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Original article

## 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 acknowledgment 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 acknowledgment 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 acknowledgment 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 ( $\beta = .53, p = .03$ ) acknowledgment. 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 ( $\beta = .74, p < .001$ ;  $\beta = .41, p = .006$ , respectively) acknowledgment, with similar results for waist circumference z-score and percent body fat.

**Conclusions:** Inverse associations between specific food rules and healthful eating behaviors but positive associations with anthropometric outcomes suggest potentially bidirectional 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.

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### IMPLICATIONS AND CONTRIBUTION

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 acknowledgment and dyad agreement.

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The prevalence of obesity in the United States is approximately 20.5% among 12- to 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 and 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 acknowledgment of home food rules, youth eating behaviors, and measures of body composition and excess weight. Consistent with prior studies, we used 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].

In addition, 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 obesoprotective environments, and with low and high average body mass indexes (BMIs) among youth. Electronic health record (EHR) data at a large integrated health care system in Pennsylvania were used 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 used 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  $\geq 85$ th) and obese (BMI-for-age percentile  $\geq 95$ th) youth; and (3) represented environments considered obesogenic and obesoprotective based on community socioeconomic deprivation, population density, and physical activity diversity [16]. Environmental variables, community overweight, and obesity prevalence (high vs. 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, obesoprotective environment; low overweight, obesoprotective environment). Youths were enrolled from 28 communities that included nine boroughs, 11 townships, and eight 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;

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