Home food rules in relation to youth eating behaviors, body mass index, waist circumference, and percent body fat

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Abstract

Purpose—To investigate agreement and associations between parent and youth acknowledgement of home food rules, youth eating behaviors, and measures of body composition and excess weight.

Methods—Parent-youth dyads (N = 413) completed the "Rules for eating at home" scale (*Active Where Survey)* and reported dietary intake. Trained research staff obtained anthropometric data. Linear regression analyses separately evaluated relationships between youth and parent acknowledgement of rules and youth-reported eating behaviors and anthropometric outcomes. Food rules were evaluated as a 12-item scale and individually.

Results—Score on the food rule scale was positively associated with fruit and vegetable servings by youth acknowledgement only ($\beta = .09$, $p = .006$), and not with anthropometric outcomes. The rule "No desserts except fruit" was positively associated with fruit and vegetable servings by youth ($\beta = .72$, $p = .002$) and parent ($\beta = .53$, $p = .03$) acknowledgement. The rules "No second helpings at meals" and "Limited fast food" were positively associated with body mass index z-score by youth ($\beta = .38$, $p = .002$; $\beta = .32$, $p = .02$, respectively) and parent ($\beta = .74$, $p < 0.001$; $\beta = .41$, $p = .006$, respectively) acknowledgement, with similar results for waist circumference z-score and percent body fat.

Conclusion—Inverse associations between specific food rules and healthful eating behaviors but positive associations with anthropometric outcomes suggest potentially bi-directional relationships between food rule implementation and youth weight. Future studies should disentangle how food rules guide youth behavior in the context of youth weight status.

Keywords

fast food; fruits and vegetables; weight; BMI; waist circumference; percent body fat

Introduction

The prevalence of obesity in the United States is approximately 20.5% among 12–19 year-olds, with no significant changes from 2003–2004 to 2011–2012 [1]. In an effort to promote healthy weight and growth among youth, certain food behaviors have been targeted for clinical guidance, including limiting portion sizes, encouraging fruit and vegetable consumption, promoting family meals, and limiting eating out at restaurants, particularly fast food restaurants [2]. The Dietary Guidelines for Americans encourages several of these behaviors, as well as having fruit as dessert [3]. Whether communicated as clinical guidance or public health messages, such recommendations require translation into practice at home by parents, a setting recognized for influencing obesity [4].

Parents may translate recommendations into rules for eating at home to guide youth behavior and achieve goals for their growth [5,6]. Recently, food rules have been described as a structural parent feeding practice, defined as parents setting clear expectations and boundaries regarding what, when, where, and how much youth eat [7]. Although structure-based feeding is recommended as an alternative to coercive or restrictive parent feeding styles, little is known about whether food rules are associated with eating behaviors and anthropometric outcomes, or how and when structure-based routines should be implemented [7,8]. Whether parents implement food rules as a health promotion strategy or in response to concerns about their children's weight is unclear [8]. To begin disentangling these dynamics, it is first necessary to understand the relationship between food rules and youth eating behavior and weight.

In this study, we investigated agreement and associations between parent and youth acknowledgement of home food rules, youth eating behaviors, and measures of body composition and excess weight. Consistent with prior studies, we utilized the "Rules for eating at home" scale from the *Active Where Survey* [9–11]. The 12-item scale includes rules such as "No desserts except fruit," "No snacking while watching television," "Must eat dinner with family at home," and "No second helpings at meals," that, respectively, mirror what, when, where and how much to eat. Although rule-setting may potentially be an effective parent feeding practice, current evidence, based on parent-report of rules, is mixed regarding the relationship between summary scores on the "Rules for eating at home" scale and youth eating behavior, and limited evidence suggests no relationship with weight status [7–10]. Given the lack of empirical evidence in prior studies using the scale as a summary score, we hypothesized that specific, evidence-informed food rules such as "Limited fast food", rather than a summary score, would be associated with youth-reported eating behaviors and anthropometric outcomes [12,13].

Additionally, little is known about whether parents and youth agree upon household food rules. Household food rules that parents endorse may not be recognized or internalized by youth during the transition into adolescence. Prior studies have addressed agreement between younger children and parents regarding parenting practices but have not directly assessed food rules [14]. An advantage of this study is that we interviewed parents and youth separately about food rules to allow examination of agreement. Considering that associations

between household rules and youth sedentary behavior can be strengthened when rules are acknowledged as being in place by both parents and youth, we hypothesized that food rules would be more strongly associated with outcomes when there was parent-youth agreement on a rule [15].

Methods

This observational study was conducted as phase 2 of the project, "Understanding Obesity from Epigenetics to Communities," led by the Global Obesity Prevention Center at Johns Hopkins Bloomberg School of Public Health and conducted at the Geisinger Health System. All study procedures were approved by the Institutional Review Boards at both institutions.

Participants

The study aimed to collect data from communities representing a range of obesogenic and obeso-protective environments, and with low and high average body mass indexes (BMIs) among youth. Electronic health record (EHR) data at a large integrated healthcare system in Pennsylvania were utilized to first identify study communities with at least 75 primary care patients, aged 2–18 years that contained BMI data in their EHR. Strategies were then employed to identify communities that: 1) were geographically distributed across Geisinger's 45-county area; 2) exhibited wide variation in the proportion of overweight (BMI-for-age percentile $\geq$ 85th) and obese (BMI-for-age percentile $\geq$ 95th) youth; and 3) represented environments considered obesogenic and obeso-protective based on community socioeconomic deprivation, population density, and physical activity diversity [16]. Environmental variables, community overweight, and obesity prevalence (high versus low) were divided into quintiles and communities were selected from the first or fifth quintile in four strata (high overweight, obesogenic environment; low overweight, obesogenic environment; high overweight, obeso-protective environment; low overweight, obeso-protective environment). Youth were enrolled from 28 communities that included 9 boroughs, 11 townships, and 8 census tracts, ranging (median) from 7 to 28 (14.5) youth per community.

Procedures

Households were called to recruit and enroll parent-youth dyads and schedule home visits. From each household, the study enrolled one parent and one youth between 10 and 15 years of age. Primary data were collected during home visits conducted in 2013 and 2014. Participants were provided $30 gift cards. In 2013, 210 parent-youth dyads were enrolled (22.2% participation rate), and in summer 2014, 224 dyads were enrolled (14.8% participation rate) for a total enrollment of 434 dyads. Lack of participation was attributed to passive refusal (no response after 18 telephone calls; 19.9% in 2013 and 39.5% in 2014), active refusal following successful telephone contact (46.3% in 2013 and 31.1% in 2014), and incorrect telephone number (27.4% in each year).

Primary data were collected from the parent during recruitment telephone calls (demographic information) and parent-youth dyads during home visits using self-administered questionnaires, completed independently of one another. Trained field research

assistants provided instruction. Questionnaires were initially fielded as paper tools and were converted to electronic tablets (parents in 2013, youth in 2014) using online software (QuestionPro Inc., San Francisco, California). Paper questionnaires were double-entered into a database and verified by trained research staff.

Survey Development

Youth and parent questionnaires were similarly structured with validated questions on home environment; youth physical activity; youth sedentary activity; neighborhood conditions; household rules for physical activity, television viewing, and eating; youth fruit and vegetable intake; home food availability; transportation to school; access to foods at school; and youth meal and sleep habits [17–20]. The parent questionnaire contained items regarding time squeeze; youth maturation; parental perception of youth body size; family weight talk; parent feeding practices; household food security; parent health; parent physical activity; and household food shopping behaviors [21–27].

Measures

Anthropometrics—Trained research staff followed national guidelines for anthropometric assessment to measure youth and parent height, weight, waist circumference (WC), and percent body fat (PBF) three times each using a portable stadiometer (model seca-213, seca North America, Inc.), calibrated portable digital scale, measuring tape, and bioelectrical impedance analysis (model TBF-310, TANITA Corporation of America, Inc.)[28]. Height (cm) and weight (kg) values were used to estimate BMI (kg/m^2). Age- and sex-specific BMI z-scores (BMIz) were computed using the Centers for Disease Control and Prevention 2000 Growth Charts [29]. Measured waist circumference mean values were used to compute WC z-scores (WCz) based on data from the National Health and Nutrition Examination Survey, 1988–1994 [30–32].

Youth report of eating behavior—Youth fruit and vegetable consumption was assessed with two questions ("In a typical day, how many servings of fruit/vegetables do you eat?") with examples of serving sizes provided (e.g., "1 medium piece of fresh fruit," "1 small bowl of green salad"). Response options included 0, 1, 2, 3, and 4 or more [17,18]. Reported consumption of fruits and vegetables was combined into a single continuous measure, with "4 or more" responses counted as 4 servings. Youth fast food consumption was assessed with the question "In the past week, how often did you eat something from a fast food restaurant (like McDonald's, Burger King, Hardee's, etc.)?" Response options included never, 1–2 times, 3–4 times, 5–6 times, 7 times, more than 7 times [19,20].

Food rules—Parent and youth acknowledgement of household rules for eating were assessed with the questions "How often do you or another parent/guardian have the following rules about your child's eating, regardless of how often the child is told the rule?" and "Does your parent or guardian have the following rules about your eating, whether your parent or guardian tells you often or not?" The food rules comprised the 12-item "Rules for eating at home" scale from the *Active Where Survey* and used a 3-point response scale (yes, sometimes, no) [11]. Consistent with prior research, responses were dichotomized for this

analysis with "sometimes" recoded as "yes" [9,10]. A summary score of the 12 items was also calculated for each participant [9].

Statistical Analysis

The goals of the analysis were to evaluate: 1) agreement between youth and parent acknowledgement of home food rules; 2) associations of parent- and youth-acknowledged food rules with youth-reported eating behaviors; and 3) associations of parent- and youth-acknowledged food rules with youth BMI, WC, and PBF. From the original 434 parent-youth dyads, we excluded 21 with missing parent data on BMI or age. To assess agreement between youth and parent acknowledgement of each food rule, we calculated Cohen's kappa coefficients, which were interpreted as follows: < 0.10 virtually no agreement, 0.11–0.40 slight, 0.41–0.60 fair, 0.61–0.80 moderate, 0.81–1.0 substantial [15]. To assess independent associations between youth and parent acknowledgement of food rules and youth eating behavior and anthropometric measures we conducted multivariable linear regression analyses. We examined associations between 12-item food rule scores (separately for youth and parents) and two categories of outcomes: youth report of eating behaviors (fruit, vegetable, and fast food consumption) and anthropometric outcomes (BMIz, WCz, and PBF). Analyses were repeated using specific food rules (separately by youth and parent acknowledgement). To evaluate effect modification by parent-youth agreement on rules, a second set of analyses was run that included a cross-product term between specific food rules and an indicator for parent-youth agreement for each rule. All regression models were adjusted for youth age (continuous, centered), youth sex, youth race/ethnicity (non-Hispanic white versus Hispanic or non-white), history of Medical Assistance (acquired from EHR), parent age (continuous, centered), parent sex, and parent BMI (kg/m^2, centered). Models with anthropometric outcomes were also adjusted for a centered-squared term for parent age to account for non-linearity. Considering the potential environmental, behavioral, and cultural conditions that contribute to both parent and child weight status, anthropometric models were also evaluated without parent BMI. Results are reported as beta coefficients (β) with standard errors (SE) and were considered significant at two-tailed $p < .05$. We did not adjust for multiple testing, but interpreted all p-values with knowledge of the number of tests and the consistency of the findings. All analyses were performed using Stata version 14.0 (StataCorp LP, College Station, TX).

Results

The 413 youth in the study were primarily white non-Hispanic, with a mean age of 12.9 years and substantial proportions receiving Medical Assistance (Table 1). Youth reported eating an average of 3.7 servings (standard deviation [SD] = 1.9) of fruit and vegetables per day and eating fast food 1.2 times (SD = 1.0) in the past week. Approximately 16% of youth were overweight and 18% obese.

There was moderate correlation between youth and parent summary scores for the 12-item food rules scale (Pearson's r = 0.43). Kappa coefficients by item ranged from 0.20 to 0.35, indicating slight agreement in specific food rules by youth and parent acknowledgment (Table 2).

Summative scores for the 12-item food rule scale, by youth acknowledgement only, were significantly and positively associated with youth report of fruit and vegetable servings (Table 3). Regardless of youth or parent report, scores for the 12-item food rule scale were not associated with weekly fast food consumption (Table 3) or anthropometric outcomes (Table 4).

Specific food rules, by youth or parent acknowledgement, were significant and positively associated with daily fruit and vegetable intake and significant and inversely associated with weekly fast food consumption (Table 3). Only one rule, "No desserts except fruit," was associated with fruit and vegetable intake by both youth and parent acknowledgement. Youth acknowledgement of the rules "No dessert until plate is clean" and "Must help with meal preparation at home" were associated with fruit and vegetable intake, as was "Must eat dinner with family at home" by parent acknowledgement. Youth acknowledgement of the rules "No meals while watching TV/DVDs" and "Limited fast food" were inversely associated with weekly fast food consumption, as was parent acknowledgement of the rules "No sweet snacks" and "No fried snacks."

Parent-youth agreement on rules did not modify associations between specific food rules and eating behavior, with one exception. We observed a significant interaction between the rule "No dessert until plate is cleaned" (by parent acknowledgement) and parent-youth agreement in the model with fruit and vegetable intake as an outcome. When there was agreement on this rule the association between parent acknowledgement of the rule and fruit and vegetable intake was strengthened to $\beta = .37$, crossing an inferential boundary.

Two food rules were positively and significantly associated with anthropometric outcomes by youth and parent acknowledgement: "No second helpings at meals" and "Limited fast food" (Table 4). The rule "Limited portion sizes at meals" was positively and significantly associated with PBF by youth and parent acknowledgement and with BMIz and WCz by parent acknowledgement only. Youth acknowledgement of this rule was also associated with BMIz and WCz when parent BMI was excluded as a covariate. The rule "No fried snacks" was positively and significantly associated with PBF by youth acknowledgement only. Including parent BMI as a covariate slightly attenuated associations between specific food rules and anthropometric outcomes, but did not change inferences except in regard to "Limited portion sizes at meals" as described above.

In general, parent-youth agreement on rules did not modify associations between specific food rules and anthropometric outcomes. Exceptions included youth acknowledgement of the rules "No second helpings at meals" and "Limited portion sizes at meals"; when there was agreement on these rules, associations between rules and BMIz were strengthened to $\beta = .78$ and $\beta = .65$, respectively, with similar results for WCz and PBF. Additionally, we observed a significant interaction between parent acknowledgement of the rule "No fried snacks" and parent-youth agreement in the model with PBF as an outcome, which strengthened the association between this rule and PBF to $\beta = 1.20$.

Discussion

To our knowledge, this is the first study to assess agreement between youth and parent acknowledgement of home food rules and to examine the relationship between rule acknowledgement and youth-reported eating behaviors and measures of body composition and excess weight. Study findings indicate slight agreement between youth and parents regarding specific food rules, which may reflect problematic survey design (e.g., unclear questions) or differential interpretation of questions or response options, or it may indicate that rules are not clearly communicated within households. Consistent with our first hypothesis, summary scores for the food rule scale were generally not associated with youth-reported eating behavior or anthropometric outcomes, whereas youth and parent acknowledgement of several specific food rules were significantly associated with outcomes. Contrary to our second hypothesis, with a few exceptions, parent-youth agreement on rules did not strengthen the association between acknowledgement of specific food rules and behavioral and anthropometric outcomes.

Youth scores on the 12-item food rule scale were positively associated with daily fruit and vegetable intake; parent scores were not associated with eating behavior. This finding contrasts a prior study that observed positive associations between parent scores on the food rule scale and diet quality among school-aged children in models adjusted for neighborhood food environment, but is consistent with a study that found no association between parent acknowledgement of rules and diet quality among school-aged children [9,10]. Consistent with prior reports, neither youth nor parent scores were associated with anthropometric outcomes [9]. Our findings suggest that specific food rules, rather than summary scores, have greater utility in evaluating relationships between rules and youth outcomes.

Specific household rules for eating were positively associated with fruit and vegetable intake as well as body composition and excess weight, but the temporal direction of these relationships is unclear, as parents could implement rules to guide youth behavior to proactively achieve weight goals or in response to excess weight. "No desserts except fruit" was the only rule that had a positive and significant association with youth fruit and vegetable intake by both youth- and parent-acknowledgement and may be an effective rule for parents to use in guiding youth eating behavior. Three food rules, by youth or parent acknowledgement, were significantly associated with each of the anthropometric outcomes examined. A substantial literature base supports the evidence between portion control and energy balance, conveyed through the rules, "No second helpings at meals" and "Limited portion sizes at meals" [33]. Similarly, "Limited fast food" is supported by evidence linking fast food consumption and weight status [12,13]. A fourth rule, "No fried snacks," was positively and significantly associated with PBF by youth acknowledgement; however associations between snacking, fat intake, and excess weight are unclear. Despite recent studies demonstrating an inverse association between snacking and BMI, dietary culprits are challenging to identify as snack foods are often grouped as one item (e.g., chips, cookies, candies, ice cream) [34,35].

The restrictive nature of these latter four rules may explain the observed positive associations with anthropometric outcomes. Each of the rules includes the phrasing "no" and

"limited" to convey restriction, perhaps a marker for coercive, controlling parent feeding practices, which have been associated with excess weight in youth [7,8,21]. Two of these four rules ("No second helpings at meals" and "Limited portion sizes at meals") interacted with parent-youth agreement to strengthen positive associations with anthropometric outcomes. This suggests that overt parental implementation of restrictive rules, confirmed by youth agreement, may be ineffective, and even counter-productive, in achieving parent-established health goals [21,36,37]. In contrast, covert implementation of rules may allow parents to exercise structure over youth food decisions without challenging youth autonomy [7,8,37]. For example, parents can pre-plate meals to covertly limit portion sizes rather than overtly communicating a directive to limit consumption during family-style meal service.

Alternatively, our findings may indicate that parents implement rules in response to concerns about youth body size, or that like parent feeding practices, the temporal relationship between food rule implementation and youth weight status may be bi-directional [38]. For example, a recent longitudinal study observed that mothers implemented restriction and/or monitoring feeding practices when they were concerned about their daughters being overweight and that these practices were associated with a persistence of overweight among the youth [39]. Though the temporal relationship between food rules and youth weight status is impossible to discern using cross-sectional data, in regard to the rule "Limited fast food," our finding that youth acknowledgement of the rule was inversely associated with fast food consumption indicates that the rule may, in fact, be effective at influencing eating behavior. Thus its association with higher BMIz, WCz, and PBF may result from parental implementation of the rule in response to larger body size. This suggests a bi-directional relationship between food rules and youth weight status, as has been proposed in regard to parent feeding practices, though understanding the degree to which household food rules persist over time is critical to assessing the validity of such a relationship [38].

Strengths of this study included having parallel data from parent-youth dyads, which allowed for evaluation of youth and parent acknowledgement and agreement of home food rules in relation to behavioral and anthropometric outcomes. Additionally, the reliability of our findings related to anthropometric outcomes was enhanced by concurrent measures of body composition and excess weight. Study limitations included the use of a scale ("Rules for eating at home") that has demonstrated reliability, but not validity. Thus evidenced-informed rules like "No sugar-sweetened beverages" were not evaluated. Additionally, the source population with little racial/ethnic diversity limits the generalizability of findings to the overall U.S. population. Further, the cross-sectional study design limits temporal inferences about the relationships between retrospective exposures and measured outcomes.

Conclusions

This study demonstrated the relevance of home food rules in relation to youth eating behaviors and measures of body composition and excess weight. Although several of the rules in the 12-item home food rule scale were associated with eating behavior or anthropometric outcomes, relationships were complex. Given limited evidence supporting the scale as a whole, this study highlights specific, evidence-informed rules for future investigation. Specific food rules may function as actionable messages that can guide youth

eating behaviors, but given the positive associations we observed between food rules and anthropometric outcomes, the context in which rules are implemented should be better understood to inform parental strategies. Future studies should be designed to disentangle the potentially bi-directional relationship between food rules, eating behaviors, and anthropometric outcomes. The variability in food rule acknowledgement and dyad agreement also suggests that future studies should collect both youth and parent perspectives and evaluate implementation practices.

Acknowledgments

List of Abbreviations

BMIz   body mass index z-score

WCz   waist circumference z-score

PBF   percent body fat

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Implications and Contributions

Household food rules function as actionable messages for parents to guide youth, but complex relationships exist between rules and eating behavior, body composition, and excess weight. This study advances understanding of associations between summary rule scores versus specific food rules, behavior, and anthropometric outcomes by reporter acknowledgement and dyad agreement.

Table 1

Characteristics of youth and their parents

Characteristic	N (%)	Mean (SD)	Range
Youth	413 (100)		
Age, years		12.9 (1.7)	10.1, 16.0
Sex, male	198 (48)		
Race/ethnicity			
White	377 (91)		
Black	25 (6)		
Hispanic	3 (1)		
Other	8 (2)		
Received Medical Assistance	141 (34)		
BMI, kg/m^2		21.5 (5.6)	12.8, 47.3
<85th percentile	273 (66)		
85th to 95th percentile	66 (16)		
95th percentile	74 (18)		
Waist circumference		29.7 (5.2)	20.3, 51.0
<85th percentile	290 (70)		
85th to 95th percentile	74 (18)		
95th percentile	49 (12)		
Percent body fat		22.9 (11.4)	1.3, 55.5
Parents	413 (100)		
Age, years		42.6 (8.2)	26, 74
Sex, male	60 (15)		
BMI, kg/m^2		29.2 (7.5)	15.8, 59.1

Table 2

Frequency and inter-rater agreement of youth and parent acknowledgement of home food rules

Food Rule	Youth Acknowledging Rule (%)	Parents Acknowledging Rule (%)	Kappa Coefficient
"No second helpings at meals"	117 (28)	83 (20)	0.25
"Limited portion sizes at meals"	152 (37)	138 (34)	0.28
"No dessert until plate is cleaned"	276 (67)	238 (58)	0.22
"No desserts except fruit"	95 (23)	80 (19)	0.20
"No meals while watching TV/DVDs"	203 (49)	214 (52)	0.34
"No snacking while watching TV/DVDs"	133 (32)	128 (31)	0.24
"No sweet snacks"	140 (34)	129 (31)	0.23
"No fried snacks"	122 (30)	116 (28)	0.34
"Must help with meal preparation at home"	269 (65)	269 (65)	0.21
"Must help with cleanup after meals at home"	338 (82)	348 (85)	0.25
"Must eat dinner with family at home"	331 (80)	359 (87)	0.22
"Limited fast food"	321 (78)	344 (84)	0.25

Table 3

Adjusted[a] multivariable regression results for associations between home food rules by youth or parent acknowledgement and youth report of daily fruit and vegetable servings and weekly fast food visits

Home Food Rule	Youth Fruit and Vegetable Servings		Youth Fast Food Visits	
	β (SE)	P-value	β (SE)	P-value
Summative score of 12 food rules				
Youth score	**0.09 (0.03)**	**0.006**	−0.03 (0.02)	0.11
Parent score	0.07 (0.04)	0.06	−0.03 (0.02)	0.09
"No second helpings at meals"				
Youth reports yes	0.08 (0.22)	0.72	0.14 (0.11)	0.18
Parent reports yes	0.32 (0.24)	0.18	0.03 (0.12)	0.81
"Limited portion sizes at meals"				
Youth reports yes	0.09 (0.20)	0.67	−0.15 (0.10)	0.15
Parent reports yes	0.07 (0.20)	0.72	−0.00 (0.10)	0.97
"No dessert until plate is cleaned"				
Youth reports yes	**0.52 (0.21)**	**0.01**	−0.16 (0.10)	0.13
Parent reports yes	0.06 (0.20)	0.77	−0.06 (0.10)	0.52
"No desserts except fruit"				
Youth reports yes	**0.72 (0.23)**	**0.002**	0.15 (0.12)	0.20
Parent reports yes	**0.53 (0.25)**	**0.03**	−0.21 (0.12)	0.10
"No meals while watching TV/DVDs"				
Youth reports yes	0.19 (0.19)	0.32	**−0.20 (0.10)**	**0.04**
Parent reports yes	0.28 (0.19)	0.15	−0.03 (0.10)	0.77
"No snacking while watching TV/DVDs"				
Youth reports yes	0.09 (0.21)	0.66	−0.13 (0.10)	0.20
Parent reports yes	0.17 (0.21)	0.42	−0.14 (0.11)	0.19
"No sweet snacks"				
Youth reports yes	0.40 (0.20)	0.05	−0.00 (0.10)	1.00
Parent reports yes	0.11 (0.21)	0.61	**−0.23 (0.11)**	**0.03**
"No fried snacks"				
Youth reports yes	0.32 (0.21)	0.13	−0.07 (0.11)	0.52
Parent reports yes	0.35 (0.22)	0.11	**−0.26 (0.11)**	**0.02**
"Must help with meal preparation at home"				
Youth reports yes	**0.46 (0.20)**	**0.02**	−0.15 (0.10)	0.16
Parent reports yes	0.04 (0.20)	0.85	0.02 (0.10)	0.86
"Must help with cleanup after meals at home"				
Youth reports yes	0.28 (0.25)	0.27	−0.8 (0.13)	0.54
Parent reports yes	0.08 (0.27)	0.78	−0.12 (0.14)	0.38
"Must eat dinner with family at home"				
Youth reports yes	0.39 (0.24)	0.10	−0.11 (0.12)	0.37

Home Food Rule	Youth Fruit and Vegetable Servings		Youth Fast Food Visits	
	β (SE)	P-value	β (SE)	P-value
Parent reports yes	**0.70 (0.29)**	**0.02**	−0.13 (0.15)	0.38
"Limited fast food"				
Youth reports yes	0.15 (0.23)	0.53	**−0.45 (0.11)**	**< 0.001**
Parent reports yes	0.51 (0.26)	0.05	−0.22 (0.13)	0.10

[a]Adjusted for youth age, youth sex, youth race/ethnicity, youth Medical Assistance, parent age, parent sex, and parent BMI

Table 4

Adjusted[a] multivariable regression results for associations between home food rules by parent or youth acknowledgment and anthropometric outcomes

Home Food Rule	Youth BMI Z-score		Youth Waist Circumference Z-score		Youth Percent Body Fat	
	β (SE)	P-value	β (SE)	P-value	β (SE)	P-value
Summative score of 12 food rules						
Youth score	0.02 (0.02)	0.24	0.02 (0.02)	0.16	0.27 (0.17)	0.12
Parent score	0.03 (0.02)	0.17	0.03 (0.02)	0.10	0.30 (0.18)	0.09
"No second helpings at meals"						
Youth reports yes	**0.38 (0.12)**	**0.002**	**0.24 (0.10)**	**0.01**	**4.21 (1.12)**	**< 0.001**
Parent reports yes	**0.74 (0.13)**	**< 0.001**	**0.49 (0.11)**	**< 0.001**	**5.84 (1.23)**	**< 0.001**
"Limited portion sizes at meals"						
Youth reports yes	0.19 (0.12)	0.10	0.14 (0.09)	0.12	2.35 (1.06)	**0.03**
Parent reports yes	**0.62 (0.11)**	**< 0.001**	**0.47 (0.09)**	**< 0.001**	**5.95 (1.03)**	**< 0.001**
"No dessert until plate is cleaned"						
Youth reports yes	0.04 (0.12)	0.73	0.08 (0.09)	0.42	0.51 (1.08)	0.64
Parent reports yes	−0.08 (0.11)	0.50	−0.04 (0.09)	0.68	−1.02 (1.03)	0.32
"No desserts except fruit"						
Youth reports yes	−0.09 (0.13)	0.52	−0.11 (0.10)	0.31	−0.08 (1.20)	0.95
Parent reports yes	0.16 (0.14)	0.27	0.13 (0.11)	0.26	1.63 (1.30)	0.21
"No meals while watching TV/DVDs"						
Youth reports yes	−0.18 (0.11)	0.10	−0.12 (0.09)	0.18	−1.39 (1.01)	0.17
Parent reports yes	−0.13 (0.11)	0.26	−0.07 (0.09)	0.44	−0.47 (1.02)	0.65
"No snacking while watching TV/DVDs"						
Youth reports yes	−0.07 (0.12)	0.54	0.04 (0.09)	0.64	−0.22 (1.08)	0.84
Parent reports yes	0.03 (0.12)	0.81	0.04 (0.09)	0.68	0.12 (1.10)	0.92
"No sweet snacks"						
Youth reports yes	0.13 (0.12)	0.26	0.15 (0.09)	0.10	1.20 (1.07)	0.27
Parent reports yes	0.02 (0.12)	0.89	0.04 (0.10)	0.70	0.44 (1.10)	0.69
"No fried snacks"						

Home Food Rule	Youth BMI Z-score		Youth Waist Circumference Z-score		Youth Percent Body Fat	
	β (SE)	P-value	β (SE)	P-value	β (SE)	P-value
Youth reports yes	0.20 (0.12)	0.09	0.17 (0.09)	0.08	2.46 (1.09)	0.03
Parent reports yes	−0.04 (0.12)	0.76	−0.02 (0.10)	0.85	−0.39 (1.14)	0.73
"Must help with meal preparation at home"						
Youth reports yes	0.07 (0.12)	0.52	0.06 (0.09)	0.54	−0.16 (1.07)	0.88
Parent reports yes	−0.14 (0.12)	0.21	−0.03 (0.09)	0.71	−0.76 (1.07)	0.48
"Must help with cleanup after meals at home"						
Youth reports yes	0.04 (0.14)	0.80	−0.04 (0.11)	0.74	0.33 (1.31)	0.80
Parent reports yes	−0.23 (0.15)	0.13	−0.19 (0.12)	0.11	−1.03 (1.41)	0.46
"Must eat dinner with family at home"						
Youth reports yes	−0.13 (0.14)	0.34	−0.04 (0.11)	0.70	−0.86 (1.26)	0.50
Parent reports yes	0.04 (0.16)	0.80	0.09 (0.13)	0.48	1.01 (1.51)	0.50
"Limited fast food"						
Youth reports yes	**0.32 (0.13)**	**0.02**	**0.24 (0.10)**	**0.02**	**2.59 (1.21)**	**0.03**
Parent reports yes	**0.41 (0.15)**	**0.006**	**0.30 (0.12)**	**0.01**	**3.37 (1.37)**	**0.01**

[a] Adjusted for youth age, youth sex, youth race/ethnicity, youth Medical Assistance, parent age (centered and centered-squared terms), parent sex, and parent BMI