



# HHS Public Access

Author manuscript

*J Fam Psychol.* Author manuscript; available in PMC 2020 June 01.

Published in final edited form as:

*J Fam Psychol.* 2019 June ; 33(4): 465–475. doi:10.1037/fam0000519.

## Associations between Father Availability, Mealtime Distractions and Routines, and Maternal Feeding Responsiveness: An Observational Study

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### Abstract

Responsive feeding and frequency of family mealtimes are related to healthier eating behaviors and weight outcomes in children and adolescents. Distractions at mealtimes are related to greater intake of unhealthy food and a less positive mealtime emotional climate. However, there is little understanding of effects of routines and father availability on distractions at family meals, and there is limited research investigating the effects of distractions among all family members on maternal feeding practices in toddlerhood. This study aims to characterize distractions at family mealtimes, and examine associations between father availability, distractions, and observed responsive feeding. Descriptive analyses, non-linear mixed models, and path analyses were conducted using observational (home-based family mealtimes) and self-report data collected from a subsample of families ( $n = 109$ ) of 18–24 month old children in the larger STRONG Kids 2 Study ( $N = 468$ ). Between fathers, mothers, and children, families spent almost half of the mealtime distracted. Fathers and mothers engaged in about equal amounts of distractions, and children engaged in more technology-related distractions than parents. Fathers' absence at the mealtime was associated with more child distractions and less maternal feeding responsiveness. Lower paternal total distractions, maternal non-technology object-related distractions, and higher household income were significantly associated with more observed maternal feeding responsiveness. Future research should investigate how father availability and family mealtime distractions may be associated directly and indirectly with children's eating behaviors and weight outcomes.

### Keywords

mealtime; observational study; responsiveness; distractions; family systems

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A previous version of these analyses was presented at the Ingestive Behavior Research Conference at Purdue University in West Lafayette, Indiana in October 2017.

## Introduction

Between 21.3 and 30.7% of two- to five year olds are considered overweight (body mass index [BMI] > 85<sup>th</sup> percentile for age and sex), and between 11.4 and 16.0% are considered obese (BMI > 95<sup>th</sup> percentile; (Skinner, Ravanbakht, Skelton, Perrin, & Armstrong, 2018). Children who are overweight/obese are at increased risk for exposure to bullying, emotional, behavioral, and eating disorders, and lower health-related quality of life (Dietz, 1998; Rankin et al., 2016). The family is the most proximal context influencing energy intake in early childhood (Harrison et al., 2011), and mealtimes serve as a consistent setting for socialization around food and eating (Larson, Branscomb, & Wiley, 2006). In early childhood, food socialization occurs in large part via approaches to feeding and mealtime routines and rituals.

## Feeding Responsiveness

The World Health Organization (WHO) and the American Academy of Pediatrics (AAP) recommend that parents use responsive feeding for infants, stating that breastmilk/formula, complementary, and solid foods should be provided to children according to a consistent routine, in response to children's cues of hunger/satiety, and in response to children's developmental and nutritional needs (American Academy of Pediatrics, 2017; World Health Organization, 2002). Hughes and colleagues investigated responsive feeding as it relates to general parenting styles applied in sociocultural contexts that are prone to obesity-associated outcomes (e.g., predominantly Latina families in the US; Hughes et al., 2013; Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005; Hurley, Cross, & Hughes, 2011). This approach focused on the effect of underlying dimensions of demandingness (behavioral expectations) and responsiveness (warmth/sensitivity) in explaining parental behavior patterns, emphasizing that in addition to responding to children's cues of hunger and satiety, in early life families in obesogenic environments must also guide children to consume a healthful and balanced diet. Nonresponsive feeding has been characterized by a lack of balance in control over the feeding situation; either parents have taken too much control by restricting/pressuring eating behavior, or children have complete control over the feeding situation (Hurley et al., 2011). This theory-driven approach is uniquely appropriate for the US' obesogenic food environment, in that it recognizes that if feeding responsiveness is operationalized as only sensitive and warm behaviors contingent on children's cues of hunger and satiety, parenting behaviors that acquiesce to pickiness, food avoidance, and overeating would be considered responsive. Therefore, we define responsive feeding approaches as the degree to which a parent uses feeding practices (observable food-related parenting behaviors) designed to promote consumption of a healthy diet while also encouraging children to exercise autonomy in choosing when and how much food to consume.

Responsive feeding is a behavior implemented by an individual (typically measured in mothers) in a dyadic context. Family systems theory posits that individual family members and the family are separate, but interrelated units of analysis with measurable unique characteristics and contributions to family functioning and individual wellbeing (Cox & Paley, 1997, 2003). Just as children are affected by their caregivers' behaviors, so too are

caregivers influenced by children and other individuals in the family, as well as factors affecting the family as a whole. As one such family-level factor, mealtime routines—and to a much lesser extent, mealtime rituals—have been investigated in relation to parent feeding and children’s weight-related health (Fiese, Jones, & Jarick, 2015; Fiese & Kline, 1993). However, few—if any—studies have investigated associations between mealtime routines and maternal feeding responsiveness.

### **Family Mealtimes and Weight-Related Health**

Family mealtimes are a demonstration of repeated patterns of family interaction around food, and are influenced by two interconnected components—routines and rituals—passed down across generations (Fiese, Foley, & Spagnola, 2006; Fiese et al., 2002). Family rituals are the symbolic, affective aspects of patterned interactions that subscribe meaning to repeated behaviors and communications (Fiese & Kline, 1993; Fiese et al., 2002). In contrast, family mealtime routines are the directly observed, quantifiable aspects of patterned interactions (e.g., everyone comes together for an evening meal on Friday nights). Both routines and rituals support healthy family functioning (Fiese et al., 2002; Haines et al., 2013; Kiser, Bennett, Heston, & Paavola, 2005), but substantial literature has linked family mealtime routines specifically to parenting practices and children’s weight-related health (Bates et al., 2018; Fiese et al., 2006; Hammons & Fiese, 2011). For example, family mealtime frequency is associated with healthier food consumption and weight outcomes in young children (Hammons & Fiese, 2011). In a systematic review, 10 out of 16 (63%) studies found associations between mealtime routines and child weight (Bates et al., 2018). However, more studies on school-aged children showed effects in expected directions, as compared to those on preschoolers. This may be because the cumulative effects of family mealtime routines are not detectable until later in childhood, or positive effects may be enacted indirectly via other factors, such as responsive feeding (Saltzman, Fiese, Bost, & McBride, 2017). Among low income mothers, mealtimes may be perceived as challenging due to lack of help from other family members in managing child behavior and distractions from television, food, leaving the table, and toys/games (Malhotra et al., 2013; Herman et al., 2012). Some research has investigated how distractions may disrupt children’s behavior and the emotional aspects of shared family mealtimes, but few studies have investigated how distractions may be associated with mothers’ behaviors and the effects other family members on maternal and child mealtime behavior.

### **Distractions**

Distractions at mealtimes (e.g., loud noises, chaos, television) are related to greater intake of unhealthy food and a less positive mealtime emotional climate (Fiese, Jones, & Jarick, 2015; Trofholz, Tate, Miner, & Berge, 2017). During mealtimes with no distractions (e.g., no television, magazines, or toys) preschoolers have been observed engaging in less fussy eating behaviors, whereas mealtimes with a distraction were characterized by children making more negative vocalizations (Powell, Frankel, Umemura, & Hazen, 2017). Among families with adolescents, higher levels of media use (e.g., texting, listening to music with headphones, playing videogames, and watching TV/movies) during family mealtimes are related to lower levels of family communication, and less importance being placed on mealtimes (Fulkerson et al., 2014). More mealtime media use is also associated with lower

likelihood of serving fruits or vegetables, 100% juice, and milk, and higher likelihood of serving sugar-sweetened beverages (Fulkerson et al., 2014). A recent systematic review found that eating while watching television during meals was positively associated with childhood overweight (Ghobadi et al., 2018). Distractions—particularly media usage—are not only associated with more unhealthy and less healthy food intake, but preliminary experimental findings suggest that excess noise may make it difficult for families to connect emotionally or communicate around the dinner table (Fiese et al., 2015).

Distractions may also have implications for parent feeding, although there is limited research on this topic. Mothers of infants (6 months of age) reported engaging in both technological (e.g., television, computer, smartphone, tablet) and non-technological (e.g., reading, housework) distractions while feeding their children (Ventura & Teitelbaum, 2017). Mothers reported technological distractions during 26% of total feedings, and non-technological distractions during 17% of total feedings. Infant appetite and maternal use of indulgent or laissez-faire feeding style were associated with the intensity of both types of distractions (Ventura & Teitelbaum, 2017). These findings suggest that—consistent with transactional family systems theories—there may be multidirectional relationships between distractions, feeding, and children’s behaviors at mealtimes. There are two key limitations to the current literature on distractions. First, to the best of our knowledge, no studies have yet described and characterized the full range of distractions (e.g., distractions from technology, food-related tasks like leaving the table to get other dishes or utensils, leaving the table to answer the door or to be in another area of the house, or other non-technology objects like books, toys or pets) that can affect family mealtimes. This is despite empirical evidence suggesting that technology- and non-technology related distractions are related to parent feeding and infant eating (Ventura & Teitelbaum, 2017), and qualitative evidence suggesting that mothers may perceive children being distracted by several different stimuli at family meals, including leaving the table, technology/television, food, and toys (Malhotra et al., 2013). The second limitation concerns level of analysis. Unlike feeding (which—excluding some notable exceptions—is typically measured in one family member), and family routines (typically measured as a family-level variable), distractions are individual behaviors that can be measured in most—if not all—family members. Given the bidirectional effects of family members on one another at the mealtime, it is not surprising that recent systematic reviews call for an increased focus on the full range of family members, including fathers’ roles in promoting children’s weight-related health (Davison et al., 2016; Davison et al., 2018). Nonetheless, no studies have examined how fathers’ distractions at family meals may be associated with maternal and child behavior.

### **Father Availability and Involvement**

Much of the focus in the literature on feeding has been on mothers, and indeed in intact, heterosexual families, mothers spend more than twice as much time as fathers in routine childcare activities like feeding in the first year of life (Kotila, Schoppe-Sullivan, & Kamp Dush, 2013). However, fathers report feeling just as competent and are observed being equally sensitive in the feeding context as mothers in early infancy (Parke & Sawin, 1976). Furthermore, by preschool about 40% of fathers report substantial influence over child nutrition, and about half report preparing food or assisting their child to eat on a daily basis

(Guerrero, Chu, Franke, & Kuo, 2016). Still, in a sample of ( $n = 120$ ) families of school-aged children, 85% of families had mothers present at family meals, while only 34% had fathers present (Berge et al., 2014). Importantly, children in families with fathers absent at mealtimes were more likely to be overweight or obese than their counterparts with fathers present. Paternal availability and involvement may be associated with child outcomes; however, across 667 non-experimental studies, only 1% reported including fathers, and across 85 interventions, fathers represented only 6% of parent participants (Davison et al., 2016; Davison et al., 2018). Paternal support and involvement is a well-known predictor of breastfeeding initiation and duration (Hunter & Cattelona, 2014; Rempel, Rempel, & Moore, 2017), but little research has examined how fathers' involvement might be associated with maternal feeding behaviors after the breast- or bottle-feeding stages. This represents a critical gap in the literature, given that responsive feeding is currently a recommended practice by the AAP and the WHO, and that responsive feeding may promote healthier weight (American Academy of Pediatrics, 2017; World Health Organization, 2002; DiSantis, Hodges, Johnson, & Fisher, 2011).

In a family systems approach to children's weight-related health, we would expect fathers (and other resident co-caregivers) to exert both direct and indirect effects on children's weight-related health across several different components of care (Lamb, 2010; Parke & Cookston, 2019; Pleck, 2012; Wilson & Prior, 2011). In the current study, we focused on father availability and involvement in order to garner preliminary understanding of fathers' influence on mealtimes. We considered distractions during mealtimes a proxy measure of low levels of involvement in caregiving and shared family activities, whereas father presence/absence at the meal involves the fathers' potential availability for interaction around food (Lamb, Pleck, Charnov, & Levine, 1987).

### The Current Study

The current study aims to address critical gaps in the current literature on responsive feeding, summarized briefly here. First, no studies have yet characterized the full range of distractions at family mealtimes, nor the proportion of the mealtime spent in different types of distractions. Second, although feeding in response to children's developmental, nutritional, and hunger/satiety needs is a recommended approach for feeding young children, it is unknown whether mealtime distractions and routines are associated with this behavioral outcome. Finally, there are few empirical studies investigating the effect of paternal availability and involvement on mothers' and children's behaviors at mealtimes. Three aims will address these gaps.

The first aim was to characterize and describe the proportion of time that mothers, fathers, and children spend in distraction in a sample of predominantly two-parent families. Based on qualitative research about mothers' concerns regarding mealtimes (Malhotra et al., 2013), we hypothesize that children would spend more time than parents engaged in overall distractions, and technology-related distractions specifically. The second aim was to examine how father presence/absence is associated with maternal and child behaviors at the mealtime. Based on research conducted with a family systems theory approach to father *availability* (Lamb et al., 1987; Parke & Cookston, 2019), we hypothesized that both

mothers and children would be more distracted in families with fathers absent, than in families with fathers present. Mothers may also engage in less responsive feeding when fathers are absent. The third aim was to examine the relative associations between family members' mealtime distractions and routines/rituals with mothers' feeding responsiveness at mealtimes. Based on family systems research on father *involvement* (Lamb et al., 1987; Parke & Cookston, 2019; Pleck, 2012), we expected that greater paternal mealtime distractions and fewer family mealtime routines/rituals would be associated with lower levels of maternal feeding responsiveness.

## Method

### Participants and Recruitment

Participants in this study included a subsample ( $n = 110$ ) of families who were recruited from the larger STRONG Kids 2 Birth Cohort project ( $N = 468$ ; Fiese, MUSAAD, Bost, McBride, Lee, Teran-Garcia, & Donovan, S. M., *under review*). The larger study aimed to examine predictors of child growth and health in early life. Women in their third trimester of pregnancy were recruited from 2014 to 2017 from healthcare facilities (e.g., obstetrics/gynecology). Families were eligible if their child was born full term ( $> 38$  weeks), and excluded if the target child had inborn errors of metabolism (e.g., phenylketonuria), health conditions that affect feeding, or were non-singletons. The full sample when children were six weeks of age included 468 families. To be eligible for inclusion in the Protective Parents subproject, participants had to live within 50 miles of the study site, children had to be between 18–24 months old, and parents had to consent to completing a 2-hour home visit between October 2015 and August 2017. Due to reporting error, one child was 34.09 months old. This child did not differ significantly from the sample mean on any demographic or outcome variables, and was retained in all analyses. Recruitment efforts used newsletters, emails, fliers, and phone calls. The Protective Parents subproject protocol was submitted and approved by the University of Illinois Institutional Review Board (#08521).

Of the 468 families in the larger STRONG Kids 2 Birth Cohort study, 140 were eligible and contacted for recruitment, and 110 consented and completed the home visit protocol. Of the 30 families that were eligible but did not participate, 10 never responded to follow-up calls and were dropped from the study. Due to technology error, one family's mealtime was not recorded and so they are excluded from analyses. All families were from rural or micro-urban areas around the primary study site. The final sample included 109 families. About half (51.8%) of target children were female ( $n = 57$ ). Most mothers identified as White (81%), 7% were Asian, 6% were Black, 6% were American Indian/Alaska Natives. Some individuals identified as biracial. Most mothers had a post-graduate (42.1%) or college (37.4%) degree, 19.6% had some college/technical school, and 0.9% were high school graduates. Most (88%) mothers were married, 8.4% were single, 2.8% were cohabiting, and 0.9% were divorced. Regarding monthly income, 44.8% of families reported between \$3,000 and \$6,000, 28.6% reported less than \$3,000, and 21.9% reported more than \$6,000 per month. Seventeen families (15.5%) reported receiving some type of government assistance (e.g., TANF, WIC, or SNAP). Most mothers were employed (74.5%), 28.2% mothers were unemployed, and 18.9% were stay-at-home parents. Of the employed mothers, 70.9% were

employed full time. Mothers were, on average, 30.9 years old ( $SD = 4.48$ ) when children were born. Children were, on average, 20.96 months old ( $SD = 2.7$ , Range = 17.8 – 34.9) at the time of the home visit. Between 2 and 9 people ( $M [SD] = 3.39 [1.14]$ ) were present at mealtimes, and mealtimes were, on average, 17.07 minutes long. There were no differences between subproject families, the larger SK2 sample, or families who were recruited for the sub-study but did not participate on the following demographic variables: maternal race/ethnicity, marital status, employment, income, maternal education, or maternal age (all  $p$ 's  $> .10$ ). Families in the larger SK2 study and families who were recruited but did not participate in the sub-study were marginally more likely to receive government assistance ( $p = .08$  and  $.07$ , respectively).

Fathers (or masculine-presenting caregivers) were absent from the meal for 35 families. In cross-tab analyses, fathers were absent for meals in 27 of 97 married/cohabiting families. Six divorced/single mothers and two mothers who did not report marital status had a masculine-presenting caregiver present at the mealtime. These families were included in the analysis but we controlled for marital status. The term “father” was used throughout this manuscript because the majority of families had resident fathers, however we acknowledge that some may instead have been resident masculine-presenting caregivers. Only mothers completed surveys.

### Home Visit Procedures

Home visits were scheduled on weekday evenings at the family's convenience. Researchers attained written informed consent from parents to video-record the mealtimes at the start of the visit. Cameras were set up in plain-sight, and were configured facing the target child during the mealtime. Researchers waited outside the family home during the mealtime, and parents told the researchers when the mealtime was finished by coming outside. After completing the home visit, families were debriefed and given \$75.00 in remuneration.

### Observational Coding Schemes

Family mealtime videos were linked only to the participating family's ID number for the SK2 study. First, one primary coder was trained on the Actions/Distractions component of the ABC's of Family Mealtimes Coding Scheme (Fiese, Winter, & Botti, 2011) and another primary coder was trained on the Feeding Behavior Interaction Scale (Hughes et al., 2007). Training occurred using ( $n = 7$ ) previously-collected videos of family mealtimes from a different study. After primary coders attained adequate interrater reliability with the previous coders on the training videos ( $ICCs = .70$  for distractions,  $ICC = .90$  for observed responsive feeding), each primary coder trained two undergraduate coders using the same videos. Once adequate interrater reliability between all coders was established, the undergraduate research assistants each coded about half ( $n = 55$ ) of the mealtime videos, while the primary coder coded 20% of these, overlapping equally with each research assistant, to guard against rater drift. Coding was completed using Mangold's INTERACT (Mangold International, 2016). Data management was conducted in SPSS 24.0 (IBM Analytics, 2016), but all analyses were conducted in SAS 9.4 (SAS Institute, 2014).

**Mealtime distractions.**—Distractions were assessed using the Distractions coding scheme from the Actions, Distractions, and Chaos (ABC's) of Family Mealtimes system (Fiese et al., 2011). Each video was coded once for every person present at the mealtime. Coders assessed the duration and type of distraction occurring at the mealtime for each person. Distractions were defined as behaviors that take someone physically or mentally away from the meal, in that their attention was at least partly focused on something away from the meal. Conversations taking place among family members seated at the table were not considered distractions given that the goal of mealtimes for many families is to connect and converse (Fiese et al., 2011; Malhotra et al., 2013).

Four types of distractions were coded during mealtimes (Table 1). *Technology distractions* involved turning on/off appliances, using electronic devices (e.g., television, computer, smart phone), or adjusting settings on devices. *Non-technology object-related distractions* involved distractions with analog “objects” (e.g., toys, pets, books, etc.) while not facing the meal or other people at the meal. *Leave taking distractions* involved leaving the meal for any reason, such as answering the door, leaving for work mid-meal, or going to the bathroom. *Food-related distractions* involved retrieving or putting away something needed for the meal (e.g., utensils, food) that was away from the main mealtime location. Interrater reliability was adequate for all of the types of distractions for mothers, fathers, and children (all ICCs  $\geq .70$ ), except for paternal non-technology object distraction ( $ICC = .520, p = .08$ ), due to the behavior's low incidence.

In analyses, distractions were calculated as proportion of the mealtime spent in distraction, by dividing the length of time (minutes and seconds) spent in a particular type of distraction by the length of the mealtime (minutes and seconds), for each person. Total distractions were calculated by summing these proportion scores for each person. For example, total distractions for mothers was calculated by summing the proportion of time spent each mother spent in in leave-taking, technology, non-technology object, and food related distractions.

**Observed maternal feeding responsiveness.**—Observations of maternal feeding responsiveness were assessed using the evidence-based Feeding Behavior Coding System (FBCS; Hughes et al., 2007). Responsive feeding practices involve food-related parenting behaviors designed to teach, encourage, and model healthful food consumption for children, while still granting the child autonomy to eat or not, and in how much they consumed. Examples include allowing the child to choose what and how much to serve from provided options, plating food for the child, or talking about food positively. Non-responsive feeding practices included spoon-feeding, offering seconds, or ignoring requests for more or less food. To calculate observed responsive feeding, the mean frequency of responsive feeding practices was divided by the mean frequency of all feeding practices. Inter-rater reliability was excellent (all ICCs  $> .90$ ). The average score for observed maternal feeding responsiveness was 2.30 (SD = .63; Range = .56 to 3.57).

**Mealtime length.**—The start of the mealtime was indicated when food was placed in front of the target child. The end of the meal was indicated by the last time that food was taken away from the child, the child leaving the table permanently, or after 20 minutes (whichever



came first). Length. Mealtimes ranged from 6 to 20 minutes, and lasted 17.07 minutes on average (SD = 3.94).

### Self-Report Measures

**Family rituals/routines.**—Mothers reported on mealtime routines/routines using the mealtime rituals/routines subscale of the Family Ritual Questionnaire (Fiese & Kline, 1993) at 12 months ( $\alpha = .79$ ,  $M [SD] = 3.87 [.66]$ , Range = 1.57 – 5.00) and 24 months ( $\alpha = .80$ ,  $M [SD] = 3.90 [.69]$ , Range = 1.71 – 5.00). This subscale uses 7 items to assess family rituals and routines in the mealtime setting specifically (e.g. “Some families regularly eat dinner together”).

**Demographics.**—Mothers reported income, age, employment, educational attainment, government assistance, marital status, and race/ethnicity when infants were 6 weeks old.

### Analytic Plan

Observational data was available for all but one family whose data was lost due to recording failure. Regarding parent-report data, missingness ranged from 0 to 17%. Some subscales had more missing data than others because forced-response format was not used for questionnaires. Little’s Missing Completely at Random [MCAR] test failed to reject the null hypothesis ( $X^2 [df] = 211.35 [201]$ ,  $p = .29$ ); thus, data were unlikely to be missing systematically.

To address the first aim, analyses of variance (ANOVA) assessed differences in the proportion of time spent in different types of distraction for each family member, and paired sample t-tests assessed comparisons between family members. To address the second aim, Mann-Whitney U tests examined associations between fathers’ presence/absence and maternal responsive feeding. A 3-step procedure assessed associations between presence/absence of father at the mealtime and distractions. First, Mann-Whitney U-tests examined preliminary differences by father presence/absence. Second, the non-linear mixed procedure (PROC NLMIXED) was used to account for a non-linear relationship between father presence/absence and distractions, while allowing for use of random family effects and retaining the nested structure of the data (child, mother, and father within a family unit). Finally, the generalized linear models procedure (PROC GENMOD) probed significant interactions with pairwise comparisons, retaining the nested data structure, and allowing for non-normality. Identity link functions were used to improve fit.

The third aim of this study—to assess associations between father’s lack of involvement (distractions), mealtime routines, and maternal feeding responsiveness—was addressed with a two-part approach. Bivariate correlations between independent variables (mealtime routines/rituals, distractions), demographic variables, and the outcome of interest (observed maternal feeding responsiveness) were investigated to identify relevant covariates and to determine whether further analysis was appropriate. Then, the relative contributions of variables that were independently associated with the outcome (including relevant demographic covariates) in bivariate analyses were examined in path analyses using PROC CALIS. PROC CALIS handles missing data using full-information maximum likelihood,

allows for error estimation, evaluations of model fit, and resolves problems of multicollinearity (Allison, 2012).

## Results

### Aim 1. Describing Family Mealtime Distractions

According to ANOVAs and post-hoc Tukey tests, mothers spent a greater proportion of the mealtime in food-related distractions on average, as compared to other kinds of distraction ( $p$ 's < .001), and a greater proportion of time engaged in leave-taking on average, as compared to non-technology object and technology-related distractions ( $p$ 's < .05; Table 1). Fathers spent a greater proportion of time engaged in food-related distraction on average, as compared to technology- and non-technology-related distractions ( $p$ 's < .001), and a greater proportion of time in leave-taking on average, than non-technology object-related distractions ( $p = .01$ ). There were no significant differences in the average proportion of time that children spent in different types of distraction.

According to paired-sample  $t$ -tests, there were significant differences between family members in the proportion of the mealtime spent in specific types of distractions (Figure 1), but not in total distractions (data not shown). Children spent a greater proportion of the mealtime in technology-related distractions than mothers, a greater proportion of the mealtime in non-technology object-related distraction than either parent, and a smaller proportion of time in leave-taking distractions than fathers, on average. Fathers trended toward spending a greater proportion of time in leave-taking distractions, as compared to mothers on average ( $t[73] = -1.99, p = .051$ ).

### Aim 2. Father Availability and Maternal/Child Behavior at Mealtimes

In bivariate Mann-Whitney  $U$  tests, father availability, or father presence at mealtime was associated with a smaller proportion of the meal spent in total maternal distractions ( $p = .02$ ), maternal leave-taking distraction ( $p = .01$ ), total child distractions ( $p = .02$ ), and child non-technology object-related distractions ( $p = .03$ ), on average. Observed maternal feeding responsiveness was, on average, significantly lower among families where fathers were absent ( $M = 2.05$ ) as compared to when a father was present at the mealtime ( $M = 2.42, p = .01$ ).

To assess individual and interactive effects of father presence/absence and person (mother vs. child) on distractions, we analyzed scatter plots, and then used PROC NLMIXED. Residual and fitted value scatter plots for outcome variables indicated good fit. We controlled for marital status to account for situations where fathers would not be expected to be present (e.g., divorced/ single mothers), but masculine-presenting resident caregivers may have been present at the meal instead. There were significant interaction effects between father presence/absence and person for non-technology object related distractions ( $B[SE] = .02[.01], t[df] = 2.37[105], p = .02, AIC = -460.6$ ), and trend toward statistically significant interactions for total distractions ( $B[SE] = -.05[.03], t[df] = -1.96 [105], p = .05, AIC = -149.7$ ). There were no significant effects of father availability by person on leave-taking, food, or technology-related distractions.

To shed more light on the significant interactions and because the NLMIXED procedure does not produce statistics for pairwise comparison, we applied PROC GENMOD with a repeated statement and an identity link function. The effects of person (mothers vs. children) and presence vs. absence of father were examined, again controlling for marital status. Counter to our hypotheses, there were no effects of father presence/absence on mothers' or children's total distractions. Mothers were engaged in significantly more distractions as compared to children, regardless of whether fathers were present (Mothers,  $M [SD] = .15 [.02]$ ; Children,  $M [SD] = .08 [.02]$ ,  $p = .02$ ) or absent (Mothers,  $M [SD] = .19 [.03]$ ; Children,  $M [SD] = .10 [.03]$ ,  $p = .01$ ). Interestingly, there were no statistically significant differences between mothers with fathers present ( $M [SD] = .15 [.02]$ ), compared to children with fathers absent ( $M [SD] = .10 [.03]$ ,  $p = .18$ ). That is, children of absent fathers were just as distracted as mothers with fathers present.

Children were engaged in significantly more non-technology object-related distractions as compared to mothers, regardless of whether fathers were present (Mothers,  $M [SD] = .01 [.00]$ ; Children,  $M [SD] = .083 [.01]$ ,  $p = .01$ ) or absent (Mothers,  $M [SD] = .01 [.00]$ ; Children,  $M [SD] = .06 [.01]$ ,  $p < .01$ ). Contrary to our hypotheses, there was no effect of father presence/absence on mothers' non-technology object related distractions. However in partial support of these hypotheses, children with fathers absent ( $M [SD] = .06, [.01]$ ) engaged in significantly more non-technology object-related distractions as compared to children with fathers present ( $M [SD] = .03 [.01]$ ,  $p = .04$ ). That is, children were more distracted with non-technology objects when fathers were absent, as compared to children with fathers present.

### **Aim 3. Mealtime Routines/Rituals, Distractions, and Feeding Responsiveness.**

**Bivariate analyses.**—To assess relevant demographic covariates, Mann Whitney U tests, and polychoric and Spearman correlations were conducted. Polychoric correlations identified significant associations between observed maternal feeding responsiveness and ordinal variables, including household income ( $r = .32$ ,  $95\% CI = [.14, .51]$ ), and maternal educational attainment ( $r = .27$ ,  $95\% CI = [.07, .47]$ ). According to Mann Whitney U-tests, observed maternal feeding responsiveness was lower among families receiving government assistance ( $p < .001$ ). There were no differences in feeding responsiveness by child gender or marital status. In bivariate Spearman's correlations, observed maternal feeding responsiveness was associated with use of more mealtime routine/rituals at 24 months, lower maternal non-technology object-related, paternal total and leave-taking, total child, and technology-related child distractions (Table 2).

**Path analyses.**—Based on bivariate analyses, we examined associations between the following variables and maternal responsive feeding: maternal non-technology object-related, paternal leave-taking, paternal total, and child total distractions, and mealtime routines/rituals at 24 months. Maternal education, household income, and receipt of government assistance were modeled as covariates. These data are not longitudinal, and so we make no causal assertions.

The preliminary model including all potential independent variables converged adequately, with maternal non-technology object-related distractions ( $\beta$  [SD] =  $-.17$  [.09]) and paternal distractions ( $\beta$  [SD] =  $-.35$  [.16]) statistically significantly associated with responsive feeding. However, household income ( $\beta$  [SD] =  $-.18$  [.11]) and mealtime routines ( $\beta$  [SD] =  $.18$  [.10]) trended toward being associated with the outcome ( $p = .10$ ). Both household income and mealtime routines were significantly associated with other variables in the model, so to ensure that the final model would be parsimonious, variables with small standardized path coefficients ( $\beta < .10$ ) were removed (paternal leave-taking distractions [ $\beta = .06$ ], and maternal education [ $\beta = .01$ ]).

The model was re-run with the remaining variables. However, because the model was still fully saturated, we constrained the covariance between two highly correlated independent variables (household income and government assistance) in order to increase degrees of freedom. Results from the final model are presented in Table 3. Mothers' non-technology object-related and fathers' total distractions, as well as household income were negatively associated with maternal feeding responsiveness. There were no significant associations between child total distractions, government assistance, or mealtime rituals/routines with the outcome. The model explained 40% of variance ( $R^2 = .40$ , total variance =  $.39$ , error variance =  $.23$ ) in observed maternal feeding responsiveness. Absolute and comparative fit statistics were adequate (Table 3).

## Discussion

This study aimed to characterize distractions at mealtimes, examine associations between father availability with maternal and child mealtime behaviors, and to investigate the relative contributions of family mealtime routines/rituals and family members' distractions on maternal feeding responsiveness. In regards to our first aim, results suggest that distractions comprise a large proportion of the average family mealtime, but contrary to our hypotheses children did not always engage in more distractions than their parents. We found mixed support for the second and third aims' hypotheses. There were a few meaningful differences between maternal and child distractions in families with fathers absent/present, and we found that father availability (presence) was associated with higher levels of observed maternal responsiveness feeding (Aim 2). Father involvement (less total distraction) at mealtimes—along with more maternal non-technology object-related distractions and lower household income—was significantly associated with less observed maternal responsive feeding (Aim 3). Our hypothesis was partially supported in Aim 3 because mealtime routines/rituals were not significantly associated with the outcome of interest.

In regards to Aim 1, by dividing the amount of time family members spent in distraction during mealtimes by the length of the mealtime, we learned that families spend about half of the mealtime in distraction on average. Analyses revealed significant within- and between-person differences in distractions for fathers, mothers, and target children. Mothers engaged in proportionally more food-related distractions than any other kind of distraction, although fathers engaged in about the same proportion of food-related and leave-taking distractions. Fathers engaged in more leave-taking distractions than children, children engaged in more technology-related distractions than mothers, and more non-technology object-related

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distractions than both parents. Most studies examining distractions at mealtimes have focused on technological distractions only and have highlighted the prevalence of these behaviors in mothers (Trofholz et al., 2017; Ventura & Teitelbaum, 2017). This study adds to the literature by characterizing the proportion of time that resident fathers, mothers, and children spend in different kinds of distraction, and is thus able to capture the nuances in mealtime behaviors within- and between family members. Findings imply that resident fathers may want to consider reducing their leave-taking, and parents may consider removing non-technology object-related distractions (such as toys, books, and pets) from the family meal to reduce children's mealtime distractions.

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In Aim 2, we investigated the association between father availability and maternal and child behaviors at mealtimes. Although there was no evidence to suggest that fathers were more or less distracted than mothers at mealtimes, fathers' presence at the meal was associated with maternal and child behavior. Controlling for parent marital status, children with present/available fathers engaged in proportionally less non-technology object-related distractions than their counterparts with unavailable/absent fathers. Children of absent fathers were also as distracted overall as mothers with fathers present. Although mothers were more distracted than children, fathers' availability may help reduce children's distractions (particularly with non-technology objects like books, toys, and games). These findings suggest that fathers play an important role in interacting with and engaging the child at the table. We also found that mothers with fathers absent engaged in significantly less responsive feeding. It seems that the presence of the father at mealtime is linked with more positive maternal and child behavior. However, fatherhood researchers have long maintained that fathers' contribution to childcare goes beyond simply being available, which we investigated in Aim 3 (Hawkins & Palkovitz, 1999; Lamb, 2000).

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More paternal distractions (father's lack of involvement), maternal non-technology object-related distractions, and lower household income—but not mealtime routines or child distractions—were significantly associated with less observed maternal feeding responsiveness at the mealtime. Qualitative studies have shown that mothers perceive support from other family members as critical to engaging in healthy mealtime practices (Herman, Malhotra, Wright, Fisher, & Whitaker, 2012; Malhotra et al., 2013). These findings corroborate those perceptions, and show that active paternal involvement at mealtimes might be an effective target for interventions aimed at improving mothers' responsive feeding and be a strategy for experimentally evaluating this possible link between father behavior and maternal responsiveness. However, we were surprised that mealtime routines/rituals were not associated with responsive feeding. On one hand, this may be due to distractions being a more proximal and concurrent influence on mothers' ability to engage in responsive feeding at directly observed mealtimes. On the other hand, the small sample size and cross-sectional nature of these data may not be able to provide a conclusive answer to the links between rituals/routines and feeding responsiveness. The latter explanation is more likely given the large standard error and marginally significant t-value observed in the path model for the effect of mealtime routines/rituals on observed maternal responsive feeding. This research addresses a key limitation in the food-related parenting practices literature: few—if any—studies have examined how fathers' and children's behaviors at mealtimes may be related either positively or negatively to mothers feeding behaviors during

early childhood (Davison et al., 2016; Davison et al., 2018). Although a small body of literature shows that father involvement may promote breastfeeding duration in infancy (Hunter & Cattelona, 2014; Rempel et al., 2017), this is one of the first studies to show that father involvement at mealtimes may be related to responsive feeding.

Several limitations to the study bear noting. First, although we use path analyses to examine the relative contributions of distractions and routines on observed responsive feeding, all of these data are cross-sectional, limiting our ability to make statements about causality and directionality. For instance, although we found that more maternal non-technology object-related distractions were associated with less feeding responsiveness, it is possible that less responsive mothers may be more willing to engage in these distractions. Future studies should investigate the directionality of these effects. Second, although the sample size is comparable to others using observational methods, it is still relatively small for a path model (as evidenced by the marginal but non-significant effects of mealtime routines/rituals on the outcome), so studies using larger data sets are needed to confirm and elaborate on findings. Third, the sample is quite homogenous; most families are White, well-educated, and married, meaning that findings cannot be generalized across racial/ethnic or socioeconomic groups, nor to families with sexual minority couples, families with non-resident fathers, or families with resident caregivers that do not present as masculine. Studies conducted in more diverse samples are needed to examine whether distractions are more or less prevalent in different populations. Fourth, we acknowledge that social desirability and observational biases may skew findings, although observers spent at least 30 minutes in the home building rapport and getting the child and family used to the observational equipment. Future studies should consider conducting multiple observations and quantifying the duration of time that family members spend distracted by the observational equipment separately, to control for some of these effects. Finally, our measure of responsive feeding may not have captured the full range of responsive feeding behaviors. Although we used this measure of responsiveness to capture feeding in response to children's cues of hunger/satiety as well as their nutritional and developmental needs, some researchers may consider applying sequential analysis to child cues and parent responses to hunger/satiety to elaborate on these findings. Alternative approaches may include using existing observational assessments of responsiveness to very young infants' feeding cues in breastfeeding, bottle feeding, solid-food and mixed feeding situations (Hodges et al., 2013), or adapting existing measures of emotional responsiveness to assess feeding responsiveness.

In conclusion, this study found that distractions take up a large proportion of the average family mealtime, and that parental distractions were linked with fewer maternal responsive feeding practices. Paternal availability at mealtime was associated with fewer child mealtime distractions and both paternal availability and involvement (lack of distractions) were associated with higher levels of maternal responsive feeding at mealtimes. Programs designed to promote responsive feeding may consider evaluating how father or co-caregiver availability and active involvement in family mealtimes are associated with responsive feeding pre- and post-intervention. Furthermore, although researchers and policymakers have long recommended limiting screen time during family mealtimes, results from this study suggest that families should also consider limiting distractions from all sources. Parents may want to use family-style serving practices in order to limit their own food-

related distractions, and to consider establishing rules about leave-taking during mealtimes. Future research should prioritize examining prospective data, and direct and indirect effects of mealtime distractions on child weight and eating behavior, via responsive feeding.

## Acknowledgments

This research was funded by grants from the National Dairy Council to Sharon Donovan and Barbara H. Fiese (CoPI's), the Gerber Foundation to Sharon Donovan, the Christopher Family Foundation to Sharon Donovan and Kelly K. Bost, Hatch ILLU 793–330 from the U.S. Department of Agriculture to Barbara H. Fiese, Kelly K. Bost and Margarita Teran-Garcia, and the National Institutes of Health DK107561 to Sharon Donovan. STRONG Kids 2 Team includes Kelly Bost, Sharon Donovan, Soo-Yeun Lee, Brent McBride, Margarita Teran-Garcia and Barbara H. Fiese.

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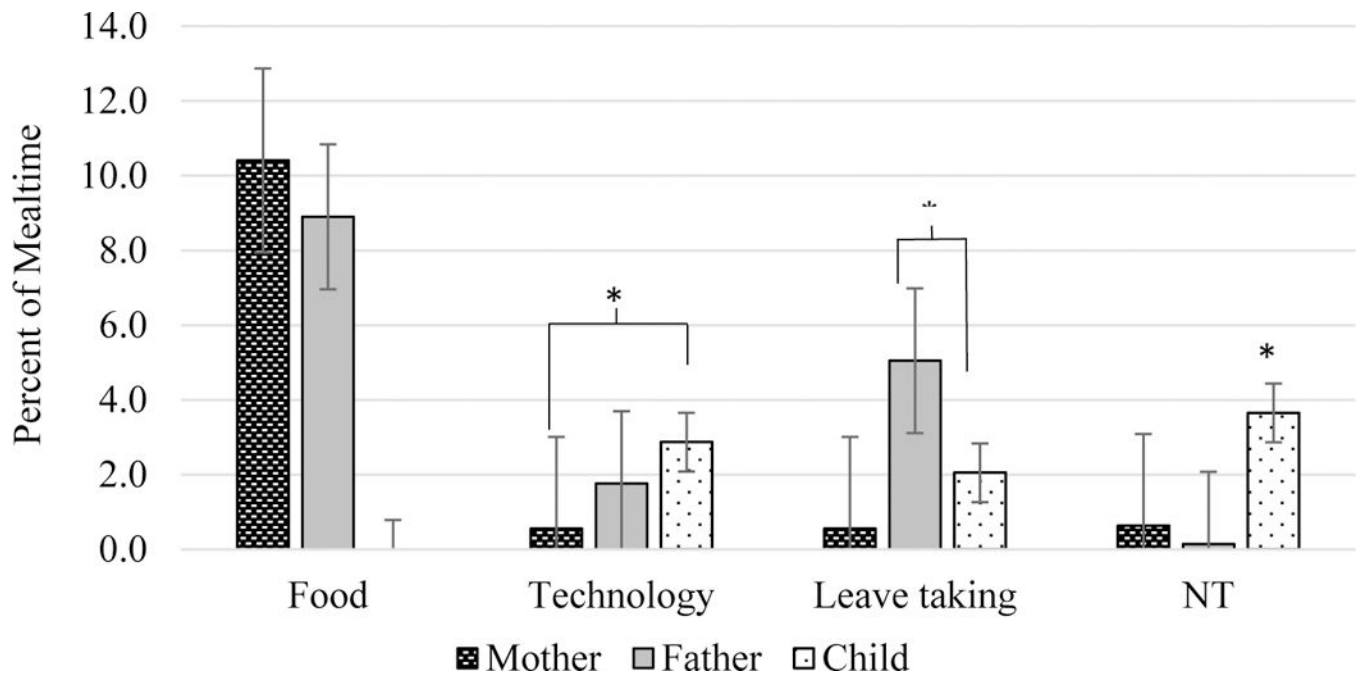
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**Figure 1.**

Differences in mealtime distractions by persons type of distraction in families with 18–24 months old children using paired sample t-tests. *Note.* NT = Non-technology object-related distractions. Differences between mothers, fathers, and children on percent of time spent in distraction were assessed using paired-sample t-tests. Analyses including fathers were limited to ( $n = 74$ ) families where fathers were present. All other analyses included the full ( $n = 109$ ) sample of participating families.

**Table 1.**

Characteristics of distractions during (n = 109) observed family mealtimes with 18-24-month-old children

	<u>Minutes spent during mealtime</u>			<u>Percent of mealtime</u>		
	<u>M</u>	<u>SD</u>	<u>Max*</u>	<u>M%</u>	<u>SD</u>	<u>Max%*</u>
Maternal total distractions (n = 109)	2.65	2.89	14.0	15.92	16.86	83.3
Food-related	1.83	2.41	14.0	10.41	12.86	70.0
Technology-related	.10	.51	4.0	.55	2.69	21.1
Leave-taking	.30	.90	6.0	.55	5.90	33.3
Non-technology object	.08	.36	2.0	.63	2.76	16.7
Paternal total distractions (n = 74)	2.93	3.22	16.0	17.73	19.92	92.9
Food-related	1.59	1.78	7.0	8.90	9.37	35.0
Technology-related	.27	1.39	10.0	1.76	9.25	71.4
Leave-taking	.77	2.33	16.0	5.05	9.25	81.8
Non-technology object	.03	.16	1.0	.14	.82	5.0
Child total distractions (n = 109)	1.33	2.50	15.0	9.30	18.60	83.3
Food-related	.00	.00	.0	.00	.00	.0
Technology-related	.41	1.86	15.0	2.87	11.36	75.0
Leave-taking	.25	1.01	7.0	2.05	7.70	46.7
Non-technology object	.58	1.06	5.0	3.65	6.89	33.3
Family distractions (sum of maternal, paternal, and child distractions, n = 109)	7.70	6.22	31.0	48.18	42.87	250.0
Food-related	3.36	3.33	20.0	19.41	17.87	100.0
Technology-related	.77	2.84	19.0	5.20	17.54	95.0
Leave-taking	1.72	3.20	16.0	11.46	22.05	90.9
Non-technology object	1.00	1.43	7.0	6.64	10.63	50.0

\* All measures of distractions have a minimum value of 0.

Total distractions in minutes spent during the mealtime were calculated by summing the number of minutes spent in each type of distraction, for each person. Total distractions in the percent of the mealtime were calculated by summing the proportion scores for food-, technology, leave-taking, and non-technology object related distractions for each person.

Note. Percent of mealtime spent in distractions is calculated by dividing minutes spent in distraction by the mealtime length (M [SD] = 17.07 [3.94], Range = [6.0 – 20.0]).

Table 2.

Associations between mealtime routines/rituals, maternal feeding responsiveness, and family mealtime distractions using Spearman's correlation coefficients with pairwise deletion

	Maternal distractions (n = 109)				Paternal distractions (n = 74)				Child distractions (n = 109)				Obs maternal FR			
	Total	Food	Tech	LT	NT	Total	Food	Tech	LT	NT	Total	Tech		LT	NT	
Mealtime ritual/ routines (12M)	r	-.17	-.13	.05	-.09	.15	-.07	.27*	-.27*	-.13	.09	-.17	-.21*	-.16	-.06	-.01
	N	105	105	105	105	105	71	71	71	71	71	105	105	105	105	105
Mealtime ritual/ routines (24M)	r	-.21*	-.14	-.03	-.17	.04	-.23	.02	-.26*	-.14	-.02	-.13	-.15	-.14	-.07	.22*
	N	90	90	90	90	90	65	65	65	65	65	90	90	90	90	90
Obs maternal FR	r	-.16	-.01	-.07	-.14	-.28*	-.37*	-.09	-.20	-.23*	-.17	-.38*	-.34*	-.16	-.18	-
	N	109	109	109	109	109	74	74	74	74	74	109	109	109	109	-

Note. Obs maternal FR = Observed maternal Feeding Responsiveness; Tech = technology-related distractions; LT = Leave taking distractions; NT = non-technology object related distractions; 12M = 12 months; 24M = 24 months.

**Table 3.**

Results from path analyses examining effects of family and household characteristics on observed responsive feeding

	Unstandardized B	Standardized $\beta$	SE	t-value
Maternal NT distractions	-3.929	-.173	.082	-2.122*
Paternal total distractions	-.959	-.317	.113	-2.817*
Child total distractions	-.457	-.136	.094	-1.452
Government Assistance	-.244	-.136	.096	-1.414
Mealtime routines/rituals (FRQ, 24M)	.167	.183	.094	1.946
Household income	.034	.192	.096	1.991*

*Note.* NT = Non-technology object related distractions; FRQ = Family Ritual Questionnaire.

Model fit for this path analysis was adequate ( $X^2$  [df] = 1.21 [1],  $p = 0.27$ , SRMR = 0.03, RMSEA = 0.04,  $p$  of close fit = 0.33, AIC = 404.07, CFI = 0.998).