

# Characteristics Associated With Adding Cereal Into the Bottle Among Immigrant Mother–Infant Dyads of Low Socioeconomic Status and Hispanic Ethnicity

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## ABSTRACT

**Objective:** Determine maternal and infant characteristics associated with adding cereal into the bottle.

**Design:** Secondary data analysis.

**Participants:** Study participants were immigrant, low-income, urban mother–infant dyads ( $n = 216$ ; 91% Hispanic, 19% US-born) enrolled in a randomized controlled trial entitled the Bellevue Project for Early Language, Literacy and Education Success.

**Main Outcome Measures:** Maternal characteristics (age, marital status, ethnicity, primary language, country of origin, education, work status, income, depressive symptoms, and concern about infant's future weight) and infant characteristics (gender, first born, and difficult temperament).

**Analysis:** Fisher exact test, chi-square test, and simultaneous multiple logistic regression of significant ( $P < .05$ ) variables identified in unadjusted analyses.

**Results:** Twenty-seven percent of mothers added cereal into the bottle. After adjusting for confounding variables identified in bivariate analyses, mothers who were single ( $P = .02$ ), had moderate to severe depressive symptoms ( $P = .01$ ) and perceived their infant had a difficult temperament ( $P = .03$ ) were more likely to add cereal into the bottle. Conversely, mothers who expressed concern about their infants becoming overweight were less likely to add cereal ( $P = .02$ ).

**Conclusions and Implications:** Health care providers should screen for adding cereal in infant bottles. Further research is needed to investigate the impact of adding cereal into the bottle on weight trajectories over time. Causal associations also need to be identified to effectively prevent this practice.

**Key Words:** feeding, cereal in the bottle, infant, Hispanic, low-income, responsive feeding (*J Nutr Educ Behav.* 2016; ■:1-8.)

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## INTRODUCTION

The American Academy of Pediatrics/  
Bright Futures and the US Department

of Agriculture (USDA) recommended waiting until after age 4–6 months to start solid foods and specifically advise against adding cereal to infant bot-

ties.<sup>1,2</sup> These recommendations were supported by research suggesting that such practices may be associated with increased caloric intake and impaired self-regulation of hunger and satiety, which could increase the risk of early excess weight gain and subsequent child obesity.<sup>3-5</sup>

Despite these recommendations, few studies evaluated adding cereal into the bottle as a practice distinct from introduction to solid foods, even within many of the large national surveys of infant feeding practices.<sup>6,7</sup> The studies that did examine this practice specifically found that adding cereal into the bottle was common in low-income groups.<sup>8-10</sup> Studies using both surveys and focus groups to assess reasons for adding

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cereal into the bottle found that mothers reported using this practice to help infants sleep or stay full longer, or to help their infant gain weight.<sup>8-15</sup>

Obesity-promoting feeding behaviors associated with excess infant weight include nonresponsive controlling feeding styles such as restrictive and pressuring feeding practices.<sup>11-19</sup> Studies of these and other commonly reported obesity-promoting feeding behaviors previously identified socio-demographic characteristics, maternal psychosocial stressors, maternal concern about infant weight, and negative perceptions of their infant's temperament as risk factors for these practices.<sup>7-11,14-22</sup> However, no studies have explored associations between these maternal and infant characteristics and adding cereal into infant bottles. Better understanding of the characteristics associated with adding cereal into the bottle would be particularly important for low socioeconomic status (SES), immigrant status, and Hispanic families at high risk for excess weight gain during infancy and early childhood obesity.<sup>21</sup>

Therefore, this study sought to determine whether maternal and infant characteristics associated with obesogenic feeding practices more broadly would be associated with the specific practice of adding cereal into the bottle in a sample of primarily low-SES, immigrant, and Hispanic mother–infant dyads. The primary study hypothesis was that 4 types of maternal and infant characteristics would be associated with adding cereal into the bottle during the first 6 months of life, including: (1) socio-demographic characteristics such as young maternal age and single parenthood, (2) maternal psychosocial stress such as maternal depression, (3) maternal concerns about future infant weight, and (4) perceived difficult infant temperament (Figure).

## METHODS

### Study Design

The study consisted of a secondary analysis of data collected at baseline and 6-month follow-up of mother–infant dyads in a larger longitudinal study (Bellevue Project for Early Language, Literacy and Education Success [BELLE]).<sup>23</sup> The BELLE is a longitudinal,

randomized, clinical trial evaluating primary care–based interventions designed to enhance child development by promoting interactive parenting skills during shared reading, play, and daily routines. Enrollment in the BELLE project took place from November, 2005 through October, 2008. This analysis included a subset of families with babies born between November, 2005 and April, 2007 for whom information about cereal in the bottle was also collected.

### Study Sample

Eligible mother–infant dyads were enrolled consecutively into BELLE in the postpartum ward at Bellevue Hospital Center, an urban public hospital in New York City. As previously described, inclusion criteria for the larger study were intention to receive pediatric primary care at Bellevue Hospital Center for at least 3 years, English or Spanish as the primary language, uncomplicated full-term delivery, no early intervention eligibility, mother as the primary caregiver, ability to contact the mother, mother's age  $\geq 18$  years, and no significant maternal medical problems.<sup>18</sup> For the current analysis, an additional criterion for inclusion was that the mother was not exclusively breastfeeding, because such mothers would be less likely to feed their infant using a bottle.

The researchers obtained informed written consent before study participation. The New York University School of Medicine Institutional Review Board, the Bellevue Hospital Center Research Committee, and the New York City Health and Hospitals Corporation granted approval to conduct human subject research.

### Study Variables and Assessments

Data were collected through an interview conducted by a bilingual research assistant at baseline (after study enrollment during the postpartum period) and when the infant was approximately age 6 months. All research assistants were trained before conducting baseline and follow-up evaluations to minimize interviewer bias. Interviews were conducted in Spanish or English, according to participant preference. All survey items were

read aloud with study participants to maximize validity of obtained data from caregivers with low education and/or literacy.

*Dependent variable.* The dependent variable was cereal in the bottle, as determined by maternal response to questions from the Infant Feeding Questionnaire at 6-month follow-up<sup>19</sup>: (1) Did you put infant cereal in the bottle so he would sleep longer at night? (2) Did you put infant cereal in the bottle so he would stay full longer? These questions assess the frequency with which cereal was added to bottles for the most common nonmedical reasons identified in literature.<sup>8,9,13</sup>

For each of these questions, possible responses were: never, rarely, sometimes, often, or always. In the analyses that follow, mothers were considered to have put cereal in the bottle if they ever did so, as indicated by an answer other than never for either question.

*Independent variables.* Independent variables consisted of maternal and infant characteristics hypothesized to be associated with cereal in the bottle. Characteristics assessed included socio-demographics, maternal depressive symptoms as an exemplar of psychosocial stressors, maternal concerns about their infant's future weight, and perceived difficult infant temperament.

*Socio-demographic characteristics.* Maternal and family socio-demographics were measured at baseline and included maternal age, marital status, SES, ethnicity, primary language spoken in the home, country of origin, education, and work status. Maternal age ranged from 18 to 42 years (median age, 26.8 years; mean age (SD), 27.7 [5.3] years) and was dichotomized as  $<21$  vs  $\geq 21$  years. Maternal age was dichotomized at age 21 years because adolescent mothers under age 18 years were excluded from this sample, and into previous studies young maternal age was associated with adding cereal into the bottle.<sup>8,9,12</sup> Marital status was dichotomized as single vs married or living with a partner. The researchers assessed socioeconomic status using the Hollingshead 4-Factor Index, based on education and

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