



## Perceptions of food intake and weight status among parents of picky eating infants and toddlers in China: A cross-sectional study



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### ABSTRACT

**Background:** Previous studies have suggested that children that are picky eaters may have a different and less varied diet than non-picky children, but the literature on picky eating in Chinese children is limited. **Objectives:** To assess the prevalence of picky eating in 6–35 month-old Chinese children, and to explore how parents' perceptions of picky eating relate to children's intake and body composition.

**Methods:** 1414 6–35 month-old infants and toddlers from 8 Chinese cities were included in this study. Questionnaires were used to collect information on family demographic factors, child picky eating behaviors, food group rejection, and parents' perception of child weight status. Dietary intake data was collected via 24-h recall. Children's length/height and weight were measured.

**Results:** The reported prevalence of picky eating was higher in 24–35 month-olds (36% of children) compared to 6–11 month-olds (12%). There were no consistent significant differences in dietary intakes of nutrients between picky and non-picky eaters. Picky eating children whose parents indicated that they avoided eggs or fruit had lower intakes of these food groups compared to non-picky eaters, whereas those reported to avoid meat had higher meat intakes. Weight status was underestimated by parents of both picky and non-picky children.

**Conclusions:** Picky eating seems to occur at similar prevalence rates in China as has been reported in other countries. Parents' perceptions of food refusal do not reflect actual intakes, nor do nutrient intakes of picky eaters show additional gaps compared to non-picky eating children. In healthy children with typical growth patterns, picky eating seems to be a normal phase of development experienced by some children, without substantial consequences on their nutrient or food group intakes.

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## 1. Introduction

Adequate intake of energy and nutrients is essential for healthy child development. In general, the diets of Chinese infants and toddlers are adequate for most nutrients (e.g., using a latent profile approach: Chen, Denney, Zheng, Vinyes-Pares, Reidy, et al., 2015).

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However, risks of inadequate intakes have been reported for fat, vitamin B6, and folate, with excessive intakes of sodium and vitamin A in 6–35 month-old Chinese children (Chen et al., 2015).

The quality of a child's diet can be influenced by the introduction of complementary foods and children's eating behaviors (Blissett, 2011; Haire-Joshu, Brownson, Nanne, Houston, Steger-May, Schechtman, et al., 2003; Zhao & Xu, 2012). Picky eating, or fussy eating, occurs when a child consumes a limited variety of foods and frequently refuses both familiar and novel foods (Dovey, Staples, Gibson, & Halford, 2008). It is a relatively common issue which parents can be perceived to be problematic. Studies suggest that picky children may have a different diet from non-picky children, consuming a narrower, less-balanced variety of foods, including fewer vegetables than do non-picky eating children (Carruth, Skinner, Houck, Moran, Coletta, & Ott, 1998; Jacobi, Agras, Bryson, & Hammer, 2003). Only a few studies have explored differences in nutrient intakes between picky and non-picky eating children (for a review, see Taylor, Wernimont, Northstone, & Emmett, 2015). Although in some studies, picky children have been found to consume lower amounts of nutrients such as vitamin C, thiamin, riboflavin, niacin and dietary fiber, these amounts were not inadequate, nor were picky eaters more likely to have inadequate intakes compared to non-picky eating children (Carruth, Ziegler, Gordon, & Barr, 2004; Galloway, Fiorito, Lee, & Birch, 2005). In 3–7 year-old Chinese children, picky eaters' mean intakes of protein, iron, and zinc were found to be lower than in non-picky eaters, but above the recommended nutrient intakes (Xue, Zhao, Cai, Yang, Szeto, Ma et al., 2015). Dietary fiber intake was low in both groups, but significantly lower in picky eaters (6.8 g vs. 7.6 g/day). There have been no publications, to date, on nutrient intakes in younger Chinese picky eaters.

Most of the studies exploring the prevalence of picky eating behaviors have been conducted outside of Asia (e.g., Carruth, Ziegler, Gordon, Barr, 2004; Galloway et al., 2005; Taylor et al., 2015; van der Horst, Deming, Lesniauskas, Carr, & Reidy, 2016). Picky eating prevalence rates reported in US and European studies cover a wide range, depending on the timing and method of assessment. Mascola, Bryson, and Agras (2010) found that 39% of children were identified as picky eaters at some point over a longitudinal study from ages 2–11, but only 13–22% were ever identified as picky at a given time point. Other studies have estimated higher prevalence rates of more than 35% (Carruth & Skinner, 2000; Carruth et al., 1998), although some studies with more stringent definitions such as persistence of picky eating (Cardona Cano, Tiemeier, Van Hoeken, Tharner, Jaddoe, Hofman, et al., 2015) or using several subscales of the Child Eating Behavior Questionnaire (e.g., using a latent profile approach: Tharner et al., 2014) show lower prevalence rates. The literature on the prevalence of picky eating in Asian children, and more specifically in Chinese children, is limited. A cross-sectional study in Singapore found that half of the 1–10 year-old participants were picky (Goh & Jacob, 2012), and studies exploring picky eating in 1–7 year old Chinese children reported prevalence rates ranging from 17% to 54% (Jin Xing-ming, Rong, & Adair, 2009; Y. Li, Shi, Wan, Hotta, & Ushijima, 2001; Zhang Hong-mei, 2011); the wide variation in the prevalence rates might be due to the different methods used to assess picky eating behavior. Similar to studies in Europe and the US, picky eaters in China were reported to consume less vegetables and fish; however, unlike in other countries, Chinese picky eaters also ate less grains (Xue, Lee, Ning, Zheng, Ma, Gao, et al., 2015).

In addition to food intake, the child's weight can also be a cause for parental concern. The existing literature exploring the relationship between pickiness and underweight has produced inconsistent results (Antonioni et al., 2015; C. L.; Brown, Schaaf, Cohen, Irby, & Skelton, 2016; Carruth & Skinner, 2000; de Barse

et al., 2015; Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007; Galloway et al., 2005; Orun, Erdil, Cetinkaya, Tufan, & Yalcin, 2012; Xue, Lee, et al., 2015). Many of these studies have relied on parent report to assess picky eating, but no studies to date have explored whether parents of picky eaters are able to report their children's food intake and weight status reliably.

The purpose of this study was to explore the relationship between parents' perception of picky eating and children's food intake and weight status in a sample of Chinese infants and toddlers. Three sets of analyses will be described in the current study to explore whether parents of picky eaters have a reliable perception of their children's intake and weight. First, nutrient intakes will be compared between picky and non-picky Chinese infants and toddlers. Second, perceived food group rejection of picky eaters will be compared to actual food group intake compared to non-picky eaters. Finally, perceived weight status will be compared to actual weight status for both picky and non-picky eaters.

As previous studies using single-item assessments of picky eating tend to report high prevalence rates (e.g., Carruth et al., 2004; Goh & Jacob, 2012), we hypothesized that many children would be identified as picky eaters, with few differences between the picky and non-picky group for dietary intake or weight. We expected that children whose parents reported that they avoided a certain food group would consume smaller quantities of that food group than non-picky eaters. Finally, we expected that all parents would tend to underestimate child weight.

## 2. Material and methods

### 2.1. Subjects

This study was embedded into the Maternal Infant Nutrition and Growth (MING) study. The MING study is a cross-sectional study designed to investigate the dietary and nutritional status of pregnant women, lactating mothers, and young children aged from birth up to three years living in urban areas of China, conducted between 2011 and 2012. Eight cities were chosen for the study, distributed across geographical regions (north, central, and south). The eight cities include a range of different socio-economic levels and population sizes, including four first tier cities (Beijing, Shanghai, Chengdu, and Guangzhou) and 4 s-tier cities (Shenyang, Lanzhou, Zhengzhou, and Suzhou). In each city, infants and toddlers from birth to 35 months old were recruited from two service centers of maternal and child care (SCMCC): one in an urban area and one in a suburban area (N = 2631). Details of the design have been described in previous papers about the MING Study (Chen et al., 2015; Wang et al., 2015). Only children aged 6–35 months who had received complementary foods were included in the current study (n = 1414). Of these, 439 (31.0%) were infants aged 6–11 months, 485 (34.3%) were toddlers aged 12–23 months, and 490 (34.7%) were aged 24–35 months.

### 2.2. Measurements

All information collected from the study was obtained through face-to-face interviews with the children's caregivers conducted in SCMCCs. The interview included a general questionnaire, including child's date of birth, gender, ethnicity, parent-reported birth weight and birth length, parents' education level, per capita family income, child picky eating behaviors, and parent concerns about the child's weight. Anthropometrics (child weight and height) and a dietary intake assessment through a single 24-h dietary recall were also collected. All interviewers were trained with a standard protocol.

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