



Does child temperament modify the overweight risk associated with parent feeding behaviors and child eating behaviors?: An exploratory study

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ABSTRACT

Background: Child temperament is a measure of an individual's behavioral tendencies. The primary objective of this study was to examine whether child temperament modified the overweight risk associated with parent feeding behaviors and child eating behaviors.

Methods: A sample of predominantly African American, Midwest families (N = 120) recruited from four metropolitan primary care clinics participated in this cross-sectional, mixed methods study. Parents reported on feeding practices, child eating behaviors, and child temperament.

Results: Difficult temperament was not statistically related to parent feeding practices or child eating behaviors ($p > 0.05$). Tests of interaction indicated that the risk of child overweight differed by difficult temperament and easy temperament for two child eating behaviors (emotional eating and food fussiness, $p < 0.05$). For example, the effect of food fussiness decreased the risk of overweight for difficult temperament children but increased overweight risk for easy temperament children. Further, the effect of emotional eating increased the risk of overweight for difficult temperament children but decreased overweight risk for easy temperament children.

Conclusions: Tailoring parent-level interventions to child temperament or promoting environments that trigger less reactive individual responses may be effective in lowering risk of child overweight.

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1. Background

The prevalence of child overweight and obesity continues to be a global public health issue and a topic of concern for prevention and treatment (Lobstein, Baur & Uauy, 2004). In the United States, over thirty percent of school-age children are estimated to be overweight and almost a quarter of those are obese (Lobstein et al., 2004; Neumark-Sztainer, Story, Hannan, Perry & Irving, 2002). Efforts to affect child obesity rates are needed to reduce obesity prevalence into adulthood, (Agras, Hammer, McNicholas & Kraemer, 2004; Anzman-Frasca, Stifter & Birch, 2012) and information about how individuals respond to triggers in their environment may be useful in the design and implementation of

childhood obesity interventions (Anzman-Frasca, Stifter, Paul & Birch, 2014).

Child temperament represents predispositions to behave in certain ways given certain eliciting contexts (Anzman-Frasca et al., 2012) and is described as biologically based individual differences in behavioral and emotional responses to the environment (Rothbart, 2007). Temperament comprises both reactivity, which is the intensity and duration of an individual's behavioral or emotional response, and regulation, which is the individual's ability to modulate a response (Rothbart, 1988). Two temperament components, negative reactivity and low emotional regulation, characterize difficult temperament and have been associated with childhood obesity (Agras et al., 2004; Anzman-Frasca et al., 2012; Brummett et al., 2006; Carey, Hegvik & McDevitte, 1988; Chapman, Fiscella, Duberstein, Kawachi & Coletta, 2009; Sutin, Ferrucci, Zonderman & Terracciano, 2011). A better understanding of how temperament is expressed in the food environment may improve

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our ability to act on obesogenic risk behaviors in childhood.

Previous studies focusing on interpersonal determinants of child overweight have shown that parent feeding practices (e.g., restriction and pressure-to-eat) and child eating behaviors (e.g., food fussiness and emotional eating) are associated with weight status (Birch & Fisher, 2000; Birch, Fisher & Davison, 2003; Loth, MacLehose, Fulkerson, Crow & Neumark-Sztainer, 2013; Loth, MacLehose, Fulkerson, Crow & Neumark-Sztainer, 2014; Wardle, Sanderson, Guthrie, Rapoport & Plomin, 2002). Little information, however, is available about whether child temperament modifies the overweight risk associated with parent feeding practices and child eating behaviors. For example, one recent study has proposed that temperament may modify the child overweight risk associated with parent emotional feeding (e.g., soothing) (Anzman-Frasca et al., 2012). Parents who use this feeding practice with difficult temperament children may inadvertently promote more emotional eating behaviors than would occur with children who have easy temperament. As a result, children with difficult temperament may subsequently develop eating behaviors that are responsive to emotional triggers rather than to hunger and satiety cues. Information about these pathways would be useful for clinicians if child temperament were found to interact with parent feeding and child eating behaviors that affect obesity risk (Agras et al., 2004; Farrow, Galloway & Fraser, 2009; Haycraft, Farrow, Meyer, Powell & Blissett, 2011; Ventura & Birch, 2008).

Other research related to parent feeding practices indicates that controlling feeding practices may interfere with the natural development of child eating behaviors (Horn, Galloway, Webb & Gagnon, 2011). Although parents may manage caloric intake with controlling feeding practices, food restriction may have an unintended effect of promoting eating when children are not hungry (Horn et al., 2011). Other studies suggest that controlling feeding practices may promote healthy eating behaviors (Rhee et al., 2010). More work is needed to understand the specific pathways by which temperament affects weight status and examining these pathways is of practical importance for intervention design (Anzman-Frasca et al., 2012; Anzman-Frasca et al., 2014).

The objective of this paper is to (1) evaluate whether child temperament is related to child overweight, (2) examine whether child eating behaviors differ according to temperament, and (3) investigate if parents use similar feeding practices with difficult and easy temperament children. The primary aim of this study is to perform an exploratory analysis (4) to explore whether child temperament modifies the child overweight risk associated with parent feeding practices and with child eating behaviors. Results from this study may provide new information about obesity risk factors modifiable in childhood and could potentially inform the development of future preventive interventions, particularly with respect to parent feeding practices.

2. Methods

2.1. Study design

The Family Meals LIVE! study (FML) is a two-year, mixed-methods, cross-sectional study designed to identify key risk and protective factors for childhood obesity in the home food environment (Berge et al., 2014). FML recruited children (N = 120) ages 6–12 years and their families from four primary care clinics primarily serving diverse and low-income families in the Minneapolis/St. Paul metropolitan area between 2012 and 2013. Recruitment was stratified by child weight status defined as (a) nonoverweight: >5th body mass index (BMI) percentile < 85th BMI percentile, and (b) overweight/obese: \geq 85th percentile (Berge et al., 2015; Fulkerson, Neumark-Sztainer, Hannan & Story, 2008). BMI

percentiles were calculated using CDC guidelines (Centers for Disease Control and Prevention, 2000)

Families participated in two home visits, two weeks apart. Data collected at home visits included anthropometric data on all family members, child 24-h dietary recalls, a home food inventory, parent qualitative interview, and child and parent surveys. In between home visits, participants were provided an iPad and asked to video-record eight days of family dinner meals.

Heights and weights were taken in the first home visit by trained researchers following standardized procedures (Lohman, Roche & Martorell, 1988). Feeding practices and child eating behaviors were assessed by a quantitative survey, which was completed by the primary caregiver at the second home visit. The survey was developed for FML and was guided by Family Systems Theory. It used standardized measures identified by in-depth literature reviews and by examining other pre-existing validated instruments and surveys. The research team and other experts in the fields of family relations and nutrition reviewed the survey to ensure content validity. Comprehensive study procedures have been previously documented (Berge et al., 2014).

2.2. Measures

Temperament was operationalized based on nine questions drawn from the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) to assess individual reactivity and self-regulation in children. Component items were reverse coded where appropriate to reflect a difficult temperament scale. Items were selected to characterize low self-regulation and negative reactivity. Parents rated their children on a scale of “(1) Not true, (2) Somewhat true, and (3) Certainly true.” The temperament scale measure was constructed as an average across the nine temperament trait questions (min/max: 1–3), and tests of internal consistency indicate good reliability of the measure (α :0.80). Children receiving an average score of two or higher on the scale measure were categorized as having a difficult temperament. All other children receiving a mean score below two were placed in the referent category representing easy temperament.

Subscales were created to represent the average scale response for parent feeding practices (restriction α : 0.84, pressure to eat α : 0.68, and monitoring α : 0.89), parent feeding style (encouragement, α : 0.76) and child eating behaviors (emotional eating α : 0.72, food responsiveness α : 0.68, and food fussiness α : 0.63) and were assessed using items drawn from previously validated scales, including the Child Feeding Questionnaire (CFQ), Parent Feeding Style Questionnaire (PFSQ), and the Child Eating Behavior Questionnaire (CEBQ) (Birch et al., 2001; Carnell & Wardle, 2007; Wardle, Guthrie, Sanderson & Rapoport, 2001). Scale representations were evaluated as indicator categorized “high” and “low” at the median value for the interaction analysis.

Height was assessed to the nearest 0.1 cm using a stadiometer and weight to the nearest 0.1 kg using a calibrated scale. To ensure inter-rater reliability, both measures were taken twice, and agreement of less than 1 cm for height and 0.5 kg for weight was required. Body mass index (BMI) percentiles were calculated using CDC guidelines (Centers for Disease Control and Prevention, 2000)

2.3. Statistical analysis

Generalized linear models were used to assess the relationship between explanatory variables and dichotomous child overweight status. All analyses are adjusted for child sex, child gender, and parent race status. Binomial variance family and identity links were used to produce risk difference estimates for dichotomous outcomes. For ordinal outcomes, Gaussian variance family and identity

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