Maternal & Child Nutrition

DOI: 10.1111/j.1740-8709.2012.00452.x

Review Article

Maternal correlates of maternal child feeding practices: a systematic review

Skye McPhie*, Helen Skouteris*, Lynne Daniels† and Elena Jansen†

School of Psychology, Deakin University, Burwood, Victoria, Australia, and †Institute of Health and Biomedical Innovation, Exercise and Nutrition Sciences, Queensland University of Technology, Kelvin Grove, Queensland, Australia

Abstract

Establishing healthy eating habits early in life is one important strategy to combat childhood obesity. Given that early maternal child feeding practices have been linked to child food intake and weight, identifying the maternal correlates of maternal child feeding practices is important in order to understand the determinants of childhood obesity; this was the overall aim of the current review. Academic databases were searched for studies examining the relationship between maternal child feeding practices and parenting, personal characteristics and psychopathology of mothers with preschoolers. Papers were limited to those published in English, between January 2000 and June 2012. Only studies with mothers of normally developing children between the ages of 2 and 6 years were included. There were no restrictions regarding the inclusion of maternal nationality or socioeconomic status (SES). Seventeen eligible studies were sourced. Information on the aim, sample, measures and findings of these was summarised into tables. The findings of this review support a relationship between maternal controlling parenting, general and eating psychopathology, and SES and maternal child feeding practices. The main methodological issues of the studies reviewed included inconsistency in measures of maternal variables across studies and cross-sectional designs. We conclude that the maternal correlates associated with maternal child feeding practices are complex, and the pathways by which maternal correlates impact these feeding practices require further investigation.

Keywords: preschool, mothers, feeding, obesity, maternal characteristics, maternal behaviours.

Correspondence: Associate Professor Helen Skouteris, School of Psychology, Deakin University, 221 Burwood Highway, Burwood, Vic. 3125, Australia. E-mail: helens@deakin.edu.au

Introduction

Childhood obesity is a worldwide problem that tends to track into adulthood. It is estimated that in 2020, the global prevalence of childhood obesity will have risen a further 2.4% to reach 9.1% (de Onis *et al*. 2010). Establishing healthy eating habits early in life, is seen as one important strategy to combat childhood obesity (Savage *et al*. 2007; Skouteris *et al*. 2012). Given that mothers tend to be the primary caregivers of young children, understanding their influence on the child food supply and socialisation towards food, as their children develop adult-like food intake patterns and eating behaviours, is of importance (Savage *et al*. 2007).

To date, a substantial amount of research has focused on the relationship between maternal child feeding practices and child food intake and weight (Birch & Fisher 2000; Galloway *et al*. 2006; Clark *et al*. 2007; Crouch *et al*. 2007; Kröller & Warschburger 2008; Ventura & Birch 2008). Maternal child feeding practices are defined as the behavioural strategies

that mothers employ to influence their child's food intake (Gregory *et al*. 2010). The most highly researched maternal feeding practices are restricting food intake (restriction), pressuring a child to eat (pressure to eat), and monitoring what a child eats (monitoring) (Birch *et al*. 2001). Paradoxically, maternal restriction is related positively to child weight status (Fisher & Birch 1999a,b; Birch & Fisher 2000; Crouch *et al*. 2007) and child food consumption once the prohibited food is available (Fisher & Birch 1999b; Jansen *et al*. 2007). In comparison, maternal pressure is associated with both increased (Campbell *et al*. 2006) and decreased (Fisher *et al*. 2002; Galloway *et al*. 2005, 2006) child food intake and lower weight/adiposity (Spruijt-Metz *et al*. 2002; Matheson *et al*. 2006; Powers *et al*. 2006; Crouch *et al*. 2007; Farrow & Blissett 2008; Kröller & Warschburger 2008). Monitoring of child eating has been less researched; while several studies have failed to report a relationship between maternal monitoring and child food intake (Kröller & Warschburger 2008) and child body mass index (BMI; Spruijt-Metz *et al*. 2002; Crouch *et al*. 2007; Farrow & Blissett 2008; Kröller & Warschburger 2008; Musher-Eizenman *et al*. 2009), Faith *et al*. (2004) reported a negative relationship between monitoring of child fat intake and child BMI among children with a low risk of becoming obese. Restriction, pressure to eat and monitoring may be regarded as controlling or non-responsive maternal child feeding practices as they fail to recognise and appropriately respond to a child's internal cues of hunger. Such maternal child feeding practices may disrupt a child's ability to self-regulate their own food intake (Johnson & Birch 1994; DiSantis *et al*. 2011), and the discordance between maternal child feeding practices and child hunger cues may contribute to weight gain in young children (DiSantis *et al*. 2011).

While understanding the potential correlates and consequences of maternal child feeding practices in relation to child eating and BMI is important, it is also important to understand what factors are associated with maternal feeding practices and what factors mediate or moderate the associations between maternal feeding practices and child eating and BMI. Given that for preschoolers, mothers tend to be responsible for the emotional and social factors of the feeding experience, as well as the quality, quantity and timing of food availability (Harrison *et al*. 2011), evaluating the *maternal* correlates of maternal feeding practices may inform the design of targeted intervention programmes that prevent unhealthy weight gain early in life. Hence, the purpose of this review was to undertake a systematic conceptual and methodological review of the literature on the maternal correlates of maternal child feeding practices during the formative preschool years. There are a wide range of maternal variables implicated in the development of childhood obesity; however, we focused our review only on the proximal maternal correlates (within the mother) of maternal child feeding practices, as opposed to environmental or family-based variables that impact on mothers (e.g. work/employment; household situation). Consequently, we sourced published papers that investigated the relationships between maternal parenting, personal characteristics and psychopathology, and maternal child feeding practices; each of these proximal maternal factors have been shown to be associated with child weight and eating (Chen &

Key messages

- Maternal parenting, personal characteristics and psychopathology are associated with maternal child feeding practices.
- There are variations in sample characteristics and measurement of key maternal variables within the current literature examining maternal correlates of maternal child feeding practices.
- Research examining the longitudinal pathways linking maternal parenting, personal characteristics and psychopathology to maternal child feeding practices and in turn to child food intake and weight is needed urgently.
- Tailoring interventions to the needs of the mothers in the target group (e.g. culturally or socioeconomically diverse; with general or eating psychopathology; different general parenting) is likely to enhance the effectiveness of childhood obesity prevention programmes.

Kennedy 2004; Kröller & Warschburger 2008; McDermott *et al*. 2008; McPhie *et al*. 2011; Moens *et al*. 2009; Ogden *et al*. 2006; Olvera & Power 2010; Parsons *et al*. 1999; Rhee *et al*. 2006; Vereecken *et al*. 2004; Zeller *et al*. 2007), and may mediate or moderate the relationship between how mothers feed their children and child food intake and/or weight. For example, Gubbels *et al*. (2009) explained that the tendency for mothers to restrict their child's intake of sweets, crisps, sugar and soft-drinks may be a reflection of a restrictive parenting style. Additionally, Rhee (2008) argued that child weight may be influenced by parenting factors interacting with specific parent behaviours, such as how mothers feed their children. Also, mothers with a higher socioeconomic status (SES) are more likely to rely on controlling child feeding practices, such as structuring mealtimes and/or dictating portion size (Ogden *et al*. 2006; Orrell-Valente *et al*. 2007), and Haycraft & Blissett (2008a) reported that maternal and paternal eating psychopathology, anxiety, and to some extent, depression are linked to greater control and reduced sensitivity in parental child feeding practices. Hence, the following questions were addressed in this review:

1. What are the maternal correlates of maternal child feeding practices?
2. What are the methodological limitations of research to date?
3. What recommendations can be made for future research?

Method

Search strategy

Our review was informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati *et al*. 2009). The purpose of the PRISMA guidelines was to ensure that systematic reviews are reported in their entirety and transparently. As such, PRIMSA guidelines use a 27-item checklist that details the requirements for each section of the review (i.e. title, abstract, introduction, methods, results, discussion, funding) and four-phase flow diagram detailing paper inclusion/exclusion. The purpose of this search strategy was to identify all papers focused on maternal parenting and/or personal characteristics and/or psychopathology and maternal child feeding practices. A search of Cumulative Index to Nursing and Allied Health Literature with full text, Medline with full text, Health Source-Consumer Edition, PsycINFO, PsycARTICLES, Psychological and Behavioural Sciences Collection, Expanded Academic ASAP, Health Reference Centre Academic, Scopus and Science Direct was conducted. Jstor was also searched for studies exploring the relationship between maternal parenting and maternal child feeding practices. The search was conducted in June 2012 and the search strategy outlined in Box 1 was followed. Supporting Information 1 details the full search strategy for one database.

Box 1. Search terms

Child* OR pediatric*
Parent* OR parenting style OR childrearing practices
Parent* demograph* OR parent* psychopath* OR parent* character*
Parent* mental health OR parent* belie* OR parent* body dissatisfac*
Feeding practic* OR feeding strateg* OR feeding behavior OR feeding style

Inclusion and exclusion criteria

Papers were limited to those published in English and between January 2000 and June 2012. This systematic review only included mothers of normally developing children (i.e. not born preterm, not diagnosed with physical or mental health complications) between 2 and 6 years old (i.e. preschoolers). There were no restrictions regarding the inclusion of maternal nationality or SES. Studies that examined mothers from special groups (i.e. teen mothers) were excluded. While the focus of this review was on mothers, studies that involved both mothers and fathers were included. To facilitate comparisons across studies, those reporting only qualitative data were excluded.

Selection process

Figure 1 shows a flow diagram of the processing of search results from the initial literature review

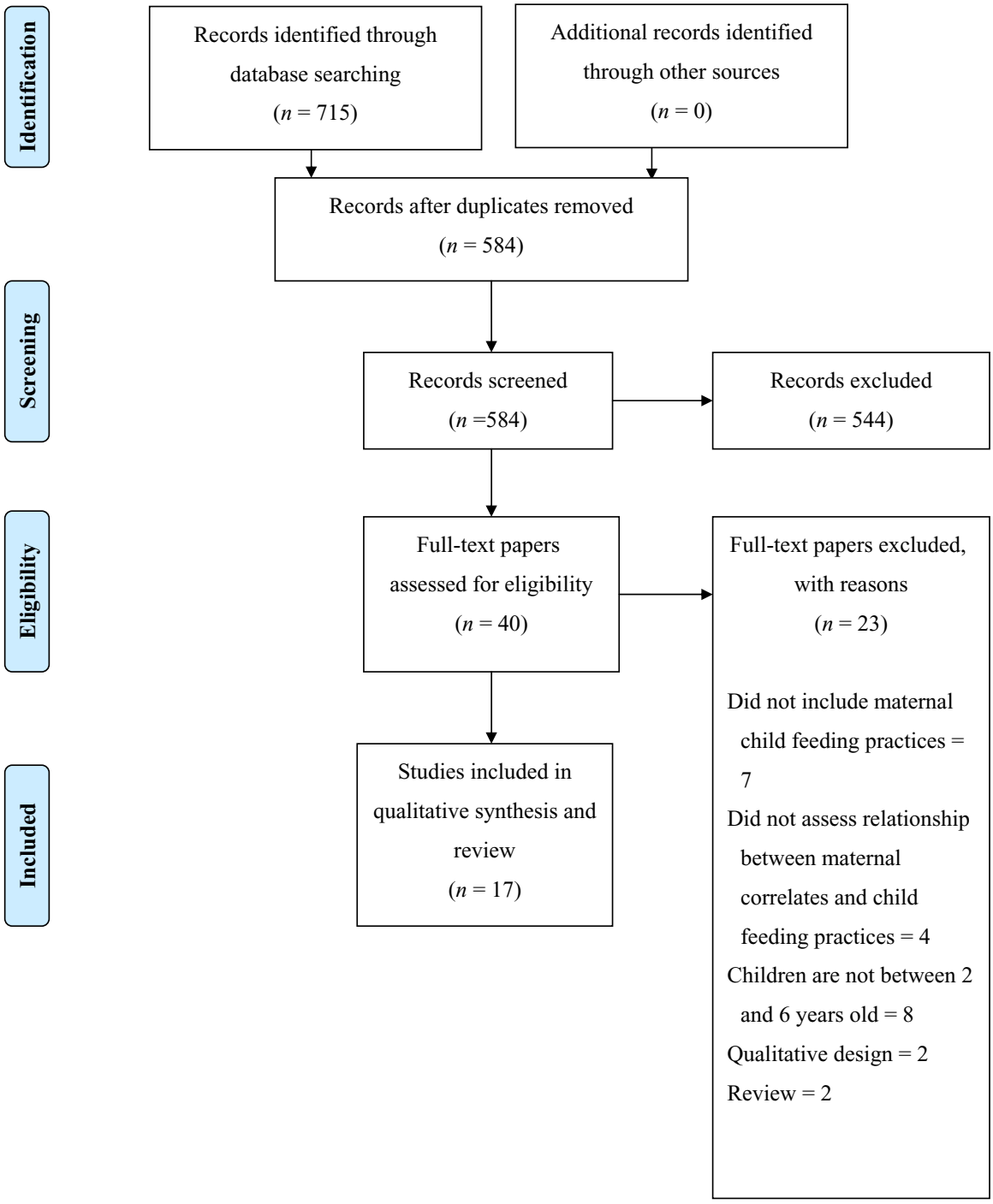

Fig. 1. Flow of studies included in review.

($N = 715$). The titles and abstracts of the initial papers identified were screened by one author (S.M.) for potential eligibility; 544 papers were excluded as they did not meet the inclusion criteria for this review. The full texts of the remaining 40 papers were read by all authors (S.M. doctoral candidate; H.S. associate professor; L.D. professor; E.J. PhD candidate); 17 papers were deemed relevant for this review. A full list of excluded studies and their reasons for exclusion can be found in Supporting Information 2.

Data abstraction

Information from the studies was summarised into three tables to improve the ease of comparability of findings across studies depending on which maternal correlates were the focus of the research. As such, Table 1 includes studies examining the association between maternal parenting and maternal child feeding practices. Table 2 summarises studies investigating the relationship between maternal personal characteristics and maternal child feeding practices. Table 3 summarises studies examining the association between maternal psychopathology and maternal child feeding practices. These tables permitted comparisons of aims, samples, methodology and results. The variables included in the tables were: the country of study, maternal and child age, maternal child feeding practices, and maternal parenting (Table 1) or maternal personal characteristics (Table 2) or maternal psychopathology (Table 3). The summary statistics (e.g. multiple regression, correlation, least squares means) differed across papers. Because of the wide variety of analyses reported in the included papers, the studies were compared using a range of reported results. In accordance with the PRISMA guidelines, the studies were also reviewed to determine if they were biased for selective reporting by one author (S.M.). Examples of selective reporting include studies reporting only significant results, not providing adequate details regarding sample characteristics or using inadequate/inappropriate measures. Such studies were included in the current review; however, their findings were interpreted with caution.

Summary of included studies

Seventeen studies were included in the review of the association between maternal parenting, personal characteristics or psychopathology, and maternal child feeding practices (Francis *et al*. 2001; Anderson *et al*. 2005; Hughes *et al*. 2005, 2008; Blissett *et al*. 2006; Blissett & Haycraft 2008, 2011; Haycraft & Blissett 2008a, 2011; De Lauzon-Guillain *et al*. 2009; Jingxiong *et al*. 2009; Musher-Eizenman *et al*. 2009; Ventura *et al*. 2010; Vereecken *et al*. 2010; Evans *et al*. 2011; McPhie *et al*. 2011; Ystrom *et al*. 2012). Five of the studies are summarised in more than one table (Francis *et al*. 2001; Blissett *et al*. 2006; Blissett & Haycraft 2008; Hughes *et al*. 2008; De Lauzon-Guillain *et al*. 2009). The majority of the studies included children over age 3 years ($n = 14$), while only three studies (Jingxiong *et al*. 2009; Evans *et al*. 2011; Ystrom *et al*. 2012) included children <3 years. Tables 1–3 summarise the aim, sample characteristics, measures and findings for each of these 17 studies, and hence will not be repeated in the subsections later.

The most frequently used measures for maternal child feeding practices were the subscales of the Child Feeding Questionnaire (CFQ) by Birch *et al*. (2001) ($n = 8$) (Francis *et al*. 2001; Anderson *et al*. 2005; Blissett *et al*. 2006; Blissett & Haycraft 2008; Haycraft & Blissett 2008a, 2011; McPhie *et al*. 2011; Ystrom *et al*. 2012). Five other measures were used to assess maternal child feeding practices: the Caregiver's Feeding Styles Questionnaire (CFSQ) by Hughes *et al*. (2005) (Hughes *et al*. 2008; Vereecken *et al*. 2010); the Comprehensive Feeding Practices Questionnaire (CFPQ) by Musher-Eizenman & Holub (2007) (De Lauzon-Guillain *et al*. 2009; Musher-Eizenman *et al*. 2009); the Feeding Demands Questionnaire (FEEDS) by Faith *et al*. (2008) (Ventura *et al*. 2010); the Preschooler Feeding Questionnaire (PFQ; Baughcum *et al*. 2001; Evans *et al*. 2011), and the Family Mealtime Coding System (FMCS) by Haycraft and Blissett (2008b) (Blissett & Haycraft 2011). Finally, Jingxiong *et al*. (2009) conceptualised maternal child feeding practices in a different way and developed a questionnaire to measure feeding on schedule and using food to soothe children.

Table 1. Studies examining the relationship between maternal parenting and maternal child feeding practices ($N = 3$)

Reference Country	Participant characteristics; study design	Study aim(s)	Measures of maternal child feeding practices	Measures of maternal parenting correlates	Findings
Blissett & Haycraft (2008) UK	$n = 48$ pairs of cohabiting parents (96 parents; 48 mothers) Mean mother age = 35.7 years Mean father age = 37.1 years Mean child age = 41.6 months Questionnaires Cross-sectional	To investigate the associations between parenting styles, parent child feeding practices and parent body mass index.	Monitoring, restriction and pressure to eat subscales on the CFQ (Birch *et al.* 2001).	PSDQ (Robinson *et al.* 2001) that measures authoritative, authoritarian and permissive parenting style.	Maternal monitoring was negatively associated with permissive/indulgent parenting style ($r = –0.30$, $P < 0.05$). Maternal restriction was positively related to permissive/indulgent parenting style ($r = 0.26$, $P < 0.05$). No other maternal parenting styles were related to maternal child feeding practices.
Francis *et al.* (2001) USA	$n = 197$ mothers Mean mother age = 35.4 years Mean daughter age = 5.4 years Questionnaires; objective measurement of weight and height Cross-sectional	To explore the role of child and maternal characteristics on maternal use of restriction of energy-dense foods and pressure to eat when feeding their daughter.	Restriction and pressure to eat scales on the CFQ (Birch *et al.* 2001).	Baumrind's measure (Baumrind 1971) of general parental control to categorise parenting style as authoritative, authoritarian, or permissive.	More rigid general parenting was related to greater pressure to eat among non-overweight mothers ($\beta = 0.30$, $P < 05$). There was no relationship between pressure to eat among overweight mothers. General parenting was not related to restriction among overweight and non-overweight mothers.
Vereecken *et al.* (2010) Belgium-Flanders	$n = 755$ (91% mothers) Mean mother age = 33.4 years Mean father age not reported Mean child age = 3.5 years Questionnaires Cross-sectional	To investigate the extent to which parent and child characteristics are related to child fruit and vegetable intake.	The subscales of child- and parent-centred feeding strategies on the CFSQ (Hughes *et al.* 2005).	The Parenting Practices Scale's Strayhorn and Weidman 1988) subscales of laxness (permissiveness and inconsistent discipline), overreactivity (exaggerated and unstructured discipline) and support/positive interactions (the extent to which parents have positive interaction with their child).	Parent-centred feeding style was positively associated with parental overreactivity ($r = 0.13$, $P < 0.001$) Child-centred feeding style was negatively correlated with parental overreactivity ($r = –0.11$, $P < 0.01$), and positively related to parental support/positive interactions ($r = 0.27$, $P < 0.001$). Parental laxness was not associated with child- or parent-centred feeding style.

CFQ, Child Feeding Questionnaire; CFSQ, Caregiver's Feeding Styles Questionnaire; PSDQ, Parenting Styles and Dimensions Questionnaire.

Table 2. Studies examining the relationship between maternal personal characteristics and maternal child feeding practices ($N = 13$)

Reference Country	Participant characteristics; study design	Study aim(s)	Measures of maternal child feeding practices	Measures of Maternal personal characteristics correlates	Findings
Anderson *et al.* (2005) USA	$n = 231$ parents (85% mothers) Mean parent age: Hispanic parents were 30.3 years; African-America parents were 32.6 years Mean child age: 4.15 years 130 Hispanic; 101 African American Questionnaires; objective collection of child and parent weight and height cross-sectional	To develop a culturally valid version of the CFQ (Birch *et al.* 2001) for two ethnic minorities.	The restriction, pressure to eat, monitoring, responsibility for feeding, perceived weight of child, concern about child weight scales of the CFQ (Birch *et al.* 2001).	Parents were asked to report their ethnicity and educational achievement (as measured by *high school diploma or less* verse *some college or more*).	African-American parents with lower education were less concerned about their child's weight than more highly educated African-American parents (LSM = 1.79 low ed, 2.61, higher ed, $P < 0.05$). All Hispanic parents had comparable levels of concern about their child's weight (LSM = 2.21 low ed, 2.50 higher ed, $P > 0.05$). Hispanic parents with lower education were more likely to feel responsible for their child's feeding than more highly educated Hispanic parents (LSM = 2.21 low ed, 2.50 higher ed, $P < 0.01$). All African-American parents had comparable levels of responsibility for their child's feeding (LSM = 4.59 low ed, 4.71 higher ed, $P > 0.05$). Parental education and ethnicity were not related to other parental child feeding practices.
Blissett & Haycraft (2008) UK	$n = 48$ pairs of cohabiting parents (96 parents; 48 mothers) Mean mother age = 35.7 years Mean father age = 37.1 years Mean child age = 41.6 months Questionnaires Cross-sectional	To investigate the associations between parenting styles, parent child feeding practices and parent BMI.	Monitoring, restriction and pressure to eat subscales on the CFQ (Birch *et al.* 2001).	Self-reported BMI. The National Statistics Socio-Economic Classification self-coded method. Self-reported educational achievement.	Mothers who continued education after 16 years of age were less likely to use restriction ($r = -0.40$, $P < 0.05$). No other maternal variables were related to maternal child feeding practices.

Blissett *et al*. (2006) UK	$n = 94$ pairs of cohabitating parents (188 parents) Mean parent age = 36.4 years Mean child age = 37.7 months Questionnaires Cross-sectional	To compare paternal and maternal child feeding practices for sons and daughters.	Perceived feeding responsibility, restriction, monitoring and pressure to eat subscales from the CFQ (Birch *et al*. 2001).	Self-reported BMI.	Maternal BMI was not related to maternal child feeding practices among daughters or sons.
De Lauzon-Guillain *et al*. (2009) US and France	$n = 219$ parents (US 97; France 122) Mean father age: US 36.4 years; France 37.8 years Mean mother age not reported Mean child age: US 5 years; France 5.5 years Questionnaires Cross-sectional	To investigate and compare some of the possible motivators of parental child feeding practices in two samples; one from the US and 1 from France.	Nine domains from the CFPQ (Musher-Eizenman & Holub 2007): monitoring, emotional regulation, reward, child control, teaching about nutrition, encouraging balance and variety, restriction for weight reasons, restriction for health reasons, and modelling healthful eating habits.	Parents were identified as living either in France or the US.	Multivariate analysis of parental perceived responsibility, perceptions of child's body weight and eating behaviours revealed that parental restriction for weight reasons (US vs. France: $\beta = 0.24$, $P < 0.01$), using food to regulate child emotions (US vs. France: $\beta = 0.37$, $P < 0.001$), using food as a reward (US vs. France: $\beta = 0.82$, $P < 0.001$), and teaching child about nutrition (US vs. France: $\beta = 0.32$, $P < 0.001$) were used more so by American parents than their French counterparts. None of the other feeding practices differed between countries.
Evans *et al*. (2011) USA	$n = 659$ parents (86% mothers) Mean parent age = 33 years Mean child age = 3.26 years Questionnaires Cross-sectional	To compare the differences in parenting feeding according to practices ethnicity/race, household income, parent education and acculturation.	Using food to calm and pushing child to eat scales on the PFQ Baughcum *et al*. 2001.	Parental ethnicity/race, household income and parent education was reported in questionnaire.	African-American parents ($\beta = 0.11$, $P < 0.05$) and Spanish-speaking Hispanic parents ($\beta = 0.12$, $P < 0.05$) were more likely to use food to calm their children. None of the other feeding practices differed between ethnicity/race, household income or parent education.

Table 2. Continued

Reference Country	Participant characteristics; study design	Study aim(s)	Measures of maternal child feeding practices	Measures of Maternal personal characteristics correlates	Findings
Francis *et al.* (2001) USA	$n = 197$ mothers Mean mother age = 35.4 years Mean daughter age = 5.4 years Questionnaires; objective measurement of weight and height Cross-sectional	To explore the role of child and maternal characteristics on maternal use of restriction of energy-dense foods and pressure to eat when feeding their daughter. This was achieved by examining structural equation models for maternal restriction and pressure to eat, which included the following variables: maternal weight concern and restraint, daughters' adiposity, perceptions of daughters' weight, concern for daughters' weight, family income, maternal education, maternal depression and general parenting style.	Restriction and pressure to eat scales on the CFQ (Birch *et al.* 2001).	Height and weight data was collected by trained staff and then BMI was calculated. Maternal report of combined family income. Maternal report of number of years of education. education.	Family income and maternal education were not associated with pressure to eat among overweight mothers. Family income had a negative relationship with pressure to eat among non-overweight mothers ($\beta = -0.24$, $P < 0.05$). No other variables were related to pressure to eat among non-overweight mothers.
Hughes *et al.* (2005) USA	$n = 231$ parents (85% mothers) Mean parent age = not reported Child age range = 3–5years 101 African-American; 120 Hispanic Questionnaires; objective collection of child weight and height Cross-sectional	To investigate the validity and reliability of the CFSQ (Hughes *et al.* 2005), among low-income families with preschoolers. The CSFQ aims to identify parental feeding styles based on differing level of parental demandingness and responsiveness.	Demandingness and responsiveness scales in the CFSQ (Hughes *et al.* 2005) to generate 4 parent feeding styles; authoritative, authoritarian, indulgent or uninvolved.	Parental ethnicity was reported in questionnaire.	Feeding style varied based on ethnicity ($\chi^2 = 8.55$, $P < 0.05$). Indulgent feeding style was more common among Hispanic parents (62.5%) than African-American parents (37.5%). Uninvolved feeding style was more common among African-American parents (66.7%) than Hispanic parents (33.3%).

Hughes *et al.* (2008) USA	*n* = 718 parents (92.7% mothers) Mean parent age = 31.6 years Mean child age = 4.4 years 43% African-American; 29.1% Hispanic; 27.9% Caucasian Questionnaires; objective collection of child and parent weight and height Cross-sectional	To investigate differences among parental affect and child temperament associated with parental feeding styles used by low-income families.	Demandingness and responsiveness scales in the CFSQ (Hughes *et al.* 2005) to generate four parent feeding styles; authoritative, authoritarian, indulgent or uninvolved.	Parental ethnicity was reported in questionnaire	There was no relationship between parent ethnicity and feeding style.
Jingxiong *et al.* (2009) China	*n* = 430 mothers Mean mother age not reported Child age range = 1–35 months Interview using a questionnaire; objective collection of child height and height Cross-sectional	To identify parental characteristic and feeding practices associated with child overweight among Beijing families.	Questionnaire interview asked mothers about their use of a regular feeding schedule and use of food to soothe their child.	Maternal weight status (normal-weight or overweight). How this information was collected was not reported.	Overweight mothers were more likely to control feeding by using a regular feeding schedule (47.7%, $P < 0.05$), than normal-weight mothers. Normal-weight mothers were more likely to use food to soothe their children than overweight mothers (20.7%, $P < 0.01$).
McPhie *et al.* 2011 Australia	*n* = 175 mothers Mean mother age = 35.69 years Means child age = 2.8 years Questionnaires Cross-sectional	To investigate the maternal child feeding practices, maternal parenting and the mother–child interaction as cross-sectional predictors of child eating behaviours and weight.	The restriction, pressure to eat and monitoring scales of the CFQ (Birch *et al.* 2001).	Maternal weight, educational achievement and family income were reported in questionnaire.	Maternal educational achievement was negatively correlated with monitoring of child's food intake ($r = -0.18$, $P < 0.05$). No other maternal child feeding practices were related to maternal educational achievement. Maternal weight and family income were not related to any maternal child feeding practices.

Table 2. Continued

Reference Country	Participant characteristics; study design	Study aim(s)	Measures of maternal child feeding practices	Measures of Maternal personal characteristics correlates	Findings
Musher-Eizenman *et al.* (2009) USA and France	$n = 219$ parents (131 mothers; US 59; France 72) Mean parent age not reported Mean child age: US 5 years; France 5.5 years Questionnaires; objective collection of child weight and height Cross-sectional	To investigate the relationship among socio-cultural factors and child feeding practices between and within French and American families.	CFPQ (Musher-Eizenman & Holub 2007) monitoring, emotional regulation, reward, child control, teaching nutrition, encouraging balance and variety, restriction for weight and for health reasons scales.	Questionnaire inquiring about parental ethnicity, family income, educational achievement, height and weight. How this information was collected was not reported.	American mothers were more likely to use food to regulate their child's emotions ($\chi^2 = 10.5$, $P < 0.05$), use food as a reward ($\chi^2 = 14.7$, $P < 0.05$), give their child control over eating ($\chi^2 = 34.1$, $P < 0.05$), teach their child about nutrition ($\chi^2 = 15.8$, $P < 0.05$) and encourage balance and variety in their child's diet ($\chi^2 = 7.0$, $P < 0.05$), in comparison with French mothers. French mothers were more likely to monitor their child's food intake ($\chi^2 = 7.7$, $P < 0.05$) and use restriction for weight reasons ($\chi^2 = 20.3$, $P < 0.05$), than American mothers. Higher education was related to reduced use of food as a reward by mothers (OR = 0.03, $P < 0.05$). Mothers with a higher BMI were less likely to teach their child about nutrition (OR = 0.9, $P < 0.05$), encourage balance and variety in their child's diet (OR = 0.9, $P < 0.05$), and model healthful eating behaviours (OR = 0.9, $P < 0.05$). Family income was not related to maternal use of any child feeding practices.

Ventura *et al.* (2010) USA	$n = 32$ (78% mothers; 53% African-American; 28% East Asian; 19% Hispanic or non-Hispanic white) Mean parent age: no reported Mean child age: 4.5 years Questionnaires; qualitative interviews Cross-sectional	To identify the parental child feeding practices and styles of low-income parents with preschoolers.	Three subscale on the FEEDS (Faith *et al.* 2008), anger/frustration, food amount demandingness, food type demandingness.	Ethnicity was presumably identified during qualitative interviews	African-American had significantly higher mean ($M = 20.0$, $P < 0.05$) amount demandingness scores than parents of East Asian ($M = 10.9$, $P < 0.05$) and other ethnic backgrounds ($M = 14.8$, $P < 0.05$). African-American had significantly higher mean type demandingness scores ($M = 20.7$, $P < 0.05$) than parents of East Asian ($M = 9.9$, $P < 0.05$) and other ethnic backgrounds ($M = 14.4$, $P < 0.05$). There were no significant relationships between anger/frustration and parent ethnicity.
Ystrom *et al.* (2012) Norway	$n = 14\,122$ Mean mother age: 33 years Child age range: 6 month to 3 years Questionnaires Longitudinal (measurements taken at 6 months, 18 months and 3 years post-partum).	To investigate the role of maternal negative affectivity, external parental locus of control and control-orientated child feeding practices in child food intake.	The restriction and pressure to eat scales of the CFQ (Birch *et al.* 2001).	Maternal education and weight were reported in questionnaire.	Maternal education was negatively related to pressure to eat ($\beta = -0.01$, $P < 0.01$) and positively related to restriction ($\beta = 0.02$, $P < 0.01$). Maternal weight was negatively related to pressure to eat ($\beta = -0.01$, $P < 0.01$) and restriction ($\beta = -0.01$, $P < 0.01$).

BMI, body mass index; CFPQ, Comprehensive Feeding Practices Questionnaire; CFQ, Child Feeding Questionnaire; ED, education; FEEDS, Feeding Demands Questionnaire; LSM, least squares means; OR, odds ratio; PFQ, Preschooler Feeding Questionnaire.

Table 3. Studies examining the relationship between maternal psychopathology and maternal child feeding practice ($N = 9$)

Reference Country	Participant characteristics; study design	Study aim(s)	Measures of maternal child feeding practices	Measures of maternal psychopathology correlates	Findings
Blissett & Haycraft (2008) UK	$n = 48$ pairs of cohabiting parents (96 parents; 48 mothers) Mean mother age = 35.7 years Mean father age = 37.1 years Mean child age = 41.6 months Questionnaires Cross-sectional	To investigate the associations between parenting styles, parent child feeding practices and parent BMI.	Monitoring, restriction and pressure to eat subscales on the CFQ (Birch *et al.* 2001).	The bulimia, drive for thinness and body dissatisfaction subscales on the EDI-2 Garner 1991).	Maternal bulimia was positively associated with restriction ($r = 0.24$, $P < 0.05$). No other maternal variables were related to maternal child feeding practices.
Blissett & Haycraft (2011) UK	$n = 23$ pairs of cohabitating parents (46 parents; 23 mothers) Mean mother age = 36 years Mean father age = 37 years Mean child age = 37 months Home observations; questionnaires Cross-sectional	This study aimed to examine whether eating disorder symptoms of mothers and fathers showed a relationship with the observed feeding practices and observed children's eating behaviour.	Video recorded home observations of a normal mealtime were coded using the FMCS (Haycraft and Blissett 2008b). The FMCS measures parental verbal pressure to eat, physical prompts to eat, restriction and use of incentives.	Drive for thinness, bulimia and body dissatisfaction scales on the EDI-2 Garner 1991).	Maternal bulimia was related to greater use of verbal pressure to eat ($r = 0.47$, $P < 0.05$). Restriction, physical prompts to eat, and incentives were not related to maternal bulimia. Maternal drive for thinness was related to greater used of physical prompts to eat ($r = 0.42$, $P < 0.05$), and verbal pressure to eat ($r = 0.36$, $P < 0.05$), yet not restriction or incentives. Maternal body dissatisfaction was positively related to use of restriction ($r = 0.39$, $P < 0.05$), and verbal pressure to eat ($r = 0.57$, $P < 0.01$). In contrast, maternal body dissatisfaction was not related to use of physical prompts or incentives for their child to eat.

Blissett *et al*. (2006) UK	$n = 94$ pairs of cohabitating parents (188 parents) Mean parent age = 36.4 years Mean child age = 37.7 months Questionnaires Cross-sectional	To compare paternal and maternal child feeding practices for sons and daughters.	Perceived feeding responsibility, restriction, monitoring and pressure to eat subscales from the CFQ (Birch *et al*. 2001).	Bulimia, drive for thinness and body dissatisfaction scales from the EDI-2 Garner 1991).	Maternal bulimia was positively related to her use of restriction of her daughter's intake ($r = 0.34$, $P < 0.01$). No other maternal variables were related to maternal child feeding practices among daughters. No maternal variables were related to maternal child feeding practices among sons.
De Lauzon-Guillain *et al*. (2009) US and France	$n = 219$ parents (US 97; France 122) Mean father age: US 36.4 years; France 37.8 years Mean mother age not reported Mean child age: US 5 years; France 5.5 years Questionnaires Cross-sectional	To investigate and compare some of the possible motivators of parental child feeding practices in two samples; one from the US and one from France.	Nine domains from the CFPQ (Musher-Eizenman & Holub 2007): monitoring, emotional regulation, reward, child control, teaching about nutrition, encouraging balance and variety, restriction for weight reasons, restriction for health reasons, and modelling healthful eating habits.	Parental restrained uncontrolled and emotional eating on the Dutch Eating Behaviour Questionnaire (Van Strien *et al*. 1986).	Parental restrained eating was related to greater use of monitoring ($\beta = 0.3$, $P < 0.01$), and restriction for weight purposes ($\beta = 0.2$, $P < 0.001$). Parental uncontrolled eating was associated with greater use of restriction for health reasons ($\beta = 0.3$, $P < 0.001$), emotional regulation ($\beta = 0.2$, $P < 0.001$), and encouragement of balance and variety in diet ($\beta = -0.1$, $P < 0.05$). Parental emotional eating was related to greater use of incentives ($\beta = 0.2$, $P < 0.001$). Monitoring, emotional regulation, child control, teaching about nutrition, encouraging balance and variety, restriction for weight reasons, restriction for health reasons, and modelling healthful eating habits were not related to parental emotional eating.

Table 3. Continued

Reference Country	Participant characteristics; study design	Study aim(s)	Measures of maternal child feeding practices	Measures of maternal psychopathology correlates	Findings
Francis *et al.* (2001) USA	$n = 197$ mothers Mean mother age = 35.4 years Mean daughter age = 5.4 years Questionnaires; objective measurement of weight and height Cross-sectional	To explore the role of child and maternal characteristics on maternal use of restriction of energy-dense foods and pressure to eat when feeding their daughter. This was achieved by examining structural equation models for maternal restriction and pressure to eat, which included the following variables: maternal weight concern and restraint, daughters' adiposity, perceptions of daughters' weight, concern for daughters' weight, family income, maternal education, maternal depression and general parenting style.	Restriction and pressure to eat scales on the CFQ (Birch *et al.* 2001).	Weight Concern Scale (Killen *et al.* 1994). Three-Factor Eating Questionnaire's (Stunkard & Messick 1985) restraint scale. Height and weight data was collected by trained staff and then BMI was calculated. Centre for Epidemiologic Studies (Radloff 1977) depression scale.	Maternal weight concern and restraint had a positive relationship with restriction among non-overweight mothers ($\beta = 0.22$, $P < 0.05$) and overweight mothers ($\beta = 0.28$, $P < 05$). Maternal depression was also related to greater restriction among non-overweight mothers ($\beta = 0.33$, $P < 05$). No other variables were related to restriction among overweight and non-overweight mothers Maternal weight concern/restraint and maternal depression were not associated with pressure to eat among overweight mothers.
Haycraft & Blissett (2008a) UK	$n = 214$ parents (107 mothers) Mean mother age = 35 years Mean father age = 37 years Mean child age = 41 months for girls; 42 months for boys Questionnaires Cross-sectional	To investigate the role of parent and child gender in the relationship between parental controlling feeding practices and mental health.	Pressure to eat and restriction scales from the CFQ (Birch *et al.* 2001).	Drive for thinness, bulimia and body dissatisfaction scales in the EDI-2 Garner 1991). BSI's (Derogatis 1993) somatisation, obsession-compulsion, interpersonal insensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism subscales as well as the subsequently calculated Global Severity Index (a measure of current and past level of symptomology, as determined by distress intensity and number of symptoms).	Maternal bulimia was associated positively with restriction of daughter's food intake ($r = 0.32$, $P < 0.01$). No other variables were related to maternal restriction of daughter's food intake. Maternal use of pressure for her daughter to eat was correlated positively with maternal depression ($r = 0.26$, $P < 0.05$), hostility ($r = 0.23$, $P < 0.05$), psychoticism ($r = 0.31$, $P < 0.01$) and Global Severity Index scores ($r = 0.27$, $P < 0.05$). No other variables were related to maternal pressure for her daughter to eat.

					Greater maternal interpersonal insensitivity ($r = 0.27$, $P < 0.05$) and Global Severity Index scores ($r = 0.30$, $P < 0.05$) were associated with pressure for her son to eat. No other variables were related to maternal pressure for her son to eat. Maternal restriction of her son's food intake was correlated positively with maternal phobic anxiety ($r = 0.28$, $P < 0.05$). No other variables were related to maternal restriction of her son's food intake.
Haycraft & Blissett (2011) UK	$n = 96$ parents (48 mothers) Mean mother age = 35 years Mean father age = 37 years Mean child age = 42 months Living in West Midlands or Cambridge; UK Questionnaires Cross-sectional	To investigate predictors of controlling feeding practices by parents of preschoolers.	The CFQ's (Birch *et al.* 2001) monitoring, pressure to eat and restriction scales.	Drive for thinness, bulimia and body dissatisfaction scales from the EDI-2 Garner 1991). The BSI's Global Severity Index (Derogatis 1993).	Maternal eating psychopathology and general psychopathology were not related to maternal monitoring or restriction. Maternal use of pressure for her child to eat was related positively to maternal general psychopathology ($r = 0.38$, $P < 0.01$). Maternal eating psychopathology was not correlated with pressure to eat.

Table 3. Continued

Reference Country	Participant characteristics; study design	Study aim(s)	Measures of maternal child feeding practices	Measures of maternal psychopathology correlates	Findings
Hughes *et al.* (2008) USA	$n = 718$ parents (92.7% mothers) Mean parent age = 31.6 years Mean child age = 4.4 years 43% African-American; 29.1% Hispanic; 27.9% Caucasian Questionnaires; objective collection of child and parent weight and height Cross-sectional	To investigate differences among parental affect and child temperament associated with parental feeding styles used by low-income families.	Demandingness and responsiveness scales in the CFSQ (Hughes *et al.* 2005) to generate 4 parent feeding styles; authoritative, authoritarian, indulgent or uninvolved.	The trait versions of the positive and negative affect scales of the Positive and Negative Affect Schedule (Watson *et al.* 1988).	Negative parental affect was lower among parents with an indulgent feeding style (mean = 19.2) than parents with an authoritarian feeding style (mean = 21.1, $P < 0.05$). Parents with an uninvolved feeding style tended to have lower positive affect (mean = 32.9) than parents with an authoritative feeding style (mean = 36.5, $P < 0.05$) or indulgent feeding style (mean = 36.0, $P < 0.05$).
Ystrom *et al.* (2012) Norway	$n = 14\,122$ Mean mother age: 33 years Child age range: 6 months to 3 years Questionnaires Longitudinal (measurements taken at 6 months, 18 months and 3 years post-partum).	To investigate the role of maternal negative affectivity, external parental locus of control and control-orientated child feeding practices in child food intake.	The restriction and pressure to eat scales of the CFQ (Birch *et al.* 2001).	Negative affectivity was assessed using a combination of measures. These included anxiousness/depression scales on the short version of the Hopkins Symptom Checklist (Strand *et al.* 2003), anger subscale of the Differential Emotions Scale (Izard *et al.* 1993) and the short version of the Rosenberg Self-Esteem Scale (Rosenberg 1989).	Using structural equation modelling, maternal negative affectivity was related positively to external parental locus of control ($\beta = 0.55$, $P < 0.01$), which in turn was related to pressure to eat ($\beta = 0.29$, $P < 0.01$) and restriction ($\beta = 0.34$, $P < 0.01$).

BMI, body mass index; BSI, Brief Symptom Inventory; CFPQ, Comprehensive Feeding Practices Questionnaire; CFQ, Child Feeding Questionnaire; EDI-2, Eating Disorder Inventory-2; FMCS, Family Mealtime Coding System.

Results

Association between maternal parenting and maternal child feeding practices

Three cross-sectional studies were included in the review of the association between maternal parenting and maternal child feeding practices (Francis *et al*. 2001; Blissett & Haycraft 2008; Vereecken *et al*. 2010) and are presented in Table 1. The samples included in these studies differed: equal numbers of mothers and fathers (Blissett & Haycraft 2008), mothers of daughters only (Francis *et al*. 2001), and mothers but not fathers (Vereecken *et al*. 2010). In addition, predominately Caucasian samples were included in these studies (Francis *et al*. 2001; Blissett & Haycraft 2008; Vereecken *et al*. 2010), and therefore cultural or ethnic variations were not considered. Mothers in all three of the studies were in their mid-30s (Francis *et al*. 2001; Blissett & Haycraft 2008; Vereecken *et al*. 2010).

Maternal parenting was measured differently across each of these studies. Blissett & Haycraft (2008) used the Parenting Styles and Dimensions Questionnaire (PSDQ) by Robinson *et al*. (2001); Francis *et al*. (2001) used Baumrind's (1971) measure of general parental control and Vereecken *et al*. (2010) used parenting laxness, overreactivity and support/positive interaction dimensions from the Parent Practices Scale (PPS) by Strayhorn and Weidman (1988).

The study by Francis *et al*. (2001) suggested that mothers who have a more demanding or controlling (i.e. rigid) parenting style might be more likely to put pressure on their child to eat. Findings by Vereecken *et al*. (2010) also supported this association as maternal discipline (which is seen as equivalent to demandingness in this review) was related positively to parent-centred feeding strategies (e.g. pressure to eat and restriction). In contrast, Blissett & Haycraft (2008) did not find an association between maternal parenting and maternal pressure to eat, but reported a positive relationship between permissive/indulgent parenting style and maternal restriction.

These three cross-sectional studies were assessed for risk of bias in the reporting of sample characteristics and inclusion of significant and non-significant results. One of the studies did not report selected sample characteristics including father age (9% of the primary caregivers of this sample were fathers), and socioeconomic variables such as family income and maternal educational level or parental weight status (Vereecken *et al*. 2010); consequently, the capacity to generalise the findings of this study is reduced.

Associations between maternal personal characteristics and maternal child feeding practices

Twelve cross-sectional studies and one longitudinal study evaluated the relationships between maternal personal characteristics and maternal child feeding practices (Francis *et al*. 2001; Anderson *et al*. 2005; Hughes *et al*. 2005, 2008; Blissett *et al*. 2006; Blissett & Haycraft 2008; De Lauzon-Guillain *et al*. 2009; Jingxiong *et al*. 2009; Musher-Eizenman *et al*. 2009; Ventura *et al*. 2010; Evans *et al*. 2011; McPhie *et al*. 2011; Ystrom *et al*. 2012); these studies are presented in Table 2. While nine studies included samples of mothers and fathers (Anderson *et al*. 2005; Hughes *et al*. 2005, 2008; Blissett *et al*. 2006; Blissett & Haycraft 2008; De Lauzon-Guillain *et al*. 2009; Musher-Eizenman *et al*. 2009; Ventura *et al*. 2010; Evans *et al*. 2011), they were mostly comprised of mothers or could (due to separate analyses) easily be separated and results individually interpreted for mothers. One study included mothers of daughters only in their sample (Francis *et al*. 2001). Six nationalities were represented across the studies: Australian, Norwegian, American, French, British and Chinese.

Seven studies examined the relationship between maternal ethnicity and maternal child feeding practices (Anderson *et al*. 2005; Hughes *et al*. 2005, 2008; De Lauzon-Guillain *et al*. 2009; Musher-Eizenman *et al*. 2009; Ventura *et al*. 2010; Evans *et al*. 2011), with five studies reporting at least partial support for this association (Anderson *et al*. 2005; Hughes *et al*. 2005; De Lauzon-Guillain *et al*. 2009; Musher-Eizenman *et al*. 2009; Ventura *et al*. 2010; Evans *et al*. 2011). Using the CFSQ, Hughes and colleagues report mixed associations with ethnicity. While one of their studies revealed differences in the use of uninvolved

and indulgent feeding practices between African-American and Hispanic mothers (Hughes *et al.* 2005), this finding was not replicated in a subsequent study (Hughes *et al.* 2008).

A significant relationship between maternal socioeconomic background, as measured by maternal education and/or family income, and maternal child feeding practices was reported in seven studies (Francis *et al.* 2001; Anderson *et al.* 2005; Blissett & Haycraft 2008; Musher-Eizenman *et al.* 2009; Evans *et al.* 2011; McPhie *et al.* 2011; Ystrom *et al.* 2012). Family income was related negatively to maternal use of pressure to eat among non-overweight mothers (Francis *et al.* 2001). Higher maternal education was associated with lower use of maternal restriction (Blissett & Haycraft 2008) and monitoring (McPhie *et al.* 2011). In contrast, lower maternal education was related to higher use of food as an incentive (Musher-Eizenman *et al.* 2009), less concern about child's weight among African-American mothers, and to greater perceived responsibility for feeding the child (i.e. responsibility for the frequency, portion size, kind of foods their child's food intake) among Hispanic mothers (Anderson *et al.* 2005). However, one study did not find a relationship between maternal education/income and maternal feeding practice (Evans *et al.* 2011).

Seven studies investigated the relationship between maternal weight and maternal child feeding practices, with inconsistent findings (Francis *et al.* 2001; Blissett *et al.* 2006; Blissett & Haycraft 2008; Jingxiong *et al.* 2009; Musher-Eizenman *et al.* 2009; McPhie *et al.* 2011; Ystrom *et al.* 2012). Jingxiong *et al.* (2009) and Musher-Eizenman *et al.* (2009) found a significant negative relationship between maternal weight and mothers teaching their children about nutrition, encouraging balance and variety in their child's diet, and modelling healthful eating behaviours. In contrast, Blissett & Haycraft (2008), Blissett *et al.* (2006) and McPhie *et al.* (2011) did not find an association between maternal weight and how mothers feed their children. However, these studies were quite different; one sample consisted of Chinese mothers of infants through to preschoolers (Jingxiong *et al.* 2009), one was comprised of Australian mothers and their preschoolers (McPhie *et al.* 2011), and the two other samples included British families with preschoolers (Blissett *et al.* 2006; Blissett & Haycraft 2008).

The risk of bias across these 13 studies was assessed, and despite including some maternal personal characteristics, five studies did not provide information on the age, weight status or socioeconomic background of the mothers in their samples (Haycraft & Blissett 2008a; De Lauzon-Guillain *et al.* 2009; Jingxiong *et al.* 2009; Ventura *et al.* 2010; Evans *et al.* 2011). One study did not use a previously validated instrument to measure maternal child feeding practices, and despite including maternal child feeding practices and maternal weight status in their analyses, Jingxiong *et al.* (2009) only provided limited information on how these variables were assessed. To better understand the appropriateness of using this measure, it is necessary to validate this tool in future studies; until then, results and associations from this study should be interpreted with caution.

Associations between maternal psychopathology and maternal child feeding practices

Eight cross-sectional studies and one longitudinal study evaluated the relationships between maternal psychopathology and maternal child feeding practices (Francis *et al.* 2001; Blissett *et al.* 2006; Blissett & Haycraft 2008, 2011; Hughes *et al.* 2008; Haycraft & Blissett 2008a, 2011; De Lauzon-Guillain *et al.* 2009; Ystrom *et al.* 2012); these studies are presented in Table 3. American, British, Norwegian and French samples were used across these studies. Again, the majority of studies involved samples of mothers and fathers (Blissett *et al.* 2006; Blissett & Haycraft 2008; Hughes *et al.* 2008; De Lauzon-Guillain *et al.* 2009; Haycraft & Blissett 2011), and most studies either separately analysed mothers from the fathers or their sample was comprised mainly of mothers. One sample was restricted to mothers of daughters only (Francis *et al.* 2001).

The relationship between maternal eating psychopathology (e.g. bulimia, drive for thinness, body dissatisfaction) and maternal child feeding practices was assessed in seven studies (Francis *et al.* 2001; Blissett *et al.* 2006; Blissett & Haycraft 2008, 2011; Haycraft &

Blissett 2008a, 2011; De Lauzon-Guillain *et al*. 2009).While five studies used the Eating Disorder Inventory-2 (EDI-2) by Garner (1991), to assess maternal eating psychopathology (Blissett *et al*. 2006; Blissett & Haycraft 2008, 2011; Haycraft & Blissett 2008a, 2011), De Lauzon-Guillain *et al*. (2009) used the Dutch Eating Behaviour Questionnaire (DEBQ; Van Strien *et al*. 1986), Francis *et al*. (2001) used the Weight Concern Scale (WCS; Killen *et al*. 1994) and the Three-Factor Eating Questionnaire (TFEQ; Stunkard & Messick 1985). The majority of these studies found at least partial support for an association between maternal eating psychopathology and maternal child feeding practices (Francis *et al*. 2001; Blissett *et al*. 2006; Blissett & Haycraft 2008, 2011; Haycraft & Blissett 2008a; De Lauzon-Guillain *et al*. 2009). Maternal bulimia was associated positively with restriction of daughter's food intake, yet no maternal eating psychopathology variables were related to the use of this maternal child feeding practice among sons (Haycraft & Blissett 2008a). In contrast, Haycraft & Blissett (2011) did not report a relationship between maternal eating psychopathology and maternal child feeding practices.

Five studies examined the association between general maternal psychopathology and maternal child feeding practices (Francis *et al*. 2001; Hughes *et al*. 2008; Haycraft & Blissett 2008a, 2011; Ystrom *et al*. 2012). Across these studies, a variety of mental health concerns were assessed (i.e. depression, hostility, psychoticism, interpersonal insensitivity, phobic anxiety, general psychopathology, and positive and negative affects). However, for simplicity, and to differentiate from the previously discussed eating psychopathology, this diverse range of mental health concerns will be termed 'general maternal psychopathology' here. Like maternal eating psychopathology, there was variation in how general maternal psychopathology was assessed within these studies. Two studies by Haycraft & Blissett (2008a, 2011) used scales from the Brief Symptom Inventory (BSI; Derogatis 1993), one study used the Centre of Epidemiologic Studies depression scale (CES-D) by Radloff (1977) (Francis *et al*. 2001), and another used the Positive and Negative Affect Schedule (PANAS) by Watson *et al*. (1988) (Hughes *et al*. 2008). In addition, Ystrom *et al*. (2012) combined measures of anxiousness/depression (short version of the Hopkins Symptom Checklist by Strand *et al*. 2003), anger (Anger subscale of the Differential Emotions Scale by Izard *et al*. 1993) and self-esteem (short version of the Rosenberg Self-Esteem Scale, by Rosenberg 1989) to create a negative affectivity variable. All five studies demonstrated some evidence for the relationship between general maternal psychopathology and maternal child feeding practices. For example, maternal general psychopathology was related positively to maternal pressure for her child to eat, and not related to maternal restriction and monitoring (Haycraft & Blissett 2011). In contrast, Francis *et al*. (2001) and Haycraft & Blissett (2008a) found that maternal general psychopathology was related positively to maternal restriction of the daughter's or child's food intake, respectively.

The risk of bias across these nine studies was assessed, and De Lauzon-Guillain *et al*. (2009), and Haycraft & Blissett (2008a) included some maternal personal characteristics information, but did not report on maternal age, weight status or socioeconomic background specifically. As such, identifying the relevant sample for which these results apply is somewhat ambiguous.

Discussion

To date, research has implicated maternal child feeding behaviours in the development of childhood obesity. To a lesser extent, the existing literature has also focused on maternal parenting, personal characteristics and psychopathology as correlates of maternal feeding practices during the formative preschool years. Understanding the role of these proximal maternal correlates in the development of child eating habits and weight gain patterns may inform preventative efforts to reduce childhood obesity.

Summary of findings

The findings of the studies in this review appear to support a relationship between maternal parenting and maternal child feeding practices. However, given the paucity of studies and inconsistency in how

maternal parenting is conceptualised and subsequently measured, only tentative conclusions can be drawn. Two out of the three studies support the hypothesis that maternal parenting control and demandingness are related positively to controlling maternal child feeding practices, including pressure to eat and restriction (Francis *et al*. 2001; Vereecken *et al*. 2010).

The findings of this review also showed that maternal personal characteristics are significantly associated with maternal child feeding practices. More specifically, there was evidence to suggest that maternal SES, as determined by maternal education or family income, and ethnicity are correlated with how mothers feed their children. Both maternal SES and culture may influence a mother's knowledge, beliefs and/or motivation regarding maternal child feeding practices (Anderson *et al*. 2005; Hendrie *et al*. 2008; Kumanyika 2008; De Lauzon-Guillain *et al*. 2009). In contrast, the empirical support for maternal weight as a correlate of maternal child feeding practices was inconsistent.

Additionally, the findings of this review suggest that maternal general and eating psychopathology are associated with maternal child feeding practices. That is, maternal eating psychopathology was more often found to be associated with greater use of maternal restriction, and maternal general psychopathology tended to be related positively to maternal pressure to eat. Therefore, it appears that both maternal eating and general psychopathology are linked to greater control and reduced sensitivity in how mothers feed their children (Francis *et al*. 2001; Blissett *et al*. 2006; Haycraft & Blissett 2008a, 2011; Blissett & Haycraft 2011), which may disrupt the child's ability to self-regulate their food intake based on internal hunger cues (Johnson & Birch 1994; DiSantis *et al*. 2011). This disturbance in child self-regulation may encourage child eating behaviours associated with excessive weight gain.

Limitations of the studies reviewed and implications for future research

This review highlighted a number of methodological issues, the first of which is the wide variation in how maternal variables were measured; this was particularly true for maternal parenting and maternal child feeding practices. For example, all three studies that investigated the relationship between maternal parenting and maternal child feeding practices used a different instrument or conceptualisation of parenting. Similarly, there were six different measures used to assess maternal child feeding practices across all studies included in this review. This lack of consistency in study measures reduces the comparability of results among studies. In addition, Jingxiong *et al*. (2009) did not use a validated instrument to measure maternal child feeding practices.

All except one of the studies included in this review were cross-sectional. As such, neither the directionality of the relationships between the maternal correlates and maternal child feeding practices can be explicitly determined, nor the long-term relationships between maternal correlates and maternal child feeding practices. Moreover, the studies included in this review had relatively small sample sizes, thereby restricting the generalisation and accuracy of their findings. Many of the studies focused only on simple correlations and often did not adjust for covariates. Collectively, these issues may compromise the strength of the findings among the reviewed studies.

A final methodological limitation was the variability of parent and child gender across the samples. For example, 10 studies included mothers and father, two studies examined daughters and sons separately (Blissett *et al*. 2006; Haycraft & Blissett 2008a), while another only included daughters (Francis *et al*. 2001). The results of Haycraft & Blissett (2008a) and Blissett *et al*. (2006) demonstrated that the role of maternal child feeding practices varies depending on child gender.

Given these methodological limitations, future research may benefit from unifying the conceptualisation, and subsequent measurement, of maternal child feeding practices to improve the comparability of findings across studies. In addition, large longitudinal studies are needed to establish directionality and the pathways linking maternal correlates of how mothers feed their children to child eating and

weight. Furthermore, future reviews may benefit from exploring the role of child correlates of maternal child feeding practices. For example, the mother–child interaction has been shown to be related to preschooler weight (Washington *et al*. 2010; McPhie *et al*. 2011), and Skouteris *et al*. (2012) proposed childhood obesity research move from a top-down to a more interactive relationship-based approach when examining the influence of parents.

Limitations of the scope of this review

The primary limitation of the current review was it only concentrated on a restricted selection of maternal correlates associated with maternal child feeding practices. Findings of existing research (Francis *et al*. 2001; Haycraft & Blissett 2008a, 2011; Musher-Eizenman *et al*. 2009) and the ecological model (Bronfenbrenner 1993; Harrison *et al*. 2011) suggest that a wide range of child, family and community variables are likely to influence child weight status. For example, previous research has shown that maternal cognition and beliefs, such as perceptions or concerns of their children's body size are related to maternal child feeding practices (Brann & Skinner 2005; McCabe *et al*. 2007) and child weight (Davison & Birch 2001; Spruijt-Metz *et al*. 2002). Similarly, personal characteristics not considered in this review, such as maternal employment, maternal parity or household composition, are also likely to be key correlates of feeding practices. As such, other important avenues for further review are the pathways between child, family or environmental factors and maternal child feeding practices.

Additionally, the focus of the current review did not extend to the role of paternal correlates and paternal child feeding practices. While most research undertaken in this area has included mothers as the primary caregivers, fathers have received markedly less attention; research focused specifically on the paternal influences of preschool children's weight gain, overweight and obesity is needed (Fraser *et al*. 2011).

Finally, the grouping of a wide range of mental health concerns into a single category of maternal general psychopathology may have impeded coherent associations from being identified. The diverse range of maternal mental health concerns investigated in the studies included in the current review suggests this maternal correlate warrants further attention.

Implications for interventions

The maternal correlates focused on in the current review are not easily changeable. However, identifying mothers at risk for developing or performing unhealthy feeding practices is important and may allow for intervention programmes to target their needs. For example, different interventions may be needed for families from various ethnic/cultural groups, or socioeconomic backgrounds. Similarly, interventions addressing maternal pressure to eat for mothers with general psychopathology, and restriction of daughters' food intake for mothers with eating psychopathology may be beneficial. Likewise, it may be valuable for interventions to approach maternal child feeding practices from within the context of parenting. Tailoring interventions that aim to modify maternal feeding practices to the needs of the mothers in the target group is likely to enhance the effectiveness of childhood obesity prevention programmes.

Similarly, the results of Blissett *et al*. (2006) and Haycraft & Blissett (2008a) highlight the need to continue stratifying study results based on child gender in future childhood obesity research; that is, gender effects need to be considered when designing interventions. In particular, child gender appears to have a role in studies examining the relationship between maternal eating psychopathology and maternal child feeding practices. As such, mothers who report eating psychopathology tend to use controlling feeding practices more often with daughters than sons (Blissett *et al*. 2006; Haycraft & Blissett 2008a). Again, accounting for the potential interaction between maternal child feeding practices and child gender may be beneficial when designing childhood obesity prevention programmes.

Conclusions

The role of maternal influences, particularly maternal feeding practices, in the development of childhood

obesity, is complex and the pathways that contribute to child weight gain require further understanding. However, the findings of this review suggest that maternal parenting and maternal characteristics (personal and psychopathology) are likely to be correlated with maternal child feeding practices. Future childhood obesity research needs to account for these maternal variables when examining the determinants of child eating and weight gain. By doing so, the multidimensional impact of maternal behaviours on child obesity risk will be better understood. This understanding will inform the design and implementation of interventions in terms of tailoring the content for particular groups.

Source of funding

None.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

All authors were involved in the conceptualisation, interpretation of findings and writing of this paper.

References

Anderson C.B., Hughes S.O., Fisher J.O. & Nicklas T.A. (2005) Cross-cultural equivalence of feeding beliefs and practices: the psychometric properties of child feeding questionnaire among Blacks and Hispanics. *Preventive Medicine* **41**, 521–531.

Baughcum A.E., Powers S.W., Johnson S.B., Chamberlin L.A., Deeks C.M., Jain A. *et al.* (2001) Maternal feeding practices and concerns and their relationships to overweight in early childhood. *Journal of Developmental and Behavioral Pediatrics* **22**, 391–408.

Baumrind D. (1971) Current patterns of parental authority. *Developmental Psychology* **4**, 1–103.

Birch L.L. & Fisher J.O. (2000) Mothers' child-feeding practices influence daughters' eating and weight. *The American Journal of Clinical Nutrition* **71**, 1054–1061.

Birch L.L., Fisher J.O., Grimm-Thomas K., Markey C.N., Sawyer R. & Johnson S.L. (2001) Confirmatory factor analysis of Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite* **36**, 201–210.

Blissett J. & Haycraft E. (2008) Are parenting style and controlling feeding practices related? *Appetite* **50**, 477–485.

Blissett J. & Haycraft E. (2011) Parental eating disorder symptoms and observation of mealtime interactions with children. *Journal of Psychosomatic Research* **70**, 368–371.

Blissett J., Meyer C. & Haycraft E. (2006) Maternal and paternal controlling feeding practices with male and female children. *Appetite* **47**, 212–219.

Brann L.S. & Skinner J.D. (2005) More controlling child-feeding practices are found among parents of boys with an average body mass index compared with parents of boys with a high body mass index. *Journal of the American Dietetic Association* **105**, 1411–1416.

Bronfenbrenner U. (1993) Ecological model of human development. In: *Readings on the development of children* (eds M. Gauvain & M. Cole), 2nd edn, pp 37–43. W. H. Freeman & Co.: New York, NY.

Campbell K.J., Crawford D.A. & Ball K. (2006) Family food environment and dietary behaviors likely to promote fatness in 5–6 year-old children. *International Journal of Obesity* **30**, 1272–1280.

Chen J.-L. & Kennedy C. (2004) Family functioning, parenting style, and Chinese children's weight status. *Journal of Family Nursing* **10**, 262–279.

Clark H.R., Goyder E., Bissell P., Blank L. & Peters J. (2007) How do parents' child-feeding behaviours influence child weight? Implications for childhood obesity policy. *Journal of Public Health* **29**, 132–141.

Crouch P., O'Dea J.A. & Battisti R. (2007) Child feeding practices and perceptions of childhood overweight and childhood obesity risk among mothers of preschool children. *Nutrition and Dietetics* **64**, 151–158.

Davison K.K. & Birch L.L. (2001) Weight status, parent reaction, and self-concept in five-year-old girls. *Pediatrics* **107**, 46–53.

De Lauzon-Guillain B., Musher-Eizenman D., Leporc E., Holub S. & Charles M.A. (2009) Parental feeding practices in the United States and in France: relationships with child's characteristics and parent's eating behavior. *Journal of the American Dietetic Association* **109**, 1064–1069.

de Onis M., Blössner M. & Borghi E. (2010) Global prevalence and trends of overweight and obesity among preschool children. *The American Journal of Clinical Nutrition* **92**, 1257–1264.

Derogatis L.R. (1993) *Brief Symptom Inventory: Administration, Scoring and Procedures Manual*, 4th edn, National Computer Systems: Minneapolis, MN.

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. *International Journal of Obesity* **35**, 480–492.

Evans A., Seth J.G., Smith S., Harris K.K., Loyo J., Spaulding C. *et al*. (2011) Parental feeding practices and concerns related to child underweight, picky eating, and using food to calm differ according to ethnicity/race, acculturation, and income. *Maternal and Child Health Journal* **15**, 899–909.

Faith M.S., Berkowitz R.I., Stallings V.A., Kerns J., Storey M. & Stunkard A.J. (2004) Parental feeding attitudes and styles and child body mass index: prospective analysis of a gene-environment interaction. *Pediatrics* **114**, e429–e436.

Faith M.S., Storey M., Kral T.V. & Pietrobelli A. (2008) The feeding demands questionnaire: assessment of parental demand cognitions concerning parent child feeding relations. *Journal of the American Dietetic Association* **108**, 624–630.

Farrow C.V. & Blissett J. (2008) Controlling feeding practices: cause or consequence of early child weight? *Pediatrics* **121**, e164–e169.

Fisher J.O. & Birch L.L. (1999a) Restricting access to food and children's eating. *Appetite* **32**, 405–419.

Fisher J.O. & Birch L.L. (1999b) Restricting access to palatable foods affects children's behavioral response, food selection, and intake. *The American Journal of Clinical Nutrition* **69**, 1264–1272.

Fisher J.O., Mitchell D.C., Smiciklas-Wright H. & Birch L.L. (2002) Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association* **102**, 58–64.

Francis L.A., Hofer S.M. & Birch L.L. (2001) Predictors of maternal child-feeding style: maternal and child characteristics. *Appetite* **37**, 231–243.

Fraser J., Skouteris H., McCabe M., Ricciardelli L., Milgrom J. & Baur L. (2011) Paternal influences on childhood obesity: a systematic review of the literature. *Fathering* **9**, 252–267.

Galloway A.T., Fiorito L., Lee Y. & Birch L.L. (2005) Parental pressure, dietary patterns, and weight status among girls who are 'picky eaters'. *Journal of the American Dietetic Association* **105**, 541–548.

Galloway A.T., Fiorito L.M., Francis L.A. & Birch L.L. (2006) 'Finish your soup': counterproductive effects of pressuring children to eat on intake and affect. *Appetite* **46**, 318–323.

Garner D.M. (1991) *Eating Disorder Inventory 2: Professional Manual*. Psychological Assessment Resources: Odessa, FL.

Gregory J.E., Paxton S.J. & Brozovic A.M. (2010) Maternal feeding practices, child eating behaviour and body mass index in preschool-aged children: a prospective analysis. *The International Journal of Behavioral Nutrition and Physical Activity* **7**, 55–64.

Gubbels J.S., Kremers S.P.J., Stafleu A., Dagnelie P.C., Goldbohm R.A., de Vries N.K. *et al*. (2009) Diet-related restrictive parenting practices. Impact on dietary intake of 2-year-old children and interactions with child characteristics. *Appetite* **52**, 423–429.

Harrison K., Bost K.K., McBride B.A., Dovovan S.M., Grigsby-Toussaint D.S., Kim J. *et al*. (2011) Toward a developmental conceptualization of contributors to overweight and obesity in childhood: the six-C's model. *Child Development Perspectives* **5**, 50–58.

Haycraft E. & Blissett J. (2008a) Controlling feeding practices and psychopathology in a non-clinical sample of mothers and fathers. *Eating Behaviors* **9**, 484–492.

Haycraft E. & Blissett J. (2008b) Maternal and paternal controlling feeding practices: reliability and relationships with BMI. *Obesity (Silver Spring, Md.)* **16**, 1552–1158.

Haycraft E. & Blissett J. (2011) Predictors of parental and maternal controlling feeding practices with 2- to 5-year-old children. *Journal of Nutrition Education and Behavior* doi:10.1016/j.jneb.2010.03.001.

Hendrie G.A., Coveney J. & Cox D. (2008) Exploring nutrition knowledge and the demographic variation in knowledge level in an Australian community sample. *Public Health Nutrition* **11**, 1365–1371.

Hughes S.O., Power T.G., Fisher J.O., Mueller S. & Nicklas T.A. (2005) Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite* **44**, 83–92.

Hughes S.O., Shewchuk R.M., Baskin M.L., Nicklas T.A. & Qu H. (2008) Indulgent feeding style and children's weight status in preschool. *Journal of Developmental and Behavioral Pediatrics* **28**, 403–410.

Izard C.E., Libero D.Z., Putnam P. & Haynes O.M. (1993) Stability of emotion experiences and their relations to traits of personality. *Journal of Personality and Social Psychology* **64**, 847–860.

Jansen E., Mulkens S. & Jansen A. (2007) Do not eat the red food!: prohibition of snacks leads to their relatively higher consumption in children. *Appetite* **47**, 572–577.

Jingxiong J., Rosenqvist U., Huishan W., Koletzko B., Guangli L., Jing H. *et al*. (2009) Relationship of parental characteristics and feeding practice to overweight in infants and young children in Beijing, China. *Public Health Nutrition* **12**, 973–978.

Johnson S.L. & Birch L.L. (1994) Parents' and children's adiposity and eating style. *Pediatrics* **94**, 653–661.

Killen J.D., Taylor C.B., Hayward C., Wilson D., Haydel K., Hamme L. *et al*. (1994) Pursuit of thinness and onset of

eating disorder symptoms in a community sample of adolescent girls: a three-year prospective analysis. *The International Journal of Eating Disorders* **16**, 227–238.

Kröller K. & Warschburger P. (2008) Associations between maternal feeding style and food intake of children with a higher risk of overweight. *Appetite* **51**, 166–172.

Kumanyika S.K. (2008) Environmental influences on childhood obesity: ethnicity and cultural influences in context. *Physiology and Behavior* **94**, 61–70.

Liberati A., Altman D.G., Tetzlaff J., Mulrow C., Gøtzsche P.C., Ioannidis J.P.A. *et al*. (2009) The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Medicine* **6**, e1000100. doi: 10.1371/journal.pmed.1000100.

Matheson D.A., Robinson T.N., Varady A. & Killen J.D. (2006) Do Mexican-American mothers' food-related parenting practices influence their children's weight and dietary intake? *Journal of the American Dietetic Association* **106**, 1861–1865.

McCabe M.P., Ricciardelli L.A., Stanford J., Holt K., Keegan S. & Miller L. (2007) Where is all the pressure coming from? Messages from mothers and teachers about preschool children's appearance, diet and exercise. *European Eating Disorders Review* **15**, 221–230.

McDermott B.M., Mamun A.A., Najman J.M., Williams G.M., O'Callaghan M.J. & Bor W. (2008) Preschool children perceived by mothers as irregular eaters: physical and psychosocial predictors from a birth cohort study. *Journal of Developmental and Behavioral Pediatrics* **29**, 197–205.

McPhie S., Skouteris H., McCabe M., Ricciardelli L.A., Milgrom J., Baur L.A. *et al*. (2011) Maternal correlates of preschool child eating behaviours and body mass index: a cross-sectional study. *International Journal of Pediatric Obesity* **6**, 476–480.

Moens E., Braet C., Bosmana G. & Rosseel Y. (2009) Unfavourable family characteristics and their associations with childhood obesity: a cross-sectional study. *European Eating Disorders Review* **17**, 315–313.

Musher-Eizenman D.R. & Holub S.C. (2007) Comprehensive Feeding Practices Questionnaire: validation of a new measure of parental feeding practices. *Journal of Pediatric Psychology* **32**, 960–972.

Musher-Eizenman D.R., De Lauzon-Guillain B., Holub S.C., Leporc E. & Charles M.A. (2009) Child and parent characteristics related to parental feeding practices. A cross-cultural examination in the US and France. *Appetite* **52**, 89–95.

Ogden J., Reynolds R. & Smith A. (2006) Expanding the concept of parental control: a role for overt and covert control in children's snaking behavior? *Appetite* **47**, 100–106.

Olvera N. & Power T.G. (2010) Parenting styles and obesity in Mexican American children: a longitudinal study. *Journal of Pediatric Psychology* **35**, 243–249.

Orrell-Valente J.K., Hill L.G., Brechwald W.A., Dodge K.A., Pettit G.S. & Bates J.E. (2007) 'Just three more bites': an observational analysis of parents' socialization of children's eating at mealtime. *Appetite* **48**, 37–45.

Parsons T.J., Power C., Logan S. & Summerbell C.D. (1999) Childhood predictors of adult obesity: a systematic review. *International Journal of Obesity* **23**, S1–S107.

Powers S.W., Chamberlin L.A., Schaick K.B., Sherman S.N. & Whitaker R.C. (2006) Maternal feeding strategies, child eating behaviours, and child BMI in low-income African-American preschoolers. *Obesity (Silver Spring, Md.)* **14**, 2026–2033.

Radloff L.S. (1977) The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement* **1**, 385–401.

Rhee K. (2008) Childhood overweight and the relationship between parent behaviours, parenting style and family functioning. *The Annals of the American Academy of Political and Social Science* **615**, 12–37.

Rhee K.E., Lumeng J.C., Appugliese D.P., Kaciroti N. & Bradley R.H. (2006) Parenting styles and overweight status in first grade. *Pediatrics* **117**, 2047–2054.

Robinson C.C., Mandelco B., Olsen S.F. & Hart C.H. (2001) The Parenting Styles and Dimensions Questionnaire (PSDQ). In: *Handbook of family measurement techniques: Vol. 3. Instruments and index* (eds B.F. Perlmutter, J. Touliatos & G.W. Holden), pp. 319–321. Sage: Thousand Oaks, CA.

Rosenberg M. (1989) *Society and the adolescent self image, Rev*. Wesleyan University Press: Middletown, CT.

Savage S.J., Fisher J.O. & Birch L.L. (2007) Parental influence on eating behaviour: conception to adolescence. *The Journal of Law, Medicine and Ethics* **35**, 22–34.

Skouteris H., McCabe M., Ricciardelli L., Milgrom J., Baur L., Aksan N. *et al*. (2012) Parent–child interactions and obesity prevention: a systematic review of the literature. *Early Child Development and Care* **182**, 153–174.

Spruijt-Metz D., Lindquist C.H., Birch L.L., Fisher J.O. & Goran M.I. (2002) Relation between mothers' child-feeding practices and children's adiposity. *The American Journal of Clinical Nutrition* **75**, 581–586.

Strand B.H., Dalgard O.S., Tambs K. & Rognerud M. (2003) Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nordic Journal of Psychiatry* **57**, 113–118.

Strayhorn J.M. & Weidman C.S. (1988) A parent practices scale and its relation to parent and child mental health. *Journal of the American Academy of Child and Adolescent Psychiatry* **27**, 613–618.

Stunkard A.J. & Messick S. (1985) The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research* **29**, 71–83.

Van Strien T., Frijters J.E.R., Bergers G.P.A. & Defares P.B. (1986) The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *The International Journal of Eating Disorders* **5**, 295–315.

Ventura A.K. & Birch L.L. (2008) Does parenting affect children's eating and weight status? *The International Journal of Behavioral Nutrition and Physical Activity* **5**, 15.

Ventura A.K., Gromis J.C. & Lohse B. (2010) Feeding practices and styles used by a diverse sample of low-income parents of preschool-age children. *Journal of Nutrition Education and Behavior* **42**, 242–249.

Vereecken C., Rovner A. & Maes L. (2010) Associations of parenting styles, parenting feeding practices and child characteristics with young children's fruit and vegetable consumption. *Appetite* **55**, 589–596.

Vereecken C.A., Keukelier E. & Maes L. (2004) Influence of mother's educational level of food parenting practices and food habits of young children. *Appetite* **43**, 93–103.

Washington P.S., Reifsnider E., Bishop S.L., Ethington M.D. & Ruffin R.E. (2010) Changes in family variables among normal and overweight preschoolers. *Issues in Comprehensive Pediatric Nursing* **33**, 20–38.

Watson D., Clark L.A. & Tellegen A. (1988) Development and validation of brief measures of positive and negative affect: the PANAS *scales*. *Journal of Personality and Social Psychology* **54**, 1063–1070.

Ystrom E., Barker M. & Vollrath M.E. (2012) Impact of mothers' negative affectivity, parenting locus of control and child-feeding practices on dietary patterns of 3-year-old children: the MoBa Cohort Study. *Maternal and Child Nutrition* **8**, 103–114.

Zeller M.H., Reiter-Purtill J., Modi A.C., Gutzwiller J., Vannatta K. & Davies W.H. (2007) Controlled study of critical parent and family factors in the obesigenic environment. *Obesity (Silver Spring, Md.)* **15**, 126–136.