

What are mothers doing while bottle-feeding their infants? Exploring the prevalence of maternal distraction during bottle-feeding interactions

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A B S T R A C T

The purpose of this study was to describe the extent to which mothers engage in distracting activities during infant feeding. Mothers reported engaging in other activities during 52% of feedings; television watching was the most prevalent activity reported. Further research on the impact of distraction on feeding outcomes is needed.

Keywords:

Infant feeding
Bottle-feeding
Maternal feeding practices
Mother–infant interactions

Rapid weight gain during infancy is a significant postnatal predictor of later obesity [1] and several other later-life metabolic disorders [2–5]. Promotion of maternal responsiveness during feeding interactions, or feeding practices that are developmentally appropriate and in response to infant hunger and fullness cues, has recently been recognized as important for reducing the risk of over-feeding and rapid weight gain in infancy [6]. However, few studies have used objective measures of maternal responsiveness [7] or have explored why some mothers may be more responsive than others [8]. Thus, our current understanding of how to promote responsive feeding practices during infant–feeding interactions is lacking.

Several hypotheses exist for why a mother would feed in a way that is not responsive to an infant's cues. For example, previous researchers have hypothesized that mothers may mistrust infants' abilities to self-regulate intake, lack awareness of appropriate feeding practices, or use food for purposes other than fulfilling nutritional needs (e.g., to soothe) [9–11]. However, given the ubiquity of technological and other distractors in today's society, it is also possible that caregivers engage in other activities during feeding interactions, and these activities distract mothers from attending to their infants' cues.

The potential impact of environmental stimuli on eating behaviors has been a focus of research aimed at understanding causes of overeating in adult samples. This research has shown that “mindless eating,” or

eating while distracted by stimuli such as television (TV) or mobile devices (MDs) [12], leads to overeating by increasing tendencies to eat in response to salient contextual cues, such as the amount of food on the plate, and lowering awareness of feelings of hunger and satiation [13–15]. To our knowledge, only a few studies have explored the analogous concept of “mindless feeding,” or the possible tendency of mothers to attend to environmental stimuli in lieu of their children during feeding interactions [16–18]. In a recent laboratory-based study, we found that almost 30% of bottle-feeding mothers were distracted (e.g., spontaneously used a MD) while feeding their infants and these mothers showed significantly lower sensitivity to their infants' cues compared to mothers who were not distracted. Additionally, infants of distracted mothers who possessed certain temperamental characteristics, (e.g., lower self-regulatory capacity and lower surgency) consumed more formula than infants with similar temperaments whose mothers were not distracted [16]. These results suggest that distracted feeding is associated with lower levels of responsive feeding and may place certain infants at risk for overfeeding.

Given that our preliminary findings occurred within a laboratory-based setting, documenting distracted feeding in free-living settings is a logical starting point for gaining insight into the prevalence of this behavior during typical feeding interactions and the possible need for targeted intervention programs. Therefore, the objectives of the present study were three-fold: 1) to use feeding records to determine the frequency of maternal distraction during bottle-feeding; 2) to explore possible associations between distracted feeding, mothers' reports of infant intake, and infant characteristics (e.g., age and temperament); and 3) to

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examine whether characteristics of mothers (e.g., parity, age) or infants (e.g., sex, age, weight status, temperament) are associated with mothers' tendencies toward distracted feeding.

1. Methods

1.1. Participants

Mothers with 0- to 6-month-old, formula-feeding infants who participated in previous studies between September 2011 and February 2014 [16,19] ($n = 41$) were asked to keep a diary of their infants' feeding patterns for 1–6 days (total number of records = 209; total number of recorded feedings = 1181). Eligible infants were between 0- and 6-months of age, predominantly formula-fed (>80% of feeds), and not yet introduced to solid foods. Eligible mothers were between 18 and 40 years of age, and did not have gestational diabetes or any complications during pregnancy and/or birth that may have resulted in their infants having problems feeding. All participants were recruited through fliers posted in Women, Infant & Children (WIC) offices, libraries, coffee shops, and pediatric offices around Philadelphia, as well as through an advertisement in a local parenting magazine. All study procedures were approved by the Office of Regulatory Affairs at Drexel University, and informed consent was obtained from each mother at study entry.

1.2. Procedures

Mothers received bottle-feeding records through the mail. They were instructed to record the timing, duration, and amount of each feeding, but were also asked to indicate what else, if anything, they were doing while feeding their infants. Records were collected when mothers and infants visited our laboratory several days later, at which time mothers also completed a demographic questionnaire and the Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R), which assesses infants' levels of surgency/extraversion, orienting/regulation capacity, and negative affect [20,21]. Infants' weight and length and mothers' weight and height measurements were also collected and recorded in triplicate. Infant anthropometric data was later normalized to z-scores using the World Health Organization (WHO) Anthro software version 3.0.1 (<http://who.int/childgrowth/en/>); age- and sex-specific percentiles were calculated based on these z-scores.

1.3. Data analysis

Mothers' responses to the question of what else, if anything, they were doing while feeding their infants were sorted into thematic categories using constant comparison within the framework of grounded theory [22]. Two coders (RBC, AKV) independently coded all records using this approach. Results were then reviewed and compared for validity and any discrepancies in theme identification or coding were discussed. Themes were used to classify feedings into two categories: 1) mother was distracted (e.g., watching TV, using a computer, talking to someone other than the infant) versus 2) mother was not distracted (e.g., nothing was specified, interacting with the infant) (Table 1). Given that previous research with adult samples has focused on technological distractors [12], we also further classified the distractions into technological (e.g., watching TV, using a computer or MD) versus not (e.g., reading, doing housework). We then determined for each mother the percentage of feedings during which a distraction was reported and further classified mothers as: 1) never distracted versus 2) distracted during one or more feedings. Similarly, we determined the percentage of feedings during which a technological distractor was reported and also classified mothers as: 1) never distracted by technology versus 2) distracted by technology during one or more feedings.

Descriptive statistics were then calculated to summarize sample demographics and mothers' frequency of different activities and distracted versus not distracted feeding (SPSS version 20, Chicago, IL). Repeated

Table 1

Percentages of feedings where mothers reported distractions versus no distractions while bottle-feeding their infants.

Activity reported	Percent of feedings	Number of feedings
Distractions reported		
Watching television	29%	348
Laying down or sleeping	8%	94
Talking on the phone or to another adult	4%	45
Doing housework	3%	31
Traveling	2%	22
Reading	2%	21
Using a mobile device	2%	21
Listening to music	1%	14
On the computer	1%	13
Eating	1%	10
No distractions reported		
Nothing specified	42%	495
Interacting with baby	6%	67

measures analysis of covariance (ANCOVA) was used to compare mothers' reports of infants' intakes when distractions were versus were not reported and to assess possible interactions between distraction and infant age or temperament subscales (i.e., surgency/extraversion, orienting/regulation capacity, negative affect); where applicable, infant age and time since last feeding were included as covariates. Fisher's exact test and analysis of variance (ANOVA) were used to explore possible associations between maternal distraction and characteristics of mothers (parity, age, race/ethnicity, education, income, or weight status) and infants (sex, birth weight-for-length z-score [WLZ], WLZ at study entry, change in WLZ between birth and study entry, orienting/regulation capacity, negative affect, and surgency/extraversion). Feedings where the mother indicated someone else was feeding the infant were excluded from analysis. A significance level of $P \leq .05$ was used to indicate significant differences.

2. Results

2.1. Sample characteristics

Infants were 14.4 ± 7.1 weeks of age (range = 1.6–25.9 weeks) and 59% ($n = 24$) were girls. Average WLZ at birth was -0.1 ± 1.5 (range = -3.1 – 3.0), and at study entry was 0.8 ± 1.0 (range = -2.2 – 2.7). Mothers were 28.0 ± 7.0 years old (range = 18.0–41.3 years). Seventy-eight percent ($n = 32$) of mothers were overweight or obese ($BMI \geq 25$) and 51.1% ($n = 21$) were obese ($BMI \geq 30$). The majority of mothers were black (70.7%; $n = 29$); 22.0% were white and 7.3% were Hispanic. Additionally, 76.9% ($n = 30$) reported a family income < \$35,000 per year and 92.5% participated in federal assistance programs.

Table 1 presents results of the thematic analysis of mothers' feeding records. For approximately half of the feedings (52%), mothers did a variety of additional activities, including watching TV, laying down or sleeping, using a phone, doing housework (e.g., cooking dinner or cleaning), reading, using a mobile device, traveling (e.g., the baby was in a stroller or car seat), listening to music, using the computer, and eating. During almost one-third (32.4%) of feedings, mothers reported using technological distractors. For the remaining 48% of feedings, mothers reported interacting with their infants or that they did not do anything else during the feeding.

The proportions of mothers who engaged in each activity during one or more of their recorded feedings were calculated (note that the percentages that follow are not mutually exclusive). Seventy-eight percent ($n = 32$) of mothers reported watching TV during one or more of their recorded feedings. Thirty-seven percent ($n = 15$) of mothers reported laying down or sleeping. Lower percentages of mothers (less than one-third) reported the remaining activity themes (i.e., doing

housework [32%; $n = 13$], talking to another adult [27%, $n = 11$], reading [22%; $n = 9$], using a MD [17%; $n = 7$], traveling [17%; $n = 7$], listening to music [12%; $n = 5$], eating [15%; $n = 6$], or using a computer [10%; $n = 4$]). Eight-three percent of mothers reported a distraction during at least one feeding and 78% reported a technological distraction during one or more feedings. Reports of distractions ranged from 1.6% to 100% of feedings (mean = $61.6\% \pm 26.0\%$) for these mothers; similarly, reports of technological distractions ranged from 1.6 to 100% of feedings (mean = $41.0\% \pm 23.6\%$).

Reported intakes ranged from 0.5 to 9 oz (mean = 4.2 ± 0.1 oz). Mothers' reports of infants' intakes did not differ between feeds where differing activities were reported ($F[10, 1037] = 0.84, P = .59$). Mean reported intakes across feedings where differing activities were reported ranged from 4.0 ± 0.3 to 4.8 ± 0.4 oz. Additionally, mothers' reports of infants' intakes did not differ between feeds where distractions were reported versus were not reported; mean reported intakes for both categories of feedings were 4.2 ± 0.2 oz ($F[1, 1046] = 1.67, P = .20$). Mothers' reports of infants' intakes also did not differ between feeds where technological distractions were reported compared to feeds where non-technological distractions or no distractions were reported ($F[2, 1045] = 0.99, P = .37$). Infant age or temperament (surgency/extraversion, orienting/regulation capacity, or negative affect) did not moderate these associations.

A significantly greater proportion of mothers who were distracted during one or more feedings were multiparous (70.6%) compared to mothers who were never distracted (29.4%; $P = .04$, Fisher's Exact Test). Parity was also significantly associated with use of technological distractors: 71.9% of mothers who reported using technological distractors were multiparous, compared to only 28.1% of mothers who were never distracted ($P = .04$, Fisher's Exact Test). Mothers who reported distractions were older (29.0 ± 1.2 years) than mothers who did not report distractions (23.4 ± 2.6 years, $P = .05$). No associations were found between maternal distraction and infant sex, birth weight for length z-score, weight for length z-score at study entry, change in weight for length z-score between birth and study entry, temperament, or mothers' race/ethnicity, education, income, or weight status.

3. Discussion

The present study illustrated that bottle-feeding while engaging in a variety of distracting activities is a common occurrence for most mothers. We also noted that distracted feeding was associated with multiparity and older age, which is likely attributable to the fact that older mothers with more children reside in environments that are inherently more distracting. Given the ubiquity of technological and other distractors in today's society, these findings highlight the need to educate multiparous mothers about the importance of managing and minimizing distractions during infant care to optimize the quality of interactions between mothers and their young infants.

Our findings regarding high levels of distraction during infant feeding are consistent with previous studies of caregivers and their older children, which have also demonstrated that distraction in the form of using a mobile device is a frequent practice among caregivers during child-feeding interactions [17,18]. For example, Radesky and colleagues observed that 40 out of 55 caregivers used a mobile device while dining in fast-food establishments with their children [18]. Furthermore, 16 of these caregivers were considered "highly absorbed" in their mobile devices, attending to their surroundings (including their children) just for brief periods of time. In a laboratory-based study of mothers' interactions with their 6-year old children, Radesky and colleagues also found that 23.1% of mothers spontaneously used a mobile device during a protocol wherein children were asked to taste familiar and unfamiliar foods [17]. These distracted mothers engaged in significantly fewer verbal interactions with their children than mothers who were not distracted. This was especially true when children were asked to try the most unfamiliar food (e.g., artichoke hearts and halva), a time when

modeling and support would have been most important [17]. Taken together, our data and these previous data suggest that distraction is prevalent among caregivers during feeding interactions with their infants and children, and might lead to decreased verbal and non-verbal communication.

Because this study examined mothers' self-reported feeding behaviors, we did not have a measure of the quality of mother-child interactions during distracted versus not distracted feedings. However, in our recent laboratory based study [16], we found that a higher proportion of mothers who were distracted versus not distracted by external stimuli while feeding their infants displayed lower sensitivity to their infants' feeding cues. Maternal sensitivity is an essential component of responsive feeding, which has been suggested to be critical in promoting infants' abilities to self-regulate intake [8] and shown to be associated with infant weight gain trajectories [24,25]. For example, lower maternal sensitivity to infants' cues is predictive of greater infant weight gain in older, but not younger, infants, potentially indicating that eating beyond fullness is a learned response that develops over time and is reinforced through low maternal sensitivity to feeding cues [25]. Infants also show healthier weight gain trajectories when their mothers use less controlling and more sensitive and child-centered feeding approaches [24]. Specifically, when mothers used more sensitive feeding behaviors, infants who had gained weight rapidly during 0 to 6 months postpartum gained weight more slowly during months 6 to 12, and infants who had gained weight more slowly in months 0 to 6 gained weight more quickly during months 6 to 12. Conversely, when mothers' feeding behaviors were more controlling, infants who had gained weight slowly during months 0 to 6 had even slower rates of weight gain during months 6 to 12 and infants who had gained weight too quickly during 0 to 6 months had even more rapid weight gains during months 6 to 12 [24]. Although these data are observational, these studies may suggest that maternal sensitivity to infant feeding cues plays a role in shaping infants' developing self-regulation abilities and weight status trajectories. Understanding whether causal mechanisms link distracted feeding to lower maternal sensitivity, and the potential implications of these linkages for infant outcomes, are important topics for future experimental work.

Previous research with older children and adults suggests that eating while distracted. ["mindless eating" [12]] increases risk for overeating [12-15,26]. Thus, it is possible that mothers who engage in "mindless feeding" are similarly placing their infants at higher risk for overfeeding than mothers who are not distracted by external stimuli because their focus is being taken away from their infants' feeding cues. The present findings did not support this possibility because we did not find that mothers fed their infants more formula when they were distracted compared to when they were not distracted. However, it is important to note that these data may be limited by the fact that mothers (many of whom were distracted) reported them. The lack of association between maternal distraction and infant intake could be the result of reporting bias, possibly due to a disconnect of distracted mothers from what is occurring during their infant-feeding interactions. Similarly, we cannot be certain that mothers were completely aware of their degree of distraction, and quite possibly that they were even engaging in a distracting behavior. For example, we did find that technological distractors (e.g., watching television, using a computer or mobile device) comprised the majority (~62%) of the distractions reported by mothers. While it is not surprising that watching television was the activity most often reported, it was somewhat surprising that very few mothers reported using a mobile device while feeding their infant. This finding may be explained by the tendencies of adults to under-report mobile device use because bouts of use tend to be short and interspersed throughout the day [27]. It is also possible that mobile device use was low because this was a low-income sample, a population that is slightly less likely to own a mobile device [28]. Future research using objective assessments of mobile device use or with higher income samples may illustrate even higher prevalence of technological, including mobile

devices, distractors among mothers of young infants and may serve to better understand associations between technological distractors, infant bottle-feeding behaviors, and mother–infant feeding interactions.

It is also important to note that, because these data came from feeding records, we could not determine mothers' level of attention to the activities versus to their infants, and some of the activities reported (e.g., listening to music) are inherently less visually and cognitively engaging than other activities (e.g., watching television). Thus, the lack of association between engagement in activities and mothers' reports of infants' intakes may be at least partially due to the variability in and lack of detail about the level of distraction afforded by the different activities reported. In contrast, our recent laboratory-based study, wherein infant intake and maternal distraction were objectively measured and not self-reported by mothers, illustrated that maternal distraction was associated with infant intake when infants had lower levels of self-regulatory capacity or extraversion/surgency, suggesting that maternal distraction may interact with infant characteristics to influence feeding outcomes [16]. However, this previous study was also observational and further experimental research is needed to better understand possible causal associations between maternal distraction and infant intake.

When considering the potential impact of maternal distraction during infant feeding on infant feeding outcomes, it is also important to consider healthy child development, the basis of which is secure (e.g., healthy) mother–infant attachment [29–33]. In order for secure attachment to develop, mother–infant interactions must possess synchrony (e.g., they must be reciprocal, mutually regulated and harmonious) [34–36], which is possible only when three primary features – maintained engagement, temporal coordination, and contingency – are present, each of which requires caregiver attunement [34]. A mother who is attuned to her infant displays sensitivity by sensing her infant's state and adjusting her behavior accordingly [34]. Indeed, a recent meta-analysis of 66 studies on attachment security and its antecedents indicated that maternal sensitivity is a necessary condition of attachment security [37]. Because feeding interactions make up a large proportion of all mother–infant interactions, it would follow that to promote secure attachment, these interactions should have synchrony, making maternal attention important. Our data suggest that the majority of the feeding interactions may not have synchrony due to mothers being distracted by environmental stimuli. This is consistent with data from our prior study showing that a higher proportion of distracted mothers versus not distracted mothers showed lower sensitivity to their infants' cues [16]. As such, it would be worthwhile to explore mindless feeding further (and with mothers from a broader range of races/ethnicities and socioeconomic statuses) to determine its potential impact on children's developmental outcomes, as well as to better understand how to help mothers focus on their infants, rather than the abundant distractors in their environments.

Conflict of interest statement

The authors have no conflicts of interest to disclose.

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