



Prompts to eat novel and familiar fruits and vegetables in families with 1–3 year-old children: Relationships with food acceptance and intake



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ABSTRACT

Toddlers often go through a picky eating phase, which can make it difficult to introduce new foods into the diet. A better understanding of how parents' prompts to eat fruits and vegetables are related to children's intake of these foods will help promote healthy eating habits.

60 families recorded all toddler meals over one day, plus a meal in which parents introduced a novel fruit/vegetable to the child. Videos were coded for parent and child behaviors. Parents completed a feeding style questionnaire and three 24-h dietary recalls about their children's intake.

Parents made, on average, 48 prompts for their children to eat more during the main meals in a typical day, mostly of the neutral type. Authoritarian parents made the most prompts, and used pressure the most often. In the novel food situation, it took an average of 2.5 prompts before the child tasted the new food. The most immediately successful prompt for regular meals across food types was modeling. There was a trend for using another food as a reward to work less well than a neutral prompt for encouraging children to try a novel fruit or vegetable.

More frequent prompts to eat fruits and vegetables during typical meals were associated with higher overall intake of these food groups. More prompts for children to try a novel vegetable was associated with higher overall vegetable intake, but this pattern was not seen for fruits, suggesting that vegetable variety may be more strongly associated with intake. Children who ate the most vegetables had parents who used more "reasoning" prompts, which may have become an internalized motivation to eat these foods, but this needs to be tested explicitly using longer-term longitudinal studies.

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1. Introduction

Young children are known for being picky eaters, which can result in refusing to eat particular types of foods or being afraid of trying new foods (Birch, 1998; Dovey, Staples, Gibson, & Halford, 2008). This can have a particularly large impact on their intake of fruits and vegetables (Carruth & Skinner, 2000), which provide essential nutrients. Although this food fussiness tends to be a phase that resolves on its own (Cardona Cano et al., 2015), many children exhibit at least some instances of food refusal in early childhood and parents often have difficulty during this time to find ways to introduce new foods into their children's diet. In infants, repeated exposures to a novel food has been shown to be an effective way of

increasing familiarity and acceptance (e.g., Mennella & Trabulsi, 2012). This method can also be successful in older toddlers and preschoolers (e.g., Anzman-Frasca, Savage, Marini, Fisher, & Birch, 2012; Caton et al., 2013), but older children may be more resistant to tasting new (or even familiar) foods (e.g., Ahern, Caton, Blundell, & Hetherington, 2014; Hausner, Olsen, & Møller, 2012; O'Connell, Henderson, Luedicke, & Schwartz, 2012) and toddlers are better able to refuse foods, both verbally and physically, than are infants. Little is known about the best ways to convince toddlers to eat healthy foods or to taste new foods.

Parents play an important role in the development of their children's eating behavior. Parents provide the food, transmit their attitudes and beliefs about food and eating behavior, and serve as role models (Birch & Fisher, 1998; van der Horst et al., 2007; Patrick & Nicklas, 2005; Savage, Fisher, & Birch, 2007; Ventura & Birch, 2008). Feeding style refers to an overall pattern of parenting in the domain of feeding. The construct of feeding style is meant to

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describe normal variations in parenting, and the most common way (but definitions vary, see: [Blissett, 2011](#)) of classifying these styles is using two important dimensions: parental responsiveness or warmth and parental demandingness or control ([Darling & Steinberg, 1993](#); [Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005](#); [Maccoby & Martin, 1983](#)). Research on parenting in the feeding domain is emerging quickly and gives some indications that an authoritative feeding style, which is characterized by setting reasonable rules for the child's intake while being sensitive to the needs of the child, is associated with healthier diets and weight status in children and adolescents ([Blissett, 2011](#); [Patrick, Nicklas, Hughes, & Morales, 2005](#); [Shloim, Edelson, Martin, & Hetherington, 2015](#); [Vollmer & Mobley, 2013](#)).

While *feeding style* refers to this overall parenting pattern, *feeding practices* are specific behavioral strategies parents use to control what, how much, or when their child eats, such as pressure to eat, restricting foods, or making foods available in the home. The broad category of “pressure to eat” is often addressed as a single construct in the literature, but in fact comprises a range of specific behaviors, from insisting that a child finish all of the food on his plate to gentler encouragements for children to eat their vegetables first. As a whole, “pressure to eat” has been associated with negative outcomes such as picky eating ([Faith, Scanlon, Birch, Francis, & Sherry, 2004](#); [Galloway, Fiorito, Francis, & Birch, 2006](#)), but recent studies are beginning to show that some prompts to eat that involve less negative affect and coercive “pressure” may have different outcomes. For example, one study that focused specifically on “stimulation of healthy intake” using a subset of items from a “pressure to eat” scale found a longitudinal association with healthier BMI ([Gubbels et al., 2011](#)). These differences in definition and scope of terms like “pressure to eat” may explain the ambiguous findings in the literature with respect to the relationship with child weight status ([Gubbels et al., 2011](#); [Jansen et al., 2014](#); [Shloim et al., 2015](#); [Webber, Cooke, Hill, & Wardle, 2010](#)). Other feeding practices may show similarly nuanced differences in outcomes. For example, using one food as a reward for eating another has been associated in the long-term with a decreased liking of the target food ([Ventura & Birch, 2008](#)), whereas using a non-food reward such as a sticker or praise may encourage consumption without creating this negative association ([Cooke, Chambers, Añez, Croker, et al., 2011](#); [Cooke, Chambers, Añez, & Wardle, 2011](#)). In the current study, we will use the more generic term “prompts to eat” to refer to this broader range of ways that parents can try to convince their children to eat more ([Orrell-Valente et al., 2007](#)). Whether it is beneficial or not to encourage the child to eat more depends on the dietary quality of the foods offered. In the current study, we will focus on fruits and vegetables as these are often foods that parents have difficulty convincing their children to eat or try for the first time. By exploring several different types of prompts to eat, we will be able to disentangle which have the most positive outcomes with respect to the child's immediate consumption of the target (encouraged) food and their general intake of fruits and vegetables.

The previous literature on feeding practices and child outcomes has a few significant limitations ([Shloim et al., 2015](#)). Studies of feeding practices in families with infants and toddlers have tended to favor questionnaire-based assessments (e.g., [Clark, Goyder, Bissell, Blank, & Peters, 2007](#); [Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008](#); [Johannsen, Johannsen, & Specker, 2006](#); [Powers, Chamberlin, van Schaick, Sherman, & Whitaker, 2006](#); [Vereecken, Rovner, & Maes, 2010](#)). A recent review identified 71 different questionnaire or interview instruments of variable length and quality that can be used to measure feeding behavior ([Vaughn, Tabak, Bryant, & Ward, 2013](#)). Questionnaires can be valuable in assessing parenting and feeding styles as they allow respondents to share information about their general approach and attitudes

toward parenting, but the questionnaire format may be limited in measuring parents' use of specific feeding practices. In this case, behavioral observation may provide a more accurate measure and allow more objective comparisons between participants. Previous studies have shown differences between parents' reported behaviors and those observed by researchers during a meal ([Bergmeier, Skouteris, & Hetherington, 2015](#); [Lewis & Worobey, 2011](#); [Moens, Braet, & Soetens, 2007](#); [Sacco, Bentley, Carby-Shields, Borja, & Goldman, 2007](#)). There are several possible explanations for this lack of consistency between behaviors as observed and those reported in a questionnaire. First, parents may not be aware of all of their behaviors, may not be able to identify the behaviors as written in the questionnaire ([Jain, Sherman, Chamberlin, & Whitaker, 2004](#)), or may underestimate their frequency. Secondly, questionnaire responses may show a social desirability bias, with parents hesitant to report using certain practices, or answering with what they *would like* to do. Although some researchers have attempted to adjust for parents' social desirability tendency, this has not been very successful thus far (e.g., [O'Connor et al., 2010](#)). In addition to its objectivity, behavioral coding also has the advantage of capturing patterns that would be missed using a checklist-style questionnaire as it is possible to identify the order of the behaviors, including how the parents responded to the child's actions and vice versa.

Overall, there have been relatively few studies that used behavioral observations of feeding practices in toddler populations (e.g., [Hughes et al., 2011](#); [Lewis & Worobey, 2011](#); [Mitchell, Piazza-Waggoner, Modi, & Janicke, 2009](#); [Sanders, Turner, Wall, Waugh, & Tully, 1997](#)), and of these, many were focused on clinical populations (e.g., children with asthma, cystic fibrosis), and tended to use broad measures such as the amount of positive communication. However, one study found that indulgent parents made fewer demands for their children to eat, as well as using less intrusiveness and negative affect during dinner ([Hughes et al., 2011](#)). Another found that immigrant parents with low levels of demandingness (indulgent and uninvolved) were less likely to have regular family meals ([Tovar et al., 2013](#)).

Three studies have explored the use of prompts to eat in somewhat older children. A study by [Orrell-Valente et al. \(2007\)](#) described which prompts to eat parents of five-year-olds used most often in a mealtime setting, but did not evaluate which of these techniques was associated with the child's intake of the target foods. Two other studies of preschool children ([Iannotti, O'Brien, & Spillman, 1994](#); [Lumeng & Burke, 2006](#)) have explored the effectiveness of prompts to eat, one in a controlled lab setting and one in the home. In the study by [Lumeng and Burke \(2006\)](#), mothers of 3–6 year-olds presented familiar and unfamiliar foods to their children and the authors counted the number of physical prompts to eat, verbal prompts, and offers of food, as well as whether the child complied within the following 5 s. They found that mothers made more prompts to eat when offering a novel food than a familiar one, and that younger, less educated mothers made more prompts to eat. Children were more compliant with maternal prompts to eat if the children were older, the food was familiar, or the mother was obese. However, the food items used as stimuli in the Lumeng and Burke study were savory and sweet snacks (potato chips, Terra chips, Twinkies, and Chinese moon cakes), and the study was conducted in a laboratory setting, so it would be difficult to generalize the findings to prompts to eat fruits and vegetables in a more natural home environment. In the study by [Iannotti et al. \(1994\)](#), families of 2–5 year-old children were observed in the home to explore the influences of parent and peer encouragements and discouragements of eating and physical activity. The results simply indicated which prompts to eat were more often successful or failures, identifying maternal commands, actions, and rationales to be more successful, whereas “firm commands using negative

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