Perceived child eating behaviours and maternal migrant background

Maria Somaraki^a, Karin Eli^b, Kimmo Sorjonen^c, Carl-Erik Flodmark^d, Claude Marcus^e, Myles S Faith^f, Christine Persson Osowski^a, Anna Ek^e, Paulina Nowicka^{a,e*}

^a Department of Food, Nutrition and Dietetics, Uppsala University, Uppsala, Sweden

^b Unit for Biocultural Variation and Obesity, Institute of Social and Cultural Anthropology, University of Oxford, Oxford, UK

^c Division of Psychology, Department of Clinical Neuroscience, Karolinska Institutet, Solna, Sweden

^d Childhood Obesity Unit, Skåne University Hospital, Malmö, Sweden

^e Division of Pediatrics, Department of Clinical Science, Intervention and Technology, Karolinska Institutet, Stockholm, Sweden

^f Department of Counseling, School, and Educational Psychology, Graduate School of Education, University of Buffalo in New York, USA

Reference:

Somaraki, M., Eli, K., Sorjonen, K., Flodmark, C.E., Marcus, C., Faith, M.S., Osowski, C.P., Ek, A., & Nowicka, P. (2018). Perceived child eating behaviours and maternal migrant background. *Appetite*, 125, 302-313.

DOI:

<https://doi.org/10.1016/j.appet.2018.02.010>

Introduction

Eating behaviours that influence the regulation of energy intake emerge during infancy and become more distinct throughout childhood (Ashcroft, Semmler, Carnell, van Jaarsveld, & Wardle, 2008; Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007; Llewellyn, van Jaarsveld, Johnson, Carnell, & Wardle, 2011; Wardle, Guthrie, Sanderson, & Rapoport, 2001). Associations between children's eating behaviours and weight status have been reported in a number of nations, including Portugal (Viana, Sinde, & Saxton, 2008), Canada (Dubois et al., 2007), Malaysia (Tay, Chin, Lee, Khouw, & Poh, 2016), Thailand (Thongbai, Fongkaew, Kennedy, Aree, & Patumanond, 2011) the Netherlands (Jansen et al., 2012), Ireland (McCarthy et al., 2015), the UK (Carnell & Wardle, 2008a) and Chile (Santos et al., 2011). In particular, children who tend to eat in response to external emotional and sensory cues, and to continue eating despite internal physiological cues, are more likely to meet overweight/obesity criteria (Carnell & Wardle, 2008a; Sanchez, Weisstaub, Santos, Corvalan, & Uauy, 2016; Viana, Sinde, & Saxton, 2008).

Eating behaviours have a strong environmental component, with the home environment playing an influential role (DiSantis, Hodges, Johnson, & Fisher, 2011; Dubois et al., 2013; Fildes et al., 2014; Pyper, Harrington, & Manson, 2016). During the preschool years, parental feeding practices may shape children's eating behaviours and their weight status trajectories (Ventura & Birch, 2008). Previous research has paid particular attention to restrictive feeding practices, which might impede children's innate self-regulation (Rollins, Savage, Fisher, & Birch, 2016). However, restrictive feeding might also be a parental response to children's eating behaviours (Afonso et al., 2016; Derks et al., 2017; Shloim, Edelson, Martin, & Hetherington, 2015; Webber, Cooke, Hill, & Wardle, 2010), a finding that reveals the bidirectional dynamics of parental feeding practices. In this model of restrictive feeding, parental concern about child weight plays a key role in mediating associations between child eating behaviours and parental feeding practices (Ek et al., 2016; Webber, Hill, Cooke, Carnell, & Wardle, 2010). Specifically, parents who are concerned about their child gaining weight are more likely to employ restrictive feeding practices in an attempt to control their child's weight status, which may then impede the child's self-regulation further (Derks et al., 2017; Webber, Hill, Cooke, Carnell, & Wardle, 2010).

While the family is central to children's eating behaviours, it is important to situate the home feeding environment within broader social, economic, and political contexts. Of particular relevance to this paper are the social contexts of feeding practices employed by migrant mothers. Experiences of migration are associated with structural vulnerabilities and social and emotional stressors that may influence eating behaviours, dietary habits and the development of obesity, including childhood obesity. Furthermore, lower socioeconomic status has consistently been associated with higher prevalence of overweight and obesity (Bammann et al., 2013; Sjoberg et al., 2011; Sundblom, Petzold, Rasmussen, Callmer, & Lissner, 2008) and migrant groups are more likely to have lower socioeconomic status (Hjern, 2012). In light of demographic changes in Europe and the observed higher prevalence of obesity among ethnic minority and migrant groups (Karlsen, Morris, Kinra,

Vallejo-Torres, & Viner, 2014; Khanolkar, Sovio, Bartlett, Wallby, & Koupil, 2013), studying eating behaviours among the children of migrant parents is essential for the development of effective childhood obesity prevention and intervention programmes.

Research on child eating behaviours relies on the large-scale administration of validated psychometric instruments, the foremost of which is the Child Eating Behaviour Questionnaire (CEBQ). The CEBQ is a parent-reported instrument, developed in the UK (Wardle, Guthrie, Sanderson, & Rapoport, 2001), and is the most commonly used instrument to assess children's eating behaviours (de Lauzon-Guillain et al., 2012). The questionnaire's 35 items were selected through the rigorous testing and re-testing of numerous candidate items, among three UK-based samples of parents whose children were aged 2-9 years (Wardle et al., 2001), demonstrating concurrent validity with actual eating behaviours (Carnell & Wardle, 2007). In several well-designed studies, the CEBQ has been validated in multiple languages and across a number of countries, including: Sweden (Ek et al., 2016; Svensson et al., 2011), Australia (Mallan et al., 2013), Portugal (Viana et al., 2008), the Netherlands (Sleddens, Kremers, & Thijs, 2008), Chile (Santos et al., 2011), China (Cao et al., 2012), the US (Domoff, Miller, Kaciroti, & Lumeng, 2015), Malaysia (Loh, Moy, Zaharan, & Mohamed, 2013) and Singapore (Quah et al., 2017). The CEBQ consists of eight factors that cluster into two dimensions: the Food Approach dimension, which includes Food Responsiveness, Emotional Overeating, Enjoyment of Food and Desire to Drink; and the Food Avoidance dimension, which includes Satiety Responsiveness, Slowness in Eating, Emotional Undereating and Food Fussiness (Wardle et al., 2001). Among young children, higher levels of Food Approach factors have been associated with higher weight status, whereas higher levels of Food Avoidance factors have been associated with lower weight status (Carnell & Wardle, 2008a; Jansen et al., 2012; Parkinson, Drewett, Le Couteur, & Adamson, 2010; Sleddens, Kremers, & Thijs, 2008). While most studies have used a cross-sectional design which does not allow for identifying causality, obesity-related eating behaviours assessed by the CEBQ are highly relevant for obesity prevention and treatment (Carnell & Wardle, 2008b).

Parental perceptions of eating behaviours are affected by covariates, such as child's gender and age, in culturally-specific ways. In the original UK-based CEBQ study, parents were more likely to perceive boys as engaging in Food Fussiness behaviours (Wardle et al., 2001); a similar finding was reported in a Dutch study (Sleddens et al., 2008). On the contrary, a study based in China found that parents were more likely to perceive girls as engaging in Food Fussiness behaviours (Cao et al., 2012). With respect to age, the original UK-based study (age range: 2–9 years; mean age: 5.6 years) found that parents were more likely to perceive older children as engaging in Food Responsiveness and Enjoyment of Food, and younger children as engaging in Satiety Responsiveness and Slowness in eating (Wardle et al., 2001). Along similar lines, a Portuguese study (age range: 3–13 years; mean age: 7.9 years) reported that parents perceived older children as showing lower levels of Food Fussiness and Slowness in Eating (Viana et al., 2008). However, a Swedish study, which included children aged 1 to 6 years, reported that parents perceived older children as showing higher levels of

Food Fussiness and lower levels of Enjoyment of Food (Svensson et al., 2011). Taken together, these results demonstrate that the CEBQ can be used to examine potential associations between demographic covariates and parental perceptions of eating behaviours, as they vary cross-culturally.

Few studies, however, have examined associations between parental migrant background and child eating behaviours using the CEBQ. The majority of CEBQ research on child eating behaviours has been conducted in largely homogeneous Western samples (Carnell & Wardle, 2008; Jansen et al., 2012; Sleddens et al., 2008; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009), and little is known about possible variations associated with parental migrant background. To our knowledge, only the studies by Mallan et al. (2013) in Australia, Loh et al. (2013) in Malaysia, Quah et al. (2017) in Singapore and Sparks and Radnitz (2012) in the US have used the CEBQ in multi-cultural samples. While none of these studies specifically aimed to compare perceived child eating behaviours across ethnic or migrant groups, the studies acknowledged the importance of ethnic background and parental experiences of migration.

This study is the first to examine associations between child eating behaviours, as perceived by mothers, and maternal migrant background. Our first hypothesis was that mothers of migrant background would report higher levels of the CEBQ Food Approach dimension. We based this hypothesis on the observed positive associations between child weight status and the Food Approach dimension (Carnell & Wardle, 2008a; Jansen et al., 2012; Sleddens et al., 2008), and on the higher obesity rates reported among migrant groups (Karlsen, Morris, Kinra, Vallejo-Torres, & Viner, 2014; Khanolkar, Sovio, Bartlett, Wallby, & Koupil, 2013). Our second hypothesis was that mothers of migrant background would report lower levels of the CEBQ Food Avoidance dimension, based on the observed negative associations between child weight status and this dimension (Jansen et al., 2012; Sleddens et al., 2008; Viana et al., 2008). Specifically, we predicted low explained variance for behaviours related to Food Avoidance, since studies have shown that fussy/picky eating has a strong genetic component (Dubois et al., 2013; Fildes, van Jaarsveld, Cooke, Wardle, & Llewellyn, 2016). Given the key role that concern about child weight status plays in mothers' perceptions of child eating behaviours (Derks et al., 2017; Gregory, Paxton, & Brozovic, 2010), we accounted for the moderating effect of parental concern about child weight status when testing these hypotheses.

Methods

Participants

Mothers of children aged three to eight years ($n=1376$) completed the Child Eating Behaviour Questionnaire (CEBQ) and a background questionnaire about sociodemographic and anthropometric characteristics of mothers and children; all questionnaires were in Swedish, and were distributed and collected by mail. The study population consisted of three subsamples of mothers. For the first subsample, the Swedish Population

Registry was used to recruit mothers in Malmö; all 3007 mothers of 4-years-olds were invited to participate, and 876 mothers completed and returned the questionnaires (a response rate of 29%) (Nowicka, Sorjonen, Pietrobelli, Flodmark, & Faith, 2014). For the second subsample, five schools and 20 pre-schools in Stockholm County were recruited from areas with low, medium and high prevalence of obesity (as compared to the Stockholm County mean prevalence rates); the parents of all children were invited to take part, and 431 out of 931 parents – fathers and mothers – completed the questionnaires (a response rate of 46%). However, in the present study, only data provided by mothers were used (n=353) (Ek et al., 2016). Finally, as the present study aims to contribute to obesity intervention research, the third subsample represents baseline data provided by 147 mothers of children with obesity (a response rate of 87.5%); this allows for the analysis of differences between children with overweight or obesity and children with normal weight. This third subsample was drawn from an ongoing randomised controlled trial for childhood obesity treatment (NCT01792531), and children were referred to this study by health-care centres across Stockholm County (Ek et al., 2015). Participant recruitment has been described in detail previously (Ek et al., 2015; Ek et al., 2016; Nowicka et al., 2014; Somaraki et al., 2016). The study's ethics and consent procedures were approved for all three samples: for the Malmö sample, by the Regional Ethical Board in Lund (approval number 2009/ 362), and for the Stockholm samples, by the Regional Ethical Board in Stockholm (approval numbers 2011/1329-31/4, 2012/1104-32, 2012/ 2005-32, 2013/486-32 and 2013/1628-31/2). In the Malmö sample and the clinical sample, mothers/caregivers provided written informed consent. In the school sample, data were collected anonymously, such that no informed consent was required.

Maternal migrant background

Mothers reported on their country of birth by responding to the question: “In which country were you born?” with the options: “I was born in: (i) Sweden, (ii) another country, please specify”. As shown in Table 1, the participants were divided into seven regional groups based on their reported countries of birth.

Eating behaviours in children

The Swedish version of the CEBQ used in this study was validated using confirmatory factor analysis (CFA) and an optimal fit was obtained after excluding one question about snacking in the Satiety Responsiveness subscale (Ek et al., 2016). The remaining 34 items of the CEBQ represent eight factors.

The Food Approach dimension includes the following four factors:

- Food Responsiveness, 5 items (Cronbach α =0.82)
 1. “My child is always asking for food”
 2. “If allowed to, my child would eat too much”
 3. “Given the choice, my child would eat most of the time”
 4. “Even if my child is full up s/he finds room to eat his/her favourite food”

5. "If given the chance, my child would always have food in his/her mouth"
- Emotional Overeating, 4 items (Cronbach $\alpha=0.76$)
 1. "My child eats more when worried"
 2. "My child eats more when annoyed"
 3. "My child eats more when anxious"
 4. "My child eats more when s/he has nothing else to do"
 - Enjoyment of Food, 4 items (Cronbach $\alpha=0.87$)
 1. "My child loves food"
 2. "My child is interested in food"
 3. "My child looks forward to mealtimes"
 4. "My child enjoys eating"
 - Desire to Drink, 3 items (Cronbach $\alpha=0.84$)
 1. "My child is always asking for a drink"
 2. "If given the chance, my child would drink continuously throughout the day"
 3. "If given the chance, my child would always be having a drink"

The Food Avoidance dimension includes the following four factors:

- Satiety Responsiveness, 4 items (Cronbach $\alpha=0.74$)
 1. "My child has a big appetite", reversed
 2. "My child leaves food on his/her plate at the end of a meal"
 3. "My child gets full before his/her meal is finished"
 4. "My child gets full up easily"
- Slowness in Eating, 4 items (Cronbach $\alpha=0.80$)
 1. "My child finishes his/her meal quickly", reversed
 2. "My child eats slowly"
 3. "My child takes more than 30 minutes to finish a meal"
 4. "My child eats more and more slowly during the course of a meal"
- Emotional Undereating, 4 items (Cronbach $\alpha=0.78$)
 1. "My child eats less when angry"
 2. "My child eats less when s/he is tired"
 3. "My child eats more when she is happy"
 4. "My child eats less when upset"
- Food Fussiness, 6 items (Cronbach $\alpha=0.88$)
 1. "My child refuses new foods at first"
 2. "My child enjoys tasting new foods", reversed
 3. "My child enjoys a wide variety of foods", reversed

4. “My child is interested in tasting food s/he hasn’t tasted before”, reversed
5. “My child is difficult to please with meals”
6. “My child decides that s/he doesn’t like a food, even without tasting it”

Responses ranged from one to five: 1= “Never”, 2= “Rarely”, 3= “Sometimes”, 4= “Often”, 5= “Always”. Mean scores for each factor were calculated; higher scores indicated higher levels of each eating behaviour.

Parental concern about child weight

The factor ‘Concern about child weight’ (Cronbach $\alpha=0.88$) from the Child Feeding Questionnaire (CFQ) was used (Birch et al., 2001). The three items for Concern about child weight are:

1. “How concerned are you about your child eating too much when you are not around him/her?”
2. “How concerned are you about your child having to diet to maintain a desirable weight?”
3. “How concerned are you about your child becoming overweight?”

The response options included: 1= “unconcerned”, 2= “a little concerned”, 3= “concerned”, 4= “fairly concerned”, 5= “very concerned”. The mean score was calculated. Higher scores indicated greater parental concern about child weight.

Covariates

The background questionnaire consisted of sociodemographic and anthropometric questions from established instruments. The following information was obtained: children’s age (in years), gender (boy or girl), height (in cm) and weight (in kg), and mother’s age (in years), height (in cm), weight (in kg) and educational attainment (more than 12 years or 12 years and fewer). Body Mass Index (BMI) (kg/m^2) was calculated based on mothers’ and children’s reported height and weight, in the clinical sample children had their weight and height measured at baseline. Children were identified as having overweight or obesity based on international age- and sex-specific criteria (Cole & Lobstein, 2012). Forty-two children in the sample had underweight based on cut offs for child weight status equivalent to $\text{BMI} < 17 \text{ kg/m}^2$ (Cole & Lobstein, 2012); due to the small number of children classified as underweight, these children were included in the normal weight category. As for mothers, overweight or obesity was identified based on the World Health Organisation (WHO) definition of overweight ($\text{BMI} \geq 25 \text{ kg/m}^2$) (WHO, 2000).

Data analysis

The present study included 1376 mothers of young children. However, 66 cases were excluded from the analysis due to missing data, either in the responses concerning mother’s country of birth or in all the CEBQ items. Thus, the analytical sample consists of 1310 mothers. Missing data in any of the covariates did not exceed 9% and we used mean imputation. Due to the large sample size and the implications of the central limit theorem for normality in such samples, we performed parametric tests. Differences across the seven

regional groups, divided according to the variable ‘mother’s country of birth’, were analysed with one-way ANOVA for continuous variables (presented as means) and chi-square tests for categorical variables (presented as percentages). Multiple linear regression was used to model mother’s migrant background as the primary exposure variable and each of the CEBQ factors (Food Responsiveness, Emotional Overeating, Enjoyment of Food, Desire to Drink, Satiety Responsiveness, Slowness in Eating, Emotional Undereating and Food Fussiness) as dependent variables. Model 1 was the crude model, including maternal migrant background and each of the CEBQ factors separately; Model 2 was adjusted for child’s overweight or obesity; Model 3 was further adjusted for CFQ concern about child weight; Model 4 was further adjusted for mother’s educational attainment; Model 5 was further adjusted for child’s gender and age, and mother’s age and overweight/obesity (from here on: covariates). Unstandardised regression coefficients (b) along with 95% Confidence Intervals (CI) were calculated; they were interpreted as the difference in eating behaviours scores between the reference group (Swedish-born mothers) and each of the other categories (mothers born in Nordic and Western Europe; Southern and Eastern Europe; the Middle East and North Africa; Sub-Saharan Africa; East, South and Southeast Asia; or Central and South America). In addition, we examined the moderation effect of maternal concern about child weight through interaction analysis. The statistical significance level for all analyses was set at $p < 0.05$. All the analyses were performed with the statistical software package IBM SPSS Statistics version 22.0.

Results

Descriptive characteristics of the sample

Table 1 provides an overview of the seven regional groups based on mother’s reported country of birth. The 74 countries were grouped based on social similarities and geographic regions according to the UN scheme (UN, 2016). The majority of participating mothers were Swedish-born, comprising 72% of the whole sample. European-born mothers represented 30 countries, with Denmark (30 mothers) and Poland (22 mothers) being the most represented after Sweden. Mothers born outside Europe represented 43 countries (including the US and Australia); most were born in the Middle East and North Africa, comprising 8.4% of the whole sample.

Please insert Table 1 here

Table 2 shows the descriptive characteristics of the sample. The children’s mean age was 4.8 years and the mothers’ mean age was 36.5 years. Mothers with more than 12 years of education comprised 63.6% of the sample. Weight classifications by BMI showed that 29.2% of the mothers and 18.1% of the children met overweight or obesity criteria.

Significant differences in anthropometric and socio-demographic characteristics were observed when mothers were compared across regional groups. Mothers born in East, South, or Southeast Asia had the lowest levels of overweight or obesity, while mothers born in Central or South America or in Sub-Saharan Africa had the

highest (19.2% versus 50%, $p<0.05$). The majority of Swedish-born mothers had more than 12 years of education (70.5%) compared to 36.4% of mothers born in the Middle East and North Africa ($p<0.001$). In addition, mothers born in Sub-Saharan Africa were, on average, the youngest across all groups, compared to Swedish-born mothers who had the oldest mean age (33.4 versus 37.1 years old, $p<0.001$). The children of mothers born in Sweden and Nordic/Western Europe had the lowest levels of overweight/obesity (15.3% and 14.7%, respectively), while the children of mothers born in Central or South America had the highest levels (73.1%, $p<0.001$). A similar pattern was observed for maternal concern about child weight, with mothers born in Sweden and Nordic/Western Europe reporting the lowest levels (1.35 and 1.26), compared to mothers born in Central and South America, who reported the highest levels (2.83, $p<0.001$).

Please insert Table 2 here

In reporting the results for each dimension, we start by comparing explained variance across the linear regression models in the total sample. We then highlight the most significant differences within the given dimension between the regionally defined groups. The full results for all regionally defined groups are provided separately in Tables 3 and 4.

The Food Approach dimension

Scores on the subscales Food Responsiveness, Emotional Overeating, Enjoyment of Food and Desire to Drink were significantly associated with maternal migrant background. In Food Responsiveness, Emotional Overeating, and Enjoyment of Food, a steep increase in the explained variance was observed in Models 2 (adjusted for child's weight status) and Models 3 (adjusted for child's weight status and maternal concern) compared to Models 1 (crude model). The explained variance remained the same in Model 4 and Model 5 when adjusting for maternal education and covariates. In addition, child's weight status and maternal concern remained significant in Model 5 in Food Responsiveness and Enjoyment of Food, while the covariates were not significant. This suggests that child's weight status and maternal concern about child weight were more important than child's age and gender and mother's age and weight in predicting mothers' perceptions of Food Responsiveness, and Enjoyment of Food. In Emotional Overeating, maternal concern about child weight and mother's weight status remained significant in Model 5. In contrast, a significant increase in the explained variance in Desire to Drink was observed after adjusting for the covariates in Model 4 and Model 5, with a particularly strong effect for child's age. This suggests that the covariates, child's age in particular, are important in predicting mothers' perceptions of Desire to Drink even after adjusting for child's weight status and maternal concern about child's weight.

The most significant differences in the Food Approach dimension were observed between mothers born in Sweden and mothers born in the Middle East and North Africa. Compared to Swedish-born mothers, mothers

born in the Middle East and North Africa reported a higher frequency of behaviours classified under Food Responsiveness ($b=0.14$, 95% CI 0.03 to 0.26, $p<0.05$), Emotional Overeating ($b=0.19$, 95% CI 0.08 to 0.29, $p<0.05$) and Desire to Drink ($b=0.57$, 95% CI 0.40 to 0.74, $p<0.001$). By contrast, mothers born in the Middle East and North Africa reported a lower frequency of behaviours classified under Enjoyment of Food ($b=-0.30$, 95% CI -0.45 to -0.16, $p<0.001$) compared to Swedish-born mothers. No significant differences were observed between mothers born in Nordic/Western Europe and Swedish-born mothers across the Food Approach subscales.

Please insert Table 3 here

The Food Avoidance dimension

While mothers' responses on the subscales Satiety Responsiveness, Slowness in Eating and Emotional Undereating were significantly associated with maternal migrant background, responses for Food Fussiness showed limited associations. The variance in the Food Avoidance subscales explained in the five models was lower than the variance explained in the Food Approach subscales, reaching 14 % in Model 5 for Satiety Responsiveness (compared to 40% in Model 5 for Food Responsiveness). In Satiety Responsiveness and Slowness in Eating, a steep increase in explained variance was seen from Models 1 (crude model) to Models 2 (adjusted for child's weight status) and Models 3 (adjusted for child's weight status and maternal concern). In Models 4 and 5, the effects of child's weight status and maternal concern remained significant while the effects of maternal education and of most of the covariates were not significant. Taken together, these findings indicate that child's weight status and maternal concern about child weight are more important than maternal education, child's age and gender, and mother's age and weight in predicting mothers' perceptions of Satiety Responsiveness and Slowness in Eating. The explained variance in Emotional Undereating doubled from 0.01 in Model 1 (crude model) to 0.02 in Model 2 (adjusted for child's weight status), Model 3 (adjusted for child weight status and maternal concern) and Model 4 (adjusted for child weight status, maternal concern and maternal education); it increased in Model 5 after further adjusting for covariates but the total explained variance did not exceed 6%. This suggests that child's age was more important than child's weight status and maternal concern in predicting Emotional Undereating scores, in contrast to the previously described scales – Satiety Responsiveness and Slowness in Eating.

As in the Food Approach dimension, the most significant differences in the Food Avoidance dimension were observed between mothers born in Sweden and mothers born in the Middle East and North Africa. Compared to Swedish-born mothers, mothers born in the Middle East and North Africa reported a higher frequency of behaviours classified under Satiety Responsiveness ($b=0.22$, 95% CI 0.10 to 0.35, $p<0.05$), Slowness in Eating

($b=0.50$, 95% CI 0.34 to 0.67, $p<0.001$), Emotional Undereating ($b=0.34$, 95% CI 0.17 to 0.52, $p<0.001$) and Food Fussiness ($b=0.23$, 95% CI 0.07 to 0.40, $p<0.05$).

Please insert Table 4 here

Interaction between mother's country of birth and CFQ Concern about child weight, in relation to CEBQ factors

The interaction effect between mother's country of birth and CFQ concern about child weight was significant for Food Responsiveness and Enjoyment of Food, both under the Food Approach dimension (Table 5). In particular, the effect of maternal concern about child weight on Food Responsiveness and Enjoyment of Food was significantly weaker among mothers born in Nordic/Western Europe, the Middle East and North Africa, and East, South and Southeast Asia, compared to Swedish-born mothers. Additionally, the effect of maternal concern about child weight on Food Responsiveness was significantly weaker among mothers born in Eastern/Southern Europe, compared to Swedish-born mothers. Significantly weaker effects on Emotional Overeating and Desire to Drink were also observed among mothers born in the Middle East and North Africa, compared to Swedish-born mothers. Under the Food Avoidance dimension, the interaction effect was significant for Satiety Responsiveness and Slowness in Eating. In particular, the effect of maternal concern about child weight on Satiety Responsiveness and Slowness in Eating was significantly weaker for mothers born in the Middle East and North Africa and East, South and Southeast Asia, compared to Swedish-born mothers. Moreover, a significantly weaker effect of maternal concern about child weight on Slowness in Eating was observed among mothers born in Nordic/Western Europe, compared to Swedish-born mothers.

Please insert Table 5 here

Discussion

This study is the first to examine associations between child eating behaviours and maternal migrant background. Using linear regression models, we found significant associations between maternal migrant background and CEBQ Food Approach factors, and between maternal migrant background and Food Avoidance factors, though associations between Food Fussiness and maternal migrant background were limited. Our first hypothesis, that mothers of migrant background would report higher frequencies of the CEBQ Food Approach dimension, was partially supported. The findings were best exemplified by mothers born in the Middle East and North Africa: the group whose CEBQ scores showed the most significant differences compared to Swedish-born mothers. Mothers born in the Middle East and North Africa reported a higher frequency of behaviours related to Food Responsiveness, Emotional Overeating and Desire to Drink, compared to Swedish-born mothers. Yet, mothers born in the Middle East and North Africa also reported a

lower frequency of Enjoyment of Food, compared to Swedish-born mothers. Our second hypothesis, that mothers of migrant background would report lower levels of the CEBQ Food Avoidance dimension, was not supported. Mothers born in the Middle East and North Africa consistently reported a higher frequency of behaviours related to Satiety Responsiveness, Slowness in Eating, Emotional Undereating and Food Fussiness, compared to Swedish-born mothers. However, as the degree of explained variance for Food Fussiness was close to zero, we consider this difference non-significant. Of note, while the CEBQ scores of mothers born in the Middle East and North Africa exemplified the overarching trends for mothers of migrant backgrounds, it is notable that variations in CEBQ scores were also observed between regional groups within the broader subsample of non-Swedish-born mothers. The variations between the regional groups suggest that differing experiences and histories of migration, acculturation, community support, and structural constraints, alongside culturally-specific notions of feeding and eating, moderate associations between mothers' migration backgrounds and their perceptions of child eating behaviours. Thus, these observed variations underscore the soundness of the study design.

In our analysis, consistently significant differences in Food Approach scores were found between mothers born in the Middle East and North Africa and mothers born in Sweden. In particular, we found that mothers born in the Middle East and North Africa were more likely to perceive their children as engaging in behaviours related to Food Responsiveness, Emotional Overeating and Desire to Drink (Food Approach behaviours), compared to Swedish-born mothers. These associations were reversed when maternal migrant background was examined in relation to Enjoyment of Food. All associations held after adjusting for child's weight status and maternal concern about child weight. It follows, then, that factors other than a child's weight status, both actual and perceived, can explain the observed associations. One clue might be provided by the contrasting results for Food Responsiveness and Enjoyment of Food. Both factors reflect Food Approach behaviours that may lead to high energy intake and weight gain. However, the two factors refer to distinct phenomena: Food Responsiveness relates to environmental and food stimuli that elicit overeating, while Enjoyment of Food designates pleasurable eating, which does not necessarily relate to external or food stimuli. This suggests that mothers born in the Middle East and North Africa might be more likely to have underlying concerns about their children's appetites – specifically that their appetites are not voracious enough. The differences between the two factors might also carry dietary consequences. While Enjoyment of Food has been associated with a liking of fruits and vegetables (Fildes et al., 2015), Food Responsiveness has been associated with food preferences and practices that increase food intake. Food responsive children have been shown to have higher meal frequencies starting at the age of 2 years (Syrad, Johnson, Wardle, & Llewellyn, 2016) and to be more inclined towards large portions (Kling, Roe, Keller, & Rolls, 2016). In addition, higher Food Responsiveness has been associated with preference for noncore foods (Fildes et al., 2015). Along similar lines, Desire to Drink has been associated with a liking for sweetened drinks, a trait that leads to higher energy intake (Sweetman, Wardle, & Cooke, 2008). As the Food Responsiveness and Desire to Drink scales have both been

associated with higher energy intake, the results indicate that mothers born in the Middle East and North Africa, who scored highly on both of these scales, were more likely to perceive their children as engaging in obesity-related eating and drinking behaviours.

Our findings concerning Enjoyment of Food should be considered in light of our findings concerning Food Avoidance, which also did not support our hypothesis. Compared to Swedish-born mothers, mothers born outside Sweden were more likely to perceive their children as engaging in Satiety Responsiveness, Slowness in Eating and Emotional Undereating – Food Avoidance behaviours (with the exception of mothers born in Sub-Saharan Africa, in the latter behaviour). These associations were particularly strong when Swedish-born mothers were compared with mothers born in the Middle East and North Africa. A higher frequency of Food Avoidance behaviours is negatively associated with child's weight status (Webber et al., 2009), and it is possible that mothers born in the Middle East and North Africa are more likely to perceive any rejection of food as alarming, because they might interpret it as a sign that their child is at risk for underweight. Moreover, mothers' past or present experiences of poverty and food insecurity may lead to increased concern about children's inadequate eating (Kaufman & Karpati, 2007). Previous research has found that mothers who experienced food insecurity in childhood are less likely to monitor their children's consumption of snacks and sweets, suggesting that remembered food insecurity influences mothers' feeding choices, notwithstanding their present-day security (Kuyper, Smith, & Kaiser, 2009). In food insecure households, the cyclical availability and paucity of food may also lead mothers to supplement their children's diets and stimulate their appetites in times of food availability, so as to ensure their wellbeing (Feinberg, Kavanagh, Young, & Prudent, 2008). In addition, socioeconomic stressors and structural barriers related to migration experiences may lead to increased concern about children's healthy growth (Thompson, Adair, & Bentley, 2014), as well as a tendency to demonstrate care through the provision of comfort foods (Kaufman & Karpati, 2007). Of the Food Avoidance factors, Food Fussiness had a low explained variance. This implies that Food Fussiness may be subject to structurally and culturally contingent variation to a lesser extent, and that factors other than those studied should be considered when analysing this eating behaviour; for example, a recent study has suggested that Food Fussiness has a strong genetic basis (Fildes et al., 2016). Overall, the findings for the Food Avoidance dimension highlight the importance of considering parental migrant status in analysing parents' reports of child eating behaviours. Future research should identify and analyse the variables that underlie the observed positive associations between perceived Food Avoidance and maternal migrant background.

Finally, our study showed that maternal concern about child weight status is important in predicting perceived Food Responsiveness, Emotional Overeating and Enjoyment of Food. Further examination of the interaction between maternal concern about child weight and maternal migrant background as it affects the CEBQ factors showed significantly weaker effects on Food Responsiveness and Enjoyment of Food (in the Food Approach dimension), and on Satiety Responsiveness and Slowness in Eating (in the Food Avoidance dimension), among mothers born in the Middle East and North Africa, compared to Swedish-born mothers. Several studies

have suggested that mothers employ controlling feeding practices when concerned about their children's weight status (Ek et al., 2016; Gregory, Paxton, & Brozovic, 2010; Webber, Hill, et al., 2010). A recent study published by our group confirmed these findings in a multi-cultural sample (Somaraki et al., 2016), suggesting that parental perceptions of child weight and eating behaviours can influence parental feeding practices. Here, perceived weight status, rather than actual weight status, is key: parental perceptions of child weight do not necessarily correspond to children's measured weights, and parents tend to underestimate their children's overweight or obesity, especially when children are younger (Lundahl, Kidwell, & Nelson, 2014). However, this also varies cross-culturally; for example, parents from Southern Europe estimate levels of both underweight and overweight less accurately than parents from Northern and Central Europe (Regber et al., 2013). While the present study focused on maternal concern about child overweight, future research that also captures maternal concern about child underweight or slow development would provide further insight into mothers' perceptions of children's Food Avoidance behaviours.

Strengths and limitations

A major strength of the study is its large sample size ($n=1310$); the diversity of the sample, which includes participants born in 74 countries, is also notable. In addition, a comparison showed that our sample was demographically similar to the study population, except for education levels (Statistics Sweden, 2012). The study's main limitation is its reliance on self-reported height and weight data in the population and school-based samples. Parental perceptions of children's weight status are moderated by socio-culturally conditioned values and ideals concerning the body (Johnson, Bouchard, Newton, Ryan, & Katzmarzyk, 2009; Wen & Kowaleski-Jones, 2012), so that overestimation and underestimation are possible, especially for children with obesity (Himes, 2009; Huybrechts et al., 2011). An additional limitation was posed by the study's focus on mothers' countries of birth alone, as there may be differences between families where only the mother is of non-Swedish background and families where both parents are of non-Swedish background. Moreover, the grouping of the participants into regional groups based on geographic and sociocultural parameters limited the scope of interpretation. One limitation relates to degree of acculturation, which this study did not assess. It is probable that, within regional groups, participants had varying degrees of acculturation to Swedish dietary practices (Satia-Abouta et al., 2002). Previous qualitative research has shown that, in the years following transnational migration, mothers increasingly integrate local foods and dietary practices into their cooking and feeding repertoires, whilst maintaining foods and dietary practices from their countries of origin, sometimes through creative recombination of the two (Dyck & Dossa, 2007; Vallianatos & Raine, 2008). Additional research is therefore needed to ascertain associations between degrees of acculturation and perceptions of child eating behaviours. Relatedly, the cross-sectional nature of the study does not allow for causal inferences on how migration experiences may influence mothers' perceptions of child eating behaviours and feeding practices over time. Finally, it is important to note that all questionnaires were in Swedish, which might have affected the responses of participants with lower proficiency in the language.

Conclusion and future research

Compared to their Swedish-born counterparts, mothers born outside Sweden were more likely to perceive their children as engaging in Food Approach and Food Avoidance behaviours. Longitudinal research is needed in order to examine prospective associations between perceived Food Approach behaviours, Food Avoidance behaviours and children's eating practices, dietary intake and weight status as well as general health later in life. In previous studies, child eating behaviours have been associated with maternal feeding practices, suggesting that mothers adjust their feeding practices based on their perceptions of child appetite and eating behaviours (Ek et al., 2016; Shloim et al., 2015). Published data from our group suggest that mothers of migrant background are more likely than Swedish-born mothers to report engaging in restrictive feeding and pressure to eat (Somaraki et al., 2016). Further research that explores how structural, socio-cultural, cognitive and emotional factors interact in shaping feeding behaviours among mothers of migrant background would shed necessary light on the specific needs and concerns of this population, and highlight points of effective prevention and intervention. Finally, the differences observed between the regional groups highlight the importance of examining how regionally-specific maternal migrant background – which implicates varied migration and structural experiences – might affect mothers' perceptions of child eating behaviours.

Authors' contributions

PN conceived the study, designed the statistical approach together with MS and supervised the coordination of the study and manuscript process. MS performed the statistical analyses together with KS and drafted the initial manuscript. KS and KE interpreted data and edited the manuscript. AE, CM, CEF, MSF and CPO made a substantial contribution to conception and design, data collection and to interpretation of data. All authors contributed to reviewing and approving the final manuscript.

Financial support

This work was supported by funds to PN by VINNOVA Marie Curie International Qualification funds (2011-03443), Swedish Research Council, Swedish Society of Medicine, Swedish Saving Bank, Nestle, Kellogg's, Karolinska Institutet, Jerring Foundation, Samariten Foundation, Magnus Bergvall Foundation, Fredrik and Ingrid Thuring's Foundation, Helge Ax:son Johnsson Foundation, Shizu Matsumura's Donation, Foundation Frimurare Barnhuset in Stockholm, Foundation Barnavård, Jane and Dan Olsson Foundation, and Crown Princess Lovisa Foundation for Pediatric Care. The funding sources had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication. We thank all the participating mothers, Anne Normann from Childhood Obesity Unit in Malmö and students from Uppsala University (Eva Pettersson, Lisa Lundberg, Sandra Davidsson,

Angelica Uhlander) who helped with data collection and data entry and John Barthelemy from Skåne University Hospital who helped with data entry.

Table 1. Regional groups based on mothers' reported countries of birth.

Sweden, total		941		
European other than Sweden, total		165	Non-European, total 204	
Nordic and Western Europe, total		68	Middle East and North Africa, total 110	
1.	Australia ^a	1	1.	Iran 17
2.	Austria	1	2.	Iraq 59
3.	Belgium	2	3.	Jordan 1
4.	Denmark	30	4.	Kuwait 1
5.	Finland	17	5.	Lebanon 21
6.	France	2	6.	Libya 2
7.	Germany	5	7.	Morocco 1
8.	Great Britain	2	8.	Syria 3
9.	Iceland	2	9.	The Palestinian territories/Palestine 1
10.	Norway	2	10.	Turkey 4
11.	The Netherlands	1		
12.	USA ^a	3	East, South, and Southeast Asia, total 52	
Eastern and Southern Europe, total 97			1.	Afghanistan 10
1.	Bosnia	18	2.	Bangladesh 1
2.	Bulgaria	1	3.	Cambodia 2
3.	Croatia	3	4.	China 8
4.	Czech Republic	3	5.	India 1
5.	Estonia	4	6.	Japan 3
6.	FYROM/Macedonia	7	7.	Korea 6
7.	Greece	1	8.	Pakistan 4
8.	Italy	4	9.	Sri Lanka 2
9.	Kosovo	8	10.	Taiwan 1
10.	Lithuania	3	11.	Thailand 5
11.	Moldova	1	12.	The Philippines 3
12.	Montenegro	1	13.	Vietnam 6
13.	Poland	22	Sub-Saharan Africa, total 16	
14.	Romania	6	1.	Burundi 1
15.	Russia	4	2.	Congo 2
16.	Serbia	6	3.	Eritrea 3
17.	Slovakia	1	4.	Ethiopia 2
18.	Spain	1	5.	Gambia 1
19.	Ukraine	2	6.	Ghana 1
20.	Yugoslavia	1	7.	Ivory Coast 1
			8.	Liberia 1
			9.	Somalia 3
			10.	Tanzania 1
			Central and South America, total 26	
			1.	Argentina 4
			2.	Bolivia 2
			3.	Brazil 2
			4.	Chile 12
			5.	Ecuador 3
			6.	Guatemala 1
			7.	Honduras 1
			8.	Peru 1

^a Included in the "Nordic/Western European" group due to socio-cultural similarities with Sweden

Table 2. Profile of the study population.

	Total (n=1310)	Sweden (n=941)	Nordic and Western Europe (n=68) *	Eastern and Southern Europe (n=97)**	Middle East and North Africa (n=110)	East, South and Southeast Asia (n=52)	Sub-Saharan Africa (n=16)	Central and South America (n=26)	P-value
	Mean or %	Mean or %	Mean or %	Mean or %	Mean or %	Mean or %	Mean or %	Mean or %	
<i>Child characteristics</i>									
Gender									0.610 ^a
Boy	50.4	50.1	48.5	50.5	52.7	59.6	31.3	50.0	
Girl	49.6	49.9	51.5	49.5	47.3	40.4	68.8	50.0	
Age in years	4.8	4.9	4.8	4.7	4.6	4.6	4.8	5.1	<0.001 ^b
Weight status									<0.001 ^a
Normal weight	81.9	84.7	85.3	77.3	79.1	76.9	56.3	26.9	
Overweight or obesity	18.1	15.3	14.7	22.7	20.9	23.1	43.8	73.1	
<i>Maternal characteristics</i>									
Age in years	36.5	37.1	36.5	33.7	35.2	36.1	33.4	35.7	<0.001 ^b
Weight status									0.008 ^a
Normal weight	70.8	72.3	70.6	71.1	60.9	80.8	50.0	50.0	
Overweight or obesity	29.2	27.7	29.4	28.9	39.1	19.2	50.0	50.0	
Education									<0.001 ^a
≤12 years	36.4	29.5	30.9	58.8	63.6	51.9	56.3	57.7	
>12 years	63.6	70.5	69.1	41.2	36.4	48.1	43.8	42.3	
CFQ Concern	1.52	1.35	1.26	1.84	2.19	1.98	2.43	2.83	<0.001 ^b
<i>CEBQ factors</i>									
Food Responsiveness	1.82	1.72	1.76	1.84	2.23	2.20	2.32	2.61	<0.001 ^b
Emotional Overeating	1.52	1.45	1.50	1.63	1.84	1.78	1.53	1.93	<0.001 ^b
Enjoyment of Food	3.37	3.38	3.35	3.29	3.22	3.41	3.61	3.71	0.035 ^b
Desire to Drink	2.17	2.00	2.08	2.55	2.85	2.58	2.93	2.66	<0.001 ^b
Satiety Responsiveness	3.22	3.21	3.40	3.27	3.29	3.20	3.01	2.83	0.004 ^b
Slowness in Eating	2.93	2.86	3.06	3.06	3.25	3.20	2.96	2.71	<0.001 ^b
Emotional Undereating	2.92	2.89	2.90	2.85	3.23	3.14	2.55	2.82	0.001 ^b
Food Fussiness	2.84	2.82	2.78	2.90	2.98	2.78	2.94	2.86	0.477 ^b

*incl. Australia and the US, **incl. Russia, ^a Chi-square (χ^2), ^b One-way ANOVA. CEBQ = Child Eating Behaviour Questionnaire, CFQ = Child Feeding Questionnaire

Table 3. Crude and adjusted unstandardized regression effects (with 95% CI) when predicting perceived child eating behavior related to Food Approach from various child and mother characteristics.

	Food Responsiveness	Emotional Overeating	Enjoyment of Food	Desire to Drink
Model 1	<i>Adj. R² = .08</i>	<i>Adj. R² = .05</i>	<i>Adj. R² = .006</i>	<i>Adj. R² = .10</i>
Nordic, Western European ^a	<i>0.04 (-0.13;0.21)</i>	<i>0.06 (-0.08;0.19)</i>	<i>-0.03 (-0.21;0.15)</i>	<i>0.08 (-0.14;0.29)</i>
Eastern, Southern European ^a	<i>0.12 (-0.02;0.27)</i>	<i>0.18 (0.07;0.30)*</i>	<i>-0.09 (-0.24;0.07)</i>	<i>0.55 (0.37;0.73)**</i>
Middle East, North Africa ^a	<i>0.50 (0.37;0.64)**</i>	<i>0.39 (0.28;0.50)**</i>	<i>-0.16 (-0.31;-0.02)*</i>	<i>0.85 (0.68;1.02)**</i>
East, South, and Southeast Asia ^a	<i>0.48 (0.29;0.67)**</i>	<i>0.33 (0.18;0.49)**</i>	<i>0.03 (-0.18;0.23)</i>	<i>0.58 (0.34;0.82)**</i>
Sub-Saharan Africa ^a	<i>0.60 (0.26;0.94)*</i>	<i>0.09 (-0.19;0.36)</i>	<i>0.23 (-0.13;0.60)</i>	<i>0.93 (0.50;1.36)**</i>
Central and South America ^a	<i>0.89 (0.62;1.15)**</i>	<i>0.48 (0.26;0.70)**</i>	<i>0.33 (0.04;0.61)*</i>	<i>0.66 (0.32;1.00)**</i>
Model 2	<i>Adj. R² = .20</i>	<i>Adj. R² = .08</i>	<i>Adj. R² = .05</i>	<i>Adj. R² = .11</i>
Nordic, Western European ^a	<i>0.04 (-0.11;0.20)</i>	<i>0.06 (-0.07;0.19)</i>	<i>-0.03 (-0.20;0.15)</i>	<i>0.08 (-0.13;0.29)</i>
Eastern, Southern European ^a	<i>0.07 (-0.06;0.21)</i>	<i>0.16 (0.05;0.28)*</i>	<i>-0.12 (-0.27;0.03)</i>	<i>0.53 (0.35;0.71)**</i>
Middle East, North Africa ^a	<i>0.47 (0.34;0.59)**</i>	<i>0.38 (0.27;0.49)**</i>	<i>-0.19 (-0.33;-0.04)*</i>	<i>0.83 (0.66;1.00)**</i>
East, South, and Southeast Asia ^a	<i>0.43 (0.25;0.61)**</i>	<i>0.31 (0.16;0.46)**</i>	<i>-0.004 (-0.20;0.20)</i>	<i>0.56 (0.32;0.80)**</i>
Sub-Saharan Africa ^a	<i>0.41 (0.09;0.72)*</i>	<i>0.01 (-0.26;0.28)</i>	<i>0.12 (-0.24;0.48)</i>	<i>0.86 (0.43;1.29)**</i>
Central and South America ^a	<i>0.50 (0.25;0.75)**</i>	<i>0.32 (0.11;0.54)*</i>	<i>0.10 (-0.19;0.38)</i>	<i>0.52 (0.18;0.87)*</i>
Child's overweight/obesity ^b	<i>0.67 (0.58;0.76)**</i>	<i>0.27 (0.19;0.35)**</i>	<i>0.40 (0.30;0.50)**</i>	<i>0.24 (0.12;0.36)**</i>
Model 3	<i>Adj. R² = .40</i>	<i>Adj. R² = .17</i>	<i>Adj. R² = .09</i>	<i>Adj. R² = .12</i>
Nordic, Western European ^a	<i>0.08 (-0.06;0.21)</i>	<i>0.08 (-0.05;0.21)</i>	<i>-0.01 (-0.18;0.16)</i>	<i>0.09 (-0.12;0.30)</i>
Eastern, Southern European ^a	<i>-0.09 (-0.21;0.03)</i>	<i>0.08 (-0.03;0.19)</i>	<i>-0.20 (-0.34;-0.05)*</i>	<i>0.49 (0.30;0.67)**</i>
Middle East, North Africa ^a	<i>0.15 (0.04;0.27)*</i>	<i>0.22 (0.11;0.32)**</i>	<i>-0.34 (-0.48;-0.19)**</i>	<i>0.75 (0.57;0.92)**</i>
East, South and Southeast Asia ^a	<i>0.21 (0.05;0.36)*</i>	<i>0.20 (0.05;0.34)*</i>	<i>-0.11 (-0.31;0.09)</i>	<i>0.51 (0.26;0.75)**</i>
Sub-Saharan Africa ^a	<i>0.10 (-0.17;0.38)</i>	<i>-0.15 (-0.41;0.11)</i>	<i>-0.03 (-0.38;0.32)</i>	<i>0.78 (0.35;1.21)**</i>
Central and South America ^a	<i>0.16 (-0.06;0.39)</i>	<i>0.15 (-0.06;0.36)</i>	<i>-0.06 (-0.35;0.22)</i>	<i>0.43 (0.09;0.78)*</i>
Child's overweight/obesity ^b	<i>0.21 (0.12;0.30)**</i>	<i>0.03 (-0.06;0.11)</i>	<i>0.17 (0.06;0.29)*</i>	<i>0.12 (-0.02;0.26)</i>
CFQ Concern	<i>0.41 (0.37;0.45)**</i>	<i>0.21 (0.18;0.25)**</i>	<i>0.20 (0.15;0.25)**</i>	<i>0.11 (0.05;0.17)**</i>
Model 4	<i>Adj. R² = .40</i>	<i>Adj. R² = .17</i>	<i>Adj. R² = .09</i>	<i>Adj. R² = .15</i>
Nordic, Western European ^a	<i>0.08 (-0.06;0.21)</i>	<i>0.08 (-0.05;0.20)</i>	<i>-0.01 (-0.18;0.16)</i>	<i>0.08 (-0.13;0.29)</i>
Eastern, Southern European ^a	<i>-0.10 (-0.21;0.02)</i>	<i>0.06 (-0.05;0.17)</i>	<i>-0.18 (-0.33;-0.03)*</i>	<i>0.39 (0.21;0.57)**</i>
Middle East, North Africa ^a	<i>0.15 (0.03;0.26)*</i>	<i>0.20 (0.09;0.31)**</i>	<i>-0.32 (-0.46;-0.17)**</i>	<i>0.64 (0.47;0.82)**</i>
East, South, and Southeast Asia ^a	<i>0.20 (0.05;0.36)*</i>	<i>0.19 (0.04;0.33)*</i>	<i>-0.10 (-0.29;0.10)</i>	<i>0.44 (0.20;0.68)**</i>
Sub-Saharan Africa ^a	<i>0.10 (-0.18;0.37)</i>	<i>-0.16 (-0.42;0.10)</i>	<i>-0.02 (-0.36;0.33)</i>	<i>0.70 (0.28;1.13)*</i>
Central and South America ^a	<i>0.16 (-0.06;0.38)</i>	<i>0.14 (-0.07;0.35)</i>	<i>-0.05 (-0.33;0.23)</i>	<i>0.36 (0.02;0.70)*</i>
Child's overweight/obesity ^b	<i>0.21 (0.12;0.30)**</i>	<i>0.03 (-0.06;0.11)</i>	<i>0.17 (0.06;0.29)*</i>	<i>0.11 (-0.03;0.25)</i>
CFQ Concern	<i>0.41 (0.37;0.44)**</i>	<i>0.21 (0.17;0.25)**</i>	<i>0.20 (0.15;0.25)**</i>	<i>0.09 (0.04;0.15)*</i>
Mother's education >12 years ^d	<i>-0.02 (-0.09;0.04)</i>	<i>-0.06 (-0.12;0.003)</i>	<i>0.06 (-0.02;0.15)</i>	<i>-0.34 (-0.44;-0.24)**</i>
Model 5	<i>Adj. R² = .40</i>	<i>Adj. R² = .17</i>	<i>Adj. R² = .09</i>	<i>Adj. R² = .18</i>
Nordic, Western European ^a	<i>0.07 (-0.06;0.21)</i>	<i>0.07 (-0.05;0.20)</i>	<i>-0.004 (-0.18;0.17)</i>	<i>0.05 (-0.15;0.26)</i>
Eastern, Southern European ^a	<i>-0.10 (-0.22;0.02)</i>	<i>0.06 (-0.05;0.18)</i>	<i>-0.17 (-0.32;-0.02)*</i>	<i>0.31 (0.13;0.49)*</i>
Middle East, North Africa ^a	<i>0.14 (0.03;0.26)*</i>	<i>0.19 (0.08;0.29)*</i>	<i>-0.30 (-0.45;-0.16)**</i>	<i>0.57 (0.40;0.74)**</i>
East, South, and Southeast Asia ^a	<i>0.21 (0.06;0.37)*</i>	<i>0.18 (0.03;0.33)*</i>	<i>-0.10 (-0.30;0.10)</i>	<i>0.39 (0.16;0.63)*</i>
Sub-Saharan Africa ^a	<i>0.08 (-0.19;0.36)</i>	<i>-0.16 (-0.42;0.10)</i>	<i>0.01 (-0.34;0.36)</i>	<i>0.62 (0.20;1.03)*</i>
Central and South America ^a	<i>0.15 (-0.07;0.38)</i>	<i>0.14 (-0.07;0.35)</i>	<i>-0.05 (-0.33;0.23)</i>	<i>0.35 (0.02;0.68)*</i>
Child's overweight/obesity ^b	<i>0.20 (0.11;0.29)**</i>	<i>0.02 (-0.07;0.11)</i>	<i>0.18 (0.06;0.30)*</i>	<i>0.12 (-0.02;0.25)</i>
CFQ Concern	<i>0.40 (0.36;0.44)**</i>	<i>0.21 (0.17;0.25)**</i>	<i>0.20 (0.15;0.25)**</i>	<i>0.10 (0.04;0.16)*</i>
Mother's education ≥12 years ^d	<i>-0.01 (-0.08;0.05)</i>	<i>-0.06 (-0.12;0.004)</i>	<i>0.05 (-0.03;0.14)</i>	<i>-0.27 (-0.37;-0.17)**</i>
Child's gender ^c	<i>0.002 (-0.06;0.06)</i>	<i>-0.04 (-0.09;0.02)</i>	<i>-0.02 (-0.09;0.06)</i>	<i>-0.04 (-0.13;0.05)</i>
Child's age	<i>0.003 (-0.04;0.04)</i>	<i>-0.03 (-0.07;0.01)</i>	<i>0.03 (-0.02;0.08)</i>	<i>-0.15 (-0.21;-0.09)**</i>
Mother's age	<i>-0.003 (-0.01;0.004)</i>	<i>0.003 (-0.002;0.01)</i>	<i>0.002 (-0.005;0.01)</i>	<i>-0.02 (-0.03;-0.01)**</i>
Mother's overweight/obesity ^b	<i>0.05 (-0.02;0.12)</i>	<i>0.07 (0.01;0.13)*</i>	<i>-0.07 (-0.15;0.02)</i>	<i>0.13 (0.03;0.23)*</i>

^a Compared with Swedish mothers, ^b compared with normal weight, ^c compared with male child, ^d compared with ≤12 years, * p<0.05, ** p<0.001
CFQ = Child Feeding Questionnaire

Table 4. Crude and adjusted unstandardized regression effects (with 95% CI) when predicting perceived child eating behavior related to Food Avoidance from various child and mother characteristics.

	Satiety Responsiveness	Slowness in Eating	Emotional Undereating	Food Fussiness
Model 1	Adj. $R^2=.01$	Adj. $R^2=.02$	Adj. $R^2=.01$	Adj. $R^2=.000$
Nordic, Western European ^a	0.20 (0.04;0.36)*	0.20 (-0.002;0.41)	0.01 (-0.20;0.22)	-0.04 (-0.24;0.15)
Eastern, Southern European ^a	0.06 (-0.07;0.20)	0.20 (0.03;0.38)*	-0.05 (-0.23;0.13)	0.08 (-0.09;0.24)
Middle East, North Africa ^a	0.08 (-0.05;0.21)	0.39 (0.23;0.56)**	0.33 (0.17;0.50)**	0.16 (0.003;0.32)*
East, South, and Southeast Asia ^a	-0.004 (-0.19;0.18)	0.35 (0.11;0.58)*	0.24 (0.005;0.48)*	-0.04 (-0.26;0.18)
Sub-Saharan Africa ^a	-0.20 (-0.52;0.12)	0.10 (-0.31;0.52)	-0.35 (-0.77;0.08)	0.12 (-0.28;0.51)
Central and South America ^a	-0.38 (-0.63;-0.13)*	-0.14 (-0.47;0.18)	-0.07 (-0.41;0.26)	0.04 (-0.27;0.35)
Model 2	Adj. $R^2=.09$	Adj. $R^2=.06$	Adj. $R^2=.02$	Adj. $R^2=.002$
Nordic, Western European ^a	0.19 (0.04;0.35)*	0.20 (-0.001;0.40)	0.01 (-0.20;0.22)	-0.04 (-0.24;0.15)
Eastern, Southern European ^a	0.10 (-0.03;0.23)	0.23 (0.06;0.41)*	-0.03 (-0.21;0.14)	0.09 (-0.08;0.25)
Middle East, North Africa ^a	0.11 (-0.02;0.23)	0.42 (0.26;0.58)**	0.34 (0.17;0.51)**	0.17 (0.01;0.32)*
East, South, and Southeast Asia ^a	0.03 (-0.14;0.21)	0.38 (0.15;0.61)*	0.26 (0.02;0.50)*	-0.03 (-0.25;0.19)
Sub-Saharan Africa ^a	-0.06 (-0.37;0.25)	0.23 (-0.17;0.64)	-0.30 (-0.72;0.12)	0.15 (-0.24;0.54)
Central and South America ^a	-0.10 (-0.35;0.14)	0.13 (-0.20;0.45)	0.02 (-0.32;0.37)	0.11 (-0.20;0.43)
Child's overweight/obesity ^b	-0.48 (-0.57;-0.39)**	-0.46 (-0.58;-0.34)**	-0.17 (-0.29;-0.05)*	-0.13 (-0.24;-0.01)*
Model 3	Adj. $R^2=.13$	Adj. $R^2=.09$	Adj. $R^2=.02$	Adj. $R^2=.004$
Nordic, Western European ^a	0.18 (0.03;0.33)*	0.19 (-0.01;0.39)	0.000 (-0.21;0.21)	-0.05 (-0.24;0.15)
Eastern, Southern European ^a	0.17 (0.04;0.30)*	0.30 (0.13;0.47)*	-0.003 (-0.18;0.18)	0.11 (-0.06;0.28)
Middle East, North Africa ^a	0.25 (0.12;0.37)**	0.55 (0.38;0.71)**	0.41 (0.23;0.58)**	0.21 (0.04;0.37)*
East, South, and Southeast Asia ^a	0.13 (-0.04;0.30)	0.47 (0.24;0.70)**	0.30 (0.06;0.54)*	-0.01(-0.23;0.22)
Sub-Saharan Africa ^a	0.08 (-0.22;0.38)	0.36 (-0.04;0.76)	-0.24 (-0.67;0.19)	0.19 (-0.20;0.59)
Central and South America ^a	0.05 (-0.20;0.29)	0.26 (-0.06;0.59)	0.09 (-0.25;0.43)	0.15 (-0.16;0.47)
Child's overweight/obesity ^b	-0.27 (-0.37;-0.17)**	-0.27 (-0.41;-0.14)**	-0.08 (-0.22;0.06)	-0.07 (-0.20;0.06)
CFQ Concern	-0.18 (-0.23;-0.14)**	-0.16 (-0.22;-0.11)**	-0.08 (-0.14;-0.02)*	-0.05 (-0.11;0.002)
Model 4	Adj. $R^2=.13$	Adj. $R^2=.09$	Adj. $R^2=.02$	Adj. $R^2=.005$
Nordic, Western European ^a	0.18 (0.03;0.33)*	0.19 (-0.01;0.38)	0.001 (-0.21;0.21)	-0.05 (-0.24;0.15)
Eastern, Southern European ^a	0.17 (0.04;0.30)*	0.28 (0.11;0.46)*	0.02 (-0.17;0.20)	0.13 (-0.04;0.30)
Middle East, North Africa ^a	0.25 (0.12;0.37)**	0.53 (0.36;0.69)**	0.43 (0.25;0.61)**	0.23 (0.06;0.39)*
East, South, and Southeast Asia ^a	0.13 (-0.04;0.30)	0.46 (0.23;0.69)**	0.31 (0.07;0.56)*	0.01 (-0.22;0.23)
Sub-Saharan Africa ^a	0.08 (-0.23;0.38)	0.35 (-0.06;0.75)	-0.22 (-0.65;0.20)	0.21 (-0.19;0.60)
Central and South America ^a	0.05 (-0.20;0.29)	0.25 (-0.08;0.57)	0.10 (-0.24;0.45)	0.17 (-0.15;0.49)
Child's overweight/obesity ^b	-0.27 (-0.37;-0.17)**	-0.27 (-0.41;-0.14)**	-0.08 (-0.22;0.06)	-0.06 (-0.19;0.06)
CFQ Concern	-0.18 (-0.23;-0.14)**	-0.17 (-0.22;-0.11)**	-0.08 (-0.14;-0.02)*	-0.05 (-0.10;0.005)
Mother's education >12 years ^d	-0.005 (-0.08;0.07)	-0.07 (-0.16;0.03)	0.07 (-0.03;0.17)	0.06 (-0.03;0.16)
Model 5	Adj. $R^2=.14$	Adj. $R^2=.10$	Adj. $R^2=.06$	Adj. $R^2=.004$
Nordic, Western European ^a	0.17 (0.02;0.32)*	0.17 (-0.03;0.37)	-0.02 (-0.23;0.18)	-0.04 (-0.24;0.15)
Eastern, Southern European ^a	0.16 (0.03;0.29)*	0.26 (0.08;0.43)*	-0.04 (-0.22;0.14)	0.14 (-0.03;0.31)
Middle East, North Africa ^a	0.22 (0.10;0.35)*	0.50 (0.34;0.67)**	0.34 (0.17;0.52)**	0.23 (0.07;0.40)*
East, South, and Southeast Asia ^a	0.11 (-0.06;0.29)	0.46 (0.23;0.69)**	0.22 (-0.01;0.46)	0.01 (-0.22;0.23)
Sub-Saharan Africa ^a	0.06 (-0.25;0.36)	0.29 (-0.11;0.69)	-0.26 (-0.68;0.16)	0.23 (-0.17;0.62)
Central and South America ^a	0.05 (-0.19;0.30)	0.26 (-0.07;0.58)	0.12 (-0.22;0.46)	0.17 (-0.15;0.49)
Child's overweight/obesity ^b	-0.27 (-0.37;-0.17)**	-0.28 (-0.41;-0.14)**	-0.07 (-0.21;0.07)	-0.07 (-0.20;0.06)
CFQ Concern	-0.18 (-0.22;-0.14)**	-0.17 (-0.23;-0.11)**	-0.05 (-0.11;0.01)	-0.05 (-0.10;0.01)
Mother's education ≥12 years ^d	0.002 (-0.07;0.07)	-0.04 (-0.14;0.06)	0.09 (-0.01;0.19)	0.05 (-0.04;0.15)
Child's gender ^c	0.04 (-0.02;0.11)	0.13 (0.05;0.22)*	-0.04 (-0.14;0.05)	-0.05 (-0.14;0.03)
Child's age	-0.07 (-0.11;-0.03)*	-0.07 (-0.13;-0.01)*	-0.24 (-0.30;-0.18)**	0.01 (-0.04;0.07)
Mother's age	0.00 (-0.01;0.01)	-0.01 (-0.02;0.002)	0.000 (-0.01;0.01)	0.004 (-0.005;0.01)
Mother's overweight/obesity ^b	0.04 (-0.04;0.11)	0.06 (-0.03;0.16)	0.03 (-0.07;0.14)	-0.004 (-0.10;0.09)

^a Compared with Swedish mothers, ^b compared with normal weight, ^c compared with male child, ^d compared with ≤12 years, * p<0.05, ** p<0.001
CFQ = Child Feeding Questionnaire

Table 5. Mother's country of birth *CFQ Concern interaction analysis

CEBQ factors		Mother's country of birth * CFQ Concern interactions p-value	Effect of CFQ Concern (one point increase) on CEBQ factors for Swedish-born mothers	Effect of CFQ Concern (one point increase) on CEBQ factors for mothers born in a country other than Sweden ^a
Food Approach	Food Responsiveness	<0.001	0.552 **	Nordic and Western Europe: 0.275 * Eastern and Southern Europe: 0.377 * Middle East and North Africa: 0.186 ** East, South and Southeast Asia: 0.361 *
	Emotional Overeating	0.277	0.241 **	Middle East and North Africa: 0.147 *
	Enjoyment of Food	0.001	0.298 **	Nordic and Western Europe: -0.191 * Middle East and North Africa: 0.121 * East, South and Southeast Asia: 0.035 *
	Desire to Drink	0.251	0.184 **	Middle East and North Africa: -0.016 *
Food Avoidance	Satiety Responsiveness	0.008	-0.288 **	Middle East and North Africa: -0.103 ** East, South and Southeast Asia: -0.116 *
	Slowness in Eating	0.003	-0.262 **	Nordic and Western Europe: 0.111 * Middle East and North Africa: -0.104 * East, South and Southeast Asia: 0.042 *
	Emotional Undereating	0.700	-0.106 *	No significant effect
	Food Fussiness	0.239	-0.110 *	No significant effect

* p<0.05, ** p<0.001, ^a significant values indicate significant differences compared to Swedish-born mothers. CEBQ = Child Eating Behaviour Questionnaire, CFQ = Child Feeding Questionnaire

References

- Afonso, L., Lopes, C., Severo, M., Santos, S., Real, H., Duraó, C., . . . Oliveira, A. (2016). Bidirectional association between parental child-feeding practices and Body Mass Index at 4 and 7 y of age. *Am J Clin Nutr*, 103(3), 861-867. doi:10.3945/ajcn.115.120824
- Ashcroft, J., Semmler, C., Carnell, S., van Jaarsveld, C. H., & Wardle, J. (2008). Continuity and stability of eating behaviour traits in children. *Eur J Clin Nutr*, 62(8), 985-990. doi:10.1038/sj.ejcn.1602855
- Bammann, K., Gwozdz, W., Lanfer, A., Barba, G., De Henauw, S., Eiben, G., . . . Pigeot, I. (2013). Socioeconomic factors and childhood overweight in Europe: results from the multi-centre IDEFICS study. *Pediatr Obes*, 8(1), 1-12. doi:10.1111/j.2047-6310.2012.00075.x
- Cao, Y. T., Svensson, V., Marcus, C., Zhang, J., Zhang, J. D., & Sobko, T. (2012). Eating behaviour patterns in Chinese children aged 12-18 months and association with relative weight--factorial validation of the Children's Eating Behaviour Questionnaire. *Int J Behav Nutr Phys Act*, 9, 5. doi:10.1186/1479-5868-9-5
- Carnell, S., & Wardle, J. (2007). Measuring behavioural susceptibility to obesity: validation of the child eating behaviour questionnaire. *Appetite*, 48(1), 104-113. doi:10.1016/j.appet.2006.07.075
- Carnell, S., & Wardle, J. (2008a). Appetite and adiposity in children: evidence for a behavioral susceptibility theory of obesity. *Am J Clin Nutr*, 88(1), 22-29.
- Carnell, S., & Wardle, J. (2008b). Appetitive traits and child obesity: measurement, origins and implications for intervention. *Proc Nutr Soc*, 67(4), 343-355. doi:10.1017/s0029665108008641
- Cole, T. J., & Lobstein, T. (2012). Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatr Obes*, 7(4), 284-294. doi:10.1111/j.2047-6310.2012.00064.x
- de Lauzon-Guillain, B., Oliveira, A., Charles, M. A., Grammatikaki, E., Jones, L., Rigal, N., . . . Monnery-Patris, S. (2012). A review of methods to assess parental feeding practices and preschool children's eating behavior: the need for further development of tools. *J Acad Nutr Diet*, 112(10), 1578-1602, 1602 e1571-1578. doi:10.1016/j.jand.2012.06.356

- Derks, I. P., Tiemeier, H., Sijbrands, E. J., Nicholson, J. M., Voortman, T., Verhulst, F. C., . . . Jansen, P. W. (2017). Testing the direction of effects between child body composition and restrictive feeding practices: results from a population-based cohort. *Am J Clin Nutr*, 106(3), 783-790. doi:10.3945/ajcn.117.156448
- DiSantis, K. I., Hodges, E. A., Johnson, S. L., & Fisher, J. O. (2011). The role of responsive feeding in overweight during infancy and toddlerhood: a systematic review. *Int J Obes (Lond)*, 35(4), 480-492. doi:10.1038/ijo.2011.3
- Domoff, S. E., Miller, A. L., Kaciroti, N., & Lumeng, J. C. (2015). Validation of the Children's Eating Behaviour Questionnaire in a low-income preschool-aged sample in the United States. *Appetite*, 95, 415-420. doi:10.1016/j.appet.2015.08.002
- Dubois, L., Diasparra, M., Bedard, B., Kaprio, J., Fontaine-Bisson, B., Tremblay, R., . . . Perusse, D. (2013). Genetic and environmental influences on eating behaviors in 2.5- and 9-year-old children: a longitudinal twin study. *Int J Behav Nutr Phys Act*, 10, 134. doi:10.1186/1479-5868-10-134
- Dubois, L., Farmer, A., Girard, M., Peterson, K., & Tatone-Tokuda, F. (2007). Problem eating behaviors related to social factors and body weight in preschool children: A longitudinal study. *Int J Behav Nutr Phys Act*, 4, 9. doi:10.1186/1479-5868-4-9
- Dyck, I., & Dossa, P. (2007). Place, health and home: gender and migration in the constitution of healthy space. *Health Place*, 13(3), 691-701. doi:10.1016/j.healthplace.2006.10.004
- Ek, A., Chamberlain, K. L., Ejderhamn, J., Fisher, P. A., Marcus, C., Chamberlain, P., & Nowicka, P. (2015). The More and Less Study: a randomized controlled trial testing different approaches to treat obesity in preschoolers. *BMC Public Health*, 15, 735. doi:10.1186/s12889-015-1912-1
- Ek, A., Sorjonen, K., Eli, K., Lindberg, L., Nyman, J., Marcus, C., & Nowicka, P. (2016). Associations between parental concerns about preschoolers' weight and eating and parental feeding practices: Results from analyses of the Child Eating Behavior Questionnaire, the Child Feeding Questionnaire, and the Lifestyle Behavior Checklist. *PLoS One*, 11(1), e0147257. doi:10.1371/journal.pone.0147257
- Feinberg, E., Kavanagh, P. L., Young, R. L., & Prudent, N. (2008). Food insecurity and compensatory feeding practices among urban black families. *Pediatrics*, 122(4), e854-860. doi:10.1542/peds.2008-0831
- Fildes, A., Mallan, K. M., Cooke, L., van Jaarsveld, C. H., Llewellyn, C. H., Fisher, A., & Daniels, L. (2015). The relationship between appetite and food preferences in British

- and Australian children. *Int J Behav Nutr Phys Act*, 12, 116. doi:10.1186/s12966-015-0275-4
- Fildes, A., van Jaarsveld, C. H., Cooke, L., Wardle, J., & Llewellyn, C. H. (2016). Common genetic architecture underlying young children's food fussiness and liking for vegetables and fruit. *Am J Clin Nutr*, 103(4), 1099-1104. doi:10.3945/ajcn.115.122945
- Fildes, A., van Jaarsveld, C. H., Llewellyn, C. H., Fisher, A., Cooke, L., & Wardle, J. (2014). Nature and nurture in children's food preferences. *Am J Clin Nutr*, 99(4), 911-917. doi:10.3945/ajcn.113.077867
- Gregory, J. E., Paxton, S. J., & Brozovic, A. M. (2010). Pressure to eat and restriction are associated with child eating behaviours and maternal concern about child weight, but not child body mass index, in 2- to 4-year-old children. *Appetite*, 54(3), 550-556. doi:10.1016/j.appet.2010.02.013
- Himes, J. H. (2009). Challenges of accurately measuring and using BMI and other indicators of obesity in children. *Pediatrics*, 124 Suppl 1, S3-22. doi:10.1542/peds.2008-3586D
- Hjern, A. (2012). Migration and public health: Health in Sweden: The National Public Health Report 2012. Chapter 13. *Scand J Public Health*, 40(9 Suppl), 255-267. doi:10.1177/1403494812459610
- Huybrechts, I., Himes, J. H., Ottevaere, C., De Vriendt, T., De Keyzer, W., Cox, B., . . . De Henauw, S. (2011). Validity of parent-reported weight and height of preschool children measured at home or estimated without home measurement: a validation study. *BMC Pediatr*, 11, 63. doi:10.1186/1471-2431-11-63
- Jansen, P. W., Roza, S. J., Jaddoe, V. W., Mackenbach, J. D., Raat, H., Hofman, A., . . . Tiemeier, H. (2012). Children's eating behavior, feeding practices of parents and weight problems in early childhood: results from the population-based Generation R Study. *Int J Behav Nutr Phys Act*, 9, 130. doi:10.1186/1479-5868-9-130
- Johnson, W. D., Bouchard, C., Newton, R. L., Jr., Ryan, D. H., & Katzmarzyk, P. T. (2009). Ethnic differences in self-reported and measured obesity. *Obesity (Silver Spring)*, 17(3), 571-577. doi:10.1038/oby.2008.582
- Karlsen, S., Morris, S., Kinra, S., Vallejo-Torres, L., & Viner, R. M. (2014). Ethnic variations in overweight and obesity among children over time: findings from analyses of the Health Surveys for England 1998-2009. *Pediatr Obes*, 9(3), 186-196. doi:10.1111/j.2047-6310.2013.00159.x

- Kaufman, L., & Karpati, A. (2007). Understanding the sociocultural roots of childhood obesity: food practices among Latino families of Bushwick, Brooklyn. *Soc Sci Med*, 64(11), 2177-2188. doi:10.1016/j.socscimed.2007.02.019
- Khanolkar, A. R., Sovio, U., Bartlett, J. W., Wallby, T., & Koupil, I. (2013). Socioeconomic and early-life factors and risk of being overweight or obese in children of Swedish- and foreign-born parents. *Pediatr Res*, 74(3), 356-363. doi:10.1038/pr.2013.108
- Kling, S. M., Roe, L. S., Keller, K. L., & Rolls, B. J. (2016). Double trouble: Portion size and energy density combine to increase preschool children's lunch intake. *Physiol Behav*, 162, 18-26. doi:10.1016/j.physbeh.2016.02.019
- Kuyper, E. M., Smith, D., & Kaiser, L. L. (2009). Does food insecurity influence child feeding practices? *J Hunger Env Nutr*, 4(2), 147-157. doi:10.1080/19320240902915250
- Llewellyn, C. H., van Jaarsveld, C. H., Johnson, L., Carnell, S., & Wardle, J. (2011). Development and factor structure of the Baby Eating Behaviour Questionnaire in the Gemini birth cohort. *Appetite*, 57(2), 388-396. doi:10.1016/j.appet.2011.05.324
- Loh, D. A., Moy, F. M., Zaharan, N. L., & Mohamed, Z. (2013). Eating behaviour among multi-ethnic adolescents in a middle-income country as measured by the self-reported Children's Eating Behaviour Questionnaire. *PLoS One*, 8(12), e82885. doi:10.1371/journal.pone.0082885
- Lundahl, A., Kidwell, K. M., & Nelson, T. D. (2014). Parental underestimates of child weight: a meta-analysis. *Pediatrics*, 133(3), e689-703. doi:10.1542/peds.2013-2690
- Mallan, K. M., Liu, W. H., Mehta, R. J., Daniels, L. A., Magarey, A., & Battistutta, D. (2013). Maternal report of young children's eating styles. Validation of the Children's Eating Behaviour Questionnaire in three ethnically diverse Australian samples. *Appetite*, 64, 48-55. doi:10.1016/j.appet.2013.01.003
- McCarthy, E. K., Chaoimh, C., Murray, D. M., Hourihane, J. O., Kenny, L. C., & Kiely, M. (2015). Eating behaviour and weight status at 2 years of age: data from the Cork BASELINE Birth Cohort Study. *Eur J Clin Nutr*, 69(12), 1356-1359. doi:10.1038/ejcn.2015.130
- Nowicka, P., Sorjonen, K., Pietrobelli, A., Flodmark, C. E., & Faith, M. S. (2014). Parental feeding practices and associations with child weight status. Swedish validation of the Child Feeding Questionnaire finds parents of 4-year-olds less restrictive. *Appetite*, 81, 232-241. doi:10.1016/j.appet.2014.06.027

- Parkinson, K. N., Drewett, R. F., Le Couteur, A. S., & Adamson, A. J. (2010). Do maternal ratings of appetite in infants predict later Child Eating Behaviour Questionnaire scores and body mass index? *Appetite*, *54*(1), 186-190. doi:10.1016/j.appet.2009.10.007
- Pyper, E., Harrington, D., & Manson, H. (2016). The impact of different types of parental support behaviours on child physical activity, healthy eating, and screen time: a cross-sectional study. *BMC Public Health*, *16*(1), 568. doi:10.1186/s12889-016-3245-0
- Quah, P. L., Cheung, Y. B., Pang, W. W., Toh, J. Y., Saw, S. M., Godfrey, K. M., . . . Mary, C. F. (2017). Validation of the Children's Eating Behavior Questionnaire in 3 year old children of a multi-ethnic Asian population: The GUSTO cohort study. *Appetite*, *113*, 100-105. doi:10.1016/j.appet.2017.02.024
- Regber, S., Novak, M., Eiben, G., Bammann, K., De Henauw, S., Fernandez-Alvira, J. M., . . . Marild, S. (2013). Parental perceptions of and concerns about child's body weight in eight European countries--the IDEFICS study. *Pediatr Obes*, *8*(2), 118-129. doi:10.1111/j.2047-6310.2012.00093.x
- Rollins, B. Y., Savage, J. S., Fisher, J. O., & Birch, L. L. (2016). Alternatives to restrictive feeding practices to promote self-regulation in childhood: a developmental perspective. *Pediatr Obes*, *11*(5), 326-332. doi:10.1111/ijpo.12071
- Sanchez, U., Weisstaub, G., Santos, J. L., Corvalan, C., & Uauy, R. (2016). GOCS cohort: children's eating behavior scores and BMI. *Eur J Clin Nutr*, *70*(8), 925-928. doi:10.1038/ejcn.2016.18
- Santos, J. L., Ho-Urriola, J. A., Gonzalez, A., Smalley, S. V., Dominguez-Vasquez, P., Cataldo, R., . . . Hodgson, M. I. (2011). Association between eating behavior scores and obesity in Chilean children. *Nutr J*, *10*, 108. doi:10.1186/1475-2891-10-108
- Satia-Abouta, J., Patterson, R. E., Neuhouser, M. L., & Elder, J. (2002). Dietary acculturation: applications to nutrition research and dietetics. *J Am Diet Assoc*, *102*(8), 1105-1118.
- Shloim, N., Edelson, L. R., Martin, N., & Hetherington, M. M. (2015). Parenting styles, feeding styles, feeding practices, and weight status in 4-12 year-old children: A systematic review of the literature. *Front Psychol*, *6*, 1849. doi:10.3389/fpsyg.2015.01849
- Sjoberg, A., Moraes, L., Yngve, A., Poortvliet, E., Al-Ansari, U., & Lissner, L. (2011). Overweight and obesity in a representative sample of schoolchildren - exploring the urban-rural gradient in Sweden. *Obes Rev*, *12*(5), 305-314. doi:10.1111/j.1467-789X.2010.00838.x

- Sleddens, E. F., Kremers, S. P., & Thijs, C. (2008). The children's eating behaviour questionnaire: factorial validity and association with Body Mass Index in Dutch children aged 6-7. *Int J Behav Nutr Phys Act*, 5, 49. doi:10.1186/1479-5868-5-49
- Somaraki, M., Eli, K., Ek, A., Lindberg, L., Nyman, J., Marcus, C., . . . Nowicka, P. (2016). Controlling feeding practices and maternal migrant background: an analysis of a multicultural sample. *Public Health Nutr*, 1-11. doi:10.1017/s1368980016002834
- Sparks, M. A., & Radnitz, C. L. (2012). Confirmatory factor analysis of the Children's Eating Behaviour Questionnaire in a low-income sample. *Eat Behav*, 13(3), 267-270. doi:10.1016/j.eatbeh.2012.03.002
- Statistics Sweden (2012). Home Page. <http://www.scb.se> (accessed November 2012)
- Sundblom, E., Petzold, M., Rasmussen, F., Callmer, E., & Lissner, L. (2008). Childhood overweight and obesity prevalences levelling off in Stockholm but socioeconomic differences persist. *Int J Obes (Lond)*, 32(10), 1525-1530. doi:10.1038/ijo.2008.104
- Svensson, V., Lundborg, L., Cao, Y., Nowicka, P., Marcus, C., & Sobko, T. (2011). Obesity related eating behaviour patterns in Swedish preschool children and association with age, gender, relative weight and parental weight--factorial validation of the Children's Eating Behaviour Questionnaire. *Int J Behav Nutr Phys Act*, 8, 134. doi:10.1186/1479-5868-8-134
- Sweetman, C., Wardle, J., & Cooke, L. (2008). Soft drinks and 'desire to drink' in preschoolers. *Int J Behav Nutr Phys Act*, 5, 60. doi:10.1186/1479-5868-5-60
- Syrad, H., Johnson, L., Wardle, J., & Llewellyn, C. H. (2016). Appetitive traits and food intake patterns in early life. *Am J Clin Nutr*, 103(1), 231-235. doi:10.3945/ajcn.115.117382
- Tay, C. W., Chin, Y. S., Lee, S. T., Khouw, I., & Poh, B. K. (2016). Association of eating behavior with nutritional status and body composition in primary school-aged children. *Asia Pac J Public Health*, 28(5 Suppl), 47s-58s. doi:10.1177/1010539516651475
- Thompson, A. L., Adair, L., & Bentley, M. E. (2014). "Whatever average is:" understanding African-American mothers' perceptions of infant weight, growth, and health. *Curr Anthropol*, 55(3), 348-355. doi:10.1086/676476
- Thongbai, W., Fongkaew, W., Kennedy, C., Aree, P., & Patumanond, J. (2011). Risk factors contributing to overweight among preschool children. *Pacific Rim Int J Nurs Res*, 15(1), 13-27.

- UN. (2016). *Statistical Yearbook – 59th issue (2016 edition)*: United Nations. Department of Economic and Social Affairs. Statistics Division
- Vallianatos, H., & Raine, K. (2008). Consuming food and constructing identities among Arabic and South Asian Immigrant Women. *Food, Culture & Society*, 11(3), 355-373. doi:10.2752/175174408X347900
- Ventura, A. K., & Birch, L. L. (2008). Does parenting affect children's eating and weight status? *Int J Behav Nutr Phys Act*, 5, 15. doi:10.1186/1479-5868-5-15
- Viana, V., Sinde, S., & Saxton, J. C. (2008). Children's Eating Behaviour Questionnaire: associations with BMI in Portuguese children. *Br J Nutr*, 100(2), 445-450. doi:10.1017/s0007114508894391
- Wardle, J., Guthrie, C. A., Sanderson, S., & Rapoport, L. (2001). Development of the Children's Eating Behaviour Questionnaire. *J Child Psychol Psychiatry*, 42(7), 963-970.
- Webber, L., Cooke, L., Hill, C., & Wardle, J. (2010). Associations between children's appetitive traits and maternal feeding practices. *J Am Diet Assoc*, 110(11), 1718-1722. doi:10.1016/j.jada.2010.08.007
- Webber, L., Hill, C., Cooke, L., Carnell, S., & Wardle, J. (2010). Associations between child weight and maternal feeding styles are mediated by maternal perceptions and concerns. *Eur J Clin Nutr*, 64(3), 259-265. doi:10.1038/ejcn.2009.146
- Webber, L., Hill, C., Saxton, J., Van Jaarsveld, C. H., & Wardle, J. (2009). Eating behaviour and weight in children. *Int J Obes (Lond)*, 33(1), 21-28. doi:10.1038/ijo.2008.219
- Wen, M., & Kowaleski-Jones, L. (2012). Sex and ethnic differences in validity of self-reported adult height, weight and body mass index. *Ethn Dis*, 22(1), 72-78.
- WHO. (2000). *Obesity: Preventing and managing the global epidemic. Report of a WHO Consultation. WHO Technical Report Series 894*: World Health Organization.