

Research and Professional Briefs

Associations of Infant Feeding Practices and Picky Eating Behaviors of Preschool Children

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ABSTRACT

Picky eating behaviors are prevalent during childhood and are often linked to nutritional problems. However, information on the determinants of picky eating behaviors during infancy, when food acceptance patterns develop, is scarce. This study was conducted to evaluate the impact of infant feeding practices on the development of picky eating behaviors during preschool years. Baseline survey data from the Synergistic Theory and Research on Obesity and Nutrition Group Kids (STRONG Kids) program were used for this retrospective data analysis. Primary caregiver-child dyads were recruited from child-care centers in Eastern Illinois between February and July of 2009. A total of 129 self-reported responses from mothers of preschool-aged children were analyzed. Logistic regression was used to evaluate the association between infant feeding practices and picky eating behaviors. Children who were introduced to complementary foods before 6 months of age had 2.5 times higher odds of developing food neophobia and limited variety of foods (95% confidence interval [CI]: 1.01 to 5.93 and 1.06 to 5.73, respectively). Children who were breastfed exclu-

sively for 6 months had lower odds of developing a preference for specific food-preparation methods by 78% (95% CI: 19% to 94%), food rejection by 81% (95% CI: 31% to 94%), and food neophobia by 75% (95% CI: 11% to 93%). Breastfeeding and introduction of complementary foods after 6 months of age reduced the odds of picky eating during early childhood. This study documents an association between infant-feeding practices and the development of picky eating behaviors in early childhood.

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According to a US nationally representative study in 2002, 50% of 19- to 24-month-old children are classified as picky eaters (1). Picky eaters are characterized as consistently being unwilling to try new foods or having strong opinions on food preferences, preparation methods, and choice of food groups (2,3). Previous studies reported picky eaters had a limited dietary variety, especially in micronutrient-rich foods, such as fruits, vegetables, and meats (1-6). These behaviors could be unfavorable for a child's growth (7). Children described as picky eaters or as having an eating problem gain less weight during the first 2 years of life, with 11.1% of these children failing to thrive (8). Moreover, unhealthy eating habits during early childhood may be persistent throughout childhood and result in an increased risk of health problems later in life (3,9-13).

Several studies about children's food acceptance have reported that food preference is the most consistent determining factor of food acceptance (14-18). Food preference is developed not only from genetically determined predispositions, but can also be modified by experiences, such as repeated exposures, feeding context, and social and physiological consequences (14-24). The first few years of life are recognized as a critical period for the development of food-acceptance patterns (25-27). Some studies suggested that prenatal and postnatal exposures to flavors through amniotic fluid and breast milk might influence food acceptance (22,28). Yet there are conflicting reports on the relationship between breastfeeding practices and picky eating behaviors (29-31). Recent studies reported a trend that early exposure to fruits and vegetables during infancy may promote higher consumption in later childhood (5,31). However, it is not clear whether an early introduction of complementary foods would also have a positive influence because the timing of the introduction of complementary foods is associated with the developmental readiness of the infant (32).

The American Academy of Pediatrics (AAP) advocates 6 months of exclusive breastfeeding and delaying the introduction of complementary foods until 6 months of

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age (33). According to the National Immunization Survey among children born in 2006, the rate of breastfeeding initiation was 73.9% and 43.4% of infants were still breastfed at 6 months (34). Rates of exclusive breastfeeding, however, were only 33.1% and 13.6% at 3 and 6 months, respectively. The Infant Feeding Practices Survey II revealed that 18.3% of infants in the United States consumed cereal at 3 months and 71.2% at 5 months (35). There is a gap between infant-feeding guidelines and current practices. This study was performed to investigate the association between infant-feeding practices and picky eating behaviors in preschool-aged children. It is hypothesized that compliance to the current infant-feeding guidelines of the AAP could have a positive influence on dietary variety and food acceptance in children 2 to 3 years of age.

METHODS

Participants

This study used the baseline data from cohort 1a of the Synergistic Theory and Research on Obesity and Nutrition Group Kids (STRONG Kids) program conducted at the University of Illinois at Urbana-Champaign. This project is an interdisciplinary research program that follows preschool children for 3 years to identify multiple factors relating to childhood obesity and health behaviors. To recruit study participants in cohort 1a, licensed child-care centers within a 65-mile radius of Champaign, IL, were contacted, and 30 of the 33 eligible child-care centers participated in the study. A cross-sectional baseline study was conducted between February and July 2009. Primary caregivers of children aged 2 to 3 years old who were enrolled in the participating child-care centers were recruited and completed a self-administered survey ($n=242$). All procedures in this study protocol were approved by the Institutional Review Board at the University of Illinois Urbana-Champaign. All participants provided written informed consent.

Measurement

Variables for Picky Eating. Based on the various aspects of picky eating behavior (29,36-38), picky eating behavior was considered to be a complex term that reflects several different dimensions. It is characterized by two attributes: consuming small amounts of food and having a limited variety of foods (limited variety). This study focused on limited variety, which was assessed using both direct and indirect variables. The indirect variables include unwillingness to try new food (food neophobia), rejection of specific food groups, such as fruits, vegetables, meats, and fish (food rejection), and preference for specific food-preparation methods. Mothers were asked to rate the frequency of each eating behavior using a 5-point response scale, with the anchor phrases of 1: "never," 3: "sometimes," and 5: "always." Survey questions were selected from the Oregon Research Institute Child Eating Behavior Inventory (39), which is an item pool addressing child eating behavior, to measure the four picky eating variables:

1. Food neophobia, with the reverse-described question of "Does your child accept new foods readily?"

2. Food rejection, with the four questions of "Does your child refuse fruit?", "Does your child refuse vegetables?", "Does your child refuse meats?", and "Does your child refuse fish?"
3. Preference for specific food-preparation methods, with the question of "Will he/she eat favorite foods only if they are prepared in a specific way?"
4. For the direct measurement of limited variety, mothers were asked how frequently they perceived their children to have a limited variety of foods through the question of "Does your child eat a limited variety of foods?"

Infant Feeding Practices

Mothers were asked to report the age at which each of the following foods were introduced to their children during the first 2 years of life: breast milk, formula, cow milk, soy milk, other milks, baby cereal, pureed baby food, fruit juice, soft drinks, and chopped or regular table foods. The intensity and duration of breastfeeding and the timing of the introduction of complementary foods were considered as major domains of infant feeding practices. Multiple binary variables (yes/no) of these feeding practices were created according to the corresponding AAP guidelines (33). These feeding practices included breastfeeding initiation, any breastfeeding (for 6 months), exclusive breastfeeding (for 3 months and for 6 months), and early introduction of any complementary foods except formula (before 6 months or before 4 months).

Confounders

The baseline data included participants' sociodemographic information. Common sociodemographic characteristics, as well as the known confounding characteristics (30), were controlled to account for the association between picky eating behaviors and infant feeding practices. These included the mother's characteristics such as age, sex, race, or ethnicity (non-Hispanic White, the others including Hispanic, non-Hispanic Black, non-Hispanic Asian, and having two or more races/ethnicities), marital status (married, not married), education level (12th grade or less, some college or technical school, college graduate, postgraduate work), and employment status (employed or student, stay at home); household characteristics such as household income level ($\leq \$24,999$; $\$25,000$ to $\$39,999$; $\$40,000$ to $\$69,000$; $\$70,000$ to $\$99,999$; $\geq \$100,000$); and the child's characteristics, including age, sex, and race or ethnicity (non-Hispanic White, the others including Hispanic, non-Hispanic Black, non-Hispanic Asian, and having two or more races/ethnicities).

Statistical Analyses

The risks of picky eating behaviors according to infant feeding practices were estimated. The other results were reported as numbers and proportions for categorical variables and means and standard deviations for numeric variables. The logistic regression model was used for multivariate analysis to control for potential confounding variables. For this analysis, each frequency response of the outcome variable was transformed to binary variable

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