

Effects of Parenting Style and Parent-Related Weight and Diet on Adolescent Weight Status

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Objective This study examined the interaction between parental limit setting of sedentary behaviors and health factors (weight status, physical activity [PA], fruit and vegetable [FV] intake) on standardized body mass index (zBMI) in African American adolescents. **Methods** Data were from 67 parent–adolescent dyads. Parental limit setting, PA and FV intake were assessed via self-report, and objective height and weight measurements were collected. **Results** Regressions examined the interaction between parental limit setting and BMI, PA, FV intake on adolescent zBMI. The model for parent BMI and FV intake accounted for 31% of the variance in adolescent zBMI. A significant interaction for parent BMI by limit setting showed that as parental BMI increased, higher (vs. lower) limit setting was associated with lower adolescent zBMI. Higher parent FV consumption was associated with lower adolescent zBMI. **Conclusion** Future interventions should integrate parent limit setting and target parent fruit and vegetable intake for obesity prevention in underserved adolescents.

Key words adolescent; health behavior; obesity; parenting style; parents.

The rate of adolescent obesity among ethnic minorities has tripled in the past 3 decades (Centers for Disease Control and Prevention [CDC], 2008) with nearly 40% of African American adolescents now considered overweight or obese (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Specifically, 39.5% of non-Hispanic black adolescents are considered overweight or obese as defined by body mass index greater than or equal to sex- and age-specific 85th percentile from the 2000 CDC Growth Charts (Ogden, et al., 2010). Previous studies have demonstrated significant positive associations between sedentary behaviors, including screen time, and adolescent weight status (Eisenmann, Barteel, Smith, Welk, & Fu, 2008; Epstein et al., 2008; Mitchell et al., 2009; Robinson, 1999). These associations are especially troubling among African American youth, given that 55.5% of African American adolescents

report watching ≥ 3 hr of television per day as compared with the national average of 32.8% (Eaton et al., 2010).

The literature base on potential intervention strategies related to sedentary behavior and obesity in African American adolescents is growing. Although this research provides insight into possible approaches to obesity intervention, more research is needed to explore under what circumstances these approaches are associated with reduced weight status in adolescents (Yildirim et al., 2011). Other factors may alter the strength and/or the direction of the relationship between an intervention strategy and adolescent weight status. Examination of potential moderators may enhance the effectiveness of obesity interventions for youth. The present study explores the interaction between parental limit setting of youth sedentary behaviors (a possible intervention strategy) and parent obesity and related

behaviors in understanding obesity in predominately African American adolescents.

Parental Limit Setting of Sedentary Behaviors, Parent Obesity and Related Health Behaviors, and Adolescent Weight Status

Limit setting of sedentary behaviors may hold promise as an effective parenting strategy for reducing screen time and obesity in African American adolescents. Parental limit setting is an aspect of authoritative parenting (Baumrind, 1966) and has been associated with positive youth health behaviors (Kitzman-Ulrich et al., 2010). With regard to sedentary behaviors, parental limit setting may be particularly important, as higher levels of parental limit setting have been associated with lower screen time in both children (Davison, Francis, & Birch, 2005; Springer et al., 2010; Spurrier, Magarey, Golley, Curnow, & Sawyer, 2008) and early adolescent youth (Carlson et al., 2010; Ramirez et al., 2011; Salmon, Timperio, Telford, Carver, & Crawford, 2005). Previous intervention studies that have included limit setting components have also been shown to decrease screen time (Ford, McDonald, Owens, & Robinson, 2002) and weight status (Epstein et al., 2008; Robinson, 1999) in children. In particular, limit setting may be especially important among underserved (low income, ethnic minority) youth. Results from a study by Epstein et al. (2008) demonstrated that an intervention that targeted increasing limit setting of screen time in children aged 4–7 years was more efficacious for families of lower socioeconomic status as compared with those of higher socioeconomic status. Another study demonstrated that an intervention for reducing screen time through parental limit setting was effective among African American youth aged 7–12 years (Ford et al., 2002). Collectively, these findings suggest that parental limit setting of sedentary behaviors may be an effective obesity prevention and intervention strategy among underserved youth; however, more work is needed to further clarify these relationships in ethnically diverse youth in early adolescence.

It remains unclear whether additional parental factors may modify the association between parental limit setting of sedentary behaviors and youth weight status. When exploring potential moderators, parent weight status and parent obesity-related health behaviors (physical activity, fruit and vegetable intake) may be important to consider. Previous research has shown that higher parental weight status is associated with higher adolescent weight status; this association has also been demonstrated among minority populations (Zeller et al., 2007). A small but growing evidence base also suggests that parental health behaviors,

specifically parent physical activity and healthy eating, are inversely associated with youth weight status (Berge, Wall, Bauer, & Neumark-Sztainer, 2010; Crawford et al., 2010). Parent obesity, physical activity, and fruit and vegetable intake may be important predictors of youth weight status because adolescents may learn positive health behaviors by observing their parents health and health behaviors. Specifically, parents who are a healthy weight and/or who engage in healthy lifestyles (i.e., are active and eat more fruits and vegetables) are likely to serve as positive role models for their children (Bandura, 2004; Berge et al., 2010). Overall, these findings suggest that parent weight status and obesity-related health behaviors (physical activity, fruit and vegetable intake) are important correlates of adolescent weight status.

It is possible that parent weight status and related health behaviors (physical activity, fruit and vegetable intake) may moderate the relationship between parental limit setting and adolescent weight status. For example, parents who both set limits on their child's sedentary behaviors and model positive health outcomes (i.e., are not obese and/or are active and eat more fruits and vegetables) may be associated with lower adolescent weight status than either parental factor in isolation. Alternatively, increased parental limit setting could compensate for parents who are obese and/or do not engage in healthy diet and physical activity behaviors. Parents who are obese and who do not engage in healthy diet and physical activity behaviors may be less inclined to set limits on their own health behaviors, and thus, they may lack modeling of self-monitoring for their adolescents. Although previous studies provide preliminary evidence for interactions between adolescent sedentary behavior and parent obesity on adolescent weight status (Steffen, Dai, Fulton, & Labarthe, 2009; Vandewater & Huang, 2006), research could be enhanced by explicitly examining the interactions between parental limit setting of sedentary behaviors and parent obesity, physical activity, and fruit and vegetable consumption. Such research could help to understand the circumstances for which limit setting is related to adolescent obesity, and thus may enhance future obesity prevention and intervention approaches.

The present study expands on past research by evaluating the interaction of parent body mass index (BMI), parent health behaviors (physical activity, fruit and vegetable intake), and parental limit setting of sedentary behaviors on predicting BMI Z-scores from sex- and age-specific BMI (CDC, 2009) in predominately low income, African American adolescents. It was hypothesized that parental limit setting of sedentary behaviors would interact with parent weight status and health behaviors (fruit and vegetable intake, physical activity) in predicting

adolescent zBMI. It was also hypothesized that there would be main effects of parent BMI, parent limit setting, and parent diet and physical activity on adolescent zBMI.

Methods

Design

In this cross-sectional study, self-administered questionnaires and objective anthropometric measurements were obtained from adolescents aged 11–15 years and one of their parents. The study was approved by the University of South Carolina Institutional Review Board. Written informed consent and assent were obtained from each parent and adolescent, respectively.

Participants

Parent and adolescent pairs were recruited from two rural counties in the Southeastern part of the United States. The purpose of the overall study was health education promotion and to learn about preference and needs related to improving one's health. Families were recruited through community partners and radio and newspaper advertisements. Sampling of participants was conducted with the goal of obtaining a sample with variation in adolescent weight status and sex. In addition, recruitment efforts were targeted toward oversampling low income, ethnic minority populations given the increased risk observed among underserved populations for obesity and health-related problems associated with being overweight. Families were eligible to participate if they had (i) an adolescent aged 11–15 years; (ii) at least one parent living in the same household as the adolescent willing to participate; and (iii) no physical or dietary restrictions. The age range of 11–15 years was selected with the goal of capturing youth who are transitioning into adolescence and are learning to manage their own health behaviors as parental influence begins to decline (Spera, 2005); this age range was based on the American Psychological Association (2002) definition of adolescence. Of the ~350 families contacted during recruitment, 70 parent and adolescent pairs consented to participate in data collection.

Measures

Demographic

Parents provided demographic data regarding their sex, marital status, household yearly income, and educational level. Adolescent sex and race/ethnicity were self-reported by the child.

Body Mass Index

Weight and height measures were assessed using standardized protocols with a Seca 880 digital scale and a

Shorr height board. Parent and adolescent BMI values were computed as: $\text{weight (kg)}/\text{height(m)}^2$. Adolescent BMI values were converted to BMI-for-age percentiles and BMI Z-scores using the CDC growth charts (CDC, 2009) using the statistical analysis system (SAS) program. Both BMI-for-age percentiles and Z-scores are useful for accurately assessing weight status in youth given that both adjust for age and gender. BMI Z-scores are particularly useful for research purposes because they can be summarized across subjects for research purposes (Cole, Faith, Pietrobelli, & Heo, 2005); thus zBMI was chosen as the outcome measure in the present study.

Parental Limit Setting of Sedentary Behaviors

The limiting-activity subscale of the parenting strategies for eating and activity scale (PEAS; Arredondo et al., 2006; Larios, Ayala, Arredondo, Baquero, & Elder, 2009) was used to assess parents' use of appropriate boundaries for sedentary behaviors. Parents were instructed to indicate how often they engage in the particular parenting practice specified in each item on a 4-point Likert scale. Response options were as follows: 1 = "strongly disagree," 2 = "somewhat disagree," 3 = "somewhat agree," and 4 = "strongly agree." An example item was, "I limit the amount of time my child watches TV or videos during the week (Mon-Fri)." Four items were averaged to create a measure of limit setting of sedentary behaviors. Construct validity of the PEAS was supported through comparison of the scale with the Child Feeding Questionnaire (Birch et al., 2001) among a sample of ethnically diverse parents (Larios et al., 2009); study results demonstrated positive correlations between the PEAS subscales and subscales on the Child Feeding Questionnaire. In addition, positive correlations shown between the PEAS and parental use of strategies for reducing child fat intake support concurrent validity of the tool as findings suggest that parents who use behavioral strategies for fat and fiber were also more likely to use parenting strategies that promote a healthy lifestyle. In the current study, reliability of the scale was adequate ($\alpha = .80$).

Parent Fruit and Vegetable Intake

Parent fruit and vegetable intake was assessed using a fruit and vegetable screening tool (Prochaska & Sallis, 2004). Two items assessed parents' daily fruit and daily vegetable consumption on a typical day. Responses from the two items were combined to create a composite measure reflecting the number of servings of fruits and vegetables eaten on a typical day. Validity and reliability of the tool have been previously supported in a study of ethnically diverse middle school youth (Prochaska & Sallis, 2004).

Results demonstrated that the screening tool was significantly correlated with servings of fruits and vegetables as assessed using a 3-day food record (Spearman's $r = .23$, $p = .008$), and that overall intraclass correlation coefficient values were .68 indicating similar reliability to the 7-day food frequency questionnaire (Domel et al., 1994).

Parent Moderate-to-Vigorous Physical Activity

Parent moderate-to-vigorous physical activity was assessed using the International Physical Activity Questionnaire (IPAQ) short form (Craig et al., 2003). The IPAQ short form assessed physical activity over a 7-day period. Physical activity was reported in terms of days per week and minutes and/or hours per day of walking, moderate, and vigorous activity. Duration and frequency of walking, moderate, and vigorous activity were then multiplied by their respective metabolic equivalent (MET) values per standardized scoring protocols and summed to yield a weighted estimate of total MET minutes per week of moderate-to-vigorous activity (Craig et al., 2003). MET values, which are measures of the energy cost of physical activities, are used to provide consistency in the scoring of self-report physical activity measures (Ainsworth et al., 2011). To enhance understanding of the reported values, total minutes per week of walking, moderate, and vigorous physical activity were calculated as well. Cases where parents reported "don't know" for time or days were removed from the analysis, resulting in a reduced sample size for moderate-to-vigorous physical activity and walking ($n = 54$). The IPAQ short form was initially designed for population surveillance of physical activity among adults, and it has demonstrated acceptable reliability and validity in comparison with objective measures of physical activity in 12 countries (Craig et al., 2003). Overall, the IPAQ questionnaires produced repeatable data (Spearman's ρ clustered ~ 0.8). Additionally, comparisons of the IPAQ to accelerometers demonstrated correlations comparable with other self-report validation studies (pooled $\rho = 0.30$, 95% confidence interval 0.23–0.36), thus supporting criterion validity of the tool. In addition, the IPAQ has been used in low income minority populations (Lee, Mama, McAlexander, Adamus, & Medina, 2011; Wolin, Heil, Askew, Matthews, & Bennett, 2008).

Data Analyses

Data were reduced and analyzed using SPSS Statistics software version 17.0 and SAS software version 9.0. A square root transformation was conducted on the outcome variable because of concerns regarding normality of the distribution. Pearson product moment correlations were used to assess for multicollinearity. Two hierarchical regressions

were performed to evaluate the interaction of parental factors and limit setting of sedentary behaviors on adolescent zBMI while controlling for race/ethnicity and income level. Because race/ethnicity and income level have been consistently associated with adolescent BMI (Ogden et al., 2010), they were selected as covariates and were controlled for in regression analyses. However, three parents were missing data on household income and were not included in the final sample. Thus, the final sample consisted of 67 parent and adolescent pairs. The first regression included both fruit and vegetable intake and parent BMI. A separate regression was run for parent physical activity because of missing physical activity data noted previously. This model included covariates; main effects for moderate-to-vigorous physical activity and limit setting of sedentary behavior; and the interaction between moderate-to-vigorous physical activity and limit setting on predicting adolescent zBMI. Before calculating the interaction term, predictor variables were centered (Aiken & West, 1991). To interpret the interaction, low, medium, and high levels of parent BMI and limit setting of sedentary behaviors were computed using the mean as the medium value and one standard deviation below and above the mean as low and high values, respectively.

Results

Participant Demographics

Demographic, behavioral, and limit setting characteristics are presented in Table I. It is noteworthy that, although adolescents ($M = 12.67 \pm 1.34$ years, 59% male) were predominately African American (91.04%), six (8.96%) identified as "other" for race/ethnicity. In addition, parents ($M = 41.81 \pm 11.12$ years, 92.53% female) were predominately lower income (62.68% $\leq \$39,000$ annual income per year). However, a portion of the sample (19.40%) reported an annual income $\geq \$55,000$ per year, with 7.46% reported making $\geq \$85,000$ a year.

Correlation Analyses

Correlations showed that adolescent zBMI was inversely correlated with parent fruit and vegetable intake ($r = -.36$, $p < .01$) and positively correlated with household income ($r = .26$, $p < .05$). Additionally, parent fruit and vegetable intake was positively associated with limit setting of sedentary behaviors ($r = .26$, $p < .05$). No other associations were significant, suggesting that the assumption of multicollinearity was not violated.

Parent Factors and Adolescent zBMI

A series of hierarchical regressions were conducted to evaluate the interaction of parental factors and limit setting

Table I. Demographic and Limit Setting Characteristics^a

Variable	Total
Sample size, <i>n</i> (%)	67
Race/ethnicity, <i>n</i> (%)	
African American	61 (91.04)
Other	6 (8.96)
Adolescent sex, <i>n</i> (%)	
Male	40 (59.70)
Female	27 (40.30)
Adolescent age (years)	12.67 (1.34)
Adolescent zBMI ^b	1.48 (.89)
Parent sex, <i>n</i> (%)	
Male	5 (7.46)
Female	62 (92.53)
Parent age (years)	41.81 (11.12)
Household yearly income, <i>n</i> (%)	
<\$10,000	10 (14.93)
\$10,000–\$24,000	20 (29.85)
\$25,000–\$39,000	12 (17.91)
\$40,000–\$54,000	12 (17.91)
\$55,000–\$69,000	3 (4.48)
\$70,000–\$84,000	5 (7.46)
≥\$85,000	5 (7.46)
Parent education level, <i>n</i> (%)	
Some high school	5 (7.46)
High school degree or GED	14 (20.90)
Some college	26 (38.81)
College graduate	14 (20.90)
Graduate training or professional degree	8 (11.94)
Parent daily fruit and vegetable intake ^c	4.13 (1.75)
Parent MVPA ^d MET min/week (<i>n</i> = 54)	3,061.79 (3,909.07)
Parent walking min/week (<i>n</i> = 54)	303.18 (410/28)
Parent moderate PA ^e min/week	183.27 (310.61)
Parent vigorous PA ^e min/week	178.99 (312.24)
Limit setting of sedentary behaviors ^f	3.32 (.86)

^aValues are expressed as means (standard deviations) unless otherwise indicated.

Parent and adolescent BMI were calculated using the formula weight (kg)/height(m)². Independent samples *t*-tests revealed no significant differences.

^bBody mass index *z*-score.

^cFruit and vegetable consumption similar to other studies examining African American adults (see Dubowitz et al., 2008).

^dModerate-to-vigorous physical activity calculating using MET values and transformed using standardized scoring protocols (see Craig et al., 2003).

^ePhysical activity.

^fLimit setting of sedentary behaviors were recorded on a 4-pt Likert scale: 1 = "Strongly Disagree," 2 = "Somewhat Disagree," 3 = "Somewhat Agree," and 4 = "Strongly Agree."

of sedentary behaviors on adolescent zBMI. In the combined regression including fruit and vegetable intake and parental BMI, race/ethnicity, and income level were entered as covariates on the first step (Table II). Parent fruit and vegetable intake, BMI, and limit setting of sedentary behaviors were entered on the second step, and the interaction terms were entered on the third step. The model for step 1 was not significant ($F(2,64) = 2.98$,

$p = .06$). The model for step 2 was significant ($F(5,61) = 4.0$, $p = .003$) and accounted for 25% of the variance in adolescent zBMI. The overall model for step 3 was also significant ($F(7, 59) = 3.86$, $p = .002$), accounting for 31% of the variance in adolescent zBMI. Significant main effects were found for parent fruit and vegetable intake, BMI, and limit setting of sedentary behaviors. Higher adolescent zBMI was associated with higher parental weight status ($\beta = .23$, $p = .04$), lower levels of parental limit setting of sedentary behaviors ($\beta = -.27$, $p = .04$), and lower fruit and vegetable intake ($\beta = -.27$, $p = .02$). A significant two-way interaction ($\beta = -.29$, $p = .02$; Figure 1) qualified the main effect for parent weight status. As parental weight status increased, higher (vs. lower) limit setting was associated with having adolescents with lower zBMI values. No other effects were significant.

The regression model including parent moderate-to-vigorous physical activity was not significant ($F(5,48) = 1.41$, $p = .24$). Additionally, neither the covariates, the main effects (moderate-to-vigorous physical activity, limit setting), nor the interaction term were significant predictors of adolescent zBMI.

Discussion

Findings from the present study suggest that, although parental limit setting may be an important intervention strategy for reducing adolescent weight status for all parents, it may be particularly important for parents who are obese (vs. non-obese). In addition, higher levels of parent fruit and vegetable intake were associated with lower weight status among adolescents. These results highlight the important role of parental weight status in understanding the relationship between parental limit setting of sedentary behaviors and adolescent weight status in a sample of predominately African American adolescents. Furthermore, findings suggest that both parental limit setting and parent fruit and vegetable consumption may be important modifiable factors in preventing adolescent obesity.

This study expands on past research by examining the interaction between parent BMI and parental limit setting of sedentary behaviors on adolescent zBMI in predominately African American youth. Results indicated that parent weight status moderated the effects of parental limit setting of sedentary behaviors on adolescent zBMI such that as parental weight status increased higher (vs. lower) limit setting was associated with having adolescents with lower zBMI values. Previous intervention studies have shown that incorporating a limit setting component is an effective strategy for reducing screen time (Ford et al., 2002) and

Table II. Hierarchical Regression Testing Main and Interaction Effects of Parent BMI, Parent FV^a Intake, and Limit Setting on Adolescent zBMI Square-Root Transformed

Step	Variable	Unstandardized Coefficients		Standardized Coefficients		R ²
		β	SE	β	t	
Overall model F(7,59) = 3.86, p < .01						
1	Intercept	-1.42	.13	-11.24		.09
	Race/ethnicity	-.13	.12	-.13	-1.11	
	Household income level	.04	.02	.23	2.04*	
2	Parent FV intake	-.05	.02	-.27	-2.35*	.25
	Parent BMI	.01	.004	.23	2.06*	
	Parent limit setting	-.09	.04	-.27	-2.12*	
3	Parent FV X parent limit setting	.001	.02	.01	.06	.31
	Parent BMI X parent limit setting	-.02	.01	-.29	-2.31*	

*p < .05

^aParent fruit and vegetable intake.

weight status (Epstein et al., 2008; Robinson, 1999) in children. Findings from the present study expand on past research by suggesting that limit setting may be a particularly important intervention strategy for African American adolescents with parents who are obese. Furthermore, it is interesting to note that in the present study, higher levels of parental limit setting of sedentary behaviors were associated with lower levels of adolescent zBMI across levels of parent BMI. Although this is consistent with previous literature highlighting the importance of limit setting on health behaviors associated with adolescent weight status, few previous studies have evaluated these effects in underserved and ethnically diverse youth (Epstein et al., 2008; Ford et al., 2002). Therefore, present findings shed new light into understanding the relationship between parental limit setting of sedentary behaviors and adolescent weight status in predominately African American adolescents. Specifically, results suggest that limit setting may be an important parenting strategy for all parents, but it may be particularly important to encourage obese parents to set limits on their child's sedentary behaviors. Given the association between limit setting of sedentary behaviors and limit setting of other youth health behaviors (Arredondo et al., 2006), future research should continue to explore these relationships with limit setting of other behaviors related to adolescent weight status.

Results from the present study also indicated that parent fruit and vegetable intake, but not parent physical activity, was significantly associated with adolescent zBMI. The finding that lower parent fruit and vegetable intake was associated with higher adolescent zBMI highlights the important role of parental modeling of dietary behaviors in understanding youth weight status. Although previous investigators have demonstrated a positive association between parent and youth dietary patterns (Berge, 2009),

few studies have evaluated the association between parent healthy eating and youth weight status (Berge et al., 2010). Berge et al. (2010) demonstrated that increased parental modeling of healthy eating was associated with lower weight status among a large sample of ethnically diverse adolescents. Our study expands on past work by showing the association specifically between parent fruit and vegetable intake and adolescent weight in predominately underserved and African American adolescents. Surprisingly, parent physical activity was not significantly associated with youth weight status. It is possible that an association between parent physical activity and adolescent weight status was not found because of the overall low levels of parent physical activity; in the present study, parent physical activity was lower as a whole than as compared with other studies conducted with low income, African American adults (Lee et al., 2011). Alternatively, it is possible parents may not be active in the presence of their youth, and as such role modeling of physical activity is not as visible as dietary behaviors in the home. Future studies that use longitudinal designs are needed to clarify these associations and the directions of these effects.

There are several limitations to the present study that are worth noting. First, this study is cross-sectional in nature, and thus no causal relationships can be drawn from these findings. Therefore, alternative explanations for the observed interaction may be possible. For instance, youth who are overweight may also encourage parents to engage in poor health behaviors, such as eating out and being sedentary. Further research is needed to explore the relationships between parent weight and health behaviors and limit setting of sedentary of behaviors on youth weight status longitudinally. Additionally, the present study relies on parent self-report measures of physical activity and fruit and vegetable intake. Thus, these measures are susceptible

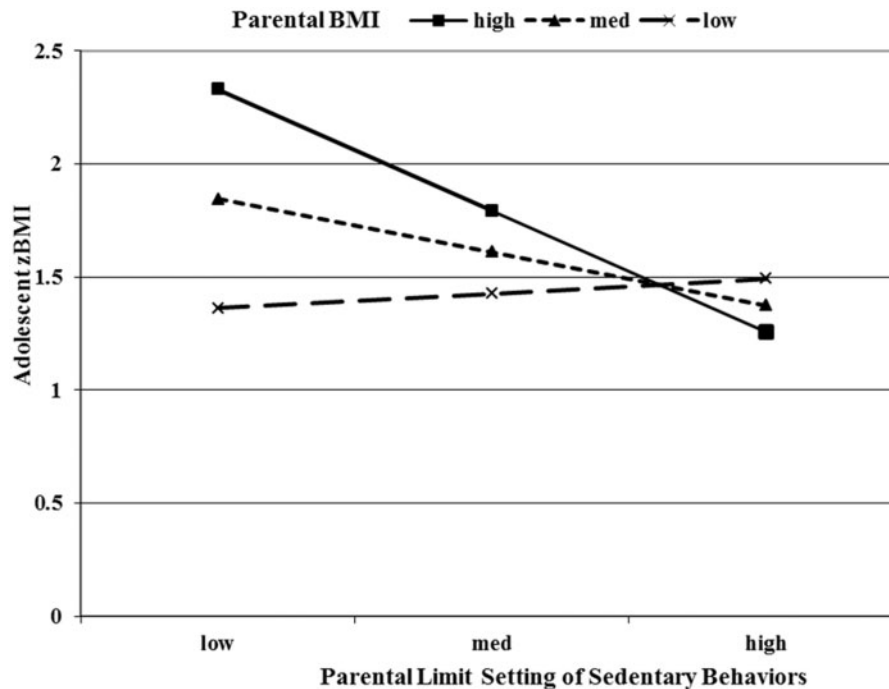


Figure 1. Interaction between parent BMI and limit setting of sedentary behaviors on adolescent zBMI. Low, medium, and high levels of parent BMI and limit setting of sedentary behaviors were computed using the mean as the medium value, one standard deviation above the mean as the high value, and one standard deviation below the mean as the low value. Adolescent zBMI, standardized to account for age and sex differences, is presented above to allow for more meaningful interpretation of the interaction.

to social desirability responding. Furthermore, past research on the parent fruit and vegetable intake measure has not demonstrated strong validity of the measure. Given these limitations, caution should be used in terms of interpreting results around fruit and vegetable intake, although results do go in the expected direction. An additional limitation was the lack of a measure of parent and youth sedentary behavior. However, given the well-established link between youth screen time and weight status (Mitchell et al., 2009), the present analyses were focused on examining potential intervention strategies (i.e., parental limit setting of sedentary behaviors) for youth obesity. It is also important to acknowledge that study findings may differ based on demographic variables. Specifically, the majority of the parents are female. Results from previous studies suggest that the relationship between parental and adolescent weight status may differ based on parent sex (Berge et al., 2010; Johannsen, Johannsen, & Specker, 2006). As few studies include large sample of fathers and male care-givers, it is difficult to ascertain whether these associations do or do not generalize across parent sex. The study focuses on youth in early adolescence. This age range was viewed as important from a prevention perspective, as youth in this critical age group are still influenced by their parents while at the same time learning to manage their own health behaviors as parental

involvement declines (Spera, 2005). Future research should explore these associations in children and older adolescents to see whether study findings generalize to other age groups. Furthermore, the present study includes a limited sample of non-African American and higher income families; thus, there is slight diversity in the sample and, as such, generalizability should be interpreted cautiously.

In summary, the present findings highlight the role of parent weight status in understanding the association between parental limit setting of sedentary behaviors and adolescent weight status. Results from this study provide preliminary evidence that parent weight status may moderate the effects of parenting styles related to limit setting on adolescent weight status such that among obese parents, higher (vs. lower) limit setting is associated with lower adolescent zBMI. Furthermore, higher parent fruit and vegetable intake was predictive of lower youth zBMI, indicating that parental modeling of healthy eating is also an important parental factor to consider. Findings from the present study suggest that targeting both parental limit setting and parent health factors especially related to diet may be an important strategy for future obesity prevention and intervention efforts. Encouraging parents who are obese to set limits on their adolescent's sedentary behaviors may be particularly important for obesity prevention in underserved, African American adolescents.

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