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Associations between Perceived Family Meal Environment and Parent Intake of Fruit, Vegetables, and Fat

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ABSTRACT

Objective: To describe the family mealtime environment and assess associations with adult fruit, vegetable, and fat intake.

Design: Telephone survey.

Participants: A convenience sample of 277 adults in the Minneapolis/St. Paul area were recruited through 4 schools. The sample was 85% female and 70% married. The mean number of children in the household was 2.6 (range 1 to 9).

Variables Measured: Adult fruit and vegetable intake, fat intake, and perceptions of the mealtime environment.

Analysis: Descriptive and mixed-model linear regression.

Results: Participants reported that the television was frequently on during dinner meals and almost one third felt that their family was too busy to eat dinner together. A higher frequency of television viewing during dinner was associated with lower fruit and vegetable consumption and higher fat consumption. Planning meals in advance was associated with higher fruit and vegetable consumption; however, 46% of the adults did not plan meals in advance. Arguments concerning eating behavior during dinner were associated with higher fat consumption.

Conclusion and Implications: The family meal environment is associated with adult eating patterns and should be considered when designing nutrition messages for families.

KEY WORDS: eating behavior, families, mealtime, environment

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INTRODUCTION

Poor eating patterns are associated with a variety of chronic diseases, including cardiovascular disease and cancer.¹ Nutrition interventionists seeking to promote behavior change are challenged to find effective channels for behavioral messages and interventions. Psychosocial theories, such as Social Cognitive Theory and Theory of Reasoned Action, indicate that social influences play a role in determining eating behavior.^{2,3} Because families constitute a key social influence, particularly for youth, it may be important to understand how families influence eating behaviors. The family meal environment is one context in which to evaluate the family's influences on eating behavior. However, there is limited research examining the associations between the mealtime environment and food intake.

The purpose of this study was to explore the association between perceived family mealtime environment and adult fruit, vegetable, and fat intake. The first aim of this study was to evaluate the family mealtime environment by examining perceptions of (1) the frequency of dinner meals together, watching television, and arguments during dinner; (2) rules about mealtime behavior; (3) barriers to eating dinner together; (4) planning meals; (5) pleasantness of the dinner environment; and (6) satisfaction with the frequency of dinner meals together. The second aim of the study was to evaluate the relationship between the above-mentioned factors and adult fruit and vegetable and fat consumption.

DESCRIPTION OF TELEPHONE SURVEY

Sample Recruitment

A convenience sample of parents was recruited through 4 junior high and middle schools in the Minneapolis/St. Paul, Minnesota, metropolitan area. The 4 schools were selected from a group of 20 schools that agreed to participate in a randomized, school-based intervention study (Teens Eating for Energy and Nutrition at School [TEENS]) to reduce diet-related cancer risk factors in adolescents.⁴ The research

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described here was part of a formative assessment to guide the development of the family intervention for that study.

To recruit parents, research staff made presentations in seventh and eighth grade classrooms. The students were asked to take the forms home, describe the study to their parent or guardian, and return the completed forms to designated teachers in their schools. Additional recruitment activities included having sign-up booths at school activities. Incentives were offered both for turning in completed forms and for participating in the telephone survey. Families who returned a signed consent form were entered into a drawing for a \$15 gift certificate. All families who completed the telephone surveys also received a pair of movie tickets and were entered into a drawing for a \$50 gift certificate. The study was approved by the University of Minnesota Institutional Review Board.

Survey Development

This survey was developed to assess a variety of influences on family eating behavior. Because there were no validated measures available, literature on health behaviors and the family meal environment was used to develop the survey questions.^{5,6} The survey was developed by the TEENS research staff and was pilot-tested on approximately 25 parents. Trained telephone interviewers from Data Collection and Support Services at the University of Minnesota conducted the telephone interviews using the computer-assisted telephone interviewing system. Based on the pilot testing, language and response scales were simplified, and items were organized into topic areas to ease administration. The final version of the adult survey included 107 items and took approximately 20 minutes.

Measures

For the purposes of this study, a number of questions were chosen from the adult survey to assess family mealtime environment, satisfaction with dinner environment, adult eating behavior, and sociodemographic variables.

Perception of and satisfaction with dinner environment. Perceptions of the eating environment were assessed by questions developed for the TEENS study with two different response categories. The adult responded to 4 questions about the frequency of eating dinner together as a family, watching television, and having arguments during family dinners. The adult also responded to 12 additional questions that asked how much he or she agreed or disagreed with statements about the family meal environment.

A factor analysis was conducted with all of the items evaluating the adults' perceptions of the dinner environment (items were standardized; mean = 0 and SD = 1). The factor analysis yielded two scales with strong psychometric properties: the Time scale and the Television (TV) scale. The Time scale items included the following:

- How often does your family sit down together for dinner?
- We are too busy to eat together as a family most nights.
- Adolescents' activities, such as sports, music, or part-time jobs, often make it difficult to have family meals together.
- Adult work schedules often make it difficult to have family meals together.
- I am satisfied with how often my family eats the dinner meal together.

Higher scores on the Time scale suggest that the family finds more time to eat together and that the adult is more satisfied with meals together. The standardized Cronbach α for these items was 0.83.

The TV scale items included the following:

- How often is the television on during dinner time?
- Adults in the family want the television on during mealtime.
- The children and teenagers want the television on during mealtime.

Higher scores on the TV scale suggest that the family frequently watches television during mealtime. The standardized Cronbach α for these items was 0.77.

Adult intake. Fruit and vegetable consumption was assessed using the Block Fruit and Vegetable Screener and fat consumption was assessed using the Block Fat Screener. The Block Fruit and Vegetable Screener is an instrument similar to the measure developed by the Centers for Disease Control and Prevention for use in the Behavioral Risk Factor Surveillance System.⁷ The Block Fat Screener has been used and validated in studies of adults.⁸ These two screeners were used to rank participants along a continuum of fruit and vegetable and fat consumption. Higher scores on the Block Fruit and Vegetable Screener suggest higher fruit and vegetable consumption. Higher scores on the Block Fat Screener suggest higher fat consumption.

Sociodemographic Variables

Adult sociodemographic variables included gender, age, marital status, and family socioeconomic status (SES). Rather than using education only to categorize SES, we took a more comprehensive approach, creating a 3 × 3 table using employment status and education. Families were categorized as low SES if none of the adults had any college experience, or none of the adults were employed. Families were categorized as high SES if at least one working adult had a college degree or held a professional or executive position. Families with at least one employed adult with some college experience that did not meet the criteria for high SES were categorized as moderate SES.

Statistical Analysis

The purpose of these analyses was to describe the distributions on the mealtime environment questions and assess the

associations between dinner environment and fruit, vegetable, and fat consumption. All analyses were conducted using Version 6.12 of SAS.⁹ Mixed-model regression methods were used to examine both the univariate and multivariate associations between the independent and dependent variables. Such methods are appropriate given multiple sources of random variation, as existed in these data. The data may be viewed as coming from a cluster-sampling design, wherein the school is the cluster, crossed with the fixed effects of interest, with multiple students nested within each school. We chose to include school as a random effect both to account for variation owing to schools and to allow for broader inferences to other schools like those included in the study.¹⁰

We first examined descriptive statistics, including distributions of responses on both individual items describing the mealtime environment and the Time and TV scales. For each of the main dependent variables (adult fruit and vegetable consumption and adult fat consumption), we then fit separate regression models using the environmental measures as the main independent variables and sociodemographic variables as potential confounders. Because the models were exploratory, independent variables and confounders were retained as long as $P < .10$.

SURVEY FINDINGS

Sample

There were 1371 age-eligible adolescents and their families in the 4 schools. The recruitment activities were conducted in groups with the students, and it is unclear how many adults received the recruitment message via their child. Of the 309 adults who agreed to participate, 287 adults completed the survey; because of missing data in the adult survey, 277 adults made up the final sample. Thirty-five percent of the sample came from 1 school, 25% each from 2 schools and 15% from the fourth school (Table 1).

Eating Environment

Table 2 shows the distribution of adult responses to the 4 questions assessing the mealtime environment. Over half of the adults reported that the family sits down together for dinner 4 or more times a week, and 11% said that the family sits down together for dinner less than once a week. Nearly 40% of the adults reported that the television is on more than 4 times per week during dinner. About one quarter reported that arguments (about eating or about other issues) occur during the dinner meal at least once per week.

Table 3 shows the distribution of responses to the eating environment questions. Whereas 70% of the adults did not believe that the family is too busy to eat together in the evening, approximately 50% reported that children's activities and adult work schedules make it difficult to have family meals. Approximately one quarter of the adults reported

Table 1. Demographic Information

| | | |
|--|--|----------------------------|
| Adult interviewed | Mother | 234 (84.5%) |
| | Stepmother | 7 (2.5%) |
| | Other female guardian | 7 (2.5%) |
| | Other female not guardian | 5 (1.8%) |
| | Father | 22 (7.9%) |
| | Stepfather | 1 (0.4%) |
| | Other male guardian | 1 (0.4%) |
| Marital status | Two parents in household (married or living in marriage-like relationship) | 195 (70.4%) |
| | Single-parent household (separated, divorced, widowed, or never married) | 82 (29.6%) |
| Age | | Mean = 39.9 SD = 6.5 |
| Number of children living in the household | | Mean = 2.61 Range = 1-9 |
| Family SES | High | 82 (29.6%) |
| | Moderate | 101 (36.3%) |
| | Low | 94 (33.3%) |

that they were not satisfied with how often their family eats dinner together. About half of the adults agreed that they do not plan dinner meals in advance.

A number of questions assessed family rules about dinner. Nearly all of the adults agreed that it is important for teens to have good table manners, and almost one third said that teens were allowed to eat dinner separately from the rest of the family. Approximately 40% of families had a rule against answering the telephone during dinner. Some two thirds of the adults reported that the teens want the television on during dinner, but only one third said that the adults want the television on during dinner. The large majority of the adults said that dinnertime is usually pleasant and is a time to connect and talk with the family.

Dinner Environment and Adult Fruit and Vegetable and Fat Intake

Adult fruit and vegetable consumption. Three variables remained in the final multivariate model predicting adult Block Fruit and Vegetable score: the TV scale, the single question "I often don't think about what to have for dinner until right before dinner," and adult SES (Table 4). The TV scale was inversely associated with Block Fruit and Vegetable score in this model, suggesting that less television viewing during dinner was associated with consuming more fruits and vegetables overall among the adults. Higher SES was associated with consuming more fruits and vegetables. In addition, planning dinner in advance was associated with adult Block Fruit and Vegetable score, suggesting

Table 2. Adult Perceptions of the Family Mealtime Environment

| | < 1 Time/Wk (%) | 1-3 Times/Wk (%) | ≥ 4 Times/Wk (%) |
|---|-----------------|------------------|------------------|
| How often does your family sit down together for dinner? | 11.2 | 29.6 | 59.2 |
| How often is the television on during dinner time? | 40.8 | 19.5 | 39.7 |
| How often would you say arguments about eating occur during dinner time? | 72.9 | 18.4 | 8.7 |
| How often do other arguments, not about eating, occur during dinner time? | 77.3 | 15.5 | 7.2 |

a trend that adults who plan dinner in advance are more likely to report eating more fruits and vegetables.

Adult fat consumption. Three variables remained in the final multivariate model predicting adult Block Fat score: the TV scale, the single question “How often would you say arguments about eating occur during dinner time?” and adult SES (see Table 4). Arguments about eating during meals were positively associated with Block Fat score, suggesting that more arguments during dinner were associated with higher overall fat consumption. Higher SES was associated with lower scores on the Block fat screener. The TV scale was positively associated with Block Fat score in this model, suggesting a trend that more television watching during dinner by adults was associated with higher fat consumption.

DISCUSSION

This study suggests that adult eating behaviors are related to a number of mealtime environmental influences. Although this study was exploratory, a number of interesting findings about the family meal environment were observed and merit further investigation.

These data suggest that television viewing during dinner may be part of a set of behaviors that includes less healthful fat and fruit and vegetable consumption. Adults in this

sample who reported having the television on more frequently during meals were more likely to report a diet higher in fat and lower in fruits and vegetables. About 40% of families surveyed reported having the television on at least 4 times per week during dinner. These data are consistent with a previous study that showed that families who had a higher frequency of television watching during meals had higher proportions of total energy from snack foods, meats, and sodas and lower proportions from vegetables than families with less frequent or no television watching during meals.¹¹ This research is supportive of further investigations into the relationship between television viewing and less healthful eating behavior and how to translate findings into appropriate messages for families.

These results also suggest that arguments during dinner-time had an undesirable association with adult fat consumption. Families may try to address conflict during mealtimes because it is one of the few times when the whole family is gathered together. Conflict during mealtime may negatively impact the diet if it reduces the amount of time the family sits down for a meal, reduces the occurrence of dining together, or triggers coping skills that involve poorer food choices. The research on the relationship between stress and eating behavior suggests that stress can affect eating in a negative manner by triggering less effective coping skills and possibly decreasing time spent at the dinner table. Family nutrition education messages might suggest that

Table 3. Adult Perceptions of the Family Meal Eating Environment (n = 277)

| Survey Questions | Agree (%) | Disagree (%) |
|---|-----------|--------------|
| We are too busy to eat together as a family most nights | 30.0 | 70.0 |
| Children's activities, such as sports, music, or part-time jobs, often make it difficult to have family meals together. | 49.1 | 50.9 |
| Adult work schedules often make it difficult to have family meals together. | 46.2 | 53.8 |
| I am satisfied with how often my family eats the dinner meal together. | 72.6 | 27.4 |
| I often don't think about what to have for dinner until right before dinner. | 47.7 | 52.3 |
| In our family, it is important for teenagers to have good table manners. | 96.4 | 3.6 |
| In our family, it's okay for the teenagers to eat dinner separately from the rest of the family. | 30.7 | 69.3 |
| In our family, we have a rule against answering the telephone during dinner. | 41.5 | 58.5 |
| Adults in the family want the television on during mealtime. | 32.9 | 67.1 |
| The children and teenagers want the television on during mealtime. | 66.1 | 33.9 |
| Dinner time is usually a pleasant time for the family. | 96.8 | 3.2 |
| Dinner time is usually a time when our family connects and talks with each other. | 92.1 | 7.9 |

Table 4. Final Models for Environmental Predictors of Adult Intake

| Dependent Variables | Independent Variables | Beta (SE) | P Value |
|---------------------------------------|---------------------------|-----------------|---------|
| Adult Block fruit and vegetable score | TV scale | -.10 (.04) | .02 |
| | Plan dinner | -.35 (.2) | .09 |
| | SES | | |
| | High SES mean = 15.73 | 1.93 (.52) | < .01 |
| | Moderate SES mean = 14.49 | .88 (.48) | .07 |
| | Low SES mean = 13.82 | Reference level | |
| Adult Block fat score | TV scale | .19 (.1) | .07 |
| | Arguments about eating | 1.15 (.45) | < .01 |
| | SES | | |
| | High SES mean = 34.94 | -4.45 (1.24) | < .01 |
| | Moderate SES mean = 36.52 | -2.84 (1.12) | .01 |
| | Low SES mean = 39.35 | Reference level | |

dinner time is not the best time to resolve family conflicts, and future studies are clearly needed in this area.¹²

Independent of mealtime environmental factors, SES was associated with adult fat and fruit and vegetable consumption. This finding supports other studies showing that lower SES groups are at a greater risk for lower-quality diets and the related chronic diseases.^{13,14} SES could affect adult consumption through a number of mediating variables, including education, finances, or time to prepare meals.

The descriptive statistics suggest that families have to work to find time to have meals together, although the Time scale was not a significant predictor in any of the final models. Thirty percent of the sample said that they were too busy to eat together as a family most nights, and almost half of the adults reported that adults' and children's schedules made it difficult to have meals together. Not planning meals was negatively associated with fruit and vegetable consumption in adults. This suggests that busy schedules may be compromising the diets of American families, and one recommendation to families may be to slow down the pace. Because that message is difficult for families to implement, it is important to communicate to the public that quickly prepared meals can still be nutritious and that dinnertime can be a time to connect with each other.

This study was cross-sectional and is limited by the self-report measures and the lack of longitudinal data. The family mealtime environment variables reflect the perceptions of the adult respondents rather than direct observations, which are far more costly and intensive for both the researchers and participants. In addition, these results do not address the causal nature of the relationships between family mealtime environment and eating behavior. Owing to the lack of validated measures for mealtime environment, we focused our questions on the dinner mealtime environment but used adult intake measures that were more comprehensive. When considering this research, it is important to consider the possibility of both response and social desirability biases. We

attempted to limit response bias by telling all participants that the data were confidential and would not be reported to their school. Although the sample was not drawn randomly, its racial and ethnic distribution closely matched that of the schools from which the sample was drawn. However, only approximately 20% of the eligible families participated in the study, and this could have biased the findings.

IMPLICATIONS FOR RESEARCH AND PRACTICE

This article is among the first to evaluate the family dinner meal environment and to explore associations with eating behavior. We found that the parents' perception of mealtime environment was associated with their intake of fruit, vegetable, and fat, suggesting that intervention messages concerning eating behaviors should be sensitive to the family meal environment. More research is needed examining these relationships in larger samples. In addition, future studies are needed that examine other factors potentially related to the family mealtime environment, such as stress levels, family communication practices, and cohesiveness in the family. Research on the influence of mealtime environment and family eating behaviors is an important piece in learning how to improve the quality of the diet to reduce diet-related diseases.

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