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Examining multiple parenting behaviors on young children's dietary fat consumption

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Abstract

Objective—To understand the association between parenting and children's dietary fat consumption, this study tested a comprehensive model of parenting that included: parent household rules, parent modeling of rules, parent mediated behaviors, and parent support.

Design—Cross-sectional.

Setting—Baseline data from the MOVE/me Muevo project, a recreation site-based obesity prevention and control intervention trial.

Participants—Five hundred and forty-one parents of children between the ages of five and eight years old and living in San Diego County.

Main Outcome Measure(s)—Children's fat consumption based on parent-report of a short food frequency questionnaire.

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Analysis—A hierarchical linear regression was conducted. In exploratory analyses, a step-wise backward elimination approach was used.

Results—Children's fat consumption was positively associated with parent household rules (P<.01), and negatively associated with parent modeling of rules (P<.01).

Conclusions and Implications—Controlling parenting behaviors such as rule setting is associated with more frequent fat consumption, whereas role modeling healthy behaviors is associated with less frequent fat consumption. Changing parenting behaviors with regards to how they feed their children are logical avenues for improving eating behaviors. (177)

Keywords

parent rules; social support; fat consumption

INTRODUCTION

Parental influences are key determinants of children's eating habits[1], in part because young children are dependent on parents for food[2]. Parents influence their children's diets through modeling[3], household rules related to eating and mealtime (RREM)[3], parent-mediated behaviors[4], and social support[5]. Parents' eating behaviors are important sources of information for the development of children's food preferences[3]. Pressuring the child to eat, restricting access to certain foods, and specific household rules about eating are also associated with unhealthy eating behaviors in children[1,2], although the evidence is mixed[6,7]. Higher levels of parental pressure can result in a stronger dislike for and lower intakes of particular foods[1], and potentially lead to increased consumption of energy-dense foods and beverages[8]. Children may prefer foods that have been restricted and eat more of them compared to unrestricted foods[1].

Children who view TV during 2 or more daily meals consume 5% more of their total energy intake from pizza, salty snacks, and soda and 5% less from fruits, vegetables, and juices compared to children who view TV during fewer than 2 meals per day[9]. Eating away from home at restaurants and/or at family and friends' homes at least once a week is also associated with unhealthy eating behaviors[10]. However, parent-mediated family behaviors such as frequency of eating family meals together are associated with children's reduced fast food consumption and greater fruit, vegetable and fiber-rich food consumption[11]. In addition, greater parental support for healthy eating is associated with lower snack intake in children[5].

Parenting practices are influenced by cultural norms and socio-cultural factors, which in turn can influence children's eating behaviors[12]. Latino parents may be more inclined to pressure a child to eat, expect hearty appetites, and have different definitions of ideal child body weight[13]. Parents who are unemployed and less acculturated tend to engage in more controlling and authoritarian parenting styles in regards to their child's eating[12].

The 2010 Dietary Guidelines for Americans recommends 4 to 18 year olds limit their total fat intake to 25–35% of their total daily calories[14] and saturated fats to <10% of total caloric intake[15]. According to NHANES 2001–2006 data, children 2 years and older exceeded these daily allowances for fat intake, and high fat foods were considered among the top sources of their total daily energy intake[16,17]. Studies have identified 1 or 2 components of parenting related to children's dietary fat consumption,[1,5,13] yet few studies have tested several parenting variables simultaneously. This study tested a parent feeding model associated with young children's dietary fat consumption and to examine whether the model differed by ethnicity.

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METHODS

Study Design

Data were taken from baseline measures of the MOVE/me Muevo (MOVE) study. MOVE was a recreation site-based childhood obesity intervention conducted in San Diego County, California. The San Diego State University Institutional Review Board approved this study.

Participants

MOVE recruited 541 families with children between the ages of 5 and 8 years old and living in San Diego County, California. Eligibility criteria included: living ≤2 miles of 1 of 30 participating recreation centers, willing to participate in the study for 3½ years, willing to be randomly assigned to the control or intervention conditions, and able to speak, read, and understand either English or Spanish. Parents were the participating child's legal guardian or primary caregiver. Children were excluded if they had a medical and/or psychological condition that affected their diet, physical activity, or weight. Families were recruited through targeted phone calls and at public locations, such as libraries, schools, and the 30 participating recreation centers, as well as community events, such as street fairs and special gatherings.

Procedures

Parents completed a self-administered paper survey (English or Spanish) at the recreation center. Some parents completed the survey at their homes or over the telephone.

Children's dietary fat consumption was assessed using a 21-item fat screener[20] from the Patient-Centered Assessment and Counseling for Exercise Plus Nutrition (PACE+) Health and Environment Survey. PACE+ assessed an adolescent sample that was 59% non-White. The internal consistency and test-retest reliability of this screener were α=0.88 and intraclass correlation (ICC) = 0.64, respectively. The screener was validated and significantly correlated with percent calories from fat as measured by a 3-day food record (r=0.36, P<.01). Examples of food items were fried chicken, chicken nuggets, fish sticks, bacon, chorizo (spicy sausage), French fries, onion rings, potato chips, tortilla chips, and buttered popcorn. Response options for each item were: '0=did not eat it this week', '1=once this week', '2=2 to 3 times this week', '3=4 to 6 times this week', '4=once or twice each day', and '5=more than twice each day'. Consistent with PACE+ coding procedures, responses were summed for each participant, with a higher score representing more frequent intake of fatty foods (possible range 0–105).

Eating dinner as a family was assessed by asking 3 questions developed in a previous study: "In a typical week, how often does your family eat the following meals together: Breakfast (morning), Lunch (afternoon), and Dinner (evening)?"[21] The original scale was taken from the Aventuras para Niños study[23], a predominantly Latino sample, and modified to obtain weekly frequency. Only responses to dinner were used in the present study given the age of these children (school age). Response options ranged from ≤1 time/week to 5–7 times/week. These were recoded to represent average times per week (e.g., '3–4 times/week' was coded as '3.5 times/week'). To approximate equal distribution and based on its relationship to obesity in youth[22], 'less than once a week' and '1–2 times a week' were combined, resulting in 3 response categories: '2 or less times a week', '3.5 times a week', or '6 times a week'.

Eating away-from-home meals was assessed by asking a series of questions, also developed in Aventuras[23], on how often the family goes out to eat or brings home ready-to-eat foods from (a) relatives' or friends' homes, (b) fast food restaurants, and (c) other restaurants. Responses were recoded as 'never/less than once a week' or 'once a week or more', given

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that at least weekly consumption of foods eaten outside the home is associated with poorer diet quality for children[10].

Television-related behaviors during meals were assessed using questions from the Study of Child Activity and Nutrition (SCAN)[24]. SCAN included a diverse sample of young children and their mothers and examined total energy intake and energy from fat. Questions asked how frequently, during a typical week, the family and/or child engaged in the following behaviors: eating dinner with the TV on, child snacking in front of the TV, and child eating meals in front of the TV. Responses were recoded as average days per week. A higher mean score (possible range 0–21) indicated a greater number of days per week engaged in TV-related behaviors (α=0.70).

Consistent with protocols used in the "Active Where?" study[25], total daily screen time was assessed by asking how much time on a typical weekday the child engages in the following activities: watching TV/videos/DVDs, playing computer or video games (like Nintendo or Xbox), using the internet, email, or other electronic media for leisure. Test-retest reliabilities were as follows: watching TV/videos/DVDs ICC=0.67, playing computer or video games ICC=0.73, and using the Internet, email or other electronic media for leisure ICC=0.72[26]. Responses were recoded into minutes per day, and a higher sum score reflected more minutes of screen time (α=0.49).

The parenting rules, i.e. RREM, were modified from the "Active Where?" study[25], a study examining factors associated with the physical activity and diets of ethnically diverse youth. Test-retest reliabilities were as follows: limited portion sizes at meals ICC=0.61, no meals while watching TV/DVDs ICC=0.69, no fried snacks at home ICC=0.74, must eat dinner with family ICC=0.62, and limited fast food ICC=0.70[26]. Two questions were added: "No sugary beverages" and "Must finish all food on plate," modeled after those from "Active Where?". Response options were 'no', 'yes', or 'sometimes'. 'Yes' and 'sometimes' responses were combined to a single response of 'yes' given the assumption that sometimes having the rule is likely to affect the child's eating habits. In addition, combining these response options created more even distributions between categories. All 'yes' responses were summed with a possible range from 0 to 7 (α=0.68).

Parents reported on the extent to which they followed the same 7 rules set for their children (as a proxy indicator of parent modeling). Coding procedures were identical to the child (α=0.66).

Parent support was assessed using a scale developed for PACE+[27]. Parents were asked how often, during a typical week, they engaged in the following 5 activities: encouraged your child to eat fruits and vegetables, provided fruits or vegetables for your child as a snack or as part of a meal, ate fruits and vegetables with your child, encouraged your child not to drink sugary beverages, and talked with your child about the correct portion sizes of the foods to eat. Two questions were added similar to the original scale: encouraged your child not to drink sugary beverages and talked with your child about the correct portion sizes. Responses were recoded as days per week (e.g., '1–2 days' was recoded to '1.5 days'), and a higher mean score indicated more days of parent support in a typical week (α=0.68).

Parent/primary caregiver demographics included age, gender, education, monthly family income before taxes from all sources, and ethnicity. Education was dummy coded and the 'middle school or less' response option was the reference category. Total monthly family income was coded into the following 4 groups: 'less than $500–$2000', '$2001–$3500', '$3501–$5000', '$5001 or more'. Ethnicity was assessed by asking the parent whether or not he/she considered himself/herself Latino, Hispanic, Mexican/Mexican American, or of Spanish origin (yes vs. no). Race was assessed by asking the participant to indicate which

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race(s) applied to him/herself. Racial groups were: White, Black or African American, Asian, Native Hawaiian or other Pacific, American Indian or Alaskan Native, mixed race, or unknown. Child demographics included age, gender, and ethnicity.

Data Analysis

Descriptive statistics included means for continuous data and frequencies for categorical data. Bivariate analyses examined correlations between individual scales and children's dietary fat consumption, the latter meeting the assumptions for parametric tests.

Hierarchical linear regression analyses examined the independent associations and variance explained of variable blocks to children's dietary fat consumption. The blocks were chosen based on their relative contribution to children's dietary fat consumption, ordered from most to least influential based on current literature[28]. Child gender and parent education were included in Block 1 as potential confounders given that boys showed greater mean screen time than girls ($P<.05$). Parent education was negatively association with RREM ($P<.05$), TV on during meals ($P<.05$), eating away from home at sit-down restaurants ($P<.01$), and screen time ($P<.05$). Parent-mediated behaviors were deemed most proximal to children's dietary fat consumption and were entered into Block 2. Parent modeling of rules and having these rules for their children shape their children's eating behaviors and were entered in Blocks 3 and 4, respectively[28,29]. Parent support was entered into Block 5. In exploratory analyses, each significant association was tested for interaction by parent ethnicity. Due to missing data, the final analytic sample was 532.

Additional exploratory analyses examined an item-specific model of parenting given heterogeneity observed among items in the bivariate analyses (i.e., direction of associations varied among items in the same construct). A step-wise backward elimination process was used to achieve a final model that consisted of the strongest variables associated with children's dietary fat consumption. Backward elimination was also preferred given potential collinearity between items. Block 1 (confounders) remained consistent throughout the model-testing process. For each subsequent block, individual items that comprised each construct were entered into the model as a group. Items were subsequently excluded from each block whose $P>.10$ and removed in order of largest p-value. After the exclusion of each individual item, the model was rerun with the remaining items in the respective block and the exclusion criteria were applied until all items that remained in the given block were $P<.10$.

RESULTS

Caregiver and child sociodemographics are described in Table 1. Most caregivers were White (84%); very few were African American, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaskan Native, and mixed race (13% non-White). Most children were also White (83%), and only 17% were African American, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaskan Native, and mixed race.

The mean fat consumption score was 20 (ranging from 4 to 54). The PACE+ validation study[20] determined through receiver operator characteristic (ROC) analyses that scores ≤16 were considered low fat consumption (≤30% calories from fat) and scores >16 were considered high fat consumption (>30% calories from fat), suggesting that, on average, children in this study had a high fat diet. In a typical week, 42% of children never ate meals in front of the TV and about half of the families ate away-from-home foods or brought ready-to-eat foods home from relatives' or friends' homes (49%), fast food restaurants (53%), or sit down restaurants (59%) less than once a week. The most common rule parents had for themselves was 'Must eat dinner with the family' (90%) and the least common rule

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was 'Must finish all food on plate' (46%). The most common rules the parents had for their children were 'Limited fast food' (87%) and the least common rule was 'Limited portion sizes at meals' (49%). During a typical week, parents encouraged their children to eat fruits and vegetables (71%), provided fruits and vegetables for their children to eat (67%), ate fruits and vegetables with their children (59%), and did not encourage their children to drink sugary beverages (52%) every day. However, during a typical week, 32% of the parents never talked with their children about appropriate portion sizes of foods to eat.

Regression Analysis

After adjusting for confounders, parents who had more rules for their children had children who consumed fatty foods more frequently (P<.01). However, parents who modeled more rules had children who consumed these foods less frequently (P<.01), explaining 8% of the variance (see Table 2). Except for parent education, no other variables were significantly related to children's dietary fat consumption and there were no significant interactions with parent ethnicity.

Exploratory Regression Analysis

After adjusting for confounders, more weekly screen time was associated with more frequent dietary fat consumption (P<.01; Block 2; see Table 3). Similarly, more frequent consumption of away-from-home foods from fast food restaurants and family and friends' homes were associated with more frequent dietary fat consumption (P<.05; Block 2). Parents who had the 'Limited portion sizes at meals' (P<.05) and 'No fried snacks (such as potato chips) at home' (P<.01; Block 3) rules for themselves had children who consumed fatty foods less frequently. In terms of rules for their children, parents who had the 'No meals while watching TV/DVDs' and 'Must finish all food on plate' rules had children who consumed fatty foods more frequently (both P<.01; Block 4). Parent support was not related to children's dietary fat consumption (Block 5). The full model explained 11% of the variance in child dietary fat consumption.

DISCUSSION

This study examined a model of parenting related to feeding on children's dietary fat consumption. Parents who modeled healthy portion control at mealtime and who controlled access to fried snacks by not bringing them home had children who consumed fat less frequently. These findings are consistent with previous studies[1,3,13]. Older children are more influenced by portion size and external cues rather than internal and physiologic cues for hunger and satiety[30]. In addition, home accessibility and availability of foods affects the types of foods that children consume. For example, having unhealthy foods at home can be a barrier to choosing fruits and vegetables[31]. Furthermore, parents who had rules about not watching TV during meals and finishing all of one's food on one's plate had children who consumed fat more frequently than their counterparts. These 2 rules are examples of how restricting and controlling parenting styles may be associated with an increased frequency of unhealthy food consumption[12]. Similarly, children whose parents pressure them to finish all of the food on their plates consume more high-fat snack foods per week[8]. Finally, contradicting previous research[32], having a college education was positively associated with children's fat consumption. More educated parents may have more demanding jobs which gives them less time to prepare food at home compared with the types of jobs held by less educated parents. This interpretation is supported by exploratory analyses (data not shown), in which we found a positive association between college education and eating away from home at sit-down restaurants (P<.01). More frequent consumption of foods obtained outside the home is associated with higher fat consumption[33].

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Exploratory analysis revealed that more screen time was associated with more frequent fat consumption, a known risk factor for childhood obesity[34]. In addition, children who ate fast food at least once per week or more consumed fat more frequently. This is consistent with current literature[10]. Surprisingly, there were no interactions with ethnicity. This finding contradicts what has been shown in other research[12,13]. When compared to their non-Latino counterparts, Latino parents tend to be more authoritarian[35]. One explanation for these contradictory findings could be that the Latino sample was more acculturated, resulting in little difference between the 2 ethnic groups. However, after testing this assumption (data not shown), the Latino sample was found to be less acculturated than the non-Latino sample (i.e., greater use of a language other than English) suggesting that acculturation may not explain this finding.

This study was cross-sectional which limits inference of causality[36]. All data were collected from the parents via self-report, which may have introduced self-report bias,[36] such as socially desirable responses[37]. Using a food frequency questionnaire to collect dietary fat consumption is relatively inexpensive and reduces participant burden compared to other approaches. However, there is evidence for low levels of agreement between child and parent reports with children overestimating their levels of vegetable intake compared to their parents[38]. In this study, children were too young to provide a valid self-report of their dietary intake. The fat consumption questionnaire was validated for use with adolescents without a parent proxy, thus results should be interpreted with caution. Nevertheless, the questionnaire was evaluated previously with a similar population[5]. The scale used to measure parent modeling may not measure the parents' actual behavior. To our knowledge, no study has examined whether parents follow the same rules they set for their children as an indicator of modeling. However, it has been shown that parent modeling, in general, is associated with healthy eating behaviors[3]. A study by Hendy et al.[39] assessed parent modeling by asking parents to complete the same feeding and mealtime questionnaire for themselves that they completed for their children. We argue that if parents have mealtime and feeding rules for themselves, it will reinforce these behaviors in their children and support their healthy eating behaviors. Parental perception of child's weight has implications for parental feeding practices, which was not taken into account in the present study[40]. Study strengths include the heterogeneity of races/ethnicities, the sample size and the multiple operationalizations of parenting.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Given the importance of parental influence on children's dietary intake, more research is needed to understand these associations, including longitudinal studies to provide evidence of causality. Studies should consider examining enforcement of RREM as rules may be present but enforcement may be inconsistent, as was evident by the number of parents who reported sometimes having a rule. Finally, research should determine whether children respond differently to paternal versus maternal parenting styles and modeling. It is unknown if study findings generalize to fathers as 94% of the caregivers were female. Studies have shown that children may perceive different parenting styles between their parents and that these parenting styles may be associated with certain eating behaviors, such as eating family meals together[41].

Study results, along with results from previous research[1,4], support the roles parents play in children's diet intake. Attempts to change parents' knowledge, attitudes, and practices about how they feed their children are logical avenues for changing children's fat intake, which may ultimately have implications for obesity prevention[42]. Children need guidance and a certain degree of parental control when choosing which foods to eat and how often to eat

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them[7]. Results suggest that parents should avoid over controlling and restricting their children's eating to avoid excess consumption of dietary fat.

Health care professionals have many opportunities to discuss family behaviors to decrease risk for childhood obesity[42]. Therefore, a possible avenue for intervention might be to provide pediatricians with key family and child behaviors to focus on, so they may be more willing to conduct preventive counseling during pediatric visits.

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Table 1

Caregiver and child socio-demographics, children's fat consumption and parental influences (n = 541)

	n (%)	Mean ± SD
Caregiver demographics		
Age (y)		37.6 ± 6.5
Female	506 (93.5)	
Monthly income		
$0–$2000	115 (22.7)	
$2001–$3500	106 (20.9)	
$3501–$5000	101 (20.0)	
$5001 or more	184 (36.4)	
Education		
Middle school or less	80 (14.8)	
High school	83 (15.3)	
Some college, not graduate	145 (26.8)	
College graduate	133 (24.6)	
Post graduate work	100 (18.5)	
Latino ethnicity	222 (41.0)	
Child Demographics		
Age (y)		6.7 ± 0.7
Female	298 (55.1)	
Latino ethnicity	249 (46.0)	
Mean fat consumption[1]		20.4 ± 7.0
		Range: 4.0–54.0
Parenting influences		
Parent mediated dietary behaviors[2]		
Eating dinner together (3.5x week vs ≤ 1.5x week)	100 (18.5)	
Eating dinner together (6x week vs ≤ 1.5x week)	394 (72.8)	

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	n (%)	Mean ± SD
TV on during snacks/meals (weekly)		2.3 ± 1.8
Weekly eating away from home: family and friends	76 (14.0)	
Weekly eating away from home: fast food restaurants	214 (39.6)	
Weekly eating away from home: sit down restaurants	164 (30.3)	
Total screen time (minutes per day)		108 ± 86.2
Parent modeling of food rules[3]		5.2 ± 1.7
RREM[4]		4.7 ± 1.8
Parent support of healthy eating[5]		5.2 ± 1.5

[1] Fat consumption score refers to the sum score of the fatty foods consumed by children.

[2] Parent mediated behaviors refer to the behaviors listed here that parents facilitate for their children.

[3] Parent modeling of rules refers to the food rules that parents have for themselves (possible range from 0–7).

[4] RREM refers to the food rules that parents have at home for their children (possible range from 0–7).

[5] Parent support refers to behaviors which parents use to encourage healthy eating behaviors or discourage unhealthy eating behaviors (possible range from 0–7).

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Table 2

Hierarchical linear regression of parental correlates of children's fat consumption (n = 532)

		Standardized β				
	R^2 Change	**Block 1**	**Block 2**	**Block 3**	**Block 4**	**Block 5**
Demographics **R^2=0.02**						
Child gender		0.03	0.02	0.02	0.02	0.02
High school education▱		0.11	0.08	0.08	0.08	0.08
Some college education▱		0.12	0.10	0.09	0.12	0.12
College graduate▱		0.16**	0.16*	0.15*	0.17**	0.17**
Post graduate education▱		0.08	0.09	0.09	0.13*	0.13*
Parent Mediated Behaviors **R^2=0.05**	**0.03**					
Eating dinner together (3.5x week vs ≤1.5x week)			0.02	0.02	0.01	0.01
Eating dinner together (6x week vs ≤1.5x week)			0.04	0.06	0.05	0.04
TV on during meals/snacks (α= 0.71 (0.66, 0.74))			0.05	0.04	0.07	0.07
Weekly eating away from home at family and friends			0.08	0.07	0.06	0.06
Weekly eating away from home at fast food restaurants			0.07	0.06	0.07	0.07
Weekly eating away from home at sit down restaurants			0.02	0.02	0.03	0.02
Screen time			0.09	0.08	0.09	0.09
R^2=0.06	**0.01**					
Parent modeling of food rules				−0.10*	−0.22**	−0.22**
R^2=0.08	**0.02**					
RREM					0.21**	0.20**
R^2=0.08	**0.00**					
Parent support for healthy eating						0.01

*P<.05,

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** P<.01

□ Middle school or less is reference category.

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Table 3

Hierarchical linear regression of parental correlates of children's fat consumption using a stepwise backward elimination approach (n = 532)

		Standardized β				
	R^2 Change	**Block 1**	**Block 2**	**Block 3**	**Block 4**	**Block 5**
Demographics **R^2=0.02**						
Child gender		0.03	0.02	0.02	−0.00	−0.00
High school education▱		0.11	0.08	0.09	0.10	0.10
Some college education▱		0.12	0.10	0.14*	0.15*	0.15*
College graduate▱		0.16**	0.15*	0.20**	0.19**	0.19**
Post graduate education▱		0.08	0.09	0.14*	0.14*	0.14*
Parent Mediated Behaviors **R^2=0.04**	**0.03**					
Weekly eating away from home at family and friends' homes			0.08	0.08	0.08	0.08*
Weekly eating away from home at fast food restaurants			0.07	0.06	0.08	0.09*
Total weekly screen time			0.10*	0.10*	0.11**	0.12**
Parent Modeling **R^2=0.07**	**0.03**					
Limited portion sizes at meals				−0.08	−0.09*	−0.10*
No fried snacks (such as potato chips) at home				−0.13**	−0.15**	−0.16**
Must finish all food on plate				0.11*	−0.02	−0.02
RREM **R^2=0.11**	**0.03**					
TV on during meals/snacks					0.14**	0.14**
Must finish all food on plate					0.15**	0.16**
R^2=0.11	**0.00**					
Parent support for healthy eating						0.04

*P<.05,

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** P<.01

□ Middle school or less is reference category.