. Our results with respect to social class indicate that children who are involved with fathers who are more highly educated may have more resources for coping with the complexities of visitation. For example, more highly educated fathers may have more flexible work schedules, which would allow the children to eat at home more frequently and engage in after-school activities. More highly educated fathers may also be more aware of the issue of adult and child obesity and may take greater steps to prevent it through healthier habits.

The effect of father involvement on adolescent obesity is different for males and females. For females only, involvement with an obese father is associated with an even greater risk of obesity. In contrast, males with more involved nonresident fathers are less likely to be underweight. These results may be linked to differential levels of physical activity between nonresident fathers and males versus females. Weight norms that are dictated by social class, in conjunction with fathers' own obesity, may also shape how involvement is related to males' versus females' weight. A major limitation of the present study is that measures of nonresident fathers' attitudes and behaviors with regard to food consumption, exercise, and weight maintenance were not available. Therefore, further work with more detailed measures is needed to test these possibilities.

Obesity, overweight, and underweight are conditions that disproportionately affect children in single-mother households. A body of research has emerged that indicates that the *quality* of involvement with a nonresident father, rather than the *quantity*, is what is important to children's well-being (e.g., Stewart, 2003). Our research suggests that we might consider gender, class, and nonresident fathers' own obesity to be important facets of the quality of his involvement with his child and that manipulating these variables (e.g., incorporating "healthy lifestyles" into educational activities for nonresident parents and encouraging exercise as a focus of visitation activities) may indirectly help address the problem of child obesity. At minimum, policymakers need to be made aware that the lives of American children are complex and may include more than one household as well as multiple parents and stepparents who are responsible for their feeding and care. Programs and policies aimed at reducing childhood obesity that do not address these issues would be incomplete and not fully effective.

Notes

1. Although the CDC and AOA use different terminology to describe the two highest weight categories, both organizations are consistent in defining classification cut-off points between the 85th and 95th percentiles and above the 95th percentile. The CDC defines the former group as "at risk for overweight" and the latter as "overweight," whereas the AOA defines the former as "overweight" and the latter as "obese." We use the latter convention as a matter of convenience.

2. A formal clinical measure for this variable was not available and there is a possibility of both error and bias in reporting. However, considering that one might expect resident mothers to recall their ex-partners' traits more negatively in retrospect, it is interesting to note that a greater percentage reported that they themselves suffered from obesity than reported that their ex-partners did so.

3. Interviewer-measured height and weight is not available for wave 1.

4. Membership in high- and low-income categories was verified to be mutually exclusive.

5. All males were coded as 0 for this variable.

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Table 1: Weight Category by Sex (percentage)

Sample	Underweight	Normal Weight	Overweight	Obese	*N*
All	4.0	71.5	12.7	11.8	1,983
Males	4.3	71.4	10.8	13.5	925
Females	3.7	71.6	14.5	10.2	1,058

Note. Percentages do not sum to 100% due to rounding. Estimates account for sample design characteristics.

Table 2: Descriptive Statistics for Independent Variables and Controls

Variable	Metric	All		Males		Females	
		$\bar{x}$	*SE*	$\bar{x}$	*SE*	$\bar{x}$	*SE*
Adolescent							
BMI at wave 1	kg/m^2	22.269	0.142	22.394	0.187	22.154	0.204
Ever Pregnant	1 = yes	0.025	0.004	NA	NA	0.047	0.008
Latino	1 = yes	0.088	0.015	0.091	0.017	0.085	0.018
African American	1 = yes	0.201	0.030	0.226	0.034	0.177	0.030
Depression	Standardized scale	-0.040	0.014	-0.103	0.018	0.019	0.021
Smoked Cigarettes	1 = yes	0.268	0.017	0.270	0.022	0.265	0.021
High Income (top quintile)	1 = yes	0.212	0.020	0.208	0.026	0.216	0.022
Poor (<=130% poverty)	1 = yes	0.351	0.027	0.350	0.033	0.352	0.028
Resident Mother							
Education							
HS/GED	1 = yes	0.394	0.018	0.402	0.022	0.386	0.023
Some college	1 = yes	0.238	0.015	0.219	0.018	0.256	0.020
4-year college degree	1 = yes	0.176	0.014	0.196	0.018	0.158	0.017
> 4-year college degree	1 = yes	0.064	0.008	0.059	0.012	0.068	0.010
Bio Mother Obese	1 = yes	0.179	0.012	0.182	0.023	0.176	0.017
Mother Involvement	Standardized index	0.068	0.012	0.011	0.018	0.121	0.016
Nonresident Father							
Child Support	$1000s/year	2.488	0.084	2.409	0.103	2.561	0.107
Education							
HS/GED	1 = yes	0.439	0.016	0.439	0.022	0.439	0.022
Some college	1 = yes	0.157	0.012	0.156	0.016	0.158	0.017
4-year college degree	1 = yes	0.159	0.011	0.168	0.015	0.151	0.015
> 4-year college degree	1 = yes	0.052	0.011	0.052	0.014	0.051	0.012
Bio Father Obese	1 = yes	0.117	0.013	0.149	0.020	0.088	0.012
Father Involvement	Standardized index	0.071	0.023	0.125	0.034	0.021	0.026
N		1,983		925		1,058	

Table 3: Effect of Father Involvement on Weight (versus normal weight)

Variable	Underweight *b* *SE*	Overweight *b* *SE*	Obese *b* *SE*
Adolescent			
BMI at wave 1	–0.655***	0.546***	1.049***
	(0.104)	(0.069)	(0.092)
Ever Pregnant	–0.058	0.577	0.123
	(0.980)	(0.619)	(0.858)
Latino	–0.512	0.357	–0.858
	(0.634)	(0.348)	(0.684)
African American	0.205	–0.044	–0.654
	(0.384)	(0.268)	(0.496)
Depression	0.809*	–0.036	–1.147**
	(0.373)	(0.273)	(0.404)
Smoked Cigarettes	0.506	–0.153	–0.473
	(0.400)	(0.249)	(0.423)
High Income (top quintile)	–0.286	–0.836*	–0.279
	(0.507)	(0.323)	(0.423)
Poor (<=130% poverty)	0.241	0.215	1.199**
	(0.392)	(0.232)	(0.370)
Resident Mother			
Education			
HS/GED	–0.128	0.288	1.092
	(0.477)	(0.411)	(0.684)
Some college	–0.991	0.389	0.931
	(0.668)	(0.361)	(0.673)
4-year college degree	–0.435	0.434	1.312
	(0.640)	(0.446)	(0.777)
> 4-year college degree	–0.722	0.425	0.770
	(0.815)	(0.497)	(0.808)
Bio Mother Obese	–0.964*	0.422	–0.019
	(0.486)	(0.373)	(0.490)
Mother Involvement	0.537	0.324	0.222
	(0.331)	(0.264)	(0.350)
Nonresident Father			
Child Support	–0.079	–0.017	0.035
	(0.061)	(0.038)	(0.069)
Education			
HS/GED	–0.599	–0.318	–0.736
	(0.402)	(0.274)	(0.461)
Some college	0.010	–0.214	–1.307
	(0.511)	(0.376)	(0.733)
4-year college degree	–0.260	–0.095	0.507
	(0.612)	(0.398)	(0.682)
> 4-year college degree	–0.736	–0.906*	–1.336

	(0.710)	(0.421)	(0.820)
Bio Father Obese	0.438	0.223	–0.264
	(0.493)	(0.360)	(0.508)
Father Involvement	–0.675*	0.052	0.802**
	(0.308)	(0.165)	(0.242)
Intercept	10.353***	–14.231***	–28.547***
	(2.072)	(1.775)	(2.538)

Note. *$p < .05$, **$p < .01$, ***$p < .001$.
$N = 1{,}983$.

Table 4: Effect of Father Involvement x Education on Weight (versus normal weight)

Variable	Underweight *b* *SE*	Overweight *b* *SE*	Obese *b* *SE*
Adolescent			
BMI at wave 1	–0.678***	0.560***	1.071***
	(0.107)	(0.069)	(0.091)
Ever Pregnant	0.074	0.512	0.180
	(0.995)	(0.604)	(0.854)
Latino	–0.539	0.296	–0.938
	(0.635)	(0.350)	(0.697)
African American	0.267	–0.096	–0.759
	(0.384)	(0.272)	(0.510)
Depression	0.906*	–0.035	–1.171**
	(0.363)	(0.265)	(0.394)
Smoked Cigarettes	0.585	–0.179	–0.592
	(0.397)	(0.253)	(0.432)
High Income (top quintile)	–0.303	–0.860*	–0.257
	(0.480)	(0.334)	(0.438)
Poor (<=130% poverty)	0.196	0.175	1.204**
	(0.393)	(0.236)	(0.387)
Resident Mother			
Education			
HS/GED	–0.069	0.237	1.044
	(0.524)	(0.412)	(0.710)
Some college	–1.003	0.393	0.988
	(0.699)	(0.362)	(0.711)
4-year college degree	–0.277	0.379	1.265
	(0.640)	(0.437)	(0.808)
> 4-year college degree	–0.856	0.257	0.602
	(0.895)	(0.488)	(0.835)
Bio Mother Obese	–1.012*	0.411	–0.040
	(0.509)	(0.372)	(0.510)
Mother Involvement	0.486	0.407	0.239
	(0.335)	(0.270)	(0.375)
Nonresident Father			
Child Support	–0.069	–0.019	0.046
	(0.064)	(0.038)	(0.069)
Education			
HS/GED	–0.130	–0.328	–0.802
	(0.466)	(0.284)	(0.475)
Some college	0.262	–0.102	–1.012
	(0.567)	(0.376)	(0.754)
4-year college degree	0.150	0.029	0.502
	(0.659)	(0.389)	(0.691)
> 4-year college degree	–0.057	–1.012*	–1.125

	(0.746)	(0.492)	(0.807)
Bio Father Obese	0.517	0.309	–0.187
	(0.459)	(0.353)	(0.512)
Father Involvement	–2.146*	–0.073	0.919
	(0.858)	(0.422)	(0.566)
Involvement × Nonres. Father's Education			
Father Involvement × HS/GED	1.856	0.673	0.415
	(0.944)	(0.517)	(0.699)
Father Involvement × Some college	2.843**	–0.600	–1.788*
	(0.906)	(0.543)	(0.834)
Father Involvement × 4-year college degree	0.795	–0.566	–0.210
	(1.071)	(0.703)	(0.718)
Father Involvement × > 4-year college degree	0.331	0.618	–2.624**
	(0.962)	(0.680)	(0.969)
Intercept	10.249***	–14.484***	–29.049***
	(2.188)	(1.751)	(2.514)

Note. *$p < .05$, **$p < .01$, ***$p < .001$.
$N = 1{,}983$.

Table 5: Effect of Father Involvement on Weight by Gender (versus normal weight)

Variable	Males			Females		
	Underweight	Overweight	Obese	Underweight	Overweight	Obese
	b	*b*	*b*	*b*	*b*	*b*
	SE	*SE*	*SE*	*SE*	*SE*	*SE*
Adolescent						
BMI at wave 1	–0.734***	0.549***	1.277***	–0.680***	0.583***	1.072***
	(0.151)	(0.101)	(0.167)	(0.161)	(0.074)	(0.106)
Ever Pregnant				0.528	0.360	0.114
				(1.076)	(0.581)	(0.828)
Latino	–1.480	0.410	–2.411	–0.091	0.429	0.049
	(0.907)	(0.694)	(1.448)	(0.819)	(0.369)	(0.722)
African American	0.263	–0.493	–1.968*,[a]	–0.127	0.152	0.550[a]
	(0.537)	(0.429)	(0.810)	(0.618)	(0.441)	(0.773)
Depression	1.037	0.792[a]	0.030	1.193*	–0.459[a]	–1.493**
	(0.566)	(0.498)	(0.764)	(0.530)	(0.321)	(0.518)
Smoked Cigarettes	0.830	–0.451	–1.333*	–0.170	0.061	0.215
	(0.577)	(0.391)	(0.634)	(0.540)	(0.377)	(0.614)
High Income (top quintile)	–0.202	–1.008*	–0.660	–0.423	–0.619	0.250
	(0.575)	(0.433)	(0.583)	(0.730)	(0.410)	(0.675)
Poor (<=130% poverty)	0.379	–0.032	1.860**	0.220	0.384	0.829
	(0.555)	(0.371)	(0.614)	(0.538)	(0.387)	(0.573)
Resident Mother						
Education						
HS/GED	–0.321	–0.188	1.756	–0.019	0.525	0.613
	(0.861)	(0.572)	(1.510)	(0.527)	(0.499)	(0.640)
Some college	–0.452	–0.184	1.238	–1.246	0.866*	0.670
	(0.914)	(0.605)	(1.593)	(0.789)	(0.431)	(0.688)
4-year college degree	–1.221	–0.063	0.968	–0.010	1.022	2.003*
	(1.029)	(0.549)	(1.636)	(0.786)	(0.588)	(0.935)
> 4-year college degree	–0.680	0.634	1.321	–36.588***	0.178	0.303

	(1.278)	(0.816)	(1.771)	(0.747)	(0.728)	(1.171)
Bio Mother Obese	–1.266	0.809	–0.238	–1.443	0.124	0.472
	(0.781)	(0.512)	(0.663)	(1.197)	(0.413)	(0.548)
Mother Involvement	0.516	0.430	–0.223	0.928	0.374	0.867
	(0.580)	(0.487)	(0.604)	(0.576)	(0.348)	(0.439)
Nonresident Father						
Child Support	–0.018	–0.031	0.150	–0.102	–0.012	–0.032
	(0.068)	(0.060)	(0.095)	(0.097)	(0.058)	(0.107)
Education						
HS/GED	–0.464	–0.579	–1.263	–0.494	–0.178	–0.688
	(0.669)	(0.348)	(0.875)	(0.513)	(0.420)	(0.575)
Some college	–1.584	0.056	–0.582	0.674	–0.767	–2.496**
	(1.030)	(0.508)	(1.158)	(0.684)	(0.558)	(0.908)
4-year college degree	1.138	–1.144[a]	0.669	–1.541	0.553[a]	0.305
	(0.893)	(0.659)	(0.978)	(1.160)	(0.508)	(0.938)
> 4-year college degree	0.072	–1.125	–2.304*	–36.872***	–0.978	–1.546
	(1.022)	(0.669)	(1.105)	(0.693)	(0.549)	(1.477)
Bio Father Obese	0.640	–0.007	–0.699	0.084	0.751	–0.033
	(0.601)	(0.507)	(0.613)	(0.893)	(0.401)	(0.768)
Father Involvement	–1.279*	0.093	0.812*	–0.070	0.180	1.197**
	(0.603)	(0.279)	(0.356)	(0.383)	(0.229)	(0.387)
Intercept	11.627***	–13.576***	–34.207***	10.679***	–15.482***	–29.527***
	(3.014)	(2.433)	(4.463)	(3.158)	(1.946)	(2.763)
N		925			1,058	

Note. *$p < .05$, **$p < .01$, ***$p < .001$.
[a]Slope differs significantly by sex.

Table 6: Effect of Father Involvement x Father Obesity on Weight by Gender (versus normal weight)

Variable	Males			Females		
	Underweight	Overweight	Obese	Underweight	Overweight	Obese
	b	*b*	*b*	*b*	*b*	*b*
	SE	*SE*	*SE*	*SE*	*SE*	*SE*
Adolescent				–0.684***	0.584***	1.093***
BMI at wave 1	–0.746***	0.550***	1.287***	(0.162)	(0.075)	(0.109)
	(0.152)	(0.101)	(0.165)	0.583	0.394	0.110
Ever Pregnant				(1.069)	(0.599)	(0.875)
				0.041	0.347	–0.197
Latino	–1.481	0.407	–2.461	(0.837)	(0.358)	(0.770)
	(0.922)	(0.693)	(1.472)	–0.115	0.136	0.464
African American	0.231	–0.495	–1.961*	(0.608)	(0.453)	(0.793)
	(0.543)	(0.425)	(0.810)	1.155*	–0.431[a]	–1.436**
Depression	1.030	0.784[a]	0.219	(0.538)	(0.317)	(0.534)
	(0.576)	(0.496)	(0.827)	–0.156	0.046	0.205
Smoked Cigarettes	0.779	–0.461	–1.275*	(0.537)	(0.372)	(0.597)
	(0.581)	(0.394)	(0.633)	–0.445	–0.644	0.405
High Income (top quintile)	–0.238	–1.028*	–0.789	(0.746)	(0.412)	(0.678)
	(0.597)	(0.446)	(0.568)	0.227	0.373	0.925
Poor (<=130% poverty)	0.313	–0.035	1.869**	(0.536)	(0.390)	(0.577)
	(0.557)	(0.372)	(0.620)			
Resident Mother						
Education						
HS/GED	–0.311	–0.177	2.026	–0.048	0.577	0.767
	(0.857)	(0.571)	(1.599)	(0.524)	(0.505)	(0.673)
Some college	–0.447	–0.182	1.219	–1.274	0.887*	0.732
	(0.902)	(0.606)	(1.655)	(0.794)	(0.437)	(0.693)
4-year college degree	–1.249	–0.058	1.112	0.010	1.039	2.082*
	(1.021)	(0.550)	(1.708)	(0.784)	(0.592)	(0.956)
> 4-year college degree	–0.759	0.641	1.500	–34.576***	0.157	0.301
	(1.300)	(0.814)	(1.827)	(0.747)	(0.714)	(1.226)
Bio Mother Obese	–1.300	0.791	–0.302	–1.259	0.160	0.482

	(0.763)	(0.517)	(0.677)	(1.181)	(0.419)	(0.565)
Mother Involvement	0.465	0.425	0.009	0.955	0.390	0.821
	(0.588)	(0.483)	(0.630)	(0.568)	(0.350)	(0.439)
Nonresident Father						
Child Support	–0.019	–0.030	0.143	–0.093	–0.016	–0.050
	(0.070)	(0.062)	(0.096)	(0.098)	(0.057)	(0.106)
Education						
HS/GED	–0.467	–0.587	–1.359	–0.489	–0.202	–0.697
	(0.675)	(0.353)	(0.894)	(0.513)	(0.422)	(0.579)
Some college	–1.539	0.062	–0.475	0.629	–0.768	–2.482**
	(1.037)	(0.517)	(1.183)	(0.692)	(0.555)	(0.908)
4-year college degree	1.102	–1.157[a]	0.778	–1.610	0.556[a]	0.375
	(0.897)	(0.666)	(0.998)	(1.185)	(0.509)	(0.974)
> 4-year college degree	–0.046	–1.126	–2.323*	–34.847***	–1.047	–1.573
	(1.032)	(0.670)	(1.140)	(0.701)	(0.576)	(1.539)
Bio Father Obese	0.881	0.031	–0.511	–0.533	0.699	–0.166
	(0.608)	(0.504)	(0.683)	(0.895)	(0.408)	(0.728)
Father Involvement	–1.446*	0.105	0.994*	–0.126	0.124	1.018*
	(0.673)	(0.312)	(0.439)	(0.406)	(0.259)	(0.418)
Father Involvement × Bio Father Obese	1.171	–0.098	–1.141[a]	1.705	0.785	2.350*,[a]
	(0.947)	(0.597)	(0.969)	(1.219)	(0.722)	(1.091)
Intercept	11.907***	–13.587***	–34.598***	10.744***	–15.499***	–30.150***
	(3.041)	(2.444)	(4.425)	(3.186)	(1.973)	(2.856)
N		925			1,058	

Note. *$p < .05$, **$p < .01$, ***$p < .001$.
[a]Slope differs significantly by sex.