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An exploration of how family dinners are served and how service style is associated with dietary and weight outcomes in children

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It is important to identify factors within the home that are relevant to dietary and weight-related outcomes in children. Research examining family meals has found more frequent family meals are associated with positive outcomes in youth, including improved dietary intake and lower prevalence of overweight/obesity.^{1,2} However, while health professionals strongly recommend parents prioritize regular family meals,³ evidence-based recommendations are sparse on how to best serve food during family meals for optimal child benefit. Learning more about how families serve food during family meals and how style of food service is associated with child dietary and weight-related outcomes can help in guiding interventions to improve home food environments.

Testable hypotheses are difficult to develop given the dearth of research addressing meal service style at home. Yet, a related body of literature does exist that explores the use and impact of food-related parenting practices, such as pressure-to-eat and food restriction.^{2,4} Research has shown pressuring children to eat and restricting intake of palatable food items can lead to emotional eating, higher levels of picky eating, a greater resistance to eating, and a dislike of certain foods that can persist throughout life.^{2,4} Instead, parents are typically advised to engage in responsive feeding techniques. Responsive feeding is when parents provide their child with healthy food choices and consistent meal times, but allow the child to decide how much food is consumed at meals.⁵ Serving foods and beverages family-style, where children select their own portions and serve themselves, is one way for parents to engage in responsive feeding, and may encourage better self-regulation of children's intake^{3,6,7} and yield positive child weight-related outcomes.^{8–12} Given these potential benefits of family-style meal service and the known health benefits of eating frequent family meals, it is worthwhile to deepen understanding of how family meals are being served at home.

Thus, the current study addresses gaps in the extant literature on family meals through addressing three exploratory aims. First, we aim to understand what meal service looks like at home during family meals across family demographic characteristics. Second, we explore if meal service style is associated with markers of responsive feeding. Finally, we explore associations between style of meal service and child dietary and weight-related outcomes.

Methods

Study design

Baseline data were drawn from the XXXXX randomized controlled trial.^{13–15} The main meal-preparing parent and one 8–12-year-old child per household were recruited to participate through events and flyers at XXXXX (XXXXX) Park and Recreation centers.¹⁴ Additional XXXX study methodological details have been previously published.¹⁵ Parents and children provided written consent and assent, respectively. The study was approved by the XXXX Institutional Review Board.

Measures

Parents provided demographic information (see Table 1) and completed surveys; trained study staff measured parent's and children's height and weight. Children completed multiple 24-hour dietary recall interviews.

Family Meal Food Service: Family meal food service was assessed using the validated Evening Meal Screener (EMS) for up to seven evenings.¹⁶ If the family meal was prepared and eaten at home, food service was assessed with the question: "How were the foods served?" Participants were allowed to select one response from the following options: (1) all foods were put on family member's plates/bowls by a parent and then served (plated); (2) all of the dinner food was served family-style where everyone helped themselves from food on the table (family-style); (3) family members served themselves all of the dinner foods from the counter or stovetop (family-style); and (4) only fruits and vegetables were served family-style and the rest of the food was put on plates by a parent (hybrid).

Participants were included in the analysis if they completed at least four EMS and reported preparing and eating a family meal at home on at least four evenings (n=75), allowing them to report style of food service for four separate family dinners. For participants who completed more than four EMS forms, the first four were analyzed to allow for an equal representation of family meals across participants. To summarize meal service style across four meals, categories were created as follows: "**Plated**" if they reported plated meal service 3–4 times, "**Family-style**" if they reported family-style meal service 3–4 times; "**Half and Half**" if they reported plated meal service twice and family-style meal service twice, and "**Other**" if they reported some other meal service combination. These collapsed categories were created after a thorough review of the full range of participant responses (data not shown).

Markers of Parental Responsive Feeding—Responsive feeding was measured by examining parental pressure-to-eat, food restriction, and emotional feeding. *Pressure-to-eat*

was assessed with the 4-item Child Feeding Questionnaire (CFQ) Pressure-to-Eat Subscale,¹⁷ measuring degree of encouragement for their child to eat more food ($\alpha=0.72$). Parents rated their agreement with statements like the following: “My child should always eat all of the food on his/her plate” using a 5-point Likert scale (range 4–16). *Food restriction* was measured using the 8-item CFQ Restriction Subscale,¹⁷ to assess parent’s attempts to control child’s eating by restricting access to palatable foods ($\alpha=0.78$). Parents rated their agreement with statements like the following: “I have to be sure that my child does not eat too many sweets” using a 5-point Likert scale (range of 9–40). *Emotional feeding* was assessed with the 5-item PFSQ Emotional Feeding Scale,¹⁸ measuring the degree parents provide food to their child in response to emotions ($\alpha=0.84$). For example, parents indicated how often they did the following “I give my child something to eat to make him/her feel better when he/she is upset” using a 4-point Likert scale (range 5–20).

Child dietary and weight outcomes—The two dietary outcomes analyzed for the present study were average daily fruits and vegetables (FV) servings and Healthy Eating Index (HEI)-2010 scores,^{19,20} calculated from 24-hour dietary recall interview data. Children completed one recall in person and two via phone with trained research staff within two weeks, using Nutrition Data System for Research software version 2011 and 2012 and analyzed with version 2012 (XXXX).

Research staff used standardized procedures to measure height and weight from all study participants; age- and gender-adjusted BMI z-scores were calculated for children using the CDC’s growth chart parameters.²¹

Statistical Analysis

Raw percentages were calculated to show meal service style by demographic and weight-related subgroups (Table 1). A series of linear regression models were fit to examine associations between meal service style and each dependent variable: markers of parental responsive feeding (*pressure-to-eat*, *food restriction*, and *emotional feeding*), and child dietary (average daily FV servings, HEI-2010 score) and weight outcomes. Adjusted mean scale scores (with 95% confidence intervals) for dependent variables were computed for each meal service style, as were beta coefficients (and standard errors) from the regression models in Tables 2 and 3. All regression models were run with and without adjustment for parent educational attainment and race; in adjusted models, covariates were contemporaneously entered into the model based on a-priori substantive knowledge regarding associations between the exposure variable and the outcome. Unadjusted and adjusted results were nearly identical, thus only adjusted results are reported. Exploratory bivariate associations were examined between number of people in the family (family size) and meal service style and study outcomes to assess if family size should be included as a covariate; no significant associations were found, thus family size was not included in any models. Analyses were performed in Stata v13 (College Station, TX: StataCorp LP).

Results

Just over one-third of families (36%) reported using primarily **plated** meal service for family meals. Meals were served **family-style** in approximately 29% of families, **half and half**

meal service was reported by 11% of families, and finally, some **other** combination of meal service was reported by 24% of families. Details on style of meal service across demographic characteristics and child weight status are shown in Table 1.

The adjusted mean level of *food restriction* was significantly higher among families that engaged in **plated** [M: 28.5 (CI: 25.9–31.1); referent] and **other types** [M: 28.1 (CI: 24.9–31.3); $p=0.09$] of meal service, compared to **family-style** meal service [M=23.6 (CI: 20.7–26.5)]; $p=0.01$]. No significant associations were observed between style of meal service and parental *pressure-to-eat* ($p=0.42$) or *emotional feeding* ($p=0.83$).

No significant associations were observed between style of meal service and daily FV servings ($p=0.48$), HEI-2010 score ($p=0.40$), or child BMI z-score ($p=0.82$). See Tables 2 and 3 for additional details including beta coefficients and standard errors from each regression model.

Discussion

This exploratory study sought to understand how families are serving dinner to their children and how different meal service styles are associated with markers of responsive feeding and child dietary and weight outcomes. Study findings suggest families of elementary and middle school children use a variety of meal service styles. Families most frequently engaged in plated meal service, followed closely by family-style meal service.

Findings from this study indicate family-style meal service is positively associated with using responsive feeding techniques; however, no significant associations were found between meal service style and child dietary or weight-related outcomes. The lack of significant findings between meal service style and dietary outcomes corroborates results of a recent study of children ($n=350$) within childcare settings.²² However, a small number of cross-sectional, longitudinal, and intervention-based studies also conducted within childcare settings have found style of meal service to be associated with several positive outcomes including higher levels of intuitive eating, fewer overall calories consumed and more new foods tried, when compared with pre-plated meal service.^(8–12) Given our small sample size, it is possible lack of significant findings is an artifact of limited power to detect statistically significant differences. Alternatively, it is also possible meal service style within the home is not significantly associated with children's dietary intake or weight. Overall, findings suggest although service style may not impact dietary or weight-related outcomes directly, use of family-style meal service may be one way for parents to more easily engage in responsive feeding, which has been shown to be associated with healthful dietary and weight-related outcomes in children.^{2,23,24}

Finally, it is important to note nearly one-quarter of families reported using a variety of meal service styles throughout the study period. It may be parents decide service style on a more momentary basis, depending on things like the type of food being served (e.g. temperature, messiness), amount of time available for the meal (e.g. relaxed or rushed), or other child-related factors (e.g. preference for a particular meal, mood or behavior). Given the day-to-day diversity of meal service styles utilized and the potentially momentary reasons parents

might choose to engage in each style, public health professionals and clinicians working with families should identify ways parents can engage in responsive feeding techniques that are feasible with any meal service style. For example, if parents utilize plated meal service, they should be encouraged to allow their child to ask for seconds if they still feel hungry or to avoid pressuring their child to eat all of the food served to them if they report being full; allowing a child's hunger and satiety cues to guide the amount of food consumed is a responsive feeding technique that does not necessarily stand in contrast to the plated style of meal service.

Implications for Research and Practice

Use of the well-validated Evening Meal Screener provided us with the unique ability to ask this potentially important and previously un-researched question; however, the sample utilized for this exploratory study was small and limited in terms of generalizability. Thus, given the observed findings and their potential implications, the present study aims seem worth exploring further within larger, more diverse samples. In particular, a deeper exploration into the predictors of meal service style variability would be an informative next step. Understanding how meal service styles differs by family structure (e.g. age of children, single versus dual parent households) would also be of interest.

A broad body of literature supports the premise that parents engage in responsive feeding techniques with their children as a way of promoting healthful dietary intake and body weight.^{2,23,24} The present study findings suggest engaging in family-style meal service might be one way to facilitate the use of responsive feeding techniques. However, given families report using a variety of meal service styles, it is important that clinicians teach parents ways to engage in responsive feeding with their children regardless of meal service style.

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Table 1.

Meal service style during family dinners by demographic and weight-related characteristics (n=75)

	Meal Service Style				
		Plated n=27	Family-style n=22	Half/Half n=8	Other n=18
Age		Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Child		9.9 (9.4, 10.5)	10.6 (10.0, 11.1)	10.5 (9.6, 11.5)	10.4 (9.7, 11.0)
Parent Education	n	%(n)	%(n)	%(n)	%(n)
Associate's degree or less	24	37.5 (9)	33.3 (8)	8.3 (2)	20.8 (5)
Bachelor's degree or more	51	35.3 (18)	27.5 (14)	11.8 (6)	25.5 (13)
Receives Economic Assistance					
No	59	39.0 (23)	27.1 (16)	8.5 (5)	25.4 (15)
Yes	16	25.0 (4)	37.5 (6)	18.8 (3)	18.8 (3)
Parent Race					
White	67	27.3 (25)	26.9 (18)	10.5 (7)	25.4 (17)
Any other race	8	25.0 (27)	29.3 (22)	10.7 (8)	24.0 (18)
Parent Weight					
Under-/Average-weight	38	36.8 (14)	23.7 (9)	37.5 (3)	31.6 (12)
Overweight	37	35.1 (13)	35.1 (13)	13.5 (5)	16.2 (6)
Child Weight					
Average weight	48	35.4 (17)	25.0 (12)	12.5 (6)	27.1 (13)
Overweight	7	37.0 (10)	37.0 (10)	7.4 (2)	18.5 (5)

Table 2.

Linear regression results of associations between family meal service style and markers of parental responsive feeding (n=75)

Markers of Responsive Feeding (dependent variable)	Style of Meal Service (independent variable)									
	Plated n = 27		Family-style n = 22			Half/Half n = 8			Other n = 18	
	Adjusted* Mean (95% CI)	B Coefficient (SE)	P-Value	Adjusted* Mean (95% CI)	B Coefficient (SE)	P-Value	Adjusted* Mean (95% CI)	B Coefficient (SE)	P-Value	Model R ²
Parental Pressure-to-Eat (Scale Range: 4–16)	28.5 ^a (26.3, 30.7)	Referent	0.42	7.5 (6.1, 8.9)	–0.76 (–.93)	0.42	9.4 (7.1, 11.7)	1.16 (1.30)	0.38	0.17
Parental Food Restriction (Scale Range: 8–40)	28.5 ^a (26.3, 30.7)	Referent	0.01	23.6 ^b (20.7, 26.5)	–4.93 (1.97)	0.01	28.4 ^{ab} (23.6, 33.2)	–0.10 (2.74)	<0.01	0.12
Emotional Feeding (Scale Range: 5–8)	5.5 (5.2, 5.8)	Referent	0.84	5.5 (5.2, 5.8)	–0.45 (0.22)	0.84	5.3 (4.8, 5.8)	–0.25 (–.30)	0.61	0.09

* Adjusted for parent education, maternal age, and race.

Notes: Values with different superscripts were found to be significantly different from one another at p<0.05 (post-hoc analyses)

Table 3.

Regression results of associations between family meal service style and dietary and weight-related outcomes (n=75)

Style of Meal Service (independent variable)												
	Plated n = 27			Family-style n = 22			Half and Half n = 8			Other n = 18		
	Adjusted* Mean (95% CI)	B Coefficient (SE)	P-Value	Adjusted* Mean (95% CI)	B Coefficient (SE)	P-Value	Adjusted* Mean (95% CI)	B Coefficient (SE)	P-Value	Adjusted* Mean (95% CI)	B Coefficient (SE)	P-Value
	3.42 (2.73, 4.11)	Referent		3.05 (2.29, 3.82)	-0.37 (0.51)	0.48	2.80 (1.54, 4.06)	-0.62 (0.72)	0.39	3.31 (2.47, 4.15)	-0.10 (0.52)	0.84
	54.48 (50.42, 58.54)	Referent		57.07 (52.54, 61.59)	2.59 (3.06)	0.40	53.83 (46.38, 61.29)	-0.65 (4.26)	0.88	54.71 (49.74, 59.69)	0.23 (3.21)	0.94
	0.94 (0.65, 1.22)	Referent		0.99 (0.67, 1.30)	0.05 (0.21)	0.82	0.64 (0.11, 1.16)	-0.30 (0.30)	0.32	0.81 (0.46, 1.16)	-0.12 (0.22)	0.58
												0.06
												0.11
												0.07

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