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Ecological Momentary Assessment of the Breakfast, Lunch, and Dinner Family Meal Environment in Racially/Ethnically Diverse and Immigrant Households

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Abstract

Objective: To: (1) describe meal characteristics across breakfast, lunch, and dinner family meals in racially/ethnically diverse and immigrant/refugee households via ecological momentary assessment (EMA); (2) identify real-time meal characteristics that are associated with family meal frequency; and (3) identify qualitative themes regarding parent's perspectives about meal characteristics and meal types that influence family meal frequency.

Design: Cross-sectional.

Setting: In-home visits.

Participants: Children ages 5–7 (n=150) and their families from diverse and low income households.

Main Outcome Measure(s): Mixed-methods.

Analysis: Multiple linear regression and hybrid deductive and inductive content analysis.

Results: Quantitative results indicated several similar meal characteristics occurring across weekday and weekend day and by meal type (e.g., parent prepared the meal, food mostly homemade, meal eaten at table) and some significant associations ($p < 0.05$) between meal characteristics and family meal frequency (e.g., fast food for family meals). There were 8 main qualitative themes with several sub-themes that supported and expanded the quantitative findings and added depth to the interpretation of the findings.

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Conflict of interest: Authors have no conflicts of interest to report.

Conclusions and Implications: Results identified specific meal characteristics both quantitatively and qualitatively that may inform the development of interventions to increase the frequency of family meals so that more families can benefit from the protective nature of family meals.

Keywords

Ecological Momentary Assessment; Qualitative; Mixed Methods; Family Meals; Parenting Practices

INTRODUCTION

Cross-sectional and longitudinal studies have consistently shown that having regular family meals is associated with important health benefits for children including, healthy dietary intake,¹⁻⁷ less unhealthy weight control behaviors,⁷⁻¹² and better psychosocial health.^{13,14} In addition, research has indicated that parents receive many of these same health benefits (e.g., healthy dietary intake, better psychosocial health) when they participate in regular family meals.^{15,16} However, little is known about specific meal characteristics (e.g., who prepared the meal, who is present at the meal, emotional atmosphere of the meal, what was served at the meal)¹⁷⁻¹⁹ and whether these characteristics differ by family meal types including, breakfast, lunch, or dinner family meals.^{20,21} In addition, it is unclear which meal characteristics are associated with family meal frequency. Furthermore, prior research has not included real-time measures of meal characteristics, which makes it difficult to determine whether these family meal characteristics vary across time and context. Identifying specific meal characteristics that are associated with regular family meals is important for informing the development of interventions that can target these meal characteristics and meal types (i.e., breakfast, lunch, dinner) to increase family meal frequency so more families can experience the health benefits of regular family meals.

Of the prior research that has been conducted on family meal characteristics, *quantitative* studies have found that more chaotic family meal environments and distractions (e.g., TV) during family meals were associated with childhood overweight and less healthy dietary intake.^{18,22,23} However, there are many other meal characteristics that may be associated with family meal frequency such as who is at the meal, who prepared the meal, what types of foods were served at the meal (e.g., fast food, homemade, pre-prepared), where the meal occurred (e.g., at the table, in the family room), what day the meal occurred (e.g., weekend vs. weekday) that have not been measured and may be important with regard to family meal frequency. For example, if having homemade meals increase the likelihood of having regular family meals then interventions could prioritize targets such as homemade versus pre-prepared foods in interventions (e.g., home cooking skills interventions) to increase family meal frequency. Furthermore, many previous studies have focused solely on characteristics of one meal, such as dinner. It is important to identify characteristics of breakfast, lunch, and dinner family meals because prior research has suggested that family meals eaten at any time may convey similar health benefits.^{20,24}

Additionally, the majority of previous research has utilized self-report surveys and questionnaires to evaluate meal characteristics, which tend to be static measures.^{2,3,5–9,12} The current study utilizes Ecological Momentary Assessment (EMA), which uses real-time data collection methods,^{25,26} to examine meal characteristics. Using EMA, meal characteristics, in addition to meal types (i.e., breakfast, lunch, dinner) can be assessed multiple times throughout the day and across the week. These multiple real-time assessments allow for a more complete assessment of meal characteristics and meal types to better understand their influence on family meal frequency across time and context.

There has also been some prior *qualitative research* conducted with parents to identify meal characteristics of importance for promoting family meal frequency.^{19,27–29} These studies have provided a solid first step in understanding key meal characteristics (e.g., rules at meals, importance of family meals)^{19,27–29} from a parent's perspective that may increase the likelihood of family meals occurring. A next important step is to utilize mixed methods to provide both depth (qualitative) and breadth (quantitative) in understanding meal characteristics associated with family meal frequency.

Thus, the current study used both quantitative and qualitative data from a racially/ethnically diverse and immigrant/refugee sample to advance the field of nutrition and public health in understanding real-time meal characteristics associated with family meal frequency and potential targets for family meal interventions. The main aims of the study included: (1) Describe meal characteristics across breakfast, lunch, and dinner family meal types and by weekday and weekend day meals in racially/ethnically diverse and immigrant households; (2) Identify real-time meal characteristics that are associated with family meal frequency; and (3) Identify qualitative themes regarding parent's perspectives about meal characteristics and meal types that influence family meal frequency.

MATERIALS AND METHODS

Data for the current study were from *Family Matters*,³⁰ a National Institutes of Health-funded study. *Family Matters* is a 5-year incremental (Phase I = 2014–2016.; Phase II = 2017–2019), mixed-methods (e.g., video-recorded tasks, EMA, interviews, surveys) longitudinal study designed to identify novel risk and protective factors for childhood obesity in the home environments of racially/ethnically diverse and primarily low-income children. Phase I included an in-depth, mixed-methods, cross-sectional examination of the family home environment of diverse families (n=150). Phase II will be a longitudinal epidemiological cohort study with diverse families (n=1200). In-depth details regarding both Phases of the *Family Matters* study have been published elsewhere.³⁰

Data in the current study were from Phase I of the *Family Matters* study. In Phase I, a mixed-methods analysis of the home environments of children ages 5–7 years old from six racial/ethnic groups including, African American, American Indian, Hispanic/Latino, Hmong, Somali, and White (n=25 from each racial/ethnic group) was conducted to identify individual, dyadic, and familial risk and protective factors for childhood obesity. The University of Minnesota's Institutional Review Board Human Subjects Committee approved all protocols used in both phases of the *Family Matters* study.

Recruitment and Eligibility Criteria

Eligible children (n=150) and their families were recruited from the Minneapolis/St. Paul, MN area between 2015–2016 via a letter sent to them by their family physician. Children were eligible to participate in the study if they were between the ages of 5–7 years old, had a sibling between the ages of 2–12 years old living in the same home, lived with their parent/primary guardian more than 50% of the time, shared at least one meal/day with the parent/primary guardian, and were from one of six racial/ethnic groups (African American, American Indian, Hispanic/Latino, Hmong, Somali, and White). The sample was intentionally stratified by race/ethnicity and weight status (overweight/obese=BMI ≥85%ile; non-overweight=BMI <85%ile)³¹ of the study child to identify potential weight- and/or race/ethnic-specific home environment factors related to obesity risk.

Procedures and Data Collection

A 10-day in-home observation was conducted with each family, including two in-home visits and an 8-day direct observational period in between home visits. The observational components included: (1) an interactive observational family task³² using a family board game with activities around family meal planning, meal preparation, and family physical activity to measure family functioning and parenting practices; (2) EMA³³ surveys via iPad minis measuring parent stress, depressed mood, parent feeding practices, food preparation, parent modeling of eating and physical activity, and child dietary intake, physical activity, and sedentary behaviors; (3) child and parent accelerometry; (4) three 24-hour child dietary recalls; (5) a home food inventory; (6) built environment block audit; (7) objectively measured height and weight on all family members; (8) a parent-completed online survey; and (9) a parent interview. All study materials were translated into Spanish, Somali, and Hmong and bilingual staff were available at all home visits, allowing families to participate in their preferred language. For the current study, data from online surveys, the EMA observational period, and qualitative interviews were utilized. Participants were given the iPad minis used in the EMA data collection as an incentive for participating in the study and up to \$100 in gift cards if all study elements were complete (e.g., all 3 dietary recalls, all 7 days of accelerometry, all 8 days of EMA).

This study also included a community-engaged process with a community-based research³⁴ team named SoLaHmo (stands for Somali, Latino, and Hmong) Partnership for Health and Wellness. SoLaHmo partnered with the UMN research team throughout Phase I on recruitment, survey development/translation/pilot testing, in-home data collection, coding parent interviews, and analysis. They also participated in interpretation of study findings, in particular with qualitative data analysis.

Sample demographics.—The study sample included diverse families from Minneapolis and St. Paul, Minnesota living in urban communities. Families were equally distributed across the six racial/ethnic groups recruited in the study (African American, American Indian, Hispanic, Hmong, Somali, White) (Table 1). Additionally, families were from low-income households, with 70% of families earning less than \$35,000 per year. The majority of participants were mothers (91%) who were approximately 35 years old (mean = 34.5; sd = 7.1) with children aged 6 years old (mean = 6.4; sd = .08). Over half of the mothers worked

full or part time and 61% had a high school diploma or less. About half of the mothers were married and 64% of households had two parents.

Measures: Quantitative

Ecological momentary assessment (EMA).—Multiple daily measures of EMA over eight days were collected on parents, allowing for examining different contexts that occurred day-to-day, moment-by-moment, in families' lives. The items used for EMA questions, as well as all other measures in the study, came from pre-existing validated measures in the field, or were adapted from validated measures.^{35–37} In addition, standardized EMA data collection protocols from prior studies³³ were used in the study including: (1) signal contingent and (2) event contingent EMA messaging.³³ iPad minis were provided to parents to enter responses to the EMA surveys during the eight-day observation period. The EMA protocol was pilot tested in 25 participants prior to the current study to identify feasibility, glitches, and errors. More in-depth details regarding the development and testing of EMA for the current study have been published elsewhere.³⁰ EMA event contingent surveys were used in the current analysis and are described in more depth below.

Event contingent EMA recordings were self-initiated by parents whenever they shared an eating occasion with the child participant. Parents were asked to fill out information about meal characteristics (e.g., food preparation, who was present at the meal, where meal occurred, what was served, how meal was prepared, emotional atmosphere at the meal, what was happening during the family meal—TV, screen time), parent feeding practices used, and child eating behaviors (e.g., child pickiness).

All EMA responses were time-stamped. Participants were assigned additional days of EMA if several EMA prompts were missed within a day to obtain a minimum of eight full days of EMA data with at least four complete EMA responses per day (i.e., at least 2 signal contingent responses; at least 1 event contingent response; 1 end-of-day response).

Family meal characteristics.—The event contingent surveys that parents filled out throughout the day whenever a meal occasion happened with their child prompted them to answer the following questions regarding family meal characteristics:

1. Who prepared the meal: (a) Myself; (b) My partner/spouse; (c) A child in the household; (d) Another adult in the household; (e) Other person(s) (e.g., potluck, visiting a friend); (f) Food establishment (e.g., fast food, restaurant, grocery store deli); (g) Other.
2. How was the meal prepared: (a) Homemade/freshly prepared (include fresh fruits or vegetables); (b) Pre-prepared foods (e.g., macaroni and cheese, frozen meals) or purchased snacks (e.g., fruit snacks, chips, granola bars, cereal); (c) Fast food/take-out (eating at home or at a restaurant).
3. What influenced the person's decision to serve the food at the meal: (a) Quick and easy to make; (b) Child/family likes; (c) Child asked for a specific food or meal; (d) Desire to avoid conflict with child or a family fight; (e) It was food I had available at home; (f) It was a healthy option; (g) Stressful day/busy

schedule; (h) Too tired to cook; (i) It was a planned meal; (j) It was available at the place we ate (e.g., restaurant, celebration/gathering); (k) Other.

4. How many children were present: 1–10+.
5. Who were the children: (a) Child in the study; (b) Older sibling(s); (c) Younger sibling(s); (d) Other family members (e.g., cousin); (e) Non-family members (e.g., friend, neighbor).
6. How many adults were present: 1–10+.
7. Who were they: (a) Main parent; (b) Other caregiver (e.g., partner, spouse); (c) Other family members (e.g., grandparent, aunt, uncle); (d) Non-family members (e.g., friend, neighbor).
8. Where did the meal take place: (a) Around a table or counter at home; (b) On couch/chair in living area; (c) Scattered throughout house; (d) Standing up; (e) In the car; (f) At a restaurant; (g) Other.
9. What foods were served: (a) Fruit; (b) Vegetables; (c) Whole grains (e.g., whole wheat breads or cereals, brown rice, oatmeal, corn tortillas); (d) Refined grains (e.g., white bread or cereals, flour tortillas, white rice); (e) Dairy (e.g., milk, cheese, yogurt, milk alternate such as soy milk, ice cream); (f) Meal protein (e.g., chicken, beef, seafood/fish); (g) Beans, eggs, seeds, nuts, tofu; (h) Sugar drinks (e.g., pop, Kool-Aid, Capri Sun, Sunny Delight, sports drinks); (i) Cake/cupcakes/cookies or other baked goods; (j) Candy (e.g., sweets, chocolate, fruit snacks).
10. What was happening during the meal: (a) Conversation; (b) Watching TV; (c) TV on in background; (d) Playing a video game; (e) Using a cell phone; (f) Using a tablet; (g) Using a computer; (h) Reading/looking at a book; (i) Listening to headphones; (j) None of the above.
11. What was the emotional atmosphere like: (a) Chaotic; (b) Rushed; (c) Tense; (d) Relaxed; (e) Enjoyable; (f) Neutral?

Family meal frequency.—Participants were asked, “During the past 7 days, how many times did all, or most, of your family living in your house eat a meal together?” The response options were: never, 1–2 times, 3–4 times, 5–6 times, 7 times, more than 7 times. This item was taken from a previously validated measure used in numerous studies on family meals.^{6,16,23,24,38,39}

Race/ethnicity, Sex, and Age.—One of the criteria for study eligibility was pre-stratification on race/ethnicity across 6 racial/ethnic groups (i.e., African American, American Indian, Hispanic/Latino, Hmong, Somali, white), thus parents self-reported their own and their child’s race/ethnicity according to these six racial/ethnic groups. Parent and child age was calculated using self-reported birth date and survey completion date. Parent and child sex was determined by parent self-report of their own and the child’s sex.

Measures: Qualitative

Qualitative interview.—Interview questions were developed based on 3 sources: (1) tenets of Family Systems Theory regarding family meal routines;¹⁰ (2) our own and other prior study results examining family meals and recommendations for future research;² and (3) community researchers' (i.e., SoLaHmo) input on research questions and cultural norms regarding family meals. Development of the interview guide was a team process where community members contributed questions and guidance for making the questions accessible to the race/ethnicities sampled. Specific interview questions (Table 2) were designed to explore family meal characteristics, family meal types (i.e., breakfast, lunch, dinner), and family meal experiences. The interview was semi-structured using a set of pre-determined questions, with interviewers being trained to use probes to ensure questions were fully answered. All parent interviews (n=150) were audio-recorded and transcribed; those done in a language other than English were transcribed and translated into English by a staff member fluent in the interviewee's language. The average interview length was 34 minutes.

Statistical Analysis

Quantitative Analysis.—Descriptive statistics and cross-tabulations were calculated to describe meal features/characteristics on weekend and weekday meal occasions and by the type of the meal (i.e., breakfast, lunch, and dinner). The frequency of meal features was examined as counts and the fractional frequencies (prevalence of meal characteristics at the observed meals) were calculated within meal types for comparison across breakfast, lunch, and dinner meal occasions. Pearson chi-square and Fisher's exact tests of independence were used to determine if tabulations differed overall by meal types, on weekdays and separately on weekends, for variables corresponding to meal preparation, logistics of the meal (e.g., how many parents/children were present), and features of the meal such as the overall atmosphere of the meal and activities occurring at the meal. These variables' values were dummy coded into dichotomous "1-presence; 0-absence" values for each reported meal and subsequently collapsed to the participant level by taking the mean of all dummy coded responses. The prevalence of these participant meal features was operationalized into a percent and multiplied by 10 for improved interpretation of model coefficients to examine how ten-percent increases in the prevalence of each item was related to the participant's report of the number of weekly meals that were eaten together as a family. Linear regression with robust standard errors was performed to examine the bivariate and adjusted relationships controlling for parent and child sex, age, and overweight status, child race, household structure (e.g., single parent household), household income, and parent immigrant status. Correlation matrices and variance inflation factors were computed to rule out presence of multi-collinearity in the adjusted models. The primary outcome variable, weekly family meal frequency, was analyzed as a continuous random variable, and models were separately computed for weekday and weekend meal occasions. Significance level was set to the .05 level and 95% confidence limits are reported for coefficients calculated from multiple regression testing. All data management and analysis were performed in Stata 15.1 MP (StataCorp., College Station, TX; 2017).

Qualitative Analysis.—Transcripts were coded using a hybrid deductive and inductive content analysis approach.²³ The hybrid deductive/inductive qualitative approach allowed

for the main research question (i.e., what family meal characteristics and meal types do parents identify are important for promoting family meal frequency) to guide the development of the coding tree (deductive), while also allowing for unique themes to emerge (inductive) during the coding. To ensure transcripts were interpreted through an appropriate cultural lens, coding teams with representation from each of the 6 racial/ethnic groups participating in the study developed an initial coding tree through group coding twelve transcripts (i.e., 2 from each racial/ethnic group). After the creation of the coding tree, qualitative coding took place in multiple stages by two main coders: (1) line by line coding to identify broad themes; (2) organization of themes into sub-themes; and (3) identification of overarching themes. The overarching themes were organized around family meal characteristics to understand parents' perspective of these factors with regard to family meal frequency (deductive analysis). Sub-themes also emerged during the coding of the overarching themes (inductive analysis). The 2 main coders double coded the first 20 transcripts together to ensure inter-rater reliability. After these twenty transcripts, coders double coded every fifth interview and met to discuss the coding until 100% agreement was reached. All 150 interviews were coded to ensure theme saturation; the second author (act) was a main coder. A kappa, which measures inter-rater reliability of coders, of 0.86 was achieved across all coded transcripts.⁴⁰ Once overarching themes were identified the larger racially/ethnically diverse research team reviewed the themes and quotes to ensure culturally representative interpretations of the findings. NVivo 12 (QSR International Pty Ltd, Melbourne, AU; 2018) software was used for the qualitative coding. All names in quotes have been changed to protect participant confidentiality.

RESULTS

Quantitative Results

Descriptive results.—Descriptive results regarding family meal preparation showed that across weekdays and weekend days and family meal types (i.e., breakfast, lunch, dinner): (1) parents were the most likely to prepare the meal, (2) homemade food was the most commonly reported way of preparing the family meal, and (3) “the child/family likes”, “it was a healthy option”, “it was a planned meal”, and “it was food I had available in the home” were the most commonly reported responses regarding the reasons why certain foods were served at the meal (Table 3).

Descriptive results regarding family meal logistics showed that across weekdays and weekend days and family meal types that: (1) there were 2 or more children present at the majority of meals, (2) the children were most likely to be siblings, and (3) it was common to have both parents and other adults (e.g., another parent, grandparent) at family meals (Table 3).

Descriptive results regarding family meal characteristics showed that across weekdays and weekend days and family meal types that: (1) the majority of family meals took place around the table, (2) family meals most often included grains (refined and whole), dairy, fruit and vegetables, and meat and beans, (3) the majority of meals included conversations only and conversation and other activities (e.g., reading book), and (4) the majority of family meals were reported to have a relaxed, enjoyable, or neutral atmosphere (Table 3). With the

exception of serving grains and the variety of activities at the meal on weekends, meal characteristics on weekdays and weekends were all found to differ by meal type ($p < .05$).

Associations between meal characteristics and family meal frequency.—There were some significant results ($p < .05$) found between meal characteristics on weekdays and the weekend days and family meal frequency, but many results did not reach significance (Tables 3 and 4). Specifically for weekdays, having fast food for meals and engaging in conversations in combination with other activities (i.e., screen time, reading books, listening to music on headphones, using cell phone) during meals was significantly associated with fewer family meals per week (Table 3). For example, a 10 percent increase in the fraction of weekday meals that included fast food for the meal was negatively associated with -0.24 family meals per week (95% CI: $(-.46, -.01)$; $p = .037$) after adjustment for all other covariates in the model. Or, another way to interpret this finding is that families with 50% greater frequency of serving only fast food for meals had approximately 1.2 fewer days of family meals per week. No other associations between meal characteristics on the weekday and family meal frequency reached statistical significance.

On weekend days, having fast food for family meals and engaging in conversations in combination with other activities (e.g., reading a book) during family meals were significantly associated with fewer family meals per week (Table 4). In addition, serving food the child/family likes and serving grains for the meal were significantly associated with higher frequency of family meals per week (Table 4). No other associations between meal characteristics on the weekend day and family meal frequency reached statistical significance.

Qualitative Results

There were 8 overarching themes related to family meal characteristics found in the qualitative data (i.e., Family Meal Types, Family Members Present at the Meal, Family Members' Roles at Family Meals, Location of Family Meals, Types of Food Served at Family Meals, Decisions Regarding What to Serve for Family Meals, Rules at Family Meals, Family Meal Atmosphere). Under each overarching theme there were multiple sub-themes. These themes and sub-themes highlight important family meal characteristics that may help promote family meal frequency. Table 5 shows additional qualitative quotes by theme.

Theme #1: Family Meal Types (Breakfast, Lunch, Dinner Family Meals)

There were 2 sub-themes (i.e., family meal type depends on whether it is a weekday or weekend day; lunch family meals) that parents endorsed under the overarching theme of family meal types.

Family meal type depends on whether it is a weekday or weekend day.—Parents identified that they ate family meals for breakfast, lunch, or dinner, but this often depended on the day of the week. For example, during the week, the majority (111/150) of parents reported that they ate only dinner family meals because of their busy schedules or

inflexibility of their schedules (e.g., children at school), but on weekends they ate breakfast family meals.

It's dinner during the week...when they're in school all day. And on the weekends, we always have breakfast, that's one of our biggest meals that we have...that's our FAVORITE...weekends we usually sleep in until nine, ten, and then we get up and cook a big, huge breakfast...like pancakes, sausage, eggs, bacon... (Female, Native American, 28 y.o.)

The two older (children) go to school and I go to work so we don't get to eat breakfast and lunch together during the week, but we do get to eat dinner together. On the weekends we eat breakfast, lunch, snacks and dinner together. (Female, Hmong, 25 y.o.)

Lunch family meals.—Some parents (42/150) also reported eating lunch together on weekends, based on the fact that they had more flexibility in their schedules.

It's different weekdays versus weekends...family meals will be lunch, whereas during the week it's supper. (Female, White, 35 y.o.)

Theme #2: Family Members Present at the Meal

There were 3 sub-themes endorsed by parents related to who is usually present at family meals (i.e., most family members attend meals; extended family members are present at family meals; have family meals even if all family members are not present).

Most family members present at family meals.—Many parents (103/150) stated that most family members were present when family meals occurred.

What I consider to be a family meal, is that everyone in the family is eating together, whether it is at a restaurant or at home. I have 8 people in my family, if all 8 individuals are eating together in the same setting, I consider it a family meal. (Female, Somali, 41 y.o.)

Extended family members present at family meals.—Parents (41/150) also stated that extended family members often ate family meals with them and sometimes friends.

Aunties, cousins, you know, a lot of people know how my mom cooks. They want to be here. So we have a lot of people...my brothers, all three of my brothers be here with their kids, you know, so it be a lot of people. (Female, African American, 28 y.o.)

And my son often invites his friends here too. He'll be like, "Oh, can Michael stay for dinner?" (Female, White, 43 y.o.)

Have family meals even if all family members aren't present.—Some parents (42/150) said that when 1 parent or family member was not present at the family meal because of work or other events, the rest of the family would still eat a family meal together.

Family meals happen every day of the week. I generally do not work nights. My husband does, just because we own the business, so he, on an average week, would not be here maybe two nights a week, because he's working, but if he's not here, or if he is here, we sit at the table and eat a family meal. (Female, White, 46 y.o.)

Theme #3: Family Members' Roles at Family Meals

There were 2 sub-themes (i.e., split between family members; tag-team approach to dividing roles/responsibilities at family meals).

Split between family members.—The majority of parents (101/150) reported that roles during family meals were split, with parents (mostly mothers) doing the majority of preparing and cooking the meal and children helping in some way (e.g., setting the table, cleaning up, food preparation that doesn't pose a safety concern).

We work together as a family and clean up...I assign a chore to each person...one person cleans the table, one sweeps the floor, one mops the floor, one cleans the dishes, and the other puts the dishes away. (Female, African American, 22 y.o.)

Tag-team approach with significant other.—Additionally, many parents (69/150) said that they tag-team all aspects of carrying out family meals from food shopping, food preparation, cooking, and cleaning up family meals with their significant other.

Mostly, my wife and I cook. If my wife is taking care of the kids or cleaning then I would prepare the meal. If she is preparing the meal then I will watch over the children and tell them to do their homework. (Male, Hmong, 48 y.o.)

I do all the purchasing food. My wife helps out a little bit. I have more opportunities to do that than she does, and then I usually prepare food, too. Where she'll cleanup afterwards. We finally got that all figured out. (Male, White, 32 y.o.)

Theme #4: Location of Family Meals

There were 2 sub-themes (around a table; different room around a table) found for the overarching theme of location of family meals.

Around a table.—The majority of parents (88/150) identified that family meals occurred around a table.

Because I think at a family meal, everybody should be together as a family eating. Not in the bedroom or in the living room, [but] everybody sitting around the table, like we had when I was growing up. (Female, Native American, 52 y.o.)

If it's a family meal, we need to sit down at the table and eat together and not be separated. We are one family. It's not a family meal if everyone eats in their own place. (Female, Somali, 29 y.o.)

Different rooms around a table.—Some parents (36/150) stated that it was okay if family meals occurred in different rooms of the house besides the kitchen, but that they still needed to sit together and most often around a table for it to feel like a family meal.

In the kitchen, on our counter top. Or sometimes in the dining room. It just kind of varies, yeah. Or in the summer, on the deck, at the table there...but always at a table. (Female, White, 43 y.o.)

Theme #5: Types of Food Served at Family Meals

There were 2 sub-themes (i.e., a combination of homemade and pre-prepared foods are served at family meals; everyone eats the same food) under the main theme of types of food served at family meals.

A combination of home-cooked and pre-prepared foods are served at family meals.—The majority of parents (113/150) said that they serve homemade food at their family meals or did a combination of pre-prepared and homemade foods.

...I mean at least 5 out of the 7 nights, we make it at home. I mean sometimes it's a bagged salad or something, but we cook the other stuff. And, yeah, then usually once or twice a month it's something else, either at a restaurant or fast food or something. (Female, Latino, 43 y.o.)

Everyone eats the same food.—Many parents (88/150) said that at family meals the entire family is served, and expected to eat, the same food.

Yes, everyone eats the same food but I make different food everyday. One day I might make pasta, another day I make rice with meat and salad on the side, another day anjero, another day maybe chicken legs, and so on. (Female, Somali, 31 y.o.)

Theme #6: Decisions Regarding What to Serve for Family Meals

Six sub-themes (i.e., child or family member likes/asks for specific food; exposure to a variety of foods; healthy foods; parent who prepares the meal decides; schedules are a determining factor; dependent on weekday or weekend family meal) were identified under the main theme of decisions regarding what to serve for family meals.

Child or family member likes/asks for specific foods.—Many parents (82/150) stated that they made decisions about what to feed their family based on what the kids or family member's liked or asked for.

We kind of decide together. I usually ask them, you know, what they want to eat for dinner or what we're going to have. You know, when we go shopping it's like, well, you know, what are we going to eat for the next week, and what kind of dinners do you guys want? And then we'll go shopping for those things. (Female, Hmong, 27 y.o.)

So I always have to find out what they're going to eat first before I can make something...that's important to me, that my kids eat, and that I make something that they will eat, something they'll like. (Female, Native American, 52 y.o.)

Exposure to a variety of foods.—Some parents (40/150) identified that 1 of the ways they make decisions about what to serve for family meals is related to wanting to expose their children to a variety of food options, including cultural-specific foods and recipes.

Um, I guess we've been trying to teach our kids some other culture foods that we grew up with, and teaching them how to gain a taste for it. Instead of just eating strictly, you know, American-style food, like sausage, corn dogs, and pizza. (Male, Hmong, 29 y.o.)

Healthy foods.—Other parents (36/150) stated that they decided what to feed their children based on healthy options.

I try to add in vegetables and make it as healthy as I can, like boiling vegetables with meat or adding like fruits on the sides. (Female, Hmong, 24 y.o.)

Parent who prepares the meal decides.—Some parents (35/150) stated that they were the one that decided what to serve for dinner because they were the cooks/chef.

And I usually know from that morning, what exactly I'm going to make, because before I leave for work, I take something out to start thawing in the fridge, whether it's chicken, steak, hamburger, ground turkey, or whatever. And then I know what size I'm going to make. I already have everything. By the time I come home, everything is already mapped out in my head, and then I get in the kitchen. (Female, African American, 28 y.o.)

Schedules are a deciding factor.—A few parents (27/150) stated that they decided what to make for family meals based on their schedules, how busy they were, or if there was an important event occurring.

Sometimes, you know, we are really busy or want to celebrate something...so we go out to eat...family dinner at a buffet. So we'll take everybody out to the buffet and say this is family meal. You guys did a good job or whatever. We just don't want to cook, so here's your treat. (Female, Hmong, 32 y.o.)

Dependent on weekday or weekend day family meal.—Some parents (26/150) reported that they decided on what to eat depending on whether it was a weekday or weekend day meal.

Usually we have like spaghetti, or pork chops, or chicken, just like, I don't know... kind of the quick meals on the week days, and then on the weekends we have a bigger meal. (Female, Native American, 28 y.o.)

Weekends my husband is home, so I can take my time to cook, and I can cook like whatever I want, but during the weekdays it's just trying to hassle four kids, and then trying to feed every single one of them... (Female, Hmong, 28 y.o.)

Theme #7: Rules at Family Meals

Under the main theme of rules at family meals there was one sub-theme of having rules about electronics at family meals.

Rules about electronics.—The majority of parents (103/150) stated that no electronics were allowed during family meals because it was a time for the family to connect and focus on each other.

When we're sitting together at the table there's total quiet because the TV is not on, or anything that is like a distraction for my kids, and I don't want them to be distracted from eating, because after a while it gets cold and they don't want to eat it. So if we're having a meal, then the atmosphere is strictly about the meal that we're having. (Female, African American, 22 y.o.)

I guess what we've been trying to teach them is, we at least should have 1 meal together, even if it's a busy day, let's try to have one meal together. During that time, no other distraction, no electronics, no TV. Let's have a real talk and see how everyone's day's going, so that's something I've been teaching them. (Male, Hmong, 29 y.o.)

Theme #8: Family Meal Atmosphere

There were 3 sub-themes (i.e., family meals are a time to connect; television on in the background; chaotic or hectic family meals) under the main overarching theme of family meal atmosphere.

Family meals are a time to connect.—Parents (41/150) identified that family meals were a time to connect and talk.

...we get to sit down and talk about how their days were and what they did and if they want to talk about anything, they have the opportunity to, I don't know, sometimes I just miss them, and want to sit and watch them eat. (Female, Native American, 31 y.o.) When we are sitting around the table eating dinner, we can talk about our day, you know...what the meal tastes like, if it's good, what they like, what they don't like, you know...dinner time is pretty much the best time of the day. (Female, African American, 30 y.o.)

Television is on in the background.—Some parents (48/150) reported that they allowed television to be on in the background of the family meal.

More often than not, it's us sitting at the table, the 4 of us, me and the kids, and the TV is on in the background (Female, African American, 34 y.o.)

We don't have any electronic devices at the table, even if my phone rings, I don't go run and answer it. Yeah, we just talk. We do have the TV on in the background...the TV's always on...(Female, Native American, 52 y.o.)

Chaotic or hectic family meals.—Some parents (22/150) stated that the atmosphere at family meals can be "chaotic" or "hectic" and that it is mostly based on the children's behavior(s).

Family meals, they're difficult because they take time to prepare and it's right at the time of the day when the kids are tired...so one person is cooking, and the other person is taking care of the kids, and the kids are going absolutely nuts...and then,

you prepare them and you sit down and you know, the kids seem to take one bite and be done. And the kids use bad manners when we're sitting there...you know, then there's like screaming and whining during the meal, and you know, complaining about the food that's being served, even though they haven't tasted it, right? (Male, White, 40 y.o.)

Hectic. The kids, they be stealing each other's food off their plates. If one finishes first, the others are still hungry...or one don't want to eat...It's kind of hectic but it's pretty fun watching them, three different ages interact with each other at the dinner table. (Female, African American, 28 y.o.)

DISCUSSION

Results of the current study both support and expand prior research. Results identified specific meal characteristics that were similar across weekday and weekend day and meal types (i.e., breakfast, lunch, dinner) including: parent preparing the meal, homemade food being served at the meal, the food served being determined by whether the child/family liked the food, the meal taking place around a table, children, parents and other relatives being present at the meal, and the meal environment being relaxed and enjoyable. Previous research has provided some information about important meal factors that contribute to family meal occurrence (e.g., importance of family meal, meal planning, mealtime rules, busy schedules)^{19,27-29} however, this study adds a more detailed understanding of what specific behaviors/characteristics occur during family meals across the week and across multiple family meal types. Understanding what meal characteristics are common during family meals (e.g., child/family liking the food determines what is served at family meals) may provide important information about what modifiable factors to target in future interventions that aim to increase family meal frequency in diverse households.

In addition, results showed that having fast food for family meals and engaging in conversation in combination with other activities (e.g., screen time) across both weekday and weekend day family meals were associated with less frequent family meals per week. In addition, serving what the child/family likes and having grains on weekend days were associated with having more frequent family meals per week. One hypothesis that may explain these findings is that when families engage in screen time, rather than focusing on building their relationships with people around the table, it may make the family meal experience less rewarding and potentially family members become less invested in having family meals. In addition, when a child or the family member is served something they like, it is expected that they will be eager to have more family meals. These findings are new to the field and may provide insight into what specific mealtime factors contribute to increasing family meal frequency both across weekdays and weekend days and different family meal types (i.e., breakfast, lunch, dinner).

Qualitative results also support past findings and provide new information not previously known from prior family meals research. For example, prior studies have indicated the importance of having rules at family meals (e.g., electronics, flexible scheduling so family members can be at family meals) and that a positive emotional atmosphere at family meals is

associated with child healthy weight and weight-related behaviors, which was also identified in the qualitative findings in the current study.^{19,23,27–29} One result from the current study that extends past findings includes the qualitative theme regarding having more breakfast and lunch family meals on weekend days versus weekdays. One hypothesis for this finding is that families may have more time on the weekends to carry out these different family meal types and may find them more reinforcing because they are less rushed, or include more home-cooked foods, which potentially leads to having more breakfast and lunch family meals on the weekend. This new finding may be useful for informing measurement of family meals and the delivery of family meal interventions. For example, families may need more flexibility in being able to define family meals as breakfast, lunch, or dinner especially on weekend days in order to measure family meal frequency more accurately and to intervene in a tailored way for diverse families.

Additionally, the qualitative finding regarding how parents decide what to serve at family meals (i.e., child/family likes, exposure to a variety of foods, healthy foods, parent preparing the meal decides, schedules determine, depends on weekday or weekend day) could be useful in designing interventions to increase family meal frequency. The finding related to parents serving a combination of homemade and pre-prepared foods for family meals may be an important take away point for family meal interventions, in that families may feel a combination approach is more doable for carrying out family meals compared to serving all homemade foods. Another prior study also found that combination meals (i.e., part homemade, part pre-prepared) were associated with more healthful child diet quality.⁴¹ Furthermore, the importance of eating around a table may also be an important intervention point for family meal researchers, as well as key information for health care providers or Women, Infant, Children (WIC) educators to be aware of when encouraging parents to engage in family meals with their children. Not having a table may feel like an insurmountable barrier to families and they may need help navigating and identifying potential resources to address this barrier in order to carry out family meals.

There were both strengths and limitations of this study. One strength is the use of both quantitative and qualitative data, which allowed for identifying quantitative patterns in the data, as well as providing rich qualitative quotes to corroborate the findings, which is not commonly done. In addition, the sample was highly diverse, including both racially/ethnically diverse participants and immigrants to the United States. Furthermore, EMA data was used, which allowed for examining meal characteristics across time and context. There were also limitations to the study. One limitation is the overall small sample size (n=150), however using EMA data that was gathered multiple times per day over eight days allowed for examining almost 2000 meal occasions, which improves our ability to capture both common and rare meal features for analyses. In addition, interviews were only conducted with the primary caregiver. Including the secondary caregiver in future research may broaden study findings, or confirm the themes already found with primary caregivers. Given the many tests conducted on meal characteristics across weekday and weekend day and meal type, it is important to use caution in interpreting significant results by not only interpreting the magnitude of the statistically significant effect measure, but also the width of the associated confidence interval and how close the upper or lower limits fall with respect to the null value (i.e., zero for our analyses).

IMPLICATIONS FOR RESEARCH AND PRACTICE

Results of the current study indicated that there were many similar meal characteristics across weekday and weekend day and meal types (i.e., breakfast, lunch, dinner). In addition, meal characteristics associated with family meal frequency were identified (e.g., fast food for family meals reduced family meal frequency) however, there were several associations that did not reach significance. Results of the current study may inform the development of interventions to increase the frequency of family meals so that more families can benefit from the protective nature of family meals.⁴² For example, results indicating that families eat breakfast, lunch, and dinner family meals on weekdays and weekend days should be considered when designing interventions targeting family meals to allow for more variability in the definition of family meals so more families can engage in family meals and thereby effect change in child weight and weight-related behaviors. In addition, qualitative findings indicating the importance of being flexible in carrying out family meals (e.g., eat family meals even if all family members aren't there, tag-team carrying out family meals) may also increase the likelihood that future family meal interventions feel doable to parents. Additionally, results of the current study provide guidance for future research with regard to measurement of family meals. Findings suggest the importance of measuring family meal types (i.e., breakfast, lunch, and dinner family meals) rather than just dinner family meals and measuring weekday and weekend day meals separately. Furthermore, results may also be useful for health care providers for providing anticipatory guidance (e.g., rules about screen time at the table, being flexible in the definition of family meals, serving combination meals) to parents for improving family meals in the home environment.

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Table 1.

Family Matters Study Phase I Demographic Characteristics (N=150)

	Primary Caregiver (n=150)	Child (n=150)
Participant Characteristics		
	N (%)	N (%)
Female	137 (91%)	71 (47%)
Age in years (sd)	34.5 (7.1)	6.4 (0.8)
Adult BMI and Child BMI %ile (sd)	30.9 (7.2)	75.9 (23.1)
<i>Weight Status</i>		
Nonoverweight	35 (23%)	77 (51%)
Overweight	38 (25%)	28 (19%)
Obese	77 (51%)	45 (30%)
<i>Race/Ethnicity</i>		
American Indian or Alaskan Native	21(14%)	25 (17%)
Asian	25 (17%)	25 (17%)
Black or African American	22 (15%)	25 (17%)
White	27 (18%)	25 (17%)
Somali	25 (17%)	25 (17%)
Hispanic	23 (15%)	25 (17%)
Mixed/Other	7 (5%)	--
Household Characteristics		
<i>Household Structure</i>		
One Parent (no other adults)	37 (25%)	
One Parent (w/other adults)	18 (12%)	
Two Parents (no other adults)	78 (52%)	
Two Parents (w/other adults)	17 (11%)	
<i>Primary Caregiver Marital Status</i>		
Married	78 (51%)	
Committed dating relationship or engaged	31(21%)	
Casually dating	2 (1%)	
Separated or Divorced	6 (4%)	
Widowed	1 (1%)	
Single/never married	31(21%)	
Missing	1 (1%)	
<i>Educational Attainment</i>		
Middle school or junior high	15 (10%)	
Some high school	17(11%)	

	Primary Caregiver (n=150)	Child (n=150)
High school or GED	60 (40%)	
Vocational, technical, trade certificate program, or associate degree	28 (18%)	
College degree (e.g., bachelor, masters, or doctorate]	25 (16%)	
Other	4 (3%)	
Missing	1 (1%)	
<i>Primary Caregiver Work Status</i>		
Working full-time	63 (42%)	
Working part-time	32 (21%)	
Stay at home caregiver	25 (17%)	
Currently unemployed, seeking work	18 (12%)	
Not working for pay (unable to work, retired, student, etc)	11 (7%)	
Not Applicable	1 (1%)	
<i>Household Income</i>		
Less than \$20,000	50 (33%)	
\$20,000 - \$34,999	55 (37%)	
\$35,000 - \$49,999	16 (11%)	
\$50,000 - \$74,999	12 (8%)	
\$75,000 - \$99,999	7 (5%)	
\$100,000 or more	9 (6%)	
Missing	1 (1%)	
<i>Household Income Source (all that apply)</i>		
Wages from self	85 (57%)	
Wages from other guardian	34 (23%)	
Another family member	14 (10%)	
Unemployment compensation	4 (3%)	
Worker's compensation	0 (0%)	
Social Security	11 (7%)	
Public assistance (e.g., MFIP)	34 (23%)	
Alimony/Child support	17 (11%)	
Other sources	21(14%)	

Note: Percentages may not sum to exactly

100% due to rounding

Table 2:

Interview Questions

Construct Assessed	Qualitative Questions
Importance of Family Meals	<i>What are some of the reasons you have family meals?</i>
Family Meal Logistics	<i>What is a usual “family meal” like for your family: (a) who is there; (b) how often do they occur; (c) when/where do they occur?</i>
Roles During Family Meals	<i>What “role” does each family member play in carrying out family meals? For example, who does the meal planning, buying/shopping, cooking, setting the table, cleaning up after family meals?</i>
Definition of Family Meal	<i>In your opinion, what would you count as a family meal? For example, would going out to a restaurant to eat as a family count as a family meal? Or, If someone cooks a meal and everyone gets their own food and eats in different rooms, would this count? Why?</i>
Food Rules at Family Meals	<i>Many families have ways of doing things, or “rules”, during family meals, such as you can’t leave the table until you eat everything on your plate, or you don’t have to eat everything that is served as long as you try it. What are some of your food “rules”?</i>
Rules about Electronic Devices at Family Meals	<i>What types of rules does your family have about electronic devices at family meals (e.g., TV, computer games, talking on phones, texting on phones)? What happens if someone breaks one of these rules?</i>
Barriers to Family Meals	<i>Many families tell us that they face challenges in eating family meals. What are some of the challenges your family faces?</i>
Solutions to Family Meal Barriers	<i>What has your family done to deal with some of these challenges?</i>

Table 3.

Weekday ($N=1877$) Meal Characteristics by Meal Type (Breakfast, Lunch, Dinner) and the Relationship with Family Meal Frequency

WEEKDAY MEAL PREPARATION	Breakfast N = 648 N (%)	Lunch N = 327 N (%)	Dinner N = 902 N (%)	Family Meal Frequency [†] Mean Response, 95% CI	P Value
Who prepared the meal?					
Parent	449 (69.3%)	192 (58.7%)	475 (52.7%)	-.07 (-.23, .09)	.384
A cook outside home (e.g. fast food, restaurant, another adult)	130 (20.1%)	108 (33%)	326 (36.1%)	.06 (-.10, .21)	.490
Child participant + parent/partner	69 (10.6%)	27 (8.3%)	101 (11.2%)	.08 (-.21, .36)	.600
How was the meal prepared?					
Only homemade	302 (46.6%)	174 (53.2%)	561 (62.3%)	.03 (-.13, .20)	.688
Only pre-prepared	238 (36.7%)	69 (21.1%)	127 (14.1%)	.02 (-.18, .23)	.822
Only fast-food	45 (6.9%)	57 (17.4%)	135 (15%)	-.24 (-.46, -.01)	.037
Combination of homemade, pre-prepared, fast-food	63 (9.7%)	27 (8.3%)	78 (8.7%)	.15 (-.06, .35)	.155
What were the primary decisions about what was served?					
Child / family likes	158 (24.4%)	66 (20.2%)	167 (18.5%)	.22 (-.01, .45)	.057
Child asked for a specific food or meal	103 (15.9%)	28 (8.6%)	71 (7.9%)	-.02 (-.33, .29)	.903
Desire to avoid conflict with child or a family fight	18 (2.8%)	13 (4%)	17 (1.9%)	-.30 (-.73, .14)	.183
Healthy option	98 (15.1%)	47 (14.4%)	109 (12.1%)	.11 (-.19, .40)	.466
Planned meal	39 (6%)	39 (11.9%)	200 (22.2%)	.02 (-.17, .21)	.828
Using food available in the home	89 (13.7%)	63 (19.3%)	154 (17.1%)	-.20 (-.43, .03)	.083
Quick and easy to make	116 (17.9%)	33 (10.1%)	75 (8.3%)	-.10 (-.43, .22)	.538
Other	27 (4.2%)	38 (11.6%)	108 (12%)	-.08 (-.40, .23)	.604
WEEKDAY MEAL LOGISTICS	Breakfast N = 648 N (%)	Lunch N = 327 N (%)	Dinner N = 902 N (%)	Family Meal Frequency [†] Mean Response, 95% CI	P Value
How many children were present?					
Child participant	91 (14%)	40 (12.2%)	93 (10.3%)	-.13 (-.33, .07)	.186
Two children	277 (42.7%)	128 (39.1%)	291 (32.3%)	.01 (-.11, .13)	.909
Three children or more	280 (43.2%)	159 (48.6%)	518 (57.4%)	.04 (-.07, .15)	.482
Who were these children?					
Child participant	89 (13.8%)	40 (12.2%)	92 (10.2%)	-.13 (-.33, .07)	.201
Child participant + siblings(s)	513 (79.4%)	257 (78.6%)	683 (75.8%)	.06 (-.09, .21)	.456
Child participant + siblings(s)+others	44 (6.8%)	30 (9.2%)	126 (14%)	.03 (-.14, .21)	.698
<i>Note for others: extended family members or non-family members</i>					
How many adults were present?					
Parent participant	416 (64.2%)	177 (54.1%)	(40%)	-.08 (-.23, .06)	.238
Parent participant + another adult(s)	232 (35.8%)	150 (45.9%)	541 (60%)	.08 (-.06, .23)	.238
Who were these adults?					
Parent/primary caregiver	411 (63.8%)	177 (54.1%)	361 (40.0%)	-.09 (-.23, .05)	.228

WEEKDAY MEAL PREPARATION	Breakfast N = 648 N (%)	Lunch N = 327 N (%)	Dinner N = 902 N (%)	Family Meal Frequency [†] Mean Response, 95% CI	P Value
Parent + other family member(s)	225 (35.0%)	130 (39.8%)	504 (55.9%)	.12 (−.02, .26)	.088
Parent + other family member + non-family member	8 (1.2%)	20 (6.1%)	37 (4.1%)	−.23 (−.61, .15)	.237
<i>Note for other family member: second caregiver and grandparent</i>					
WEEKDAY MEAL CHARACTERISTICS	Breakfast N = 648 N (%)	Lunch N = 327 N (%)	Dinner N = 902 N (%)	Family Meal Frequency [†] Mean Response, 95% CI	P Value
Where did the meal take place?					
Around the table	520 (80.2%)	227 (69.4%)	731 (81.1%)	−.02 (−.19, .15)	.821
On couch/chair in living area	80 (12.3%)	42 (12.8%)	71 (7.9%)	.03 (−.19, .26)	.778
Scattered throughout house or standing-up	26 (4%)	15 (4.6%)	35 (3.9%)	.08 (−.28, .43)	.672
Outside house (e.g. in the car, at a restaurant, other)	22 (3.4%)	43 (13.1%)	64 (7.1%)	−.06 (−.35, .23)	.671
<i>Note for other: at a park, school's picnic table/event, neighbor's home, relative's home, or friend's home.</i>					
What kinds of foods were served?					
All Grains	484 (35.4 %)	200 (24.6 %)	608 (23.3%)	−.15 (−.01, .31)	.056
Dairy	351	126 yr(15.5 %)	433 (16.6%)	−.01 (−.15, .15)	.973
Fruit and Vegetables	318 (23.2%)	225 (27.6 %)	659 (25.3 %)	−.02 (−.17, .13)	.799
Meat and Beans	172 (12.6 %)	192 (23.6 %)	714 (27.4 %)	−.01 (−.23, .20)	.904
Added Sugar (e.g., sugary drinks, cake, candy)	43 (3.1%)	71 (8.7 %)	194 (7.4 %)	−.20 (−.44, .04)	.099
What was happening during the meal or snack?					
Conversation only	390 (60.2%)	145 (44.3%)	506 (56.2%)	.11 (−.02, .24)	.086
Screentime activities only	113 (17.4%)	72 (22.0%)	132 (14.7%)	−.02 (−.20, .16)	.814
Screentime + conversation	66 (10.2%)	63 (19.3%)	176 (19.5%)	−.18 (−.35, −.01)	.041
Conversation + other	9 (1.4%)	11 (3.4%)	19 (2.1%)	−.13 (−.45, .19)	.425
No conversation + other	70 (10.8%)	36 (11.0%)	68 (7.6%)	−.01 (−.28, .25)	.930
<i>Note for screentime activities: Listening to headphones; playing videogames; watching TV and/or TV in background; using cellphone, computer, or tablet</i>					
<i>Note for other: Reading/looking at a book or none of the above</i>					
What was the atmosphere like?					
Relaxed	195 (30.1 o/o)	80 (24.5 %)	235 (26.1 %)	−.02 (−.17, .14)	.845
Enjoyable	232 (35.8 %)	136 (41.6 %)	463 (51.4 %)	.02 (−.13, .16)	.810
Neutral	123 (19 %)	77 (23.5 %)	136 (15.1 %)	.02 (−.16, .21)	.811
Rushed	68 (10.5 %)	17 (5.2 %)	19 (2.1 %)	−.06 (−.47, .36)	.793
Chaotic	23 (3.5%)	10 (3.1%)	23 (2.6 %)	−.17 (−.64, .29)	.454
Tense	7 (1.1%)	7 (2.1%)	25 (2.8 %)	.15 (−.68, .97)	.724

[†] Multiple linear regression adjusted for parent/child sex, age, and overweight status, household structure and race, income status, and parent immigrant status

[‡] One household not available for analysis; n=149 families responded to the frequency of family meals in the prior seven days

^{††} Statistical analysis includes only breakfast, lunch, and dinner meal occasions (i.e., excludes snacks), and significance testing for the association between each meal characteristic and family meal frequency is presented in boldface at $P < 0.05$.

Interpretation Example: Cross-tabulations were calculated to examine the frequency of meal features at breakfast, lunch, and dinner. The fraction of participant-level meal occasions for which parents reported the characteristic was present or absent was calculated (0%-never to 100%-always). This fraction was divided by ten to examine how a 10%-unit difference in the fraction was associated with family meal frequency (excluding snacking occasions). A ten percent increase in the fraction of family meals for which fast foods were served on weekdays was negatively associated with -0.24 family meals in the prior week (95% CI: $(-0.46, -0.01)$; $P=0.037$) after adjustment for all other covariates in the model. These results indicate that families with 50% greater frequency of serving only fast foods have approximately 1.2 fewer days of weekday family meals.

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Table 4.

Weekend Day (*N*=882) Meal Characteristics by Meal Type (Breakfast, Lunch, Dinner) and the Relationship with Family Meal Frequency

WEEKEND DAY MEAL PREPARATION	Breakfast N = 308 N (%)	Lunch N = 269 N (%)	Dinner N = 305 N (%)	Family Meal Frequency [†] Mean Response, 95% CI	P Value
Who prepared the meal?					
Parent	201 (65.3%)	136 (50.6%)	127 (41.6%)	.02 (−0.11, 0.15)	.738
A cook outside home (e.g. fast food, restaurant, another adult (n=39))	76 (24.7%)	103 (38.3%)	139 (45.6%)	−.02 (−0.15, 0.10)	.693
Child participant + parent/partner	31 (10.1%)	30 (11.2%)	39 (12.8%)	.01 (−0.18, 0.19)	.973
How was the meal prepared?					
Only homemade	162 (52.6%)	145 (53.9%)	187 (61.3%)	.02 (−0.11, 0.14)	.806
Only pre-prepared	98 (31.8%)	61 (22.7%)	48 (15.7%)	.09 (−0.06, 0.23)	.232
Only fast-food	22 (7.1%)	39 (14.5%)	49 (16.1%)	−.23 (−0.41, −0.05)	.014
Combination of homemade, pre-prepared, fast-food	26 (8.4%)	24 (8.9%)	21 (6.9%)	.03 (−0.17, 0.23)	.735
What were the primary decisions about what was served?					
Child / family likes	75 (24.4%)	46 (17.1%)	49 (16.1%)	.19 (0.04, 0.34)	.016
Child asked for a specific food or meal	41 (13.3%)	21 (7.8%)	19 (6.2%)	.06 (−0.22, 0.34)	.679
Desire to avoid conflict with child or a family fight	15 [4.9%]	7 (2.6%)	6 (2%)	−.07 (−0.44, 0.31)	.732
Healthy option	47 (15.3%)	37 (13.8%)	31 (10.2%)	−.10 (−0.32, 0.13)	.399
Planned meal	36 (11.7%)	33 (12.3%)	28 (9.2%)	.08 (−0.11, 0.28)	.390
Using food available in the home	31 (10.1%)	51 (19.0%)	47 (15.4%)	−.06 (−0.26, 0.15)	.569
Quick and easy to make	47 (15.3%)	35 (13%)	21 (6.9%)	−.16 (−0.41, 0.08)	.197
Other	16 (5.2%)	39 (14.5%)	46 (15.1%)	−.12 (−0.31, 0.08)	.254
WEEKEND DAY MEAL LOGISTICS					
How many children were present?					
Child participant	43 (14%)	25 (9.3%)	11 (3.6%)	−.10 (−0.29, 0.09)	.305
Two children	109 (35.4%)	84 (31.2%)	106 (34.8%)	.06 (−0.05, 0.17)	.291
Three children or more	156 (50.6%)	160 (59.5%)	188 (61.6%)	−.02 (−0.12, 0.08)	.703
Who were these children?					
Child participant	43 [14%]	25 (9.3%)	11 (3.6%)	−.10 (−0.29, 0.09)	.305
Child participant + siblings (s)	227 (73.7%)	191 (71%)	217 (71.1%)	.09 (−0.03, 0.21)	.150
Child participant + siblings(s)+others	38 (12.3%)	53 (19.7%)	77 (25.2%)	−.06 (−0.18, 0.07)	.358
<i>Note for others: extended family members or non-family members</i>					
How many adults were present?					
Parent participant	152 (49.4%)	107 (39.8%)	87 (28.5%)	−.09 (−0.21, 0.04)	.179
Parent participant + another adult(s)	156 (50.6%)	162 (60.2%)	218 (71.5%)	.09 (−0.04, 0.21)	.179
Who were these adults?					
Parent/primary caregiver	152 (49.4%)	106 (39.6%)	87 (28.5%)	−.09 (−0.22, 0.04)	.169
Parent + other family member(s)	144 (46.8%)	153 (57.1%)	199 (65.3%)	.08 (−0.05, 0.21)	.246

WEEKEND DAY MEAL PREPARATION	Breakfast N = 308 N (%)	Lunch N = 269 N (%)	Dinner N = 305 N (%)	Family Meal Frequency [†] Mean Response, 95% CI	P Value
Parent + other family member + non-family member	12 (3.9%)	9 (3.4%)	19 (6.2%)	.05 (−0.16, 0.26)	.659
<i>Note for other family member: second caregiver and grandparent</i>					
WEEKEND DAY MEAL CHARACTERISTICS	Breakfast N = 308 N (%)	Lunch N = 269 N (%)	Dinner N = 305 N (%)	Family Meal Frequency [†] Mean Response, 95% CI	P Value
Where did the meal take place?					
Around the table	260 (84.4%)	195 (72.5%)	220 (72.1%)	−.12 (−0.27, 0.02)	.100
On couch/chair in living area	28 (9.1%)	33 (12.3%)	27 (8.9%)	.21 (−0.01, 0.41)	.052
Scattered throughout house or standing-up	11 (3.6%)	16 (5.9%)	19 (6.2%)	.14 (−0.17, 0.44)	.388
Outside house (e.g. in the car, at a restaurant, other)	9 (2.9%)	25 (9.3%)	39 (12.8%)	−.03 (−0.24, 0.18)	.785
<i>Note for other: at a park, school's picnic table/event, neighbor's home, relative's home, or friend's home.</i>					
What kinds of foods were served?					
All Grains	244 (33.9)	173 (7.3 %)	220 (23.9 %)	.18 (0.03, 0.32)	.017
Dairy	177 (24.6)	116 (15.9 %)	154 (16.7 %)	.02 (−0.11, 0.14)	.792
Fruit and Vegetables	159 (22.1 %)	165 (22.6 %)	226 (24.6 %)	.03 (−0.10, 0.15)	.650
Meat and Beans	122 (16.9 %)	194 (26.6 %)	239 (26 %)	−.09 (−0.26, 0.07)	.259
Added Sugar (e.g., sugary drinks, cake, candy)	18 (2.5 %)	55 (7.5 %)	81 (8.8 %)	−.13 (−0.28, 0.02)	.091
What was happening during the meal or snack?					
Conversation only	159 (51.6%)	136 (50.6%)	166 (54.4%)	.10 (−0.03, 0.22)	.130
Screentime activities only	52 (16.9%)	51 (19.0%)	38 (12.5%)	.04 (−0.15, 0.22)	.683
Screentime + conversation	53 (17.2%)	53 (19.7%)	74 (24.3%)	−.19 (−0.33, −0.05)	.008
Conversation + other	8 (2.6%)	6 (2.2%)	4 (1.3%)	−.23 (−0.73, 0.26)	.358
No conversation + other	36 (11.7%)	23 (8.6%)	23 (7.5%)	.03 (−0.18, 0.24)	.779
<i>Note for screentime activities: Listening to headphones; playing videogames; watching TV and/or TV in background; using cell phone, computer, or tablet</i>					
<i>Note for other: Reading/looking at a book or none of the above</i>					
What was the atmosphere like?					
Relaxed	117 (38 %)	67 (24.9%)	69 (22.5 %)	−.02 (−0.15, 0.11)	.792
Enjoyable	109 (35.4%)	131 (48.7 %)	173 (56.4 %)	.05 (−0.08, 0.17)	.456
Neutral	63 (20.5%)	49 (18.2%)	43(14 %)	−.02 (−0.18, 0.15)	.834
Rushed	11(3.6%)	10 (3.7%)	8(2.6 %)	−.22 (−0.59, 0.16)	.251
Chaotic	5 (1.6 %)	5(1.9%)	8(2.6 %)	−.16 (−0.78, 0.47)	.616
Tense	3 (1.0 %)	7(2.6 %)	4(1.3 %)	−.02 (−0.87, 0.82)	.958

[†]Multiple linear regression is adjusted for parent/child sex, age, and overweight status, household structure and race, income status, and parent immigrant status

[‡]One household not available for analysis; n=149 families responded to the frequency of family meals in the prior seven days

^{‡‡}Statistical analysis includes only breakfast, lunch, and dinner meal occasions (i.e., excludes snacks), and significance testing for the association between each meal characteristic and family meal frequency is presented in boldface at $P<0.05$. *Interpretation Example: Cross-tabulations were calculated to examine the frequency of meal features at breakfast, lunch, and dinner. The fraction of participant-level meal occasions for which*

parents reported the characteristic was present or absent was calculated (0%-never to 100%-always). This fraction was divided by ten to examine how a 10%-unit difference in the fraction was associated with family meal frequency (excluding snacking occasions). A ten percent increase in the fraction of family meals for which fast foods were served on weekends was negatively associated with -0.23 family meals in the prior week (95% CI: $(-0.41, -0.05)$; $P=0.014$) after adjustment for all other covariates in the model. These results indicate that families with 50% greater frequency of serving only fast foods have approximately 1.2 fewer days of weekly family meals.

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Table 5

Additional Qualitative Quotes

Overarching Theme	Sub-theme	Additional Qualitative Quotes
Family Meal Types (Breakfast, Lunch, Dinner Family Meals)		
	Family Meal Type Depends on Whether it is a Weekday or Weekend	<i>Well, the majority of the time when we eat together it would be dinner. Unless it's on a weekend, then it'd be breakfast. (Female, African American, 31 y.o.)</i>
		<i>During Saturdays and Sundays it is breakfast, lunch, and dinner family meals. From Mondays thru Fridays it is only dinner time... because we all work and go to school. (Female, Latino, 24 y.o.)</i>
	Lunch Family Meals	<i>We usually have lunch together on the weekends, Saturday and Sunday, when we're all together as a whole. (Female, African American, 28 y.o.)</i>
Family Members Present at the Meal		
	Most Family Members Present at Family Meals	<i>I just think it's whenever most of the family gets together for a meal, whether it be take-out pizza or going out to eat or home cooked here at the house, just whenever the family's together is what I consider a family meal. (Female, Native American, 37 y.o.)</i>
	Extended Family Members Present at Family Meals	<i>Well, in our family it's mostly me and my children. The weekends is mostly like my nieces and nephews and I have my cousin, my sister—she don't really stay for dinner. Mostly I'm like the only adult with a bunch of kids (laughs). (Female, African American, 22 y.o.)</i>
	Have Family Meals Even if All Family Members Aren't Present	<i>...Probably 60 and 70% of the time it's just me and the two kids. Their dad works long, long hours. He works 13–16 hour days. But when he's here, like we'll wait for him, if he's coming. (Female, White, 33y.o.)</i>
		<i>For weekdays ...sometimes he is not home for family meals... and we still have it [family meal], my husband... but most likely we are all together, like on the weekend we all eat...lunch, breakfast and everything. We all are there to eat together. (Female, Hmong, 28y.o.)</i>
Family Members' Roles at Family Meals		
	Split Between Family Members	<i>We all eat as family in one place during weekdays. I prepare the food, cook the food and do groceries... My kid sets the table clean and wash the dishes. (Female, Somali, 33 y.o.)</i>
		<i>I usually cook the food. My kids and I sit down to eat together after the meal is prepared... They wash the dishes and prepare the table. (Female, Somali, 38y.o.)</i>
	Tag-team Approach with Significant Other	<i>My wife usually cooks, and then I'll cook like maybe once a week...I might do the dishes, you know a few times a week and help her cut vegetables sometimes. (Male, Hmong, 32y.o.)</i>
Location of Family Meals		
	Around a Table	<i>No, they only eat at one table, in the dining room, and they eat at one time. And no one goes to their room and eats and comes down...Everything they eat at the same table. (Female, Somali, 37y.o.)</i>
		<i>That is what the table is for- to eat, and I mean when it's time to eat, it's time to eat and eventually there will be time for play and other things. (Female, Latino, 28 y.o.)</i>
	Different Rooms Around a Table	<i>...for a family meal, we sit here all together at the table... Either it's in the kitchen, or it's everybody sitting in the living room. (Female, African American, 38y.o.)</i>
Types of Food Served at Family Meals		
	A Combination of Home-cooked and Pre-prepared Foods are Served at Family Meals	<i>They're [family meals] usually home-cooked, sometimes with precooked frozen things in them (Female, White, 43 y.o.)</i>
		<i>We never get food delivered, actually. We rarely go out to fast foods and restaurants. We mostly just cook here at home. It's cheaper, and it's better. (Female, Native American, 30 y.o.)</i>

Overarching Theme	Sub-theme	Additional Qualitative Quotes
		<i>My children love eating food that I made with my own hands. I make different things for them, like subway type of sandwiches or tacos. Whatever they see outside of the house that they like, I make for them. Whenever I tell them to go out and grab food, they say no, and ask that I make it. (Female, Somali, 41 y.o.)</i>
	Everyone Eats the Same Food	<i>I'm usually the person making the meal and I like to make the same one family meal that everyone will eat, that's what I'm most comfortable with instead of everyone eating different meals. (Female, Somali, 41 y.o.)</i>
		<i>Dinner time, we all are served the same thing, and we expect them to eat two bites of something new. (Female, White, 42 y.o.)</i>
Decisions Regarding What to Serve for Family Meals		
	Child or Family Member Likes/Asks for Specific Foods	<i>I only make, you know, stuff that we eat. I mean they won't eat plain rice. They got to have the red tomato stuff in there. (Female, Native American, 46 y.o.)</i>
		<i>I don't have any rules for Susan... whenever I'm getting her some food, I let her know what there is, and I ask her what does she want for dinner, and she tells me what she wants. (Female, African American, 37y.o.)</i>
	Exposure to a Variety of Foods	<i>My wife is a pretty adventurous recipe finder so we have tons of recipe books that she has collected, and then she'll look on line and try to find something. We also do a CSA, community support agriculture thing. And they give you like a list of recipes to try. (Male, White, 34y.o.)</i>
	Healthy Foods	<i>I decide what they like, and what's healthy for them... I try to make something mixed with vegetables... but I have told them that they have to eat it because it's healthy for you. (Female, Latino, 34y.o.)</i>
	Parent Who Prepares the Meal Decides	<i>I cook, so I just decide ...the majority of the time I already have the food prepped and ready to cook. (Female, African American, 33y.o.)</i>
	Schedules are a Deciding Factor	<i>Once in a while like I feel like we are in a rush, and we like don't have no time, so okay, we're going to buy some pizza. (Female, Latino, 43y.o.)</i>
	Dependent on Weekday or Weekend Day Family Meal	<i>I try to make the weekends more special. I try to make holiday times more special and make you know, like on Martin Luther</i>
		<i>King day now we were all at home so I baked cake, you know, I cooked spaghetti sauce, you know in the evening, I made goat meat with like stew kind of. So it just kind of making the time we are together more special and you know, making tea, things like that, yeah, we keep our company together as a family. (Female, Somali, 35 y.o.)</i>
		<i>And when it comes to soup, that's usually on the weekends that I cook the soup because it's the time that I have that I had to put together and preparing the meal compare to the time I have during the night on week nights when I have work the following day. (Female, Hmong, 25y.o.)</i>
Rules at Family Meals		
	Rules About Electronics	<i>When we are eating we don't watch TV... and we don't use any of those electronics. No phones and stuff. It's just eating and talking. (Female, Latino, 35y.o.)</i>
		<i>No, I don't allow them to use any technology because its family time and no one should be playing with phones or electronics. (Female, Native American, 38 y.o.)</i>
		<i>I don't like for them to watch television while eating, because they won't focus on the food. My rule is to keep the TV off during meals, but my kids are too young to own phones so that's not a concern for me now. (Female, Somali, 36 y.o.)</i>
Family Meal Atmosphere		
	Family Meals Are a Time to Connect	<i>I just started doing this with them at family meals...we have like highlights of our day. So we share something that we really enjoyed throughout our day, and the feelings that came with that. (Female, Native American, 27 y.o.)</i>
		<i>... when we sit at the table together, we communicate more. Like I ask them questions and, you know, about school and stuff like that. Or just to get them in the habit of, I guess, I don't know, being a family. (Female, African American, 31 y.o.)</i>

Overarching Theme	Sub-theme	Additional Qualitative Quotes
		<i>...every time we eat together, we ask about how each other's day went, and then that's how we know like what's going on and everything with them at school, and if we had a good day at work...(Female, Hmong, 28y.o.)</i>
		<i>At family meals you just get to talk, you know, have a conversation with each other, explaining how your day goes. You might have something that was bothering you, you know, and you felt you didn't have nobody else to talk to. Now is your time to talk. (Female, African American, 36y.o.)</i>
	Television is on in the Background	<i>That it's important not to watch TV while you know, you're eating. But I mean, it's on, I can't do nothing about it, so. But, yeah, it's better to, instead of to be separate from each other, it's better to be by each other, you know. Like, instead of, watching TV and eating and focusing on it, even though it's on, but still, like it's better to be by each other than like in separate rooms eating and not having like any interaction with each other while you're eating dinner, so. (Female, Native American, 32 y.o.)</i>
		<i>I work too so after coming back, if there is something (food) desirable that is there and available then you would cook it.</i>
		<i>Often, if we are not on the table then we are on the sofa where we would eat and watch TV. In our routine, we often eat in the living room and watch TV. (Female, Hmong, 25 y.o.)</i>
		<i>Yeah, it really doesn't matter to me, because sometimes the TV is on while we're eating. And I do have my phone while we're eating as well. (Female, African American, 24 y.o.)</i>
	Chaotic or Hectic Family Meals	<i>It's kind of, I don't know, kind of crazy at times, cause we're trying to figure out where we're going to eat, what we're going to eat, and how much time we have. It just seems like, sometimes it feels like we're rushed. (Female, Native American, 38 y.o.)</i>
		<i>...I'm a busy mom, you know? Sometime I just like came home, immediately have the dinner and then rush and do homework, yeah. So I wish I had that time where I want them to sit with me and we can discuss more of what the day, how their day go, you know? (Female, Hmong, 32 y.o.)</i>
		<i>They talking too much, they getting out from the seat, they cannot sit still. Either they have to run in the room to get something and come back. So that's a little difficulty but we go through it, you know. (Female, Somali, 31 y.o.)</i>