

Running title: SIBLING EATING BEHAVIOURS

Sibling Eating Behaviours and  
Differential Child Feeding Practices Reported by Parents

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### Abstract

The purpose of this study was to investigate the intra-familial relationships between parental reports of feeding practices used with siblings in the same family, and to evaluate whether differences in feeding practices are related to differences in siblings' eating behaviours. Eighty parents of two sibling children completed measures assessing their feeding practices and child eating behaviours. Parents reported using greater restrictive feeding practices with children who were fussier and desired to drink more than their sibling. Parents reported using more pressure to eat with siblings who were slower to eat, fussier, emotionally under-ate, enjoyed food less, were less responsive to food and more responsive to internal satiety cues. Restriction and pressure to eat appear to be part of the non-shared environment which sibling children experience differently. These feeding practices may be used differently for children in the same family in response to child eating behaviours or other specific characteristics.

Keywords: sibling, child, eating, restriction, pressure, fussiness

### Sibling Eating Behaviours and Differential Child Feeding Practices Reported by Parents

Parents and caregivers have an important influence upon their children's eating, and the use of excessive control around feeding and food has been associated with children's food preferences and weight (Ventura & Birch, 2008). Though most research in this area has been cross-sectional, making it difficult to discern causation, controlling feeding practices have been linked with a reduced preference for food that is pressured or forced, and an increased preference for food that is withheld or restricted (Fisher & Birch, 1999; Fisher, Mitchell, Smiciklas-Wright & Birch, 2002). Longitudinal research has shown that these feeding practices can also predict children's weight gain and weight loss (Farrow & Blissett, 2006; Farrow & Blissett, 2008), with parental pressure to eat at age 5 predicting lower child Body Mass Index (BMI) scores at age 7, and parental use of restrictive feeding practices at 5 years predicting greater child BMI at age 7 after controlling for the child's weight at age 3 (Faith et al., 2004). In theory, parental use of controlling feeding practices impacts child weight and eating behaviour by desensitising children to their internal cues of satiety, making them less able to self-regulate their intake of food (for a review, see Faith et al., 2004).

It is important to understand the factors that lead parents to use these counterproductive strategies when feeding their children. Research suggests that parents may report using controlling feeding practices in response to characteristics of each sibling: parents have been shown to report using more pressure to eat with children who weigh less (Brann & Skinner, 2005; Francis, Hofer & Birch, 2001), or who are more negative at mealtimes (Blissett & Farrow, 2007) and to use more restriction and monitoring when they are concerned about their children overeating or

being overweight (Musher-Eizenman, Holub, Hauser & Young, 2007; Tiggemann & Lowes, 2002). Research also suggests that parental use of controlling feeding practices may result from characteristics of the parent which are independent of the child. Parents who use more controlling feeding practices have been shown to report using a more authoritarian parenting style in general (Hughes, Power, Fisher, Mueller & Nicklas, 2005), suggesting that the use of control during feeding may be part of a broader method of parenting. Moreover, social, cultural and personality factors have been shown to predict feeding practices (e.g., Duke, Bryson, Hammer & Agras, 2004; Taveras et al., 2004).

It is most likely that controlling feeding practices result from an interaction between parent and child characteristics. This bi-directional approach to understanding eating behaviour is an integral part of Ecological Systems Theory (EST) (Davison & Birch, 2001). EST explains development as a web of interactions between an individual and the environment. An important aspect of the theory is that the individual and various components of their environment continually influence one another. This interaction complicates studies that attempt to elucidate risk factors for the use of parental control. Generally, research assessing the factors that predict feeding practices have used designs focused on one child per family, therefore not accounting for within-family factors that may influence parental feeding practices or genetic-environmental interactions (Faith, 2005; Ventura & Birch, 2008).

Twin and sibling designs can help us to understand these differences by reducing the variability of environmental factors such as food availability, ethnicity, socioeconomic status, and parental weight in order to reveal the extent to which feeding practices reflect general parenting or are a response to child characteristics. In one study that focused on sibling pairs discordant for obesity, researchers reported

more between-family variability in maternal control than within-family variability, suggesting that mothers' use of control during feeding is not as strongly influenced by differences between the weights of sibling children (Saelens, Ernst, & Epstein, 2000). In addition, in another study using twin pairs comparing obese and non-obese mothers Wardle, Sanderson, Guthrie, Rapoport, & Plomin (2002) found that there were almost no significant relationships between child BMI and maternal feeding styles, suggesting that feeding styles neither cause or are in response to child weight.

Other research however suggests that parents do adapt their use of control when feeding their children when there may be reason to be more or less concerned about one sibling's eating. For example, O'Neill, Shultz, Stallings, & Stettler (2005) found that mothers report using higher levels of restrictive feeding practices with a child who has Down syndrome compared to their sibling who does not, and that this relationship is accounted for by the heavier weight of the child with Downs syndrome. Furthermore, in a recent sibling pilot study, Keller, Pietrobelli, Johnson, & Faith (2006) found that certain types of parent-reported beliefs and practices assessed using the Child Feeding Questionnaire (CFQ) showed significant familial correlations (perceived responsibility, perceived child overweight and monitoring) whilst parental reports of using other feeding practices related to differences in sibling weight (pressure to eat, restriction, and concern about child weight), indicating that parents report modifying these feeding practices according to differences in their children's weights.

Keller et al. (2006) found that parents reported significantly greater concern for child weight and less pressure to eat for their heavier child, and that they tended to restrict the eating of their heavier child more, suggesting that concern, pressure, and restriction form part of the non-shared environment. Parents may not only report

adapting their feeding practices for siblings in response to their weight, they may also make comparisons between siblings and be responsive to differences in the siblings' eating habits. It is possible that parents may express more concern about one of the siblings if he or she is a fussier eater compared to his or her sibling, whilst parents may use more pressure with one child in the family who eats less, and restrictive feeding practices with a child who eats more.

The aim of this study is to extend the pilot study of Keller et al. (2006) using a larger sample to establish intra-familial correlations of parent-reported feeding practices with sibling children. A further aim of this study is to establish whether differential feeding practices are related to differences in siblings' feeding problems. Previous research has suggested that parents report using more controlling feeding practices when they have specific feeding difficulties with their children (Blissett & Farrow, 2007), however research has not yet evaluated how parental control may be related to feeding problems that are different amongst sibling children.

Using Keller et al.'s (2006) findings as a basis for the current research, it was hypothesised that within-family correlations for perceived feeding responsibility, perceived child weight and monitoring would show relatively greater effects sizes compared to concern for child weight, pressure and restriction, variables that may be more influenced child characteristics. It was also hypothesised that parents would report more concern about weight and would use more restriction with children who had feeding problems linked to over-eating. It was hypothesised that parents would report using more pressure to eat with children who were fussier eaters or had feeding problems relating to under-eating.

## Methods

### Participants

In total 80 parents of at least two sibling (N=160) children took part in this study. A screening question in the questionnaire asked parents 'Have either of your children ever been hospitalised, if so please give details'. Data sets were excluded where parents answered *yes* to this question and reported the reason for hospitalisation to be food or eating related (e.g., Celiac Disease). Participation was not restricted according to parent or child weight.

#### Procedure

500 questionnaires were distributed to parents of children aged 3 – 6 years through schools and nurseries located in the central region of England. Each pack contained a detailed information sheet, consent form, questionnaire and pre-paid envelope to return the questionnaire confidentially to the researcher. Parents were invited to complete the questionnaire if they had two or more children: the child at the target school/ nursery (aged 3- 6 years) and a sibling no more than three years in age apart to minimise the effects of age upon child eating. Where parents had more than two children in this age range they were asked to answer the questions for the child who gave them the questionnaire and the nearest sibling in age to that child. Eighty-eight parents originally responded, of whom 8 did so concerning an infant (aged  $\leq 1$  year). These 8 were excluded from the study as the questionnaires used have not been validated for use with infants, and the feeding problems presented during infancy, such as the transition to eating solid foods, are unique. This left a final sample size of 80 families (78 mothers, 2 fathers<sup>1</sup>) yielding a response rate of 18%, however it is not possible to know how many parents disregarded the questionnaires because they had 1 child, or their child's sibling(s) were not within the specified age range. Ethical permission for this study was granted from the University Psychology Research

Ethics Committee and all ethical guidelines concerning the use of human volunteers were followed during this research.

#### Measures

Each questionnaire pack contained a demographics questionnaire in which parents reported the siblings' genders, birth dates, weights, and heights. Parents were asked to indicate the siblings' weights and heights only if they had accurate scores and not to guess or estimate measures. Children's weights and heights were converted into BMI z scores using the Child Growth Foundation Package (1996) which standardizes child BMI according to exact child age and gender based on U.K. norms developed by Freeman et al. (1995) and Cole (1995). Parents also described their age, occupation, ethnicity, their history of education and self reported their height and weight which was converted into BMI scores (weight in kg / height in meters<sup>2</sup>).

Parents then completed the following measures twice (once for each child):

The Child Feeding Questionnaire (CFQ: Birch et al., 2001) was used to assess parents' reports of risk factors and concerns about child feeding which are measured by perceived feeding responsibility, perceived child overweight and concerns about child overweight. It was also used to assess parental attitudes and practices towards child food intake including parental use of pressure to eat, restriction over the child's eating/ food intake, and monitoring of child eating. The CFQ is scored using a Likert scale from 1-5 with higher scores indicating greater levels of the particular construct. The CFQ is widely used to assess parental control over child feeding (Carper, Fisher, & Birch, 2000; Fisher et al., 2002), and these subscales have good internal consistency, with Cronbach's alpha levels ranging from  $\alpha = .70 - .92$  (Birch et al., 2001). In the present study the mean Cronbach's alpha for measures concerning child A was .75, and for child B was .74.



The Child Eating Behaviour Questionnaire (CEBQ: Wardle, Guthrie, Sanderson & Rapoport, 2001) is a reliable and valid 35 item questionnaire that assesses parental perceptions of their child's eating. The questionnaire has eight subscales which assess the following: child food responsiveness (always wanting to eat), emotional over-eating (eating when worried, annoyed, anxious, happy or bored), enjoyment of food (enjoyment and interest in food and eating), desire to drink (wanting to drink continuously throughout the day), satiety responsiveness (has small appetite, gets full easily), slowness in eating (eating slowly, e.g. taking more than 30 minutes to finish a meal), emotional under-eating (eating less when upset, tired and angry) and food fussiness (eats a limited variety of foods and refusal of new foods). Caregivers are required to rate the frequency with which their child exhibits a range of behaviours on a scale from never (0) to always (5). The CEBQ is internally valid ( $\alpha = .72 - .91$ ) and has good test-retest reliability (Carnell & Wardle, 2007; Wardle et al., 2001). In the present study the mean Cronbach's alpha for child A was .74, and for child B was .79.

#### Statistical analysis

Independent sample t-tests indicated that there were significant age differences between the target child and the sibling for whom parents responded, with one sibling generally being older:  $F(154) = 46.67, p < .01$ . Given this to attempt to eliminate any effects of age, children within each family were assigned to be child A or child B in the dataset according to their age; in 50% of cases the younger child was assigned to be child A and the older child was assigned to be child B, the reverse method was used in the remaining cases. Using an alpha of  $p < .01$  to reduce the risk of Type 1 errors, a series of independent sample t-tests indicated that there were no significant gender differences across the sample in parents' reports of feeding practices, child

eating problems, or reported child BMI z scores. Therefore, the sample was collapsed and gender was not controlled for in further analyses.

A power calculation using Cohen's (1992) criteria indicated that a sample size of 85 participants would yield statistical power of more than .80 (based on  $\alpha = .05$ ) to detect medium directional correlational effects. Given this the sample was considered sufficiently powered. Descriptive statistics were first calculated on the measures obtained, then, using the procedure described by Keller et al. (2006) the familial correlation of parent-reported feeding practices were estimated using intraclass correlation coefficients. As parents only reported height and weight data for 28 pairs of siblings across the whole sample, child BMI data was excluded from further analysis. Next, for each sibling pair within-family difference scores were calculated for parentally reported feeding practices and child feeding problems by subtracting scores for child B from scores for child A to reflect the degree of variation for siblings in the same families. Finally, difference scores for sibling feeding problems were correlated with difference scores on the CFQ to assess whether parents reported using higher levels of controlling feeding practices with siblings with different feeding problems in the same family.

## Results

### Descriptive Statistics

The mean age of the participants was 35 years ( $SD = 4.95$ , range 22 - 49 years), 74 parents described themselves as White and 6 as non-White (2 Asian, 2 Indian, 1 Chinese, 1 other non-specified). The mean number of years that participants had spent in education after age 16 was 3.25 years ( $SD = 2.87$ ). Using the Standard Occupation Classification (Office of National Statistics, 2000), 78 parents reported their occupation or previous occupation prior to motherhood and 2 mothers reported

that they had never been employed. The modal occupation for the sample was category 2 (professional occupations) comprising 30% of the sample, however participants were from a wide range of occupational backgrounds ranging from category 1 (2.5%, managers and senior officials) to category 9 (7.5%, elementary occupations). Mean parental BMI was 24.41 ( $SD = 4.41$ ) corresponding to 'normal' weight. In total there were 79 boys and 78 girls (gender missing for 3 children) whom parents completed questionnaires about. There were 22 pairs of siblings where both children were boys, 22 pairs where both siblings were girls, and 34 pairs of children comprised of one boy and one girl (gender data missing from 2 pairs). The mean age of the children across the study was 5.62 years ( $SD = 1.98$ ) and the mean BMI-z score was .04 ( $SD=1.40$ , range = 7.6). Table 1 presents the descriptive statistics for the questionnaires completed by the caregivers.

Mean scores for the CFQ and CEBQ are similar to other means published from other U.K. based samples (Blissett, Meyer, & Haycraft, 2006; Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002). Independent sample t-tests indicated that there were no significant differences in parental feeding styles or child eating behaviours for families where child height and weight data were provided compared to those where it was not provided. From the descriptive statistics, mean child BMI z scores are close to 0 reflecting the average standardised child BMI. Paired sample t-tests indicated that there were no significant differences between Siblings A and Siblings B on measures assessed by the CFQ, CEBQ, or child BMI z scores.

#### Intraclass Correlations

A series of two-way random (absolute agreement) intraclass correlation coefficients were used to ascertain the familial correlations of parents' reports of feeding practices for their 2 children. Significant positive intraclass sibling

correlations indicate a degree of sibling resemblance, whereas negative intraclass correlations reveal sibling differences (Rovine, 1994). As Table 2 indicates there were significant familial correlations for all parental feeding concerns and practices with the exception of perceived child overweight, suggesting that parents reports significantly similar feeding practices within families.

#### Correlations of Difference Scores

Differences in sibling feeding problems were correlated with differences in parentally reported feeding practices using 2-tailed Pearson's correlations. Due to the large number of correlations being performed a multiple testing correction was used and the alpha level was reduced to .001 to reduce the risk of Type 1 errors. As Table 3 indicates; parents reported using greater levels of restrictive feeding practices with the sibling who was fussier and desired to drink more. Parents reported using more pressure to eat with their child who was slower to eat, emotionally under ate more, was fussier, and more satiety responsive in comparison to their sibling. Parents also reported using more pressure to eat with their child who enjoyed food less and was less responsive to food. There were no other significant correlations between differences in parental feeding practices and differences in siblings' eating.

#### Discussion

The aims of this study were to establish whether there are significant intrafamilial correlations for the feeding practices that parents report using with siblings in the same family, and to assess whether differences in parentally reported feeding practices are related to differences in sibling feeding problems. With the exception of perceived child overweight, there were significant intraclass correlations for all parental feeding practices and concerns measured using the Child Feeding Questionnaire, suggesting that parents report similar attitudes and using similar

practices when feeding their different children. However, differences in siblings' eating behaviours were also related to differences in parental restriction and pressure to eat; suggesting that parents may also report adapting these practices in response to differences in their children's eating. These findings suggest that parents may have general practices that they use to feed their children that they also modify in relation to child characteristics. Whilst it is also possible that these differences can be attributed to some other unmeasured factor and these results do not clarify the direction of influence between parent and child, they do provide evidence that the parent-child relationship relating to food can be different within families.

Specifically, parents reported using greater levels of restrictive feeding practices with the child who desired to drink more and who was a fussier eater in comparison to their sibling. Increases in children's consumption of energy-dense drinks have been associated with childhood obesity (Dubois, Farmer, Girard, & Peterson, 2007) and parental concern about children drinking too much may lead to greater restriction of both energy-dense drinks and other foods that are perceived to be unhealthy. Parents also reported using greater levels of restriction with children who were fussier, perhaps because they perceive fussier children to have a more limited diet and to more readily consume energy-dense foods (Harris, 1993) and it could be that parents use restriction of energy-dense foods in an attempt to encourage consumption of rejected foods. Previous research shows that restriction can lead to a preference and desire for withheld foods (Fisher & Birch, 1999) and it may be that parental use of restriction also exacerbates fussiness and a preference for the restricted foods, exemplifying the potentially cyclical nature of this relationship. These findings demonstrate that differential parental restriction is associated with differences in siblings' eating, suggesting that this feeding practice may be used in response to individual child

characteristics related to feeding as other random factors such as parental age, ethnicity, socioeconomic status and food availability are controlled for by using the sibling design.

In addition, parents reported using more pressure to eat with children who were slower to eat, emotionally under ate more, were fussier, and more responsive to their satiety than their siblings. Parents also used more pressure to eat with siblings who enjoyed food less and were less responsive to food. These findings support other research suggesting that caregivers use greater pressure to eat when they believe their children are fussy, underweight, or not eating enough (Francis et al., 2001; Galloway, Fiorito, Francis, & Birch, 2006). However this study is the first to replicate these relationships using a sibling design and to show that parents report adapting their use of pressure to eat with their children depending on their eating behaviours. Parental use of pressure can be a counterproductive activity which reduces the child's preference for foods which are pressured or forced, and increases negative behavioural affect at mealtimes (Fisher et al., 2002; Galloway, Fiorito, Lee, & Birch, 2005). Parents need to be provided with alternative solutions to respond to a child who is a fussy eater rather than using this strategy which has been shown to be ineffective and predicts food refusal and lower child BMI in longitudinal research (Faith et al., 2004; Batsell, Brown, Ansfield, & Paschall, 2002).

Based on their work Keller et al. (2006) proposed that perceived feeding responsibility, perceived child overweight and monitoring are part of the shared family environment, whereas pressure to eat, restriction, and concern about child weight are part of the non-shared environment. This study attempts to extend our understanding of how these feeding behaviours relate to the family environment by exploring how these practices differ according to differences in children's eating. The

results reported here support the suggestion that pressure to eat, restriction and perceived child weight form part of the non-shared environment as differences in pressure and restriction were related to differences in child eating, whilst perceived child weight was not significantly correlated within families. Moreover, differences in feeding responsibility, concern for child weight and monitoring were positively correlated for sibling pairs and were not related to child eating, supporting the suggestion that they are part of the shared family environment.

Although a major strength of this study is the use of a sibling design which allows for control of within family differences which are assumed to be random, this study is limited by its reliance on parental report of feeding behaviours, feeding practices, and child weight, which may be subject to a response bias. When parents report about practices used with children in one session they may be reluctant to reveal differences between the ways that they treat their children, and this may partly explain the high intraclass correlations identified here. Further observational research is needed to validate caregiver's reports of feeding practices and interactions with their children. A further limitation of this study is that parentally-reported child weight data were only provided for a subset of the sample and thus power was limited to explore relationships with child weight. In addition, although we do not know how many parents were non responders because they did not fit the inclusion criteria, the response rate does appear to be low and the sample primarily includes White middle class mothers, using a cross sectional design where cause and effect cannot be established. These limitations may compromise the data and further research is required to replicate this research in other, more representative, populations using experimenter-measured weight and height data.

Despite these limitations, these findings add to our understanding of the differences that may exist within families in parent-child feeding behaviours and provide evidence that eating behaviour develops in an ecological context that includes bi-directional relationships. Given that parents report using different levels of pressure and restriction with their children in the same family, research is needed to elucidate longitudinally what impact using different feeding practices may have upon both children's eating habits and attitudes towards food. In addition, researchers could evaluate whether the impact of controlling feeding practices is exacerbated for children who see their siblings being fed in a more or less controlling manner, and to establish the effect that this may have upon the differences between the siblings' eating habits in the longer term. Research has begun to evaluate some of these relationships with emotional eating and restrained eating in adolescent children (de Leeuw, Snoek, van Leeuwe, van Strien, & Engels, 2007) but as yet there are no findings available with younger dyads. It is also important to investigate the complex network of interactions that may influence the family dynamics of eating amongst multiple children. Although the clinical implications of this research are limited as this is a non-treatment seeking sample, a focus on the promotion of child autonomy in feeding and the consequences of controlling child feeding practices would be useful for parenting-based interventions designed to overcome child feeding concerns and problems.



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Footnote

<sup>1</sup> (Page 7) Data analysis was repeated using only mothers (i.e. excluding fathers) and the results were not significantly different from those reported here.

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Table 1

*Descriptive Statistics for the Child Feeding Questionnaire (CFQ) and the Child Eating Behaviour Questionnaire (CEBQ)*

Measure	Sibling A	Sibling A	Sibling B	Sibling B
	Mean	SD	Mean	SD
CFQ:				
Feeding responsibility	4.59	.55	4.58	.54
Concern about child weight	1.99	1.08	2.06	1.14
Perceived child overweight	2.97	.20	2.95	.36
Monitoring	4.52	.69	4.53	.68
Pressure	2.79	.83	2.83	.87
Restriction	3.10	.89	3.13	.88
CEBQ:				
Emotional over eating	1.79	.55	1.79	.57
Satiety responsiveness	2.77	.51	2.85	.68
Food fussiness	2.84	.79	2.82	.87
Emotional under eating	2.46	.77	2.43	.74
Food responsiveness	2.25	.70	2.27	.83
Slowness in eating	2.85	.70	2.88	.87
Enjoyment of food	3.77	.61	3.72	.74
Desire to drink	2.57	.86	2.56	.90

N= 80 for all descriptive statistics.

Table 2

*Intraclass Correlation Coefficients for Child Feeding Questionnaire (CFQ) Subscales**Reported by Parents for (N=80) Two Sibling Children (N = 160)*

Measure	Intraclass correlation coefficient
CFQ:	.99**
Monitoring	
Restriction	.97**
Pressure to eat	.86**
Perceived feeding responsibility	.96**
Perceived child overweight	.04
Child weight concern	.92**

**\*\*p<.01**



Table 3

*Difference Score Correlations for Child Eating Behaviours Questionnaire (CEBQ) and Child Feeding Questionnaire (CFQ); N = 80 parents, 160 children.*

Measure	DD <sup>a</sup>	EF <sup>a</sup>	SE <sup>a</sup>	FR <sup>a</sup>	EUE <sup>a</sup>	FF <sup>a</sup>	SR <sup>a</sup>	EOE <sup>a</sup>
CFQ:								
Restriction	.44*	-.24	.15	.09	.31	.53*	.28	.08
Pressure to eat	.19	-.61*	.51*	-.39*	.35*	.48*	.61*	-.11
Perceived child weight	.19	-.08	.05	.24	-.08	-.19	-.15	.13
Concern for child weight	.16	.11	.09	.20	.01	.03	-.09	.19
Monitoring	.01	.05	-.00	-.01	-.03	.07	-.02	.00
Feeding responsibility	.30	-.28	.19	-.38	.17	.27	.35	.09

\* $p \leq .001$

<sup>a</sup>CEBQ subscales; DD: Desire to drink, EF: Enjoyment of Food, SE: Slowness in Eating, FR: Food responsiveness, EUE: Emotional under eating, FF: Food fussiness, SR: Satiety responsiveness, EOE: Emotional over eating.