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Sibling Feeding Behavior: Mothers as Role Models During Mealtimes

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Abstract

Siblings may act as caregivers and role models during mealtimes, and develop caregiving skills by observing and imitating the behavior of their mothers. The objective of this study was to examine the association between maternal feeding behaviors and encouragements to eat delivered from the sibling to the index child during mealtimes. Index children aged 4–8 years ($n = 69$) were videotaped while eating a routine evening meal at home with one sibling present. Encouragements to eat delivered from the sibling to the index child were coded from the videotapes. Mothers completed the Child Feeding Questionnaire and the Caregiver's Feeding Styles Questionnaire. Poisson regression was used to examine the association of maternal Pressure to Eat, Restriction, Monitoring, Verbal Direction, and Coercion with number of encouragements to eat delivered from the sibling to the index child. Models were adjusted for index child's age, sex, and race/ethnicity, and maternal education. Results showed that maternal Pressure to Eat (Rate Ratio (RR): 1.39, 95% confidence interval (CI): 1.19, 1.69), Restriction (RR: 1.31, 95% CI: 1.07, 1.60), Verbal Direction (RR: 2.04, 95% CI: 1.68, 2.47), and Coercion (RR: 1.58, 95% CI: 1.29, 1.92) were each positively

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Conflicts of Interest

No conflict of interest was declared.

associated with the number of encouragements to eat delivered from the sibling to the index child. Maternal Monitoring was not associated with the number of encouragements to eat delivered from the sibling to the index child (RR: 0.92, 97% CI: 0.78, 1.09). Findings suggest that maternal behavior during mealtimes may affect the index child indirectly by shaping the behavior of siblings. Since controlling feeding behaviors have been associated with greater child obesity risk, future studies may evaluate the compounded effect of experiencing controlling feeding behaviors from both mothers and siblings.

Keywords

Feeding behavior; Siblings; Mothers; Videotape recording; Meals

Introduction

The family mealtime environment is considered an important venue for examining underlying causes of childhood obesity. Maternal feeding practices during mealtimes, such as restriction and pressure to eat, have been associated with child eating behaviors and obesity risk (Faith, Scanlon, Birch, Francis, & Sherry, 2004; Moens, Braet, & Soetens, 2007; Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). One pathway by which controlling feeding behaviors may be associated with obesity risk is the child's self-regulation of energy intake; excessive maternal control may alter the child's ability to respond to internal satiety cues, leading to overeating and weight gain (Birch & Fisher, 1998; Drucker, Hammer, Agras, & Bryson, 1999; Fisher & Birch, 1999; Fisher & Birch, 2002; Johnson & Birch, 1994).

In addition to the direct implications of maternal behavior for child behavior and weight status, maternal behavior can have indirect effects by shaping the behavior of other family members who may influence the child's behavioral development (e.g., mother-child interactions may predict sibling aggression and sibling caregiving behavior towards the child) (Howe, Fiorentino, & Gariépy, 2003; Zukow-Goldring, 2008). Siblings are family members who are likely to influence the child's behavioral development. Specifically, siblings may act as caregivers and role models (Dunn, 1983; Harrist et al., 2014). In the context of mealtimes, siblings may contribute to pressuring the child to eat by delivering many of the encouragements to eat during the meal (Mosli et al., 2015a).

Since siblings develop caregiving skills by observing and imitating their mothers (Zukow-Goldring, 2008), the way that mothers interact with children may shape caregiving behaviors of siblings during mealtimes. For example, if pressuring the child to eat is a behavior in which mothers frequently engage in during mealtimes, siblings may imitate this behavior and also pressure the child to eat. A previous report found that parental mealtime presence is associated with child obesity risk (Jacobs & Fiese, 2007), but no prior study has examined how specific maternal behaviors may relate to sibling behavior towards the child during mealtimes. Specifically, it is unknown whether controlling feeding behaviors by mothers, such as pressure to eat, have indirect implications by affecting siblings' caregiving behaviors, such as encouraging the child to eat. Establishing these associations can inform

the design of novel obesity intervention and prevention strategies that account for the co-occurring influence of maternal behavior during mealtimes. The goal of this study was to test the hypothesis that maternal feeding behaviors that are highly controlling are associated with more encouragements to eat delivered from sibling to child during mealtimes.

Methods

Participants and Procedures

The study sample included 301 index children and their mothers. Participants were recruited from Head Start facilities in South Central Michigan. Head Start is a federally subsidized preschool program for low-income, high-risk families residing in the United States (US). Participants were drawn from a longitudinal cohort initiated in 2009 to investigate associations between stress and eating behavior among low-income children. Index children ranged in age from 4 to 8 years at the time of data collection. Inclusion criteria included that the caregiver was fluent in English and did not have a college degree; and child was born at 35 weeks gestation without significant perinatal or neonatal complications, was not in foster care, and had no serious medical problems or history of food allergies. For this analysis we only considered children who were living with their biological mothers, who were living with only one sibling who was at least two years old (age of included siblings therefore ranged from 2 to 16), and who had complete data on all variables (n=86). Mothers provided written informed consent for themselves and for their children. The University of Michigan Institutional Review Board approved this study.

During two study visits, mothers completed interviewer-administered questionnaires that assessed demographic characteristics and maternal feeding behaviors. At home, each family completed three family mealtime observations; mothers were loaned a camera and instructed to videotape three routine dinner meals for the index child within a single week. These videos followed standard procedures, and mothers were asked to set up the camera so that the child's torso, plate, and drink were always in view (Goulding et al., 2014). Research assistants collected information regarding individuals present by calling the mothers after each meal.

Because mothers were instructed to videotape the index child as he/she normally ate at dinnertime, some of the videos included only the index child eating alone while others included the index child eating with his/her sibling and/or with parents and other family members. For this analysis, we selected only the videotapes on which the sibling was present during dinnertime regardless of the presence of parents. We did not include videotapes on which children other than the index child and sibling were also present. We systematically selected one of the three videos for each index child. First, we assessed the second video for each index child because we expected families to be more acclimated to the camera by the second home observation, and we were also able to maximize our sample size. If the second video did not meet the selection criteria (based on individuals present during the meal), we then assessed the third video; if the third video did not meet the selection criteria, we assessed the first video. A final sample of 69 index children was identified, 7 from the first video, 51 from the second video, and 11 from the third video. The

analytic sample included in this analysis ($n = 69$) did not differ from the sample not included ($n = 232$) with regard to index child sex, age or race/ethnicity, or maternal education.

Measures

Primary Outcome: Encouragements to Eat Delivered by Sibling to Index Child

—We evaluated the sibling's behavior during the meal by developing a coding scheme based on Bob and Tom's Method of Assessing Nutrition (BATMAN)(Klesges et al., 1983). The BATMAN is an observational assessment used to evaluate mealtime behaviors, such as encouraging the child to eat (Klesges et al., 1983). We defined verbal encouragements to eat as suggesting, demanding, directing, making positive statements about food, and offering food (Mosli et al., 2015a). We did not observe restrictive or physical feeding behaviors to occur with meaningful frequency between siblings. Therefore, we focused our coding scheme on verbal encouragements to eat. Encouragements to eat delivered by the sibling and directed to the index child were coded in 5-minute intervals from the videos (e.g., a 20-minute long video has 4 intervals). Ten percent of the videos were double coded. Inter-rater reliability by intraclass correlation coefficient exceeded 0.80. Number of encouragements was summed across intervals to create the variable “total encouragements delivered by sibling to index child”.

Primary Predictors: Maternal Feeding Behaviors—To assess maternal feeding behaviors, mothers completed the Child Feeding Questionnaire (CFQ) and the Caregiver's Feeding Styles Questionnaire (CFSQ). The CFQ is a valid and reliable 31-item questionnaire, with 5-point Likert response scales ranging from 1 to 5 (Birch et al., 2001; Kaur et al., 2006). The CFQ assesses parents' beliefs, attitudes and practices regarding child feeding (Birch et al., 2001). Variables generated from the CFQ that are included in this analysis are: Pressure to Eat (4 items, Cronbach's $\alpha = 0.62$), Restriction (8 items, Cronbach's $\alpha = 0.75$), and Monitoring (3 items, Cronbach's $\alpha = 0.86$). Scores were calculated as the mean of contributing items, with higher scores reflecting more of the given behavior. The Caregiver's Feeding Styles Questionnaire (CFSQ) is a valid and reliable 19-item questionnaire, specifically developed to assess feeding styles among low-income families (Hughes, Power, & Fisher, 2005). The CFSQ has 5-point Likert response scales ranging from 1 = never to 5 = always. For the purposes of the current study, we sought to examine specific feeding behaviors that may be associated with sibling behavior. Thus, we conducted a factor analysis that generated 2 subscales reflecting specific dimensions of maternal feeding behavior: Verbal Direction and Coercion. Scores were calculated as the mean of contributing items, with higher scores reflecting more of the given behavior. The Verbal Direction score consisted of 4 items (Cronbach's $\alpha = 0.74$) concerning how often mothers verbally suggest or command the child to eat. The Coercion score consisted of 5 items (Cronbach's $\alpha = 0.82$) concerning how often mothers use threats, bribes, and food as a reward in order to get the child to eat.

Covariates—Additional characteristics for adjusted analysis were identified a priori from the literature. Mothers reported the index child's age, sex, and race/ethnicity (dichotomized into non-Hispanic white vs. Hispanic or not white) as well as maternal years of education (dichotomized as less than or equal to a high school education vs. more than high school

education). Each of these variables has been previously associated with sibling-child interactions (Cicirelli, 1995; Dunn, 1983) and maternal feeding behaviors (Blissett, Meyer, & Haycraft., 2006; Hughes et al., 2005; Mosli et al., 2015b).

Statistical Analysis

We conducted statistical analyses using IBM SPSS Statistics 21.0 (Armonk, NY, USA). First, we conducted descriptive statistics to assess sample characteristics. Then, in order to examine the association between maternal feeding behaviors and the number of encouragements to eat delivered by the sibling to the index child we used Poisson regression. To account for variations in length of the meal, which might influence the number of encouragements to eat delivered by the sibling to the index child, we set the number of meal intervals as the offset variable. We ran separate regression models for each of the 5 primary predictors: Pressure to Eat, Restriction, Monitoring, Verbal Direction, and Coercion unadjusted and adjusted for the index child's age, sex, and race/ethnicity, and maternal education.

Results

Mean index child age was 5.4 years (\pm SD 0.8). About half of the index children were male (52.2%) and approximately 60% were non-Hispanic white (Table 1). As shown in Table 2, each unit increase in maternal Pressure to Eat was associated with a 39% increase in the number of encouragements to eat delivered by the sibling to the index child (Rate ratio (RR): 1.39, 95% confidence interval (CI): 1.19, 1.66), adjusting for covariates. Each unit increase in maternal Restriction was associated with an 31% increase in the number of encouragements to eat delivered by the sibling to the index child (RR: 1.31, 95% CI: 1.07, 1.60). The association between maternal Monitoring and the number of encouragements to eat delivered by the sibling to the index child diminished and became non-significant after adjusting for covariates (RR: 0.92, 97% CI: 0.78, 1.09). Each unit increase in maternal Verbal Direction was associated with an 104% increase in the number of encouragements to eat delivered by the sibling to the index child (RR: 2.04, 95% CI: 1.68, 2.47). Finally, Each unit increase in maternal Coercion was associated with a 58% increase in the number of encouragements to eat delivered by the sibling to the index child (RR: 1.58, 95% CI: 1.29, 1.92).

Discussion

Findings from this study support our hypothesis that maternal feeding behaviors that are highly controlling are associated with more encouragements to eat delivered from the sibling to the index child during mealtimes. Our study is the first to report an association between specific maternal feeding behaviors and encouragements to eat from the sibling during mealtimes. Although we did not find maternal monitoring to be associated with sibling behavior, we observed associations with salient feeding behaviors that may be more apparent to the sibling. Indeed, maternal monitoring was previously defined as “assessing the extent to which parents oversee their child's eating (e.g., How much do you keep track of high fat foods that your child eats)” (Birch et al., 2001). Therefore, maternal monitoring may

not involve prominent verbal interactions with the child during mealtime that the sibling is able to observe and imitate.

Results from this study are consistent with prior work showing significant associations between the mother's behavior and the behavior of other family members during mealtimes. Maternal feeding behavior has been associated with the child's own eating behavior (Birch & Fisher, 1998; Fisher & Birch, 2002), as well as paternal feeding behavior (Blissett et al., 2006). Our findings further highlight the role of mothers in shaping mealtime behaviors by showing a positive association with sibling behavior. Since siblings develop their caregiving skills by observing and imitating the behavior of their mothers (Zukow-Goldring, 2008), our study suggests that maternal use of controlling feeding behaviors, such as restriction and pressure to eat, might lead children to use similar behaviors when interacting with their siblings.

Although some suggest that restricting food or pressuring the child to eat may be a reaction to the child's weight status (Powers, Chamberlin, Schaick, Sherman, & Whitaker, 2006; Webber, Cooke, Hill, & Wardle, 2010), others have found that controlling feeding behaviors may lead to increased risk of child overweight and obesity (Birch & Fisher, 1998; Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008; Klesges et al., 1983). One underlying mechanism is the child's self-regulation of energy intake, such that children become less responsive to satiety cues when they experience overly controlling feeding behaviors (Fisher & Birch, 1999; Fisher & L. Birch, 2002; Johnson & Birch, 1994). Future studies are needed in order to examine the compounded effect of experiencing controlling feeding behaviors from both mothers and siblings. Furthermore, research that considers the effect of including both mothers and siblings in interventions involving mealtime recommendations may be beneficial.

Strengths of this study include our use of an observational assessment of sibling behavior during a naturalistic mealtime. Limitations include the small sample size, which might have affected our ability to detect statistically significant associations, and to control for potential confounders and intermediate variables. In addition, the cross-sectional design of our study limits our ability to infer causality. Finally, our study only included low-income families recruited from Head Start, and thus our findings may not be generalizable to families without these characteristics.

Conclusion

Maternal use of controlling feeding behaviors was positively associated with the number of encouragements to eat delivered by the sibling to the index child. The mother's behavior during mealtimes may therefore affect the child indirectly by shaping the behavior of other family members. Future studies are needed to further explore these associations. Since including multiple members of the family in obesity intervention programs has shown promising results (Kaplan, Arnold, Irby, Boles, & Skelton, 2013), taking into account the caregiving role of siblings during mealtimes may be beneficial.

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RM designed the study, conducted the analysis, and drafted the initial manuscript. JL provided input on the analysis plan. JL and AM designed the data collection instruments, coordinated and supervised data collection, and critically reviewed the manuscript. KP critically reviewed the manuscript. This study was supported by NIH grant 5R01HD06135.

Abbreviations

US	United States
BATMAN	Bob and Tom's Method of Assessing Nutrition
CFQ	Child Feeding Questionnaire
CFSQ	Caregiver's Feeding Styles Questionnaire
RR	Rate ratio
CI	Confidence interval

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Table 1

* Sample Characteristics

Variable	Total n=69
Index Child's Age, M (SD)	5.35 (0.80)
Index Child's Sex, n (%)	
Male	36.0 (52.2)
Female	33.0 (47.8)
Index Child's Race/Ethnicity, n (%)	
Non Hispanic white	41.0 (59.4)
Hispanic or not white	28.0 (40.6)
Maternal Education, n (%)	
High School Education	30.0 (43.5)
> High School Education	39.0 (56.5)
Sibling's Age, M (SD)	6.38 (3.44)
Sibling's Sex, n (%)	
Male	34.0 (49.3)
Female	35.0 (50.7)
Total encouragements delivered by sibling to index child, M(SD)	2.86 (4.01)
Maternal Feeding Behaviors, M(SD)	
Pressure to Eat	2.67 (1.12)
Restriction	3.30 (0.97)
Monitoring	4.06 (1.05)
Verbal Direction	2.75 (0.85)
Coercion	2.07 (0.81)

* Table shows means (M) and standard deviations (SD) or counts (n) and percentages (%).

Table 2

Associations of Maternal Feeding Behaviors with Total Encouragements Delivered by Sibling to Index Child (n=69)

	Unadjusted Rate Ratios (95% CI)	Rate Ratios (95% CI) ^I
Pressure to Eat	1.28 (1.12, 1.47) **	1.39 (1.19, 1.66) **
Restriction	1.18 (1.01, 1.50) *	1.31 (1.07, 1.60) **
Monitoring	1.21 (1.02, 1.43) **	0.92 (0.78, 1.09)
Verbal Direction	2.35 (1.93, 2.85) **	2.04 (1.68, 2.47) **
Coercion	1.71 (1.39, 2.11) **	1.58 (1.29, 1.92) **

^I Poisson regression models adjusted for potential confounders including index child's age, sex, and race/ethnicity, and maternal education.

* $p < 0.05$

** $p < 0.01$