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Research report

Mindless feeding: Is maternal distraction during bottle-feeding associated with overfeeding? ☆

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ABSTRACT

Mindless eating, or eating while distracted by surrounding stimuli, leads to overeating. The present study explored whether “mindless feeding,” or maternal distraction during bottle-feeding, is associated with greater infant formula/milk intakes and lower maternal sensitivity to infant cues. Mothers and their ≤ 24 -week-old bottle-feeding infants ($N = 28$) visited our laboratory for a video-recorded feeding observation. Infant intake was assessed by weighing bottles before and after the feedings. Maternal sensitivity to infant cues was objectively assessed by behavioral coding of video-records using the Nursing Child Assessment Feeding Scale. Maternal distraction was defined as looking away from the infant $>75\%$ of the feeding; using a mobile device; conversing with another adult; or sleeping. Twenty-nine percent ($n = 8$) of mothers were distracted. While differences in intakes for infants of distracted vs. not distracted mothers did not reach significance ($p = 0.24$), the association between distraction and infant intake was modified by two dimensions of temperament: orienting/regulation capacity ($p = 0.03$) and surgency/extraversion ($p = 0.04$). For infants with low orienting/regulation capacity, infants of distracted mothers consumed more (177.1 ± 33.8 ml) than those of not distracted mothers (92.4 ± 13.8 ml). Similar findings were noted for infants with low surgency/extraversion (distracted: 140.6 ± 22.5 ml; not distracted: 78.4 ± 14.3 ml). No association between distraction and intake was seen for infants with high orienting/regulation capacity or surgency/extraversion. A significantly greater proportion of distracted mothers showed low sensitivity to infant cues compared to not distracted mothers ($p = 0.04$). In sum, mindless feeding may interact with infant characteristics to influence feeding outcomes; further experimental and longitudinal studies are needed.

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Abbreviations: IOM, Institute of Medicine; TV, television; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children; WHO, World Health Organization; BMI, body mass index; IBQ-R, Infant Behavior Questionnaire-Revised Very Short Form.

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Introduction

Rates of childhood overweight and obesity have stabilized and even declined for certain age groups over the past decade (Ogden, Carroll, Kit, & Flegal, 2014). Despite these promising trends, the prevalence of overweight and obesity remains well above national health targets (U.S. Department of Health and Human Services: Office of Disease Prevention and Health Promotion; U.S. Department of Health and Human Services: Office of Disease Prevention and Health Promotion) as 32% of youth are either overweight or obese, and 17% are obese (Ogden et al., 2014). Additionally, over 7% of infants are classified as having a high weight-for-recumbent length (Ogden et al., 2014). Overweight and obesity track across the life-course (Baird et al., 2005), and infancy, in particular, has been highlighted as a critical period for determining later chronic disease risk (Institute of Medicine, 2011). These data suggest that evidence-based obesity prevention strategies are still relevant and should be focused on during the first few years of life.

One of the earliest postnatal risk factors is rapid weight gain during infancy (Druet et al., 2012), which is a strong predictor of later obesity (Dennison, Edmunds, Stratton, & Pruzek, 2006); higher blood pressure, fasting glucose levels, and fasting triglyceride concentrations and lower high density lipoprotein (HDL) cholesterol levels (Ekelund et al., 2007); higher waist circumference (Sacco, de Castro, Euclides, Souza, & Rondo, 2013), and non-alcoholic fatty liver disease (Breij, Kerkhof, & Hokken-Koelega, 2014). Given that infants are primarily dependent on their caregivers, and most often their mothers (Demaris, Mahoney, & Pargament, 2013; Nystrom & Ohrling, 2004), to determine when, where, what, and sometimes even how much, will be consumed, consideration of mother–infant interactions and the impact of mothers' feeding practices on infant feeding and weight status outcomes is a logical starting point for understanding predictors of rapid weight gain during infancy.

A recent Institute of Medicine (IOM) report outlines several recommendations for reducing risk for rapid weight gain during infancy, one of which encourages measures to help caregivers recognize and feed in response to infant hunger and fullness cues, especially during bottle-feeding (Institute of Medicine, 2011). Indeed, previous studies have suggested that mothers with lower responsiveness to infant cues have infants with greater weight gain across infancy (Blissett & Farrow, 2007; Farrow & Blissett, 2006; Farrow & Blissett, 2008; Worobey, Lopez, & Hoffman, 2009), but few studies have examined predictors of low maternal responsiveness (Brown & Lee, 2011) or have directly assessed the impact of mothers' lack of responsiveness on infant intake and weight gain trajectories (DiSantis, Hodges, Johnson, & Fisher, 2011). Thus, our current understanding of how to promote responsive feeding practices during infant-feeding interactions is limited.

Although there may be many reasons for why a mother would feed in a way that is not responsive to an infant's cues (Brown & Lee, 2013; Brown, Raynor, & Lee, 2011; Stifter, Anzman-Frasca, Birch, & Voegtline, 2011), one reason that, to our knowledge, has not been explored is the possibility that maternal distraction, or the tendency of the mother to pay attention to stimuli other than her infant during feeding interactions, impairs mothers' abilities to recognize and feed in response to infants' hunger and fullness cues. A substantial body of research illustrates that older children and adults who engage in "mindless eating," or eating while distracted, tend to consume more food than those who concentrate solely on their food (Wansink, 2006). Individuals who are distracted by other tasks, computers, television, work, or driving (Wansink, 2006), tend to rely on external cues to dictate when they should stop eating (e.g., when the episode of a TV show they are watching ends), rather than on their internal cues of hunger and fullness (Wansink, Payne, & Chandon, 2007). They also tend to report feeling less satiated than non-distracted individuals after eating the same amount of food (Brunstrom & Mitchell, 2006), and thus continue to eat in the absence of hunger (McKetta & Rich, 2011; Wansink et al., 2007). As follows, it is possible that caregivers who engage in "mindless feeding," or who are distracted while feeding their infants, would be less sensitive to their infants' cues and at higher risk for overfeeding.

It is also possible, however, that certain infants would be more impacted by a lack of maternal attention during feeding than others, as previous research has highlighted several factors that increase risk for overfeeding. For example, satiety responsiveness declines with age, which may be due to learned tendencies to overeat (Birch, Fisher, & Davison, 2003; Jansen, 1998). Furthermore, infants with certain temperament characteristics, such as higher negativity (Anzman-Frasca, Stifter, & Birch, 2012; Slining, Adair, Goldman, Borja, & Bentley, 2009), surgency/extraversion [a precursor to later impulsivity (Burton et al., 2011; Rothbart, Ahadi, Hershey, & Fisher, 2001)], or lower orienting/regulation capacity [an early manifestation of poor self-regulation skills (Francis & Susman, 2009; Graziano, Calkins, & Keane, 2010; Tan & Holub, 2011; Wells et al.,

1997)], are at higher risk for rapid weight gain and later obesity, which may be due, in part, to poor self-regulatory abilities. Thus, it is possible that caregiver attention to infant feeding behaviors may be especially critical to ensure these infants do not over-feed.

The objective of the present study was to assess the association between maternal distraction during infant feeding interactions and feeding outcomes. The first aim of this study was to explore: 1) whether mothers who were distracted while feeding their infants would feed their infants more formula or milk than mothers who were not distracted, and 2) whether infant characteristics (e.g., age or temperament) would moderate the association between distraction and infant intake. The second aim of this study was to assess whether mothers who were distracted would show lower levels of sensitivity to their infants' cues compared to mothers who were not distracted.

Methods

Participants

Twenty-eight bottle-feeding mothers and their healthy, full-term infants participated in an experimental infant-feeding study [data reported elsewhere (Ventura & Golen, 2015)]. The present study is a secondary analysis of data from the control condition, which was designed to reflect a typical bottle-feeding interaction. Twenty-five of these dyads were exclusively ($n = 22$) or predominantly (>80% of feeds; $n = 3$) formula-feeding; three fed breast milk from a bottle on a regular basis. An additional infant was tested but not included in the present study because she was ill during the visit ($n = 1$). Infants were eligible if they were between 0 and 6 months of age, had the experience of feeding from a bottle, and had not yet been introduced to solid foods. Infants were excluded if they were preterm or if they had medical conditions that interfered with feeding. Mothers were eligible if they 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 with feeding. Participants were recruited through fliers posted in Women, Infant & Children (WIC) offices, libraries, coffee shops, and pediatric offices around Philadelphia. They were also recruited through an advertisement in a local parenting magazine. Mothers were compensated a total of \$95.00 for completing the study. All study procedures were approved by the Office of Regulatory Affairs at Drexel University. The parent study was registered at clinicaltrials.gov (NCT02111694).

Procedures

Upon arrival to our laboratory, infants were changed into a standard onesie. Infants' weight and length and mothers' weight and height measurements were then collected and recorded in triplicate. Infant anthropometric data were 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.

When the infant began to display hunger cues (e.g., crying, fussing, or putting his or her hand to his or her mouth) and the mother indicated she was ready to begin the feeding, a trained research assistant prepared the infant's typical formula or milk in either a 4-ounce or 8-ounce glass bottle with a low-flow nipple (Evenflo, Ohio, USA). Bottle-size and amount offered were determined by the mother's report of her infant's typical bottle size and amount consumed.

Mothers were instructed to feed their infants exactly as they would at home, and to tell the researcher when they were ready to start the feed and end the feed by stating "I would like to start the feed now," and "I would like to end the feed now." The entire

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