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Parental Modelling of Eating Behaviours

by

Zoe Palfreyman

Submitted in partial fulfilment of the requirements for the award of

Doctoral Thesis of Loughborough University

(28/09/2012)

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Abstract
At present, the process of parental modelling of eating behaviours and attitudes has received limited research interest. While often mentioned as a possible factor in relation to child feeding and the development of eating behaviours, only a few studies have explicitly researched parental modelling. The main aims of this thesis were to develop a new measure to assess modelling multidimensionally and to explore the relationships between parental modelling of eating behaviours with a variety of parent and child factors. Initially, a parental self-report measure (the Parental Modelling of Eating Behaviours Scale; PARM) was developed, validated and piloted as part of a series of studies exploring the associations between modelling and a range of self-reported parental and child factors. To provide further validation for the PARM, an observational coding scheme was developed, based on the newly developed modelling measure, and this was utilised in two further studies which looked at self-reported and observed parent and child factors. The key findings from this thesis suggest a number of beneficial relationships. For example, maternal modelling was positively correlated with healthy food intake in both mothers and their children. In addition, both maternal and paternal modelling were associated with children’s increased enjoyment of food and lower levels of food fussiness. Observations of maternal modelling were also found to be positively related to other observed adaptive, non-directive feeding practices, such as encouragement to eat. However, less positive relationships were also identified, with modelling being related to parents’ mental health symptoms and to unhealthy food intake in both mothers and their children. In conclusion, this thesis has identified three distinct facets of modelling and highlighted factors which might be linked to parental role modelling around eating behaviours. While much of the research within this thesis is exploratory, and the findings require replication, they would suggest that parental
modelling has the potential to positively influence children’s eating behaviours. However, parents should also be made aware of the potential detrimental effect that modelling less adaptive eating behaviours may have on their children’s food intake, particularly those eating behaviours that parents may be unaware of modelling.
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1.1. **Aims of literature review**

The aims of this literature review are threefold. First, to introduce and examine the development of eating behaviours in children and the outcomes of these in relation to children’s diets. Second, to explore the role of the parent in the formation of children’s eating behaviours, specifically the child feeding practices that parents use and the related outcomes of these feeding practices. Finally, to explore the function of the parent as a role model in relation to eating behaviours and attitudes, whilst considering a variety of factors that may influence parental role modelling of eating behaviours.

1.2. **Children’s diets and health related outcomes**

Humans have evolved physiological and cognitive survival mechanisms designed to defend against body weight loss, due to under-nutrition and food scarcity being major threats to survival throughout human history (e.g., Berthoud, 2007; Birch, 1999). However, in contrast, humans have only weak physiological mechanisms to defend against body weight gain when food is abundant (e.g., Hill, 2006; Hill & Peters, 1998; Jequier & Tappy, 1999), and the availability of food has long been recognised as a key factor in food selection and eating behaviours (e.g., Baranowski et al., 2008; Birch & Fisher, 1998; Nicolas, Baranowski, Cullen & Berenson, 2001; Steptoe & Pollard, 1995). This has left humans at a physiological disadvantage in today’s
climate, when inexpensive foods high in sugar, fat, total energy and salt are readily available (e.g., Butland et al., 2007; Hill & Peter, 1998; Jequier & Tappy, 1999; Patrick & Nicklas, 2001). The impact of this change in food accessibility and the types of foods available within our environment has come to light in recent years with increasing concern about a range of negative health outcomes surrounding the eating behaviours, food choices and weight levels of both children and adults (e.g., Birch, 1999; Butland et al., 2007).

These concerns have arisen within a number of health related domains, the most prominent of these being the significant increases in the prevalence of overweight and obesity within both child and adult populations (e.g., Butland et al., 2007; Health Survey for England, 2003), and the co-morbidities associated with these higher weight levels (e.g., Butland et al., 2007; Jotangia, Moody, Stamataski & Wardle, 2006). Concerns about increases in weight levels have become a central focus in relation to the health of children and adults. Childhood obesity is associated with the development of a number of chronic diseases both for children and adults. For example, there has been a significant increase in type II diabetes (Hossain, Kawar & Nahas, 2007), hypertension (Bergstrom, Hernell, Persson & Vessby, 1996), and orthopaedic complications (Wilcox, Weiner & Leighley, 1998), all associated with the rise of obesity within child populations, and there have also been increases in cardiovascular disease, type II diabetes and some cancers in adults (e.g., Jontangia et al., 2006). Evidence also suggests that individuals who are overweight in childhood are more likely to remain so into adulthood (e.g., Serdula et al., 1993). Children’s diets are therefore important in terms of both current and future health.
However, overweight and obesity are not the only concerns in relation to children’s diets and health outcomes. There is substantial evidence of poor levels of nutritional intake in both high and low weight individuals (Butland et al., 2007; National Diet and Nutritional Survey, 2011). For example, in the UK, children’s intake across the basic food groups (e.g., protein, fats, carbohydrates) is inconsistent with current recommendations (Department of Health, 2007; Fox, Pac, Devaney & Jankowski, 2004). Poor dietary intake has also been strongly associated with negative health outcomes, such as cardiovascular diseases (Resnicow et al., 1998), osteoporosis (Wilcox et al., 1998), and increased risk of adult cancers (Maynard, Gunnel, Emmett, Frankel & Smith, 2003).

Another area of concern is the development of disordered eating patterns in children and adolescents, with negative body image and maladaptive eating and dieting behaviours being commonly found among child populations (e.g., Cooke, Wardle & Gibson, 2003; Davison & Birch, 2001; Hill, Oliver & Rogers, 1992). Given evidence which suggests that eating patterns develop early on in a child’s life (e.g., Kelder, Perry, Klepp & Lytle, 1994; Nicklas, Webber, & Berenson, 1991; Nicklaus, Boggio, Chabanet, & Issanchou, 2004; Nicklaus, Boggio, Chabanet, & Issanchou, 2005; Skinner, Carruth, Bounds, Ziegler, & Reidy, 2002), there may be certain factors during this early period of development which may place individuals at a greater risk of developing disordered eating patterns and, in extreme cases, conditions such as bulimia and anorexia nervosa (e.g., Marchi & Cohen, 1990; Micali et al., 2007; Micali, Simonoff & Treasure, 2009). In addition, there might also be certain protective factors which may help in the prevention of these conditions developing in later life. Thus, it seems likely that early childhood experiences around foods may be
important in shaping a child’s developing relationship with food, and their future health and weight status. Further research is required to provide a greater understanding of the development of eating patterns in early life to help aid in the prevention of disordered eating and the promotion of healthy eating.

The above health concerns relating to dietary intake in both children and adults have led both researchers and government health officials to explore the formation of eating behaviours and food preferences, and to begin to examine the factors which influence their development.

1.3. Eating behaviours

In theory, eating behaviours are modifiable, at least to a degree, as they are under an individual’s control (Lau, Jacobs Quadrel & Hartman, 1990). While other factors, such as genetics (Strauss, 2002) and socio-economic status (Murasko, 2009), are important, yet less modifiable determinants of eating behaviours, the increasing knowledge about the importance of consuming a healthy diet should allow for individuals to make positive changes in their eating behaviours; therefore the morbidity and mortality associated with eating behaviours could, potentially, be preventable. However, even though the above concerns surrounding children’s and adults’ diets have received substantial public, government and research interest, with few exceptions, behaviours which result in poor diets, high fat and energy dense food consumption, and low levels of fruit and vegetable intake, have shown little improvement (Fox et al., 2004; Guenther, Dodd, Reedy, Krebs-Smith, 2006; Lands et al., 1990; National Diet and Nutritional Survey, 2011; Nicklas, Webber, Srinivasan & Berenson, 2001). One potential reason for slow or non-existent changes in these
unhealthy eating behaviours is that they are part of an individual’s lifestyle (Lau et al., 1990). Styles of living involve habitual modes of behaviour that are, like all habits, very difficult to change (Butland et al., 2007). Such habits, however, are not absent one day and present the next, they require a period of time to develop and it is the development of these eating behaviours within an individual’s lifestyle that are of particular interest in relation to the research reported on within this thesis.

1.3.1. Development of eating behaviours in children

While the development and maintenance of eating behaviours and food preferences is complicated and not yet fully understood, research indicates that eating patterns develop within the first few years of an individual’s life and stay relatively stable right through into adulthood (e.g., Kelder et al., 1994; Nicklas et al., 1991; Nicklaus et al., 2004; Nicklaus et al., 2005; Skinner et al., 2002), with diet quality tracking and declining from early childhood through adolescence (e.g., Mannino et al., 2004). This suggests that the early years of a child’s life are critical in the development of eating behaviours and that, once the foundation of an individual’s eating behaviours are laid down during this period, altering an individual’s eating behaviours will increase in difficulty and the likelihood of successfully maintaining alterations will decrease. Therefore, it is suggested that interventions targeted during the early stages of childhood, especially the first five year period, would be more likely to yield and maintain success in promoting more adaptive eating behaviours in children, thus resulting in positive health-related outcomes in relation to children’s eating.
1.3.2. **Factors that influence the development of children’s eating behaviours**

In an attempt to understand the development of children’s eating behaviours and the damaging changes in diets and body weights which have occurred over recent years (e.g., Nicklas et al., 2001; Organisation for Economic Co-operation and Development - Health Data, 2012), research has tried to identify various factors which could be contributing to the development of less healthy child eating behaviours (such as high levels of dietary fat intake). There are several genetic and environmental factors that are known to influence the development of children’s eating behaviours. First, there is evidence of genetic dispositions for factors such as body weight, flavour learning, eating in the absence of hunger, portion size consumed and energy intake levels (e.g., Bell & Tepper, 2006; Krom et al., 2007; Rankinen & Bouchard, 2006; Rosenbaum & Leibel, 1998; Sandell & Breslin, 2006; Wardle, Carnell, Haworth & Polmin, 2008) and also some evidence for a genetic predisposition which may place individuals at a higher risk for the development of disordered eating behaviours (e.g., Fairburn & Harrison, 2003; Wade et al., 1999). However, from the moment of conception, the environment is constantly interacting with and modifying genetic predispositions. The significant increase in obesity over the last few decades, coupled with the fact that studies have consistently found that between 20% and 50% of obesity cases cannot be accounted for via genetics, leaves significant room for the role of environmental factors, such as parental feeding practices and food exposure, in explaining children’s eating behaviours (e.g., Birch, 1999; Strauss, 2002).

Over the last 50 years there has been substantial research into potential environmental causes of obesity, poor nutritional intake and the development of maladaptive eating behaviours within the child population (e.g., Baranowski et al., 2008; Birch, 1999;
Numerous factors have been shown to bear relevance on the weight and eating behaviours of children, such as changes in food availability, activity levels, parental feeding strategies and demographic factors (e.g., Butland et al., 2007; Pearson, MacFarlane, Crawford & Biddle, 2009; Kroller & Warschburger, 2008), highlighting the multi-factored development of children’s eating behaviours. More recently, one avenue which many researchers have concentrated on is aspects of the family and home environment, which may provide a context for the expression of genetic factors to produce familial patterns of overweight (e.g., Cutting, Fisher, Grimm-Thomas & Birch, 1999). In particular, one environmental influence of great interest within the home or family milieu is the parent, especially within the critical period of children’s eating behaviour development (e.g., Hart, Raynor, Jelalian & Drotart, 2009; Pearson, Biddle & Gorely, 2008; Scaglioni, Salvioni & Galimberti, 2008; Vereecken, Keukelier & Maes, 2004).

1.4. Role of the parent

Parental influences on the eating behaviours of their children are evident, especially during infancy and early childhood (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch, 2000; Fisher, Mitchell, Smiciklas-Wright & Birch 2002; Faith et al., 2004; Hughes et al., 2008; Scaglioni et al., 2008; Webber, Cooke, Hill & Wardle, 2010). During this period, parents actively make food choices for the family, provide the home environment in which children eat, and use feeding practices to reinforce the development of eating patterns they deem appropriate (e.g., Baranowski et al., 2007;
Birch, Savage & Ventura, 2007; Johnson & Birch, 1994). The influence of parents on the formation of children’s eating behaviours is supported further by research findings which suggest that eating behaviours and food preferences run in families (e.g., Brown & Ogden, 2004; Kemm, 1987; Wardle, 1995), along with both obesity and higher weight levels (Garn & Clark, 1976), and patterns of disordered eating (e.g., Cutting et al., 1999; Hill, Weaver & Blundell, 1990; Stice, 1998). Thus, the role of parents in providing the home environment and in feeding their children has become an area of potential importance in further understanding the development of childhood eating and weight concerns. Parents provide a potential avenue into accessing or modifying children’s eating behaviours and, thus, are important to target with ways to improve children’s diets or as a means of delivering healthy-eating interventions. One important parental factor which has received much research attention is the feeding practices and strategies that they use with their children.

1.4.1. **Parental feeding practices**

Parents’ child feeding practices are defined as strategies or behaviours which parents employ to manage their children’s diets and food intake (e.g., what, when and how much a child should eat), both within and outside of the mealtime setting (e.g., Blissett, 2011; Schwartz, Scholtens, Lalanne, Weenen & Nicklaus, 2011; Ventura & Birch, 2008). Parents’ motivations for the use of their feeding practices can be linked to children’s health, for example, in terms of eating a balanced and healthy diet and also in relation to children’s actual or perceived weight status (e.g., Birch & Fisher, 1998, 2000; Faith et al., 2004; Farrow, Blissett & Haycraft, 2011; Francis Hofer & Birch, 2001; Gregory, Paxton & Brozovic, 2010a; Haycraft & Blissett, 2008a; Johnson & Birch, 1994; May et al., 2007). Research suggests that parental feeding
practices play a critical role in the development of children’s taste preferences, eating habits, nutrition and eventual weight status (e.g., Carper, Fisher & Birch, 2000; Faith et al., 2004; Kremers, Brug, De Vries & Engels, 2003; Webber, Cooke, Hill & Wardle, 2010). To provide a greater understanding of the ways in which parents’ child feeding practices may exert an influence, research has begun to explore how these feeding practices are deployed and the factors which may influence parents’ use of these practices, such as their general parenting style or their children’s eating behaviours (e.g., Blissett & Farrow, 2007; Blissett & Haycraft, 2008; Francis et al., 2001; Gregory et al., 2010a; Mitchell, Brennan, Hayes & Miles, 2009; Tiggemann & Lowes, 2002; Webber et al., 2010). Parental feeding practices tend to be categorised into one of two broad groups depending on the level of control exerted by the parent: (i) directive control or (ii) non-directive control (Murashima, Hoert, Hughes & Kaplowitz, 2011). Feeding practices can also be grouped in relation to their associated outcomes for children: (i) maladaptive and (ii) adaptive. These definitions often overlap, for example, directive controlling feeding practices are often associated with maladaptive outcomes (e.g., overeating; Fisher & Birch, 1999) and non-directive controlling practices being related to more adaptive outcomes, (e.g., healthier child diets; Murashima, Hoert, Hughes & Koplowitz, 2012).

1.4.2. Directive controlling feeding practices

Feeding strategies which increase parental control over the child’s food intake and decrease the child’s control over eating have received substantial research attention; in particular, the feeding practices of food restriction and pressure to eat have been very well studied (e.g., Birch & Fisher, 2000; Birch, Fisher & Davison, 2003; Blissett & Farrow, 2007; Blissett, Meyer & Haycraft, 2006; Duke, Bryson, Hammer & Agras,
These feeding practices, which are considered to be directive and controlling, have been linked to less healthy eating and weight-related outcomes for children (e.g., Carper et al., 2000; Faith et al., 2004; Fisher & Birch, 2000; Johnson & Birch, 1994: Spruijt-Metz, Li, Cohen, Birch & Goran, 2006).

1.4.2.1. Restriction

Parents may feel the need to restrict their child’s intake of certain foods (usually foods with high fat or sugar levels) and this feeding practice has become known as ‘restriction’. During infancy and early childhood, children have been shown to possess the ability to self-regulate their energy intake by adjusting their food intake (Birch et al., 1991). Research suggests that the use of more rigid and controlling feeding practices, which restrict children’s consumption of highly desirable foods, may inhibit the development of self-regulation and self-control by teaching children to focus on external cues rather than their internal hunger and satiety signals (Johnson & Birch, 1994). Restricting foods has been shown to increase both the appeal and consumption of these foods by children when free access to them is provided (Fisher & Birch, 1999). For these reasons, it has been suggested that this feeding practice can lead to children eating in the absence of hunger (Birch, Davison & Fisher, 2003), which is believed to be a factor linked to higher weight status, and would explain why some previous research has found higher child Body Mass Index (BMI) to be associated with parental use of restriction (e.g., Birch et al., 2001; Francis, Hofer & Birch, 2001). However, not all research has found a link between restriction and increases in child weight (e.g., Carnell & Wardle, 2007; Kroller & Warschburger,
2008) and other studies have suggested that restriction may be used by parents in response to greater child weight rather than it leading to higher child weight status (e.g., Birch & Fisher, 2000; Campbell et al., 2010; Rhee, 2009). This contradiction in findings may be due to predominantly cross-sectional research studies failing to identify whether parental restriction is, in fact, a response to an increase in child weight or a cause of the increase. However, the few longitudinal studies exploring the causation of this relationship have also produced conflicting findings (e.g., Campbell et al., 2010; Farrow & Blissett, 2006, 2008). Nonetheless, a relationship between parental restriction and child weight status has been established.

1.4.2.2. Pressure to eat

‘Pressure to eat’ is when parents pressurise their child to eat more than he/she wishes. Pressure to eat is often used with healthy foods, like vegetables, which are frequently disliked or rejected by young children (e.g., see Blissett, 2011). Pressuring strategies have also been associated with children’s maladaptive eating behaviours. Parental pressure for children to eat foods and to clear plates can again interfere with internal cues of hunger and satiety and can promote children’s receptivity to external cues, again impeding the development of self-regulation and increasing eating in the absence of hunger (Johnson & Birch, 1994). Pressuring strategies have, however, been more commonly associated with lower food intake and weight levels in children (e.g., Galloway et al., 2006). Feeding practices which pressure or prompt a child to consume a particular food have been found to increase the child’s dislike for that food (e.g., Batsell, Brown, Ansfield & Paschall, 2002; Birch, Birch, Marlin & Kramer, 1982), whilst growing support suggests that this pressuring parental feeding strategy may frequently be exhibited as a response to lower child weight levels (e.g., Birch et
al., 2001; Brann & Skinner, 2005; Carnell & Wardle, 2007). Indeed, McKenzie et al. (1991) found that significantly more prompts to eat were directed at thinner children in comparison to their heavier counterparts.

Research by Orrell-Valente et al. (2007) has also suggested that there may be differences between the types of prompts used by parents to encourage their child to eat and more pressuring tactics. The researchers differentiated between neutral prompts, threats, pressure/demands and reasoning and found that parents tended to use neutral prompts and pressure to eat most frequently with their child during the observed mealtimes. Furthermore, child compliance was most highly associated with neutral prompts while refusal to eat was most strongly associated with use of pressure to eat and threats. As with restriction, many cross-sectional studies fail to identify whether pressure is a response to or a cause of children’s lower weight status. However, the link between pressure and children’s dislike or refusal of pressured foods has been fairly well established (e.g., Galloway et al., 2006).

1.4.2.3. Food as reward

While the feeding practices of restriction and pressure to eat have currently received the majority of the research interest, another controlling feeding practice has been associated with children’s subsequent food intake and taste preferences, namely using ‘food as a reward’. For example, if a child is rewarded for eating their vegetables with a pudding or sweets, the child’s preference for the highly palatable reward foods increases and the food eaten to obtain the reward (vegetables) becomes less preferred (Vereecken et al., 2004). Furthermore, research into parents’ use of foods (usually those with a high sugar or fat content) to regulate children’s emotions has found
associations between this practice with overeating, higher weight levels (Elfhag & Linne, 2005; Gangly, 1989) and unhealthy food consumption (Striegel-Moore et al., 1999) in children.

Taken together, the findings presented in Section 1.4.2 lend further support to the notion that, regardless of parents’ rationale for controlling their children’s eating behaviours, methods of trying to restrict ‘bad’ foods and encourage the consumption of ‘good’ foods often do not have the desired outcome of achieving healthy dietary behaviours. These findings suggest that directive control is not typically an adaptive feeding practice and highlight the importance of carrying out research into more adaptive, less controlling feeding strategies and examining their relationships to children’s eating behaviours.

### 1.4.3. Non-directive controlling feeding practices

There are a variety of other feeding behaviours that parents may use with their children in an attempt to get them to eat a healthy diet where parents control their children’s eating via less directive methods (e.g., Murashima et al., 2011, 2012). Whilst receiving less research attention, feeding strategies such as monitoring, modelling and encouragement have been evidenced as adaptive for prompting children’s healthy development (e.g., Cullen et al., 2001; Gregory et al., 2010a; Pearson et al., 2009). Musher-Eizenmann and Holub (2007) developed the Comprehensive Feeding Practices Questionnaire (CFPQ) in an effort to broaden the array of feeding practices that researchers were measuring and considering. The CFPQ comprises 12 subscales designed to measure feeding practices, including controlling forms, such as pressure and restriction, as well as a range of other, less
controlling feeding practices, such as teaching children about nutrition, providing a healthy food environment, and involving children in food preparation. This measure emphasises the potential variation in the feeding strategies parents use and the need for research to explore a wider variety of feeding practices.

1.4.3.1. Monitoring of child food intake

Monitoring is a covert, non-controlling feeding practice, which involves parents keeping track of what their child eats, particularly their intake of unhealthy foods. To date, monitoring has received some research interest due partly to its inclusion in the Child Feeding Questionnaire (CFQ; Birch et al., 2001). Monitoring is considered to be adaptive as it has been associated with positive outcomes in terms of children’s eating behaviours (e.g., Faith et al., 2004). For example, research by Klesges et al. (1991) found that the food choices children made when parents were present differed significantly to when they were not, with children choosing healthier options, which were lower in fat, sugar and overall energy density, when their parents were there. Such evidence suggests that parental monitoring of their children’s food intake, in moderation, is linked to healthier eating behaviours.

1.4.3.2. Encouragement to eat

Encouragement to eat or try new foods is viewed as a less controlling feeding practice (e.g., Mushashima et al., 2011). Encouragement is generally a gentle form of motivation for the child to eat, is usually verbal, and can refer to parents encouraging healthy, varied or balanced eating behaviours in their child (Musher-Eizenmann & Holub, 2007) or encouraging their children to exhibit certain eating behaviours or eat...
particular foods (Cullen et al., 2002). However, encouragement to eat is often not clearly defined in studies which have assessed it and the distinction between encouragement and pressure is not typically made clear (e.g., Francis & Birch, 2005). Despite these problems with its definition, parental use of encouragement has been associated with positive outcomes in relation to children’s eating behaviours, such as increased fruit and vegetable intake (Cullen et al., 2002; Young et al., 2004). In addition, strong, positive links have also been found between parental reports of encouragement for children to eat and other, non-directive feeding practices such as parental use of modelling (e.g., Baumrind, 1971; Hubbs-Tait et al., 2004; Young et al., 2004).

1.4.3.3. **Parental modelling of eating behaviours**

Parental modelling of eating behaviours, when intentionally used to influence children’s eating behaviours, is a non-directive feeding strategy and is not a form of overt control (Murashima et al., 2011; Ventura & Birch, 2008). To date, the use of parental modelling as a feeding strategy has received only moderate research attention. However, modelling appears to be a complex construct which varies in terms of the way it has been defined in previous research, and the outcomes associated with its use. To clarify, modelling is a process whereby behaviours can be displayed by the parent to the child. These behaviours may be displayed intentionally, as a feeding strategy aimed at increasing children’s intake of a food, or they may be unintentional, given that a parent can serve as a role model simply by being present with their child. Another factor to consider is that while findings have related modelling of eating behaviours to positive outcomes, such as higher fruit and vegetable intake in children (e.g., Campbell, Crawford & Ball, 2006; Hubbs-Tait et
al., 2008; Reinarets, de Nooijer, Candel & de Vries, 2007), relationships between modelling and negative aspects of children’s eating behaviours have also been found (e.g., Cutting et al., 1999; Hill & Franklin, 1998; Pike & Rodin, 1991), highlighting the potential for parental modelling of eating behaviours to be both negative and positive. This preliminary evidence implies that parental modelling has the potential to influence the development of children’s eating behaviours, but modelling requires further unpacking and additional research in order to more fully understand the process of modelling and its potential role as a feeding practice.

1.5. Parental modelling of eating behaviours

Although only a moderate amount of research has considered parental modelling within the domain of eating, in other research areas parental role modelling has been associated with factors such as children’s levels of physical activity (e.g., Pearson, Timperio, Salmon, Crawford & Biddle, 2009; Wright, Wilson, Griffin & Evans, 2010), and both alcohol and smoking behaviours in children (e.g., White & Buyske, 2000). Such research confirms the importance of parents as role models and highlights that further work is required to more fully examine modelling in relation to eating behaviours.

1.5.1. Previous research into parental modelling of eating behaviours

While limited, previous research has suggested associations between parental modelling behaviours and the development of children’s eating behaviours, however, the reported outcomes have been both positive and negative. Parental modelling has been found to be related to children’s willingness to try new foods. Addessi,
Galloway, Visalberghi and Birch (2005) demonstrated in a laboratory setting that 2 to 5-year-old children were more likely to accept and eat a larger quantity of a novel food when their parent ate the same food, rather than when their parent ate a different food or just sat with the child. This suggests that it is not merely the presence of the parent at a mealtime which influences a child’s intake, as shown by Klesges et al. (1991), but also what the child observes the parent doing. This again highlights the importance of considering what is being modelled by the parent to the child in relation to potential eating-related outcomes. However, some research has failed to find strong similarities between parents’ and young children’s food preferences and intake (Birch, 1980) but has found that this association (similarity) increases as the child grows older. This pattern is theorised to be due to a combination of increased time spent in a shared environments, exposure to modelling and genetic dispositions (Birch, 1999).

Extending on the above research, a few studies have explored parental modelling and its association with food intake in children. The low level of fruit and vegetable intake in children has become an area of significant interest due to its association with adverse health outcomes (Department of Health, 2007; see also 1.2). Varying degrees of support have been found for the influence of parents’ modelling of eating fruits and vegetables on their children’s fruit and vegetable intake. For example, a number of studies which have explored links between the dietary intake of mothers and their children have found positive relationships between the two. Gibson, Wardle and Watts (1998), while not directly assessing modelling, found that the frequency of mothers’ fruit consumption positively predicted that of their child. However, they did not find the same relationship between mothers’ consumption of vegetables and that
of their children. A later study by Gregory and colleagues (2011), who aimed to directly measure maternal modelling and its impact on child fruit and vegetable intake, found the opposite relationship: maternal modelling of healthy food intake predicted higher intake of vegetables in children at one year but they did not find the same relationship with fruit intake. Further support has been provided by studies which have found strong relationships between parental modelling of fruit and vegetable intake and the reported intake of their children (e.g., Reinaerts et al., 2007; Tibbs et al., 2001; Young, Fors, Fasha & Hayes, 2004). However, other studies have only produced weak correlational findings between parent-child fruit and vegetable intake (Cullen et al., 2001). Taken together, these studies would suggest that children’s observation of their parents’ fruit and vegetable intake can influence their own intake. However, the differences in findings between these studies may be related to the variation in methods used to measure modelling, for example, small unrepeated self-report questionnaires (e.g., Gregory et al., 2011; Young et al., 2004) or assessing similarities between parent and child intake rather than explicitly assessing modelling (e.g., Gibson et al., 1998).

Further associations between parents’ and children’s intake have been reported. Olivera and colleagues (1992) found an association between parents’ and their preschool children’s food intake in relation to nutrient content. They also found that correlations between mother and child were larger than father and child, but that this difference was reduced in families who shared more family meals together, thus highlighting the importance of spending time eating as a family in order for parental eating behaviours to be influential. Subsequent research using self-report measures of modelling has also found associations between parental modelling of healthy eating
behaviours and low fat eating patterns and lower dietary fat intake in children (e.g., Rossow & Rise, 1994; Tibbs et al., 2001). However, Tibbs and colleagues (2001) also found that while these parents reported healthy eating behaviours they still did not meet the regulation guidelines for fat intake or fruit and vegetable consumption suggesting that the potential discrepancy between parents’ perceptions of healthy eating and their actual diet needs to be considered. This potential discrepancy is a factor which could have a significant influence on what is modelled by parents, both intentionally and unintentionally. While some of these studies have made a distinction between intentional behavioural modelling, which may potentially be being used by parents as a feeding strategy (e.g., Reinaerts et al., 2007), others studies have not explored the potential distinction between intentional modelling and unintentional modelling of eating behaviours.

Parents are unlikely to intentionally model eating behaviours to their children that they themselves consider to be less healthy; however, unhealthy parental eating activities have been associated with modelling. Gibson et al. (1998) found that mothers’ frequency of confectionary consumption positively predicted that of their child. Ensuing research by Brown and Ogden (2004) supported this link between parents’ snacking behaviours and those of their children, with strong associations found between parent-child unhealthy snack food intake. Hendy et al. (2008) also found that mothers within their sample who displayed higher levels of modelling of snacking behaviours had children who ate more snacks. These findings highlight the potential for modelling to have negative effects on children’s food intake and preferences and draw attention to the importance of considering which behaviours are being displayed to the child through the process of parental modelling.
Other aspects of parental eating behaviours have also been suggested to transfer from parent to child. Cutting et al. (1999) found an association between mothers’ and daughters’ levels of disinhibition (the tendency to overeat in the presence of palatable foods or other disinhibiting stimuli, such as emotional stress); with mothers who reported this eating behaviour being more likely to have daughters who showed similar patterns of disinhibited eating. This lead Cutting and colleagues to conclude that mothers’ dietary disinhibition provides information for their daughters regarding which environmental cues should trigger eating and how much to eat. They further suggested that it is possible that daughters who observe their mothers’ disinhibited eating might adopt similar behaviours themselves. Cutting and colleagues’ findings also suggest that these adverse effects may begin as early as the preschool years, many years before adolescence when problems with dieting and eating behaviours tend to become more prevalent, especially within girls (e.g., Birch & Fisher, 1998; Fairburn & Harrison, 2003). There has also been a link reported between mothers’ and daughters’ degree of dietary restraint (Hill et al., 1990), although subsequent research by Cutting et al. (1998) failed to replicate this association. Pike and Rodin (1991) found that mothers of eating disordered adolescent girls had a history of more frequent dieting than controls and had more disordered eating problems. This led them to conclude that daughters who diet regularly may learn disordered eating and dieting behaviours from modelling the eating patterns of their mothers. These findings were supported in further research by Hill and Franklin (1998). While much of this research is reliant on the similarities between mothers’ and children’s eating behaviours, the evidence presented within this sub-section (1.5.1) would suggest that
parents may unintentionally model a variety of eating behaviours which could have a detrimental influence on their children’s developing eating behaviours.

However, it is not only parents’ eating behaviours which have been shown to potentially be passed from parent to child through the process of modelling but also their eating and food-related attitudes. Brown and Ogden (2004) found positive associations between parents’ and their children’s internal motivations to eat (these being eating in response to cues such as feeling upset), but they found that external motivations to eat (such as feeling like eating something when walking past a bakery, sweetshop or cafe) were not significantly related in parents and children. These findings could suggest a potential transference from parent to child of emotional eating via modelling. Brown and Ogden (2004) also found a positive association between levels of body dissatisfaction in parents and their children. This adds to research by Hall and Brown (1982), who reported that mothers of girls with anorexia nervosa showed greater body dissatisfaction than mothers of non-eating disordered girls, and suggests the role of parental modelling of eating attitudes and beliefs might be implicated in the development of disordered eating in girls. Evidence in relation to the modelling of parental weight concerns also comes from research which has found a direct correspondence between mothers’ and daughters’ degree of weight concern (Hall & Brown, 1982; Steiger et al., 1994). Mothers and daughters have also been shown to share similar attitudes about diet and weight (e.g., Hill et al., 1990; Hill & Franklin, 1998; Pike & Rodin, 1991).
1.5.1.1. Limitations of previous research and theoretical underpinnings of modelling

While several studies have begun to consider parental modelling of eating behaviours, research in this arena to date has been hampered by such things as studies using varying definitions of modelling, implementing different measures to assess modelling, and exploring different aspects (facets) of modelling. For example, previous measures have consisted of only a few items (e.g., Mushir-Eizenman & Holub, 2007; Tibbs et al., 2001), or are limited by focusing on only certain modelled behaviours, such as healthy eating (Cullen et al., 2001; Hubbs-Tait et al., 2008; Young et al., 2004) or snacking behaviours (Hendy et al., 2008), and lack clarity and face validity (e.g., by including items which relate more to food restriction than parental modelling; Tibbs et al., 2001). This means that the research evidence available at present is limited by the measures used and by the fact that they do not fully assess the multidimensional construct of modelling within the context of eating.

Previous research within the eating domain (e.g., Hubbs-Tait et al., 2008; Young et al., 2004) has conceptualised the modelling of eating behaviours within the context of Bandura’s Social Cognitive Theory (SCT). Bandura’s SCT defines modelling as a process of observational learning, where an individual (e.g., a child) adopts or imitates a behaviour as a result of observing an influential role model (e.g., a parent) repeatedly producing the behaviour (Bandura, 1971). Other researchers have proposed alternative conceptualisations of modelling along similar lines. For example, Birch and colleagues (2007) referred to the “do as I do” approach (p.4), where parents act as a role model for their child and, through exposure to their parents’ eating behaviours, children adopt and integrate them into their own eating
patterns. Other studies (e.g., Murashima et al., 2011; Reinaerts et al., 2007; Van de Hurst et al., 2007) have drawn on SCT and Birch et al.’s notion but refined them such that they propose that parents intentionally model preferred behaviours in front of their child with the intention of influencing their child’s food intake (e.g., eating fruit with their child). This approach defines a form of parental modelling of eating behaviours as a parental feeding strategy.

However, modelling cannot solely be defined as a feeding strategy employed by parents at certain times to try and encourage their children to eat a healthier diet. Specifically, parents continuously provide a role model for their child (Bandura, 1971). This means that it is not only the eating behaviours which parents intentionally model or demonstrate at mealtimes which may influence their children’s eating, but that they are a role model for their child at all times. Therefore, parental modelling can be unintentional as well as intentional and this distinction must be considered when exploring the influence of parental modelling on the development of children’s eating behaviours. The distinction between intentional and unintentional modelling has been suggested in previous research (Cullen et al., 2000) but, to date, these constructs have not been adequately defined or explored separately.

Modelling has also been defined by the behaviours which are being modelled, for example, healthy/unhealthy eating behaviours. The majority of research tends to look specifically at modelled healthy eating (e.g., Cullen et al., 2001; Gregory et al., 2010a; Hubbs-Tait et al., 2008; Murashima et al., 2011; Young et al., 2004). However, some other studies have looked at unhealthy behaviours, such as unhealthy snack food intake (Brown & Ogden, 2004), and the modelling of behaviours considered
maladaptive by the parent (Vereecken et al., 2004). This variation in the outcomes related to parental modelling of eating behaviours that previous research has focused on suggests the potential for parents to model all types of behaviours, including healthy and unhealthy eating behaviours. In addition, research often refers to modelling as a feeding practice or strategy but fails to draw a distinction between whether behaviours are intentionally or unintentionally being modelled (e.g., Gregory et al., 2011). This highlights the need for further research to consider modelling as a multidimensional construct and to acknowledge the potential for various forms of modelling to be related to a number of different factors.

The majority of the definitions of modelling used in previous studies tend to concentrate on physically modelled eating behaviours (e.g., Cullen et al., 2001; Hubbs-Tait et al., 2008; Murashima et al., 2011; Reinearts et al., 2007), which is in line with Bandura’s (1971) definition of modelling. However, physical behaviour is not the only way in which parents can model their food preferences. Parents talk to their children during mealtimes and about foods, and research has previously explored parents’ teaching or explanations to their children about health and food-related knowledge (e.g., Crockett, Mullis & Perry, 1998), suggesting that this is an important element of parent-child interactions around food. Furthermore, the use of verbal communication as a form of parental modelling has been alluded to within the modelling subscale of a previous self-report measure (e.g., “I tell my child that healthy food tastes good”; Musher-Eizenman & Holub, 2007). Distinguishing verbal modelling as a separate facet of modelling also draws support from Rossow and Rise (1994), who suggested that parents may provide social cues for their children’s behaviours in line with their own behaviours, for instance, the verbal expression of
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food preferences and dislikes. Verbal modelling adds another potential facet of modelling which has not previously been explored. Future research needs to clearly define modelling and its varying facets if further insight into this practice is to be gained.

1.5.2. Definition of parental modelling of eating behaviours

Due to the complex nature of modelling, as outlined in the above sub-section, the construct of modelling needs to be clearly defined for the purpose of the research within this thesis. Therefore, the definition of parental modelling of eating behaviours will be:

*Behaviour, attitude or belief (either verbal or physical) displayed by the parent (either intentionally or unintentionally) in the presence of the child.*

However, while this provides an all-encompassing definition of modelling, it is noted that modelling is a multidimensional process and so further definitions of the facets of modelling previously highlighted (see 1.5.1) are also required.

1.5.2.1. Definition of facets of parental modelling of eating behaviours

Previous research into parental modelling of eating behaviours has often been limited by exploring only one form of modelling, such as behavioural modelling (e.g., Gregory et al., 2011), or by concentrating on the type of behaviours being modelled, for example healthy eating (e.g., Cullen et al., 2001). It is unlikely that modelling is only a physical behaviour, especially when considering that modelling can include
attitudes and beliefs. Indeed, although it has not been defined as such, verbal modelling has been assessed via items included in previous measures (e.g., Musher-Eizenman & Holub, 2007). In addition, previous research has failed to draw a distinction between intentional and unintentional modelling. Thus, parental modelling can be split into two forms; those of behavioural and verbal. These two forms of modelling can then be further categorised into intentional and unintentional modelling.

a) Verbal modelling of eating attitudes and behaviours

Verbal modelling is when a parent verbally states a preferred behaviour, food choice or belief to their child. This form of modelling can display a parent’s likes and dislikes to a child as well as modelling their food-related beliefs and attitudes. The distinction between verbal and physical modelling has not been made in previous research (e.g., Brown & Ogden, 2004; Hubbs-Tait et al., 2008; Reinaerts et al., 2007; Young et al., 2004). However, research has alluded to verbally communicated modelling (Musher-Eizenman & Holub, 2007) and, in addition, has suggested that parents’ use of teaching and explanations about health and food related knowledge to their children is an important element of parent-child interactions around food (Crockett, Mullis & Perry, 1998).

b) Behavioural modelling of eating behaviours

Behavioural modelling is a continuous process in which the actions of the parent are displayed in front of the child and can potentially be adopted by their child. Behavioural modelling of eating encompasses a wide variety of forms. It includes the consumption and rejection of foods in front of the child (Brown & Ogden, 2004),
thereby modelling the parent’s likes and dislikes. Behavioural modelling of likes and dislikes can also include facial expressions. This can be a natural response, which the parent may or may not be aware of (e.g., grimacing at the taste of a food), or it can be intentional (e.g., smiling or rubbing their tummy after eating item) with the aim of influencing the child’s preferences or encouraging them to eat the item. The importance of the child observing parents’ behaviours for children’s subsequent intake has been shown previously in experimental research (Addessi et al., 2005). Parents who sat with their child and ate the same food had children who displayed a greater willingness to try the new foods. This suggests that young children may look to a trusted role model for behavioural cues as to whether the food is acceptable and adopt the same behaviour. Behavioural modelling also includes parents displaying behaviours such as eating certain items first, leaving foods uneaten, eating all of the food on the plate, and so on. Behavioural modelling can also refer to the modelling of family mealtime dynamics such as portion size, family members eating the same meal content, and eating at a table or in front of the TV.

c) Intentional modelling of eating behaviours

Intentional modelling can be either behavioural or verbal and is when a parent purposely performs a behaviour, or states a preference, with the aim of influencing the eating behaviour of their child; thus, this is when modelling becomes a direct feeding practice. For example, a parent might eat a certain vegetable in front of their child or state a preference for a food item to their child, with the explicit purpose of getting their child to copy this behaviour and eat the vegetable/food.
d) Unintentional modelling of eating behaviours

Unintentional modelling can be both physical and verbal, and takes place when parental eating behaviours and attitudes, which they have not drawn attention to or are unaware of, are witnessed and adopted by the child. Parents provide a continuous role model for their child and it is not just the behaviours they wish their child to adopt that are transferred but also those which they are unaware of or may have tried to repress in front of their child (Vereecken et al., 2004). Research which has shown the potential transmission from parent to child of body dissatisfaction (Brown & Ogden, 2004; Hall & Brown, 1982), dietary restraint (Hill et al., 1990) and disinhibition (Cutting et al., 1999) suggests the potential for parents’ unintentionally modelled behaviours to be imitated by children, especially given evidence for the transference of more maladaptive behaviours and attitudes. Unintentional modelling is a difficult aspect of modelling to explore due to parents typically being unaware of this form of modelling and, potentially, their own actions. However, in an attempt to gain a more comprehensive understanding of parental modelling, this facet, which has been excluded from previous research, must be included.

1.5.3. Section summary

To summarise, the process of parental modelling has been associated with both positive and negative outcomes in relation to children’s eating behaviours and attitudes. It can comprise verbal and behavioural forms, as well as being intentional when parents choose to employ this process as a means of influencing their children’s eating behaviours. Therefore, it would appear logical to conclude that the process of modelling cannot be usefully dichotomised as being either positive or negative in relation to the development of eating behaviours. Rather, modelling might best be
described as a process resulting in outcomes that can be either positive or negative, depending on the verbal and behavioural inputs of the parent. To expand, children may imitate behaviours that their parents exhibit (modelling) and, for example, if a parent eats a healthy balanced diet, this is the information which will be modelled to their child, and it will likely result in positive dietary outcomes for the child. Alternatively, if parents display unhealthy eating habits or behaviours, children are likely to imitate these resulting in negative dietary outcomes. Given that childhood behaviours track into adulthood (e.g., Kelder et al., 1994; Nicklaus et al., 2005; Skinner et al., 2002), modelling could potentially be a key factor in the development of eating behaviours. If the process of modelling can be understood to a greater degree it may help to first explain the production of certain eating behaviours within children and it may also inform potential parental intervention strategies, based on its use as a feeding practice, to prevent maladaptive eating behaviours developing and to initiate more adaptive ones. If the importance of modelling was more widely understood by the general public, it may also help to improve parents’ diets due to their wish to provide positive role models of dietary intake for their children (Haire-Joshu & Nanney, 2002).

1.6. Factors involved in parental modelling of eating behaviours

There are clear findings which highlight the potential for modelling to have both positive and negative effects on children’s eating behaviours (e.g., Brown & Ogden, 2004; Gregory, Paxton & Brozovic, 2010b). To build on this, further research needs to explore the factors which may a) influence the opportunity for the process of modelling to take place, and b) be associated with parental use of modelling as a feeding practice. Modelling can only take place when the parent and child are
together. In relation to eating, this means shared mealtime or food-based experiences. In addition, previous research has found that a number of factors are related to parents’ child feeding practices. For example, parental mental health symptoms (e.g., Francis et al., 2001; Blissett, Meyer & Haycraft, 2007), parenting styles (e.g., Duke et al., 2004; Hughes, Power, Fisher, Mueller & Nicklas, 2005), levels of intake of foods such as fruit and vegetables (e.g., Reinaerts et al., 2007), and children’s eating behaviours (e.g., Galloway et al., 2006; Wardle et al., 2006; Webber et al., 2010). These factors could all potentially influence, or be related to, parental modelling of eating behaviours.

1.6.1. Potential facilitating factors in the modelling process

Facilitating factors are variables which can influence the opportunity for modelling to take place. Some of the factors which may facilitate parental modelling of eating behaviours include family eating dynamics and the presence of other family members. Family eating dynamics are factors such as shared mealtimes or eating the same food at a mealtime, which can provide cues for models of habitual practices or may influence the transmission of behaviours from parent to child or provide a set of ‘norms’ for the child to compare their behaviours to (e.g., Rossow & Rise, 1994). These are potentially important factors in the process of modelling. For example, if children rarely eat meals with the family this substantially diminishes the opportunity for children to observe their parents modelling eating behaviours. While not all food and dietary related behaviours are demonstrated at mealtimes, a considerable number are and so sharing mealtimes represents an important opportunity for modelling of eating behaviours to occur. Children may also be more aware of their parents’ behaviours during mealtimes due to the food-focused situation. Family eating
patterns have been found to influence similarities in food intake between parent and child, which has often been associated with modelling (Addessi et al., 2005; Harper & Sanders, 2007; Olivera et al., 1992). In relation to modelling specifically, research has indicated the importance of shared mealtimes for providing an opportunity for modelling to take place (e.g., Campbell, Crawford & Hesketh, 2007).

While parents are primarily responsible for feeding their children (e.g., Baranowski et al., 2008), family mealtimes may involve other family members and so the presence of other potential role models during mealtimes must be taken into account. For children who eat with siblings or who spend a significant number of meals in the care of others, such as nurseries or grandparents, this increases the variety of role models available to children. When researching modelling, factors such as these need to be taken into account. However, it is beyond the scope of this thesis to consider all of these potential role models and so the focus will be on parents, predominantly the mother (given evidence that mothers are primarily responsible for child feeding; e.g., Birch & Fisher, 2000; Blissett & Farrow 2007; Blissett et al., 2006; May et al., 2007; Rhee et al., 2006), as role models of eating behaviours.

1.6.2. Factors associated with the use of parental modelling of eating behaviours

Research and theoretical reasoning both suggest that there are potentially a number of factors which may influence the use of modelling and the behaviours being modelled. Drawing on previous research into other parental feeding practices, there are a number of potentially relevant factors that have been associated with parents’ use of other feeding practices and which, therefore, are likely to be related to parental use of modelling. Firstly, the feeding practices employed by parents have been associated
with demographic factors, such as parental and child age, weight and/or BMI (e.g., Birch et al., 2003; Faith et al., 2004; Farrow & Blissett, 2006). The possible influence of parent weight levels on their feeding practices leads also to the consideration of parental eating psychopathology, which has been associated with parenting feeding practices previously (e.g., Duke et al., 2004; Reba-Harrison et al., 2010), as a likely correlate of parental modelling. Other mental health problems, such as depression and anxiety, are often co-morbid with eating psychopathology and have also been associated individually to the use of controlling feeding practices (e.g., Farrow & Blissett, 2005; Francis et al., 2001; Haycraft & Blissett, 2008b). Furthermore, parents’ general style of parenting has been related to their child feeding practices (e.g., Blissett & Haycraft, 2008; Hubbs-Tait et al., 2008) including to parental modelling (Hubbs-Tait et al., 2008). Parents’ feeding practices have also been associated with their children’s eating behaviours (e.g., Webber et al., 2010) and greater parental modelling has been related to lower levels of food fussiness in children and higher levels of food enjoyment (Gregory et al., 2010b). Finally, parents’ use of one feeding practice has been found to be related to their use of other feeding practices (e.g., pressure has been related to restriction; Gregory et al., 2010a). Research is required to explore the associations between these factors with the feeding practice of modelling.

1.6.2.1. Demographics

A number of demographic factors may be related to parental use of modelling as a feeding strategy. Maternal and child age have been associated with the feeding practices employed by parents and how often parents eat with their child (e.g., Cooke & Wardle, 2005; Faith et al., 2004). Weight and BMI levels of both the child and the
parent have been related to feeding practices (see Section 1.4.1.). For example, higher weight levels in children have been associated with higher levels of parental use of restriction (e.g., Faith et al., 2004; Fisher & Birch, 2000) and lower weight levels of children have been associated with increased levels of pressuring tactics and directive control employed by parents (e.g., Carnell et al., 2007; Gregory et al., 2010a; Murashima et al., 2012). To date, only one study has looked at maternal modelling and child BMI and it found no significant associations, suggesting that child weight may not influence the use of modelling (Gregory et al., 2010a). However, these results require replication and it must also be taken into account that mothers in Gregory et al.’s study provided their child’s height and weight measurements. Research by Keel, Heatherton, Harden and Hornig (1997) found that parents may consider their child to be under- or overweight when in fact they are not, suggesting that parents are not always accurate in how they perceive their child’s weight status. This difference between actual and perceived child weight levels could influence the findings depending on accuracy. Indeed, higher parental concern about their child being overweight has been associated with the use of parental restriction (e.g., Gregory et al., 2010a; May et al., 2007) and pressure to eat has been related to maternal concern about their child being underweight (Gregory et al., 2010a). Findings are equivocal with regard to parental accuracy at reporting their child’s height and weight, with some studies suggesting mothers provide relatively accurate height and weight information (e.g., Haycraft & Blissett, 2008a; Scholtens et al., 2007) and other research suggesting mothers may overestimate their child’s weight (e.g., Dubois & Girad, 2006; May et al., 2007). Maternal BMI has also been found to influence the feeding practices they employ. For example, mothers’ weight levels have been found to moderate the outcomes of their restrictive behaviours (Francis &
Birch, 2005) and to be positively correlated with observations of more controlling feeding practices (Haycraft & Blissett, 2008a). Due to the previous relationships between maternal and child ages and weight levels with other feeding practices, these variables must be considered when examining parental modelling. Parental levels of education should also be considered based on evidence that higher levels of maternal education have been associated with the use of more adaptive feeding practices and greater food availability (e.g. Faith et al. 2004; Hendricks, Breifefel, Novak & Ziegler, 2006). Food availability in particular could potentially influence what foods are being eaten and thus modelled by the parent in front of their child.

1.6.2.2. **Parental psychopathology**

Another factor which has previously been related to parents’ feeding practices, and which may influence parental modelling of eating behaviours, is parental mental health, such as symptoms of eating psychopathology, anxiety and depression. Parental mental health symptoms may potentially influence the process and outcomes of modelling by: (1) reducing the quality of the parent-child relationship; (2) influencing the use of certain feeding strategies; and (3) altering the opportunity for modelling to take place.

**Eating disorders**

Evidence suggests that parental mental health may influence facilitating factors relating to the process of modelling by impairing parents’ responsiveness to, and interactions with, their child during mealtimes. For example, mothers who reported higher levels of eating psychopathology were less likely to eat with their children, thereby reducing the opportunity for modelling to occur (Patel, Wheatcroft, Park &
Stein, 2002), and reported greater difficulties in feeding their children (e.g., Fahy & Treasure, 1989; Franzen & Gerlingerhoff, 1997). Mothers who report higher levels of eating psychopathology also have a greater tendency to employ restrictive feeding strategies (e.g., Blissett et al., 2006; Duke et al., 2004; Haycraft & Blissett, 2008b; Reba-Harrelson et al., 2010). This relationship has also been found in fathers (e.g., Blissett et al., 2006; Blissett & Haycraft, 2011; Haycraft & Blissett, 2008b). This suggests that parents’ eating psychopathology is an influential factor in determining the feeding practices they use. While previous research has not explicitly explored modelling and the transference of disordered eating behaviours, a number of associations between parental modelling and disordered eating in parents have been suggested from similarities between parents’ and children’s eating behaviours, beliefs and attitudes (e.g., Brown & Ogden, 2004; Cutting et al., 1999; Hill et al., 1990; Pike & Rodin, 2004; Steiger et al., 1994). This suggests that parents’ eating psychopathology may be modelled along with other negative eating behaviours and thus potentially transferred to the child through imitation.

**Anxiety and depression**

Maternal symptoms of anxiety and depression have also been shown to impact on the parent-child relationship and to be related to the feeding strategies employed by parents. Research has found that mothers with greater symptoms of depression often display higher levels of irritability, hostility and coercion, are less engaged with their child, and exhibit reduced emotional involvement and warmth than mothers with lower/no symptoms of depression (Cox, Puckering, Pound, & Mills, 1987; Cummings & Davies, 1994; Lovejoy, Graczyk, O’Hare & Neuman, 2000; Stein et al., 2001). This may result in the use of more hostile and intrusive feeding practices, such as
pressuring the child to eat (Francis et al., 2001), or in parental withdrawal from interactions and involvement during mealtimes (Paulson, Dauber & Leiferman, 2006). Maternal anxiety has also been associated with the use of controlling feeding practices (e.g., Farrow & Blissett, 2005) and negative mealtime interactions (Blissett et al., 2007). Maternal expression of anxiety around feeding and food may mean that the child comes to associate this with feeding and finds feeding and mealtimes a less enjoyable experience.

Given that the presence of mental health symptoms has been related to the child feeding practices that parents use, there is a need to explore the associations between psychopathology and parental modelling. Parental mental health may potentially influence both the opportunity for modelling to occur and the behaviours being modelled by parents and, potentially, adopted by their children.

1.6.2.3. **General styles of parenting**

Parenting styles are defined by how parents vary on the two largely independent dimensions of warmth/responsiveness and control/demandingness (Baumrind, 1979; 1991). These combinations are categorised into one of four groups; authoritative, authoritarian, indulgent and neglectful, these last two often being grouped together under the term ‘permissive’ (Baumrind, 1979; 1991). Parenting styles refer to the emotional context in which parent behaviour is expressed and interpreted by the child (Rhee et al., 2008) and the general context within which specific parenting practices, such as feeding strategies, are used (Darling & Steinberg, 1993). It has been proposed that feeding practices may be reflective of these general parenting styles (e.g., Blissett & Haycraft, 2008; Hubbs-Tait et al., 2008; Hughes et al., 2005). For example, an
authoritarian parenting style has been related to higher levels of controlling feeding practices (e.g., Hughes et al., 2005), while an authoritative parenting style has been related to more adaptive feeding practices, such as monitoring (Hughes et al., 2005) and parental modelling (Hubbs-Tait et al., 2008). Hubbs-Tait and colleagues’ (2008) preliminary findings suggested that higher levels of parental modelling were associated with a more authoritative parenting style and lower levels were associated with an authoritarian style. However, findings linking parenting style and feeding practices have been somewhat inconsistent with some other studies failing to find any significant relationships between parenting style and feeding practices (e.g., Brann, & Skinner, 2005) and some research producing contradictory findings (e.g., more controlling feeding practices being related to a more permissive parenting style; Blissett & Haycraft, 2008). In addition, research by Cullen et al. (2000), which has begun to consider modelling in more depth, suggests that different forms of modelling may be related to different parenting styles, for example, an authoritarian style being related to higher levels of intentional modelling. Such findings suggest that parental modelling and its relationships with parenting styles require further research.

1.6.2.4. Children’s eating behaviours

Another factor which has been related to parents’ feeding practices is children’s eating behaviours. Parents have been found to use different feeding practices with their children as a result of variations in the eating behaviours displayed by children (e.g., Webber et al., 2010), suggesting that parents’ feeding practices may be, at least in part, a response to their child’s eating behaviours. A study conducted by Farrow, Galloway and Fraser (2009) found that, when comparing siblings, parents reported
using more restrictive and pressuring feeding practices with children who were fussier eaters, suggesting that parents’ use of controlling feeding strategies was more likely with children who were more difficult eaters. However, the direction of these relationships is unclear and previous research has suggested a bi-directional relationship between parental feeding practices and children’s eating behaviours, where the feeding strategies employed by parents are linked to the eating behaviours of their children, and vice versa (e.g., Birch & Fisher, 2000). This bi-directional relationship is particularly important when considering modelling as a feeding strategy, as it follows that its use may be influenced by the child’s own eating behaviours. One study which examined this found that greater use of modelling by mothers predicted lower levels of food fussiness and higher interest in foods in children (Gregory et al., 2010b). However, it should be noted that parents may use more modelling, or consider it to be more successful, with children who are generally less fussy about food, suggesting that modelling may be a response to lower levels of food fussiness rather than the reason for it. Food fussiness is defined as a child’s unwillingness to try new foods, refuse familiar foods and to lack variety within their dietary intake (e.g., Dovey, Staples, Gibson & Halford, 2008; Wardle, Guthrie, Sanderson & Rapoport, 2001) and has been associated with lower BMI (Viana, Sinde & Saxon, 2008; Webber, Hill, Saxon & Jaarsveld, 2009), unhealthy food preferences and poor nutrition (e.g., Galloway et al., 2005). Further research is required to explore relationships between modelling and children’s eating behaviours and the potential influence of children’s eating behaviours on the employment of modelling as a feeding strategy.
1.6.2.5. **Parents’ child feeding practices**

At present, little research has explored the potential associations between parental modelling and the use of any other feeding strategies employed by parents. However, parents are likely to use more than one feeding practice, as is often found with directive and controlling feeding practices such as restriction and pressure (e.g., Gregory et al., 2010a). The use of restriction has also been associated with other maladaptive feeding practices. A study by Musher-Eizenman and Holub (2007) found parental restriction of foods as a way to control their child’s weight was positively related to parental use of food as a reward, while parental use of restriction because of health concerns was positively related to parents using food to regulate their child’s emotional state and using food as a reward. In addition, whilst utilising just a brief (4-item) measure of modelling, Musher-Eizenman and Holub also found evidence of the co-occurrence of modelling with a variety of other, non-controlling feeding practices. Positive associations were reported between modelling and healthy feeding practices, such as providing a healthy food environment, monitoring children’s food intake, encouraging a balance and variety, involving children in mealtimes, and teaching children about nutrition. Furthermore, modelling was not significantly related to any of the directive or controlling feeding practices, such as restriction or pressure to eat. Additionally, the use of parental encouragement for children to eat has been associated to parental modelling of eating behaviours (e.g., Hubbs-Tait et al., 2008; Rossow & Rise, 1994; Young et al., 2004). This relationship between encouragement and modelling may also extend to mean that there is the potential for a relationship between modelling and pressure (potentially a more directive and controlling extension of encouragement), which needs to be considered. However, it is not known whether parents who generally favour more controlling
forms of feeding strategy may be less likely to employ more non-directive forms, such as modelling. Conversely, parents who choose to employ modelling may be less likely to use restriction or pressuring tactics with their child, but this notion has yet to be tested.

1.6.2.6. **Summary of potential factors of interest**

The potential for the factors outlined in Section 1.6 to facilitate and influence parental modelling of eating behaviours is of significant interest, given that these factors have all been previously related to parental use of other child feeding practices. The preliminary findings from the above studies which have included parental modelling emphasise the need for future research into modelling to include these factors and expand on these findings. This will provide a more extensive understanding of the factors that may be related to parental modelling of eating; the findings of which may be used to help advise parents in relation to feeding their children.

1.7. **Overall Summary**

In summary, parental modelling is a feeding practice which has the potential to influence the development of children’s eating behaviours, whether intentionally or unintentionally. However, at present, modelling has only received limited research attention. This means that the process of parental modelling, the factors which might be related to its use as a feeding strategy, and the outcomes of parental modelling on children’s eating behaviours are still unclear or unknown. In addition to the lack of in-depth research at present, there is not currently a measure available which can assess the different facets of modelling, such as behaviour/verbal modelling and
intentional/unintentional. In order to address this current gap in the feeding literature, and to advance the field, the construct of parental modelling needs to be considered more comprehensively in order to identify the potential facets of modelling which may be influential in the development of children’s eating behaviours.

Preliminary work by other researchers has established relationships between parental modelling and both healthy and unhealthy child food intake (e.g., Brown & Ogden, 2004). However, at present, much of this work relies primarily on associations between similarities in parent and child food intake (see Section 1.5.1). The possible transference of parents’ eating behaviours to their child could provide an important avenue for future interventions to target as a way of improving the quality of children’s diets. There is also the possibility that by using this feeding strategy, and being aware of their status as a role model, the eating behaviours of parents may also improve. Further research with a more in-depth measure of modelling is required to further expand on this relationship between modelling and food intake.

Another potentially influential factor is the mental health of the parent. Mental health symptoms, especially eating psychopathology, anxiety and depression, have been related to the parental feeding practices employed by parents (see Section 1.6.2.2.) and could potentially influence both the opportunities for modelling to occur and the types of behaviours being modelled. The distinction between modelling as a feeding strategy (i.e. use intentionally) and behaviours modelled unintentionally may be of significant interest in relation to parental mental health especially, eating psychopathology, in terms of their impact on children’s eating behaviours.
Additional research is also needed to replicate the preliminary relationship suggested between parental modelling of eating behaviours and an authoritative parenting style in parents (Hubbs-Tait et al., 2008). An authoritative parenting style is considered to be a more adaptive approach to parenting in general and has been related to positive child eating-related outcomes. In addition, as suggested by Cullen et al. (2001), it is possible that different facets of modelling may be specifically related to certain parenting styles. Thus, further research is required.

Finally, lower levels of food fussiness and increased levels of food enjoyment have been associated with modelling in one research study (Gregory et al., 2010b), suggesting that modelling might be important in the development of adaptive feeding behaviours in children. However, these findings require replication and research needs to expand on these relationships, and to discover whether modelling may be related to other children’s eating behaviours.

Ultimately, if the positive relationships between parental modelling and children’s food intake and eating behaviours are replicated and modelling is understood as a feeding strategy in more detail, there is the potential for the results of such research to inform future interventions aimed at improving children’s diets, where parental modelling practices may be used to promote healthier eating. In addition, by expanding the understanding of the negative relationships involving modelling, as alluded to in previous research, this may be useful for interventions aimed at increasing parental awareness of the potentially negative consequences related to the modelling of their own eating behaviours. While the research in this thesis will not result in intervention materials, it is intended to increase the knowledgebase about
parental modelling of eating behaviours, and the factors which might be associated with modelling, thereby providing a useful platform for future research to expand upon.

1.8. Aims of the thesis

This thesis has four aims. They are described below and summarised in Figure 1.1.

i. The first aim is to develop a self-report measure which can explore parental modelling of eating behaviours in more detail. The development of a more comprehensive measure of modelling will allow for this thesis to expand on the research into parental modelling and enable consideration of the various facets which might be involved in the process and outcomes of parental modelling of eating behaviours (e.g., behavioural and verbal modelling).

ii. The second aim is to examine which of a variety of parent and child factors are associated with parental modelling of eating behaviours. Based on previous research into child feeding, these will include: child and maternal food intake; maternal mental health; general parenting styles; and, children’s eating behaviours.

iii. The third aim is to validate the self-report measure of modelling with observations of modelling of eating behaviours within a home environment.
iv. The fourth and final aim is to examine the relationships between observations of modelling with the self-reported parent and child factors explored in aim two, and observed maternal feeding practices.

Much of the research in this thesis is exploratory and aims to provide a firm groundwork for future research to expand on.
Figure 1.1: Model to show potential relationships between parent and child factors with parental modelling of eating behaviours.

NOTE: Connections via a dashed line relate to factors which are not examined in this thesis but are likely to contribute to the model.
CHAPTER 2

GENERAL METHODOLOGY

2.1. Introduction to the general methodology chapter

This chapter will define the methods used in this thesis. Firstly, this chapter will highlight the design criticisms of previous research and then outline the research design chosen for this thesis. Next, the samples, recruitment and data collection procedures will be described, followed by a detailed explanation of the measures chosen for this thesis. Finally, an overview of the data analysis strategy will be provided.

2.2. Research design

As described in the literature review (Chapter 1), parental modelling within the context of child feeding has received only sporadic and limited research attention. Measures which have previously been used to explore parental modelling of eating behaviours have consisted of small, uncollapsed questionnaires (e.g., Gregory, Paxton & Brozovic, 2010b; 2011; Tibbs et al., 2001) or small subscales from larger measures (e.g., Mushera-Eizemman & Holub, 2007) which are unable to examine the specific, multidimensional aspects of parental modelling concentrating on eating behaviours. This means that a more comprehensive measure was required to examine facets of modelling and its potential outcomes. Therefore, the first part of the thesis focused on developing a self-report measure of parental modelling of eating behaviours (Chapter 3), and exploring its associations with a range of parent (Chapters 3, 4, 5 & 6) and child (Chapter 3, 6) factors. Developing a self-report measure of modelling was
Therefore, the first part of the thesis focused on developing a self-report measure of parental modelling of eating behaviours (Chapter 3), and exploring its associations with a range of parent (Chapters 3, 4, 5 & 6) and child (Chapter 3, 6) factors. Developing a self-report measure of modelling was chosen over other methods due to: i) the exploratory nature of the research presented within this thesis; ii) the effectiveness of self-report methods at collecting large quantities of data (which is important for validating newly-developed measures); and iii) the ability for questionnaires to assess eating behaviours on a broad range of occasions (rather than just at mealtimes). Self-reports were also used to collect data on other parent factors (e.g., food intake, parenting styles and mental health symptoms) and child factors (children’s eating behaviours and food intake), and these were chosen in preference to other methods of data collection, such as interviews or food diaries, because of their ability to collect a wide range and number of respondents without being too time consuming for the participants or the researcher. Previous work has demonstrated reliability of parental self-reports regarding child feeding (e.g., Byers et al., 1993; Cooper, Whelan, Woolgar, Morrell & Murray, 2004; Whelan & Cooper, 2000), however, it is acknowledged that self-report questionnaires maybe subject to bias, both in terms of the responses given and the individuals recruited.

Independent observations of family mealtimes were also conducted on a sample of recruited families (Chapters 7, 8 & 9). The primary aims of the observations were: (i) to validate parental questionnaire responses (self-reports) with the newly developed observational modelling measure; and (ii) to explore the relationships between observed maternal mealtime modelling behaviours with other observed maternal
feeding strategies, and with maternal reports of mental health symptoms and eating behaviours in children.

2.3. Participants/Research Sample

Ethical permission was gained from Loughborough University ethics committee prior to each study commencing. Following ethical approval, parents were initially recruited through various play groups, nurseries and schools in Derbyshire, Nottinghamshire, Staffordshire and Leicestershire. A range of nurseries and schools (both private and Local Education Authority, in order to try to promote diversity within the samples of parents taking part) were contacted and agreed to participate in the studies reported on within this thesis. Further participants were recruited via online advertisements placed on parenting websites, such as Netmum’s (netmums.com), Derby University psychology student information board, the Loughborough University Centre for Research into Eating Disorders (LUCRED) research webpage, and an eating disorder charity’s research page. Studies were also advertised via emails sent to all Human Sciences students, staff and the mature student society at Loughborough University. Finally, participants for the observational studies were recruited via adverts posted in the same (above) locations (apart from the eating disorder charity research board), posters placed in nurseries, preschool, schools and organisations such as play groups, leaflets handed out by participants to friends and family and participants recruited by families already taking part. Taking part in all studies reported on within this thesis was entirely voluntary and so it is important to acknowledge that there may be a degree of sampling bias.
As data were collected in several different ways and samples were sometimes combined or used in more than one study, Table 2.1 summaries the data collection processes and the samples that were used in each study reported on within the thesis.

Table 2.1: Summary table showing data collection processes and samples used in each study within the thesis.

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<thead>
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<th>Data collection phase</th>
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<th>Mothers recruited (N)</th>
<th>Fathers recruited (N)</th>
<th>Questionnaires administered</th>
<th>Study/studies maternal data used in</th>
<th>Study/studies paternal data used in</th>
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<td>2 (n=254)</td>
</tr>
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<td>3</td>
<td>Beat website (online survey)</td>
<td>11</td>
<td>0</td>
<td>PARM, FFQ, CFPQ subscales, EDEQ &amp; HADS</td>
<td>2 (n=11)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Observations – online adverts, Posters/flyers etc</td>
<td>17</td>
<td>10</td>
<td>PARM, FFQ, CEBQ, EDEQ, HADS &amp; CFPQ</td>
<td>4 (n=17)</td>
<td>5 (n=17)</td>
</tr>
<tr>
<td>5</td>
<td>Online adverts, sporting events</td>
<td>n/a</td>
<td>9</td>
<td>PARM, FFQ, CEBQ, EDEQ, HADS, PSDQ &amp; CFPQ</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

Study one (Chapter 3) consisted of 484 participating mothers/female caregivers of children aged between 18 months and 8 years (data collection phases 1 and 2). Fathers/male caregivers who completed and returned questionnaires were not included in this chapter’s analyses (see section 2.3.1).

Study two (Chapter 4) included 264 mothers of children aged between 18 months and 8 years (data collection phases 2 and 3). The sample consisted of 253 mothers taken
from the large sample recruited in study 1, and 11 mothers recruited via advertising the study with an eating disorder charity (phase 3).

Study three (Chapter 5) included 229 mothers of children aged between 18 months and 8 years (data collection phase 1). This sample was taken from the first wave of data collection from the large sample recruited in study 1.

Study four (Chapter 6) included 72 participants, which consisted of 36 mothers and 36 fathers of children aged between 18 months and 8 years (data collection phases 1, 2, 4 and 5). Mothers were taken from the initial wave of recruitment in study 1 and matched to fathers. Fathers were initially recruited through the same methods as mothers in study 1 but, due to poor response rates, the sample was increased by advertising on websites aimed at fathers, at sporting activities (e.g., football training), and by approaching fathers in the families who participated in the observational study (see section 2.3.1).

Study five (Chapter 7) consisted of 17 families with children aged between 2 and 6 years who were recruited for the observational study from Derbyshire, Leicestershire and Nottinghamshire (data collection phase 5).

Study six (Chapter 8) and seven (Chapter 9) consisted of the 17 families with children aged between 2 and 6 years who participated in study five (data collection phase 5).

Throughout this thesis, where relevant, online and paper data collection techniques are compared to test for differences in scores obtained via these two data collection
methods. Analyses were also conducted to test for differences between sub-samples taken from larger data sets and the findings of these are discussed within the relevant chapters.

2.3.1. Power calculations

Before conducting the studies within this thesis, power calculations were conducted to provide guidance on the number of participants required for each study. Table 2.2, below, shows the required and the actual sample sizes recruited for each study. The power of each study is referred to in the relevant chapters.

<table>
<thead>
<tr>
<th>Study (Chapter)</th>
<th>Alpha level</th>
<th>Effect size</th>
<th>N needed for test of difference</th>
<th>N needed for correlation</th>
<th>N needed for multiple regression</th>
<th>Actual sample size obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (3)</td>
<td>0.01</td>
<td>Medium</td>
<td>95</td>
<td>125</td>
<td></td>
<td>484</td>
</tr>
<tr>
<td>2 (4)</td>
<td>0.01</td>
<td>Medium</td>
<td>95</td>
<td>125</td>
<td>134</td>
<td>254</td>
</tr>
<tr>
<td>3 (5)</td>
<td>0.01</td>
<td>Medium</td>
<td>95</td>
<td>125</td>
<td></td>
<td>229</td>
</tr>
<tr>
<td>4 (6)</td>
<td>0.05</td>
<td>Medium</td>
<td>85</td>
<td>85</td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>5 (7)</td>
<td>0.05</td>
<td>Large</td>
<td>38</td>
<td>25</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>6 (8)</td>
<td>0.05</td>
<td>Large</td>
<td>N/A</td>
<td>25</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>7 (9)</td>
<td>0.05</td>
<td>Large</td>
<td>N/A</td>
<td>25</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

Studies 1-3 were adequately powered for all analyses. However, due to the nature of the research and the fact that low response rates are common within this area of research, four of the studies conducted within this thesis were underpowered for the required effect size (4, 5, 6 & 7). This limitation is addressed in each of the relevant chapters.
2.3.2. Inclusion criteria

For the studies presented in Chapters 3, 4, and 5, participants had to be the mother/female primary caregiver of the child, which meant that fathers/male primary caregivers who completed the questionnaires were excluded. The research presented in Chapter 6 included both fathers/male primary caregivers and mothers/female primary caregivers. These were not cohabiting parents of the same child; rather, both mothers and fathers were recruited independently from different families. Parents who participated in the questionnaire studies had to have a child aged between 18 months and 8 years and any questionnaires which were completed for children outside this age range were removed (n=2). This age range was selected due to previous research suggesting that modelling may become more significant as the child ages, due to the process requiring a significant period of child exposure to the parental behaviours before they are adopted (Birch, 1999). For the observational studies presented in Chapters 7, 8 and 9, participants had to be mothers/female caregivers with a child aged between 2 and 6 years of age. Mothers also had to agree to take part in a set of three mealtime observations, which were recorded using a video camera. Any mothers who were uncomfortable with being recorded did not participate in the study (n=4). Further to this, due to the nature of the research, the aim was to collect data from mothers who regularly ate with their children. Thus mothers were asked about the number of meals they eat within a week with their child and mothers who did not eat all three of the observed meals with their child were excluded from analysis (n=1).
2.4. Recruitment Procedure

Recruitment of participants for studies 1-4 (Chapters 3-6) involved the following procedure. Managers and Head teachers of various nurseries, play groups, preschools and schools were contacted by letter, asking for their assistance with a healthy child-parent eating study by distributing questionnaires to parents of the children who attended their nursery or school (see Appendix A). Letters were followed up by telephone or email contact to further explain the studies and the recruitment and participation requirements. Those who agreed to assist with recruitment for the studies were asked to distribute questionnaires to all parents who had children within the required age range for that study. If parents had more than one child within the age criteria, they were requested to report on the youngest child. Parents were asked to return the completed questionnaires to the researcher either using the freepost self-addressed envelopes provided with the questionnaire packs or directly to the school/nursery, where they were subsequently collected by the researcher (see Appendix B & C). In an attempt to boost response rates, reminder posters (see Appendix D) were sent to all the participating schools and nurseries approximately 3 weeks after the questionnaires had been distributed, requesting the return of completed questionnaires.

Further participants were recruited via an online version of the questionnaire pack (the content of which was identical to the paper versions), which was advertised via six parenting websites (netmums.com, ukparentslounge.com, mumsnet.com, parentpage.co.uk, parentchat.co.uk and allkids.co.uk). An email was sent to the request centre of each of the websites asking for help with the study and enclosing a suggested post to go into the forums (see Appendix E). Once permission was gained,
the study advert was posted on the forums with an active link to an online version of the questionnaire pack (www.survey.lboro.ac.uk/children_eating). The online questionnaire started with an information page and consent had to be provided by the participant (by ticking a box) before the questionnaire could be completed (see Appendix F). Once completed, the online responses were only accessible through the researcher’s password-secured online account.

For the maternal and paternal study (Chapter 6), due to the low response rate, fathers were also recruited via two further methods: firstly, advertising the study at sporting activities, and secondly, by asking fathers in the families who were taking part in the observational study (see below) to take part in the questionnaire study.

For the observational study recruitment was conducted via three methods. Firstly, an information sheet and a response sheet indicating interest in the study were sent to 35 families who had taken part in previous studies and who had agreed to be contacted about future research (either studies 1-4 presented within this thesis or other research into children’s eating) were contacted via letter (see Appendix G). The letter provided information about the observational study, a reply slip and a freepost envelope. Participants who returned reply slips expressing an interest in the study were contacted to further discuss the study and to arrange a time for the mealtime observations to be conducted. Secondly, parenting websites which had previously participated in the questionnaire studies were contacted again via their request centre asking for help with this study. An advert for the observational study was provided and accepted by the request centre before being posted on local East Midlands forums (see Appendix H). Contact details for the researcher and the university were provided
on the advert and mothers who were interested in taking part were asked to contact the researcher for further details. Finally, institutions such as schools, pre-schools, play schemes, play areas, and so on were contacted and asked if they would place posters advertising the study on their information boards. The posters (see Appendix I) contained a brief explanation of the study and contact details for the researcher. Mothers who made contact were provided with further information about the study and participation requirements were clearly outlined by the researcher. Mothers who agreed to participate made arrangements with the researcher for mutually convenient times when the observations of family mealtimes could be conducted. For the observational study, because of the time commitment involved in families taking part in three mealtime observations, all participants were offered £15 as a small ‘thank you’ for taking part. This was included in the study recruitment materials. Mothers who took part in this study were given a questionnaire pack to complete, which included an information form and a consent form (See Appendix J & K). Participants were required to read the information form and sign the consent forms before data collection could begin. This also provided an opportunity for mothers to ask the research any questions they had.

2.5. Chid and Parent Demographic and Anthropometric Information

For all studies in this thesis parents were asked to report both their child’s and their own date of birth, weight and height. Parents also reported their child’s and their own ethnicity as well as their own marital status, educational background (numbers of years in education after 16 years of age), their current employment, the number of hours they currently worked per week, and the number of meals they ate with their child on average per week (out of a possible 21). This information was obtained in
order to explore potentially confounding variables and to provide information on the samples included in this study. The last variable was included due to the opportunity for children to observe their parents eating behaviours being of interest in this thesis.

2.5.1. Height and weight measurements

For Chapters 3-9, parents were asked to self-report their own and their child’s height and weight data, in order that Body Mass Index (BMI) could be calculated. This is a quick and effective way of obtaining this information and parents have been shown to be fairly accurate at reporting this information (e.g., Haycraft & Blissett, 2008a). However, not all studies have found this (Dubois & Girad, 2006) and so, in Chapters 7, 8 and 9, exact height and weight measurements of both the mother and the child were obtained. These measurements were taken at the end of the final observation by the researcher, or on collection of the video recording equipment (see Chapter 7 for details). Consent to obtain these measurements was given by the mother as part of the observational study’s consent form and participants were reminded on the first visit by the researcher that these measurements would be taken after the final observation or on collection of the equipment. Mothers were weighed first and then the target child. Participants were asked to remove their shoes and then their weight was recorded to the nearest 0.1kg using Salter electronic scales. Height measurements were then taken to the nearest 0.5cm for both the mother and the target child. Participants were asked to stand tall against a wall with their heels back and their feet flat and, using a tape measure, the researcher recorded their measurements. If participants requested, they were told their measurements but, if not, the researcher discreetly recorded them on a separate sheet of paper which contained no identifying information and attached this to the participants’ completed questionnaires, once the
consent forms had been removed. Height and weight data were converted into BMI (weight (kg) / height$^2$ (m$^2$)) for parents and into age and gender adjusted BMI z scores for children (Child Growth Foundation, 1996). A comparison of maternal self-reports with objective measurements of height and weight was made in Chapter 9.

### 2.6. Questionnaires

Participants completed a variety of questionnaires as part of the studies reported on in this thesis. Thorough literature searching was conducted before deciding to use each of the following measures, as there were often numerous available measures available which assessed the constructs of relevance to this thesis. However, in each case, the questionnaire deemed to be most suitable was selected, taking into account the research question(s) and demands on participants’ time. The reliabilities (Cronbach’s alpha, calculated from data within this thesis) for each of the questionnaires used will be presented in the following chapters.

#### 2.6.1. Child feeding practices questionnaires

2.6.1.1. **Parental Modelling of Eating Behaviours Scale: (PARM; Palfreyman, Haycraft & Meyer, 2012 – see Appendix L).**

As previously explained (see Chapter 1), the need for a specific measure of parental modelling of eating behaviours was clearly warranted. This lead to the development of a new measure, which was created based on previous research into eating and feeding behaviours, existing measures and an extensive review of relevant literature. Further details about the development of the PARM are presented within Chapter 3.
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(Palfreyman et al., 2012). The PARM consists of 15 parental self-report items split into three subscales. Definitions of the three facets of modelling are presented below.

- **Verbal modelling** (6 items) explores the ways parents model their eating behaviours and food choices to their child through verbal communication.
  
  Example items: “I tend to talk more often about foods I would like my child to eat” and “I try to influence my child’s food preferences by verbally stating my own (e.g., “I love carrots, they’re one of my favourites”).”

- **Behavioural consequences** (6 items) measures parents’ perceptions of the outcomes associated with parental behavioural modelling of eating behaviours.
  
  Example items: “My child is more likely to try new foods he/she has seen me eating” and “My child is more likely to try or eat new foods if I eat the new foods with him/her”.

- **Unintentional modelling** (3 items) looks at parental awareness of behaviours adopted by children which have not been intentionally modelled by the parent.
  
  Example items: “My child has picked up eating behaviours from me which I have not intentionally encouraged him/her to adopt” and “My child has
adopted eating behaviours from me which I did not previously realise I did (e.g. eating certain foods first)”.

Responses to all items are recorded using a 7-point Likert-type scale (anchored with: Strongly disagree (1) – Neutral (4) – Strongly Agree (7)). Higher scores on this measure indicate greater levels of reported parental modelling. The measure has been shown to have good internal validity (Palfreyman et al., 2012, Chapter 3) and to have good reliability with fathers (Chapter 6) and mothers (Chapters 3, 7) of young children.


The CFPQ is a 49 item parental self-report measure, which has been developed to explore the feeding practices of parents. It was developed from previous research, pre-existing measures such as the Child Feeding Questionnaire (CFQ; Birch et al., 2001) and the Pre-school Feeding Questionnaire (PFQ; Baughcum et al., 2001), as well as, input provided by parents’ responses to open ended questions about feeding their children. The CFPQ aimed to address limitations with pre-existing instrument by providing a measure which looks at less researched parental feeding strategies such as child control and teaching children about healthy eating, and exploring feeding practices which parents engage in when not at the dinner table, such as restriction of some foods for health reasons and using food as a reward for good behaviour (Musher-Eizenmann & Holub, 2007).
The CFPQ consists of 14 subscales which have been designed to explore 14 different parental feeding practices. In Chapter 3, this thesis concentrates on the development of a new measure of maternal modelling practices and so only the CFPQ modelling subscale (Appendix M) was used in this study to enable examination of the validity of the new modelling measure (PARM). The Modelling subscale used in this thesis is defined below.

- **Modelling** (4 items) looks at parents’ intentional modelling of healthy eating behaviours for their child.

  e.g., “I model healthy eating for my child by eating healthy foods myself.”

The full measure was originally included in study 6 (Chapter 8), however, due to the small sample size recruited for study 6 the collected CFPQ data were not included in the final analysis. The first 12 subscales utilise a 5-point response scale anchored 1-5 (Disagree, Slightly disagree, Neutral, Slightly agree, and Agree). Findings suggest reasonable support for the validity of this measure (Musher-Eizenman & Holub, 2007; Musher-Eizenman, De Lauzon-Guillain, Holub, Leporc & Charles, 2009) and the scale has been successfully used with UK (e.g., Blissett, Haycraft & Farrow, 2010), European (De Lauzon-Guillain, Musher-Eizenman, Leporc, Holub & Charles, 2009), and US samples (Musher-Eizenman & Holub, 2007; Musher-Eizenman et al., 2009).
2.6.2. **Parent and child food intake questionnaire**

2.6.2.1. **Food Frequency Questionnaire (FFQ: Cooke et al., 2007 – see Appendix N).**

The FFQ is a parental self-report measure which has been designed to assess fruit and vegetable consumption in both parents and their children by asking: *‘How often do you eat the following items?’* and *‘How often does your child eat the following items?’*. These questions are then followed by a list of six food types: 1) Fruit (fresh or tinned); 2) Vegetables (including salad items but not potatoes); 3) Meat or fish (any kind); 4) Cakes biscuits, sweets or chocolate; 5) Rice, potatoes or pasta; and 6) Eggs. Possible responses range from 1 to 8 and correspond to: Never/Rarely (1); Once or twice a week (2); 3-4 times a week (3); 5-6 times a week (4); once a day (5); Twice a day (6); Three times a day (7); and, Four or more times a day (8). Parents report their own and their child’s weekly intake separately using a ‘P’ to represent parent intake and a ‘C’ to represent child intake under the correct response. For the purpose of this research, two of the above food items (eggs and meat or fish) were removed and three food items were added. This was done to provide items which could be easily grouped into both healthy and unhealthy food intake. Firstly, ‘savoury snacks (e.g., crisps)’, was added to enable an examination of consumption of snack foods, which did not fall under the category of sweets and chocolates already covered by the original FFQ but have previously been related to maternal modelling (Brown & Ogden, 2004). The second addition to the measure was ‘salad items’ and a decision was made to split this from its original inclusion with vegetables because of findings suggesting that salad should be considered separately to vegetables (Cullen et al., 2000). Finally, the third addition was ‘fresh fruit juice’, which has been previously linked to healthier diets in children (Baranowski et al., 2008) and to parental
modelling (Woodward et al., 1996). The original FFQ has been successfully used in previous studies exploring how often items such as fruit and vegetables are consumed weekly by mothers and their child, and how these related to each other and to the nationally recommended daily intake (e.g., Cooke et al., 2003; Wardle, Carnell & Cooke, 2005).

2.6.3. **Parental Mental Health Questionnaires**

2.6.3.1. *Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994 – see Appendix O).*

The EDE-Q is a 36 item self-report version of the Eating Disorders Examination interview (Cooper & Fairburn, 1987). It measures four aspects of eating disorder psychopathology, and has a total (Global) score. The measure addresses the participants’ current status over the past four weeks, with high scores indicating more pathological eating attitudes and behaviours. Given that the samples recruited within this thesis were primarily non-clinical and that the purpose of the research was not to diagnose participants but to explore the eating attitudes and concerns of parents, the 13 item diagnostic section was removed for all studies prior to distribution. This left a shortened, 22 item version of the EDE-Q which was used in Chapters 4, 6 and 8.

Factor definitions of the four EDE-Q subscales are given below:

- **Restraint** (5 items) assesses levels of dietary restraint.
  
  Item example: “Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight?”

- **Eating concern** (5 items) assesses the individual’s concerns about eating.
Item example: “Have you been afraid of losing control over eating?”

- **Shape concern** (8 items) assesses the individual’s concern about their own body shape.
  Item example: “Have you definitely wanted your stomach to be flat?”

- **Weight concern** (5 items) assesses the individual’s concern with their body weight.
  Item example: “Have you had a strong desire to lose weight?”

The questionnaire is split into three parts with a separate 7 point likert scale provided for each part. In part 1, items 1 – 14 are scored using a likert scale numbered 0-6 (No days, 1-5 days, 6-12 days, 13-15 days, 16-22 days, 23-27 days, Everyday). This response format records how often within the past month (28 days) certain eating behaviours and attitudes are felt or acted upon. In part 2, items 29-36 are scored using a likert scale numbered 0-6 which has four anchors (Not at all, Slightly, Moderately, Markedly). This response format assesses how various factors influence an individual and the extent to which individuals feel they have been affected. In part 3, the 7 response options (0-6) for item 15 vary from the other two formats (None of the times, A few of the times, Less than half the times, More than half of the times, Most of the times, Every time). The EDE-Q is widely used and research has indicated that it has been found to be a reliable and valid measure in community samples (e.g., Fairburn & Beglin, 1994; Mond, Hay, Rodgers, Own & Beumont, 2004).
2.6.3.2. **Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983 – see Appendix P).**

The HADS is a 14 item self-report measure, which has been designed to assess symptoms of anxiety and depression. Severely psychopathological symptoms are not covered, thereby improving its acceptability and making the HADS more sensitive to mild forms of psychiatric disorders (Herrmann, 1996) and suitable for use with the community samples of parents used within this thesis. The measure consists of two subscales which have been shown to have high factorial validity (Herrmann, 1996):

- **Depression** subscale (7 items) assesses an individual’s depression level.
  
  Example statement: “I feel as if I am slowed down.”

- **Anxiety** subscale (7 items) assesses an individual’s level of general anxiety.
  
  Example statement, “I can sit at ease and feel relaxed.”

Both subscales are scored using 4 point likert response scales with varying anchors to assess the participants’ level of agreement with the statements. Response options on the 4 point Likert scale range from 0-3, with 50% of the items scored 0-3 and the other 50% scored 3-0 (see Appendix P). Total scores are created for each subscale (depression, anxiety) and scores on the individual subscale correspond to one of four groups: a score of 0-7 indicates normal levels; 8-10 indicates mild symptoms; 11-14 indicates moderate symptoms; and 15-21 corresponds to severe symptom levels of anxiety or depression. The measure has been found to perform well in assessing the symptom severity and caseness of anxiety disorders and depression in patients and in the general population (Bjelland, Dahl, Haug & Neckelmann, 2001).
2.6.4. Parenting Style Questionnaire

2.6.4.1. Parenting Style Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Olsen and Hart, 1995 – see Appendix Q).

The PSDQ is a 32-item self-report instrument of general parenting styles. It assesses how often a parent exhibits certain behaviours towards their child. The measure is based on Baumrind’s (1971) conceptualisation of parenting styles, and is composed of three subscales, which each divide into the sub-factors described below.

- **Authoritative Parenting Style** (15 items):
  - Regulation (reasoning/induction) - parent explains to child why rules should be obeyed.
    
    Example statement: “I emphasise the reasons for rules.”
  
  - Connection (warmth and support) - parent expresses affection to the child.
    
    Example statement: “I am responsive to my child’s feelings and needs.”
  
  - Autonomy Granting (democratic participation) - parent allows child to have input into family rules and processes.
    
    Example statement: “I allow my child to give input into family rules.”

- **Authoritarian Parenting Style** (12 items):
  
  - Verbal hostility - parent is verbally hostile (yells, shouts) towards child.
    
    Example statement: “I explode in anger towards my child.”
- Physical coercion - parent uses physical punishment as a means of controlling their child’s behaviour.
  
  Example statement: “I slap my child when the child misbehaves.”

- Punitive strategies – parent removes privileges from their child with little explanation.
  
  Example statement: “I use threats as a punishment with little or no justification.”

- **Permissive Parenting Style** (5 items);
  
  - Parent demonstrates indulgence and failure to follow through.
    
    Example statements: “I find it difficult to discipline my child” and “I give in to my child when the child causes a commotion about something”.

All items were answered using a 5 point scale (Never, Rarely, Sometimes, Often and Always). After careful consideration, the four items which make up the physical coercion sub-factor were removed for the purpose of the research within this thesis as these questions ask about parents’ use of physical punishments with their child and this was considered to be ethically difficult as the research team would be unable to provide appropriate support or to intervene if a parent reported highly on this scale. The removal of these items is in line with previous research in this area with similar samples (Blissett & Haycraft, 2008). For the purpose of the analysis conducted within this thesis, only the three parenting style subscales will be considered. The measure has been found to have adequate reliability and validity (Robinson et al.,
2.6.5. Child Eating Behaviour Questionnaire

2.6.5.1. Children’s Eating Behaviour Questionnaire (CEBQ; Wardle, Guthrie, Sanderson & Rapoport, 2001—see Appendix R).

Children’s eating behaviours within this thesis were assessed using the CEBQ. The CEBQ is a 35-item parental self-report measure designed to assess children’s eating behaviours. The measure is divided into eight subscales, designed to examine different dimensions of children’s eating behaviours and children’s positive and negative reaction to food and drink. However, as the research in this thesis concentrates on eating behaviours, it was decided to remove the ‘desire to drink subscale’ leaving the seven dimensions described below:

1. **Food Responsiveness** (5 items) assesses the child’s interest in and desire for foods.
   
   Example statement: ‘*My child’s always asking for more food*’.

2. **Enjoyment of Food** (4 items) assesses a child’s enjoyment of foods.
   
   Example statement: ‘*My child enjoys eating*’.

3. **Satiety Responsiveness** (5 items) assesses a child’s response to internal cues of fullness.
   
   Example statement: ‘*My child gets full up easily*’. 
4. **Food fussiness** (6 items) assesses a child’s level of selectiveness with foods consumed.

   Example statement: ‘*My child refuses new foods at first*’.

5. **Slowness in Eating** (4 items) assesses the speed at which a child consumes food.

   Example statement: ‘*My child eats slowly*’.

6. **Emotional Over-Eating** (4 items) assesses whether a child eats more food during negative emotional states.

   Example statement: ‘*My child eats more when anxious*’.

7. **Emotional Under-Eating** (4 items) assesses whether a child eats less food in response to emotional states.

   Example statement: ‘*My child eats less when s/he is upset*’.

The items are scored using a five-point Likert frequency scale (Never, Rarely, Sometimes, Often and Always; 1-5) and 5 items are reversed scored. Higher reported scores indicate a higher level of the particular eating behaviour being displayed by the child. The CEBQ has been used successfully in other research with both pre-school and older children (e.g., Wardle et al., 2001; Webber, Hill, Saxton, Jaarsveld & Wardle, 2009) and has been shown to display good internal validity and reliability (Wardle, Cooke, Hill, & Wardle, 2010) and has good test–retest reliability (Carnell & Wardle, 2007; Wardle, et al., 2001).
2.6.6. Summary of questionnaires used in each study within this thesis

The table below (Table 2.3) summarises which of the self-report questionnaires described above were used and reported on in which study and corresponding chapter of this thesis.

<table>
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<th>Study</th>
<th>Questionnaire measures</th>
<th>Thesis Chapter</th>
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</tr>
<tr>
<td>2</td>
<td>PARM; EDE-Q; HADS</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>PARM; PSDQ</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>PARM, PSDQ; EDE-Q; HADS; CEBQ</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>PARM</td>
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</tr>
<tr>
<td>6</td>
<td>EDE-Q; HADS; CEBQ</td>
<td>8</td>
</tr>
</tbody>
</table>

PARM: Parental Modelling of Eating Behaviours Scale CFPQ: Child Feeding Practices Questionnaire; FFQ: Food Frequency Questionnaire; EDE-Q: Eating Disorder Examination Questionnaire; HADS: Hospital and Depression Scale PSDQ; Parenting Style Dimensions Questionnaire; CEBQ; Child Eating Behaviour Questionnaire.

2.7. Observations

Participating families (N=17) were observed during a typical mealtime, either lunch or dinner, at home on three separate occasions. Parents and their child were asked to proceed with a ‘normal family mealtime’, including other family members, if applicable. All three observations took place within a two week period and, whenever possible, within one week. The researcher arrived 30 minutes before the pre-arranged mealtime and set up the recording equipment. A camcorder (Sony Handycam DCR-SR58E) was used to record the mealtimes. The researcher left the room during the mealtime (or removed themselves from the child’s line of sight when this was not possible). For 10 of the families participating, the researcher was not present for the
second and/or third mealtime and the camcorder was left with the families, who were asked to record the mealtime(s) as had been done on the first occasion. Mothers were shown how to work the equipment and what procedure to follow (e.g., setting the equipment up before the meal begins, not to draw attention to the camera, switching it off when the meal was finished) by the researcher on the first mealtime visit. Recordings started when the meal began, either with the child sitting at a table or being presented with food, and finished when the child or family indicated that the meal was over. Mealtime recordings were coded in real time using all occurrence sampling. Each mealtime recording was watched several times in order that all of the variables of interest could be coded for. For the purpose of coding observed maternal feeding strategies in this thesis, two coding schemes were used, as described below.

2.7.1. *Parental Modelling of Eating Behaviours Observational Coding Scheme (PARM-O; Palfreyman, Haycraft & Meyer, in preparation; Appendix S).*

The PARM-O coding scheme was developed initially from the three subscales of the PARM self-report measure (Palfreyman et al., 2012, Chapter 3): verbal modelling; behavioural consequences of modelling; and, unintentional modelling. Three observational coding scales were developed and used to record verbal and physical modelling behaviours, and unintentional modelling observed during the mealtimes (see below). A fourth observational coding subscale, which related to the behavioural consequences of modelling subscale, was subsequently added. This subscale was termed ‘similarities in meals’. High scores on each of the subscales indicate high levels of observed parental modelling. Further details of the operational definitions for all of the PARM-O variables can be found in Appendix S.
2.7.1.1. **Verbal modelling**

Verbal modelling refers to when a parent states their preferences and eating behaviours through verbal communication with their child, or via other individuals, when the child is present. Observed verbal modelling was coded for by tallying the number of instances mothers verbally modelled their eating behaviours during the observed mealtime, for example, by stating preferences such as "chocolate pudding, my favourite!" or by producing positive/negative food-related vocalisations during the mealtime, such as "mmm". A series of vocalisations, e.g., "mmm, mm, mmm", was coded as one instance when referring to one item, e.g., a slice of cake. Scores for all instances of observed verbal modelling were added together to create a total score for each mealtime observation.

2.7.1.2. **Behavioural modelling**

During mealtimes, behavioural modelling is a continuous process so the observational coding system had to be able to pick out aspects of maternal behaviour which could be defined as a potential influence on children’s eating behaviours. To explore behavioural modelling during mealtime observations, two aspects of maternal eating relating to the PARM behavioural consequences of modelling subscale were identified. Firstly, the number of times (frequency) that mothers modelled eating behaviours (such as eating certain items first, sharing foods from plates, or selecting food items in front of their child) which their child could copy were tallied to form a total score. This included forms of intentional modelling where mothers drew attention to their behaviour, for example "look at mummy". This observational subscale was termed ‘behavioural modelling’. This subscale was designed to capture all potential forms of behavioural modelling and did not differentiate between positive
and negative modelling. However, this subscale has the potential to be split into two sub-categories (positive behavioural modelling and negative behavioural modelling) in future research. The overall ‘behavioural modelling’ subscale was used to code the mealtime observations in Chapters 7, 8 and 9. A total score was calculated for each mealtime observation.

2.7.1.2.1. Similarities in meals
This subscale looks at the level of similarity in the foods served to the mother and the child and is an important subcomponent of the behavioural modelling subscale. A score was assigned based on the food that was provided at the start of the meal to the child and the mother. This similarity score did not include extra servings or the addition of items such as condiments. Meal similarity was coded on a 3-point scale, with 1 representing completely different meals, 2 representing similar meals with differences, and 3 representing exactly the same meals. This scoring was conducted for main courses and was repeated for puddings and then an average score was calculated to provide an overall score ranging from 1-3 for each meal. This was termed ‘similarities in meals’. This subcomponent explores a potential facilitator for any behavioural modelling which mothers may employ. This subscale of the PARM-O was used when coding of the mealtime observations reported on in Chapters 7, 8 and 9.

2.7.1.3. Experimenter Assessed Unintentional modelling
Unintentional modelling refers to behaviours adopted by children which have not been intentionally modelled by the parent. These can be both negative and positive. For example, parents may unintentionally model healthy food selection (e.g., by
having an extra serving of carrots - positive) or they may unintentionally model unhealthy food selection (e.g., by having a second helping of chips - negative). While future research may benefit from exploring negative and positive forms of modelling separately, the aim of the present research was, first, to explore whether unintentional modelling was observable during mealtimes and, second, whether the newly developed PARM-O subscale could adequately assess this facet of modelling. In the PARM-O, unintentional modelling was coded for by counting the number of times the target child copied a behaviour displayed by the mother which the assessor perceived as being unintentionally modelled; this meant that the behaviour could not be considered intentional or be accompanied by intentional verbal modelling. An example of experimenter assessed unintentional modelling would be the child reaching for the tomato sauce straight after his mother has had some, without the mother verbally mentioning or passing the child the sauce. This subscale was used to code observed maternal modelling in chapters 7, 8 and 9.

2.7.2. Discussion about Food and Nutrition (Appendix T)

In addition to observing maternal modelling of eating behaviours during the mealtimes, maternal talking about and discussion of foods/nutrition with the target child was also explored. This was initially based on the CFPQ subscales of Encourage balance and variety and Teaching about nutrition. Five factors were initially coded for: (a) parent talks with child about food (e.g., ingredients “there are mushrooms in this”, or food in general “you liked carrots last time you had them”); (b) parent discusses good versus bad foods (e.g., “this is a treat” or “we don’t have this very often because it’s bad for us”); (c) parent talks about eating a balanced diet (e.g., “you have to eat lots of different things for your body to work properly”); (d)
parent discusses the importance of eating healthy foods with child (e.g., “to keep our bodies healthy we have to put the right things inside”); (e) and, finally, parents discuss the nutritional value (e.g., vitamins, protein, fats) of foods with their child (e.g., “oranges are full of vitamin C which keeps us healthy”). Each variable was coded by recording every instance that the mother was observed to verbally display these beliefs and attitudes. Scores for these five factors were subsequently collapsed into one variable (discussion about food and nutrition) for the final analysis and a total score (sum) was created.

2.7.3. **Encouragement to eat (Appendix U)**

Maternal encouragement of eating behaviours was also coded for within the mealtime observations. Encouragement was split into verbal (e.g., “Can you try this for Mummy?”) and physical (e.g., mother smiled or clapped when the target child completed an eating related behaviour the mother viewed as positive). Both forms of encouragement were coded by tallying the number of instances the mother displayed the behaviour. For the final analysis, the verbal and physical encouragement variables were collapsed into one factor and a total encouragement to eat score (sum) was created.

2.7.4. **Family Mealtime Coding System (FMCS; Haycraft, 2007; Haycraft & Blissett, 2008b; Appendix V).**

The FMCS was developed in order to code observations of more controlling forms of parental feeding practices and was based on subscales of the Child Feeding Questionnaire (CFQ; Birch et al., 2001). The FMCS can be used with all children and
caregivers present at the mealtime but, for the purpose of this thesis, only the target child and primary caregiver were of interest. Five of the FMCS subscales are included in this thesis: (a) pressure for target child to eat; (b) physical prompts for target child to eat; (c) verbal restriction and (d) physical restriction of target child’s food consumption; and (e) use of incentives/rewards for eating. In addition, maternal vocalisations to the child during the mealtime were also coded for. Brief operational definitions for all these subscales are provided below and further details can be found in Appendix V.

- **Pressure from mother for target child to eat.**

  *Verbal* pressure or coercion by mother for the target child to consume more food, such as: “eat a little bit more”, “just eat what’s on your fork”, or “have one more mouthful”. This variable includes gentle use of coercion, such as “you can just eat the bread” or “just try one mouthful for me” but does not include encouragement to eat.

- **Physical prompt from mother for target child to eat.**

  Parental use of *physical* encouragements to get child to eat, usually by offering food to the child. Includes placing food on the spoon/fork and offering it to the child, or putting food on the cutlery ready for the child to pick up and eat.
• **Verbal restriction of target child’s food intake by mother**

Verbally limiting child’s consumption of foods, for example, by telling them that they are not allowed any more bread. Another example of verbal restriction is: “no, you’ve already had one, you’re not allowed another”.

• **Physical restriction of target child’s food intake by mother.**

Limiting child’s consumption of foods (as above) but via physical rather than verbal means. An example of physical restriction is moving a food item away from the child or only giving the child one biscuit when they ask for two.

• **Use of incentives/conditions by mother with target child.**

Parental use of verbal incentives or bargaining in an attempt to increase child’s food consumption or to get target child to eat a certain item. For example, “if you eat all your vegetables, you can have a pudding” or “if you don’t try it then we won’t go to the cinema later”.

• **Maternal vocalisations to target child.**

All comments directed at the target child during the mealtime by the mother were coded into one of three groups: Positive, Neutral and Negative comments. These included all comments which were not coded under one of the aforementioned subscales and included, for example: (i) food-related general comments (e.g., “would you like some more potatoes?”); (ii) comments about school (e.g., “how was your day at school?”); and (iii) comments about mealtime behaviours (e.g., “please sit
on your chair”). The tone and content of the mother’s speech determined whether the comments were coded as positive, neutral or negative. These examples are all neutral comments. Scores for each group were summed to create total scores for each type of maternal vocalisation.

2.8. General data analysis strategy

The first analysis done on each dataset was to run a series of Kolmogorov-Smirnov Z tests to test for normality. In all cases, the results indicated that the data (and the specific variables of interest for each study/Chapter) were either primarily or entirely not normally distributed. Consequently, non-parametric analyses were used throughout the thesis, where possible.

For all chapters where previous research findings meant that the hypotheses were directional, one tailed tests were employed. Where hypotheses were not directional, two tailed tests were used. There was variability in the sample sizes in the studies presented within this thesis. Where there were good sample sizes (Chapters 3, 4 and 5), alpha levels of 0.01 were adopted as indicating significance, in order to reduce the risk of type I errors. For smaller, exploratory studies (Chapters 6-9), alpha levels were set at 0.05.

Chapter 3 presented the development of a newly-developed questionnaire. This meant that, following descriptive statistics, a correlation matrix was conducted to screen for data for high levels of similarities between factors (Field, 2005). Principal Component Analysis (PCA) with varimax rotation was run on the data in order to
identify subscales for the measure. The PCA and a scree plot suggested the retention of 15 items split into three factors.

Within Chapters 3, 4, 5, 6, 7, 8 and 9, preliminary correlations were run between child age, maternal age, child BMI z scores, maternal BMI and years of maternal education after the age of 16 with the study’s key variables, to identify any confounding factors. Where any significant correlates were found, these were subsequently controlled for. This meant that either Spearman’s or partial correlational analyses were used to test the hypotheses and identify any significant relationships between parental reports of modelling behaviours with the other variables of interest (e.g., parental factors, such as parenting styles, and child factors, such as eating behaviours).

In Chapter 6, a calculation of the difference in the magnitudes of the correlation coefficients was conducted (IFA Services Statistics, 2012). This was done to identify whether the relationships between child food fussiness and both maternal and paternal behavioural modelling were significantly similar or different.

Mann-Whitney U tests of difference were run in: Chapter 3 (to explore differences between younger and older children within the sample and differences between paper and web based data collection techniques); Chapter 4 (to explore differences between mothers of boys and girls, differences between younger and older children reported on and differences between paper and web based data collect techniques); Chapter 5 (to test for differences between mothers of boys and girls, as well as differences between younger and older children within the sample); and, Chapter 6 (to test for differences between mothers and fathers in their matched variables; to test for differences
between maternal and paternal self-report parenting styles and eating psychopathology, their children’s eating behaviours and the number of meals they reported eating with their child in a typical week; and to test for differences between paternal data collected via paper and online techniques and between younger and older children within this sample). In Chapter 7, a series of Friedman tests were used to examine whether there were any significant differences between the mealtime factors from the three observations.

In Chapter 4, a stepwise multiple regression was conducted to test which of the significant correlates of unintentional modelling were the best predictors.
Title of Study 1: Development of the Parental Modelling of Eating Behaviours Scale (PARM): Links with healthy food intake among children and mothers.

This thesis aims to address gaps in current research by attempting to deconstruct parental modelling and to explore its associations with a range of parent and child factors. In the absence of an adequate pre-existing measure of parental modelling of eating behaviours, a new measure was required that considers modelling multi-dimensionally. Therefore, the aim of study 1 was to develop a new parental self-report measure of modelling, which had the ability to explore different facets of parental modelling. The study further aimed to pilot the new modelling measure by exploring the relationships between maternal modelling with food intake in mothers and their children.

This chapter is based on a paper published in *Maternal and Child Nutrition* which is currently available via early view:


The content of Chapter 3 (study 1) is the same as in the published paper, but the formatting and descriptive statistics have been altered so that it remains consistent with the rest of the thesis.
CHAPTER 3

Development of the Parental Modelling of Eating Behaviours Scale (PARM): Links with food intake among children and their mothers

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Running head: Development of the PARM
Abstract

**Objective:** This study aimed to develop a self-report questionnaire to explore parental modelling of eating behaviours and then to use the newly developed measure to investigate associations between parental modelling with healthy and unhealthy food intake in both mothers and their children. **Method:** Mothers (N=484) with a child aged between 18 months and 8 years completed the Parental Modelling of Eating Behaviours Scale (PARM), a new, self-report measure of modelling, as well as a food frequency questionnaire. **Results:** Principal component analysis of the PARM identified 15 items grouped into three subscales: Verbal modelling (modelling through verbal communication); Unintentional Modelling (children adopting eating behaviours that parents hadn’t actively modelled); and Behavioural Consequences (children’s eating behaviours directly associated with parental modelling). The PARM subscales were found to be differentially related to food intake. Maternally perceived consequences of behavioural modelling were related to increased fruit and vegetable intake in both mothers and children. Unintentional modelling was related to higher levels of savoury snack intake in both mothers and their children. **Conclusion:** This study has highlighted three distinct aspects of parental modelling of eating behaviours. The findings suggest that mothers may intentionally model healthy food intake while unintentionally acting as role models for their children’s less healthy, snack food intake.

**Keywords:** Eating Behaviours; Food preferences; Measurement; Child; Maternal; Modelling; Parental feeding strategies; Questionnaire; PARM; Fruit and vegetables.
3.1. Introduction

Parental influences on their children’s eating behaviours during infancy and early childhood are well established (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch, 2000; Faith, Scanton, Birch, Francis & Sherry, 2004; Hughes, Shewchuk, Baskin, Nicklas & Qu, 2008). The first five years of life are deemed to be critical in the development of eating behaviours (Birch & Fisher, 1998). During this time, parents actively make food choices for their family, provide the mealtime environment, and use feeding practices to reinforce the development of those eating patterns they prefer (e.g., Baranoski, Watson, Missaghian, Broadfood & Baranowski, 2007; Birch, Savage & Ventura, 2007).

Within the family, eating behaviours and food preferences are often transferred across generations (Kemm, 1987; Wardle, 1995), along with obesity (Garn & Clark, 1976) and patterns of disordered eating (Cutting, Fisher, Grimm-Thomas & Birch, 1999). One potential form of influence is parental role modelling; whereby behaviours, preferences and attitudes relating to food and eating are modelled by parents (e.g., Cutting et al., 1999; Cullen, Baranowski, Rittenberry & Olvera, 2000; Hall & Brown, 1982; Harper & Sanders, 1975; Jansen & Tenney, 2001; Rossow & Rise, 1994; Tibbs et al., 2001). Modelling is a process of observational learning which relies on the parent to encourage and facilitate behaviour within the child, with the consequence of the behaviour becoming habitual (Bandura, 1971). A limited amount of research suggests that there are several aspects of this multidimensional construct which remain ambiguous. Specifically, no distinction has been drawn between intentional and unintentional modelling or between behavioural and verbal modelling.
It is plausible that parents use modelling as a feeding strategy by intentionally demonstrating preferred eating practices in front of their child (for example, eating vegetables with the intended outcome of increasing their child’s vegetable consumption; (e.g., Reinaerts, de Nooijer, Candel & de Vries 2007; van der Horst et al., 2007). In keeping with this notion, studies have found strong similarities between the food intake and preferences of parents and their children (e.g., Brown & Ogden, 2004; Gibson, Wardle & Watts, 1998). Similarly, experimental studies have found that children are more likely to eat new foods if their parents also eat the same item during a shared mealtime (Addessi, Galloway, Visalberghi & Birch, 2005; Harper & Sanders, 2007). In support of this is research using facial expression cues, which found that showing pictures of individuals displaying pleasure in eating a food which was disliked by the participant increases the participant’s desire to eat the previously disliked food (Barthommeuf, Rousset & Droit-Volet, 2009). In addition to the conscious modelling of desired behaviours, parents are a continuous role model for their child (e.g., Rhee, 2008; Sallis & Nader, 1988) and therefore may also unintentionally model eating behaviours. This distinction between intentional and unintentional modelling of eating behaviours has been overlooked in previous research, but is nevertheless likely to be important.

Another potentially important distinction is between behavioural and verbal modelling. Parents may directly model their eating behaviours through physical means (e.g., eating certain foods in front of their child), or through verbal means (e.g., stating their food preferences). Some previous research has touched on behavioural modelling (e.g., Reinaerts et al., 2007; Tibbs et al., 2001), whereas verbal modelling has not been explored as a separate facet of modelling, although the use of verbal
communication in modelling has been alluded to in some assessments of modelling, for example: “I tell my child that healthy food tastes good” (Musher-Eizenman & Holub, 2007). The use and effectiveness of both behavioural and verbal modelling on the development of children’s eating behaviours requires further exploration.

Although research assessing the impact of parental modelling on children’s eating behaviours is limited, a number of positive health outcomes have been found. For instance, Gregory, Paxton & Brozovic (2010b) found parental modelling of healthy eating predicts lower levels of food fussiness and higher interest in food among preschool-aged children. Other studies have focused on the relationship between reported outcomes of parental modelling and child food intake, especially fruit and vegetable consumption, with research finding both strong (Gregory, Paxton & Brozovic, 2011; Reinaerts et al., 2007; Tibbs et al., 2001: Young, Fors, Fasha & Hayes, 2004) and weak (Cullen et al., 2001) positive associations between parent and child intake. Less positive eating activities have also been associated with parental modelling (e.g., intake of high fat and sugar snacks and sweetened beverages; Brown & Ogden, 2004; Hendy, Williams, Camise, Eckma & Hademann, 2008; Woodward, Boon, Cumming, Williams & Hornsby, 1996). This initial research has focussed on the perceived consequences of behavioural modelling, using questions such as: “When I show my child I enjoy eating fruits/vegetables, he/she tries them” (Tibbs et al., 2001). Such questions provide a route into examining modelling through parents’ perception of their child’s response to their modelling behaviours.

An important facilitating factor in the modelling process is the opportunity for children to observe their parents’ eating behaviours. Experimental research has found
that young children were more likely to accept a new food if their parent ate the same food with them, than if the children were simply presented with the food (Addessi et al., 2005; Harper & Sanders, 1975). This suggests that it is not merely the presence of the parent at a mealtime which influences a child’s intake, as shown by Klesges, Stein, Eck, Isbell & Klesges, (1991), but also the parental behaviour that the child observes. Furthermore, parents report a strong belief in the importance of eating with their young children in order to model eating behaviours (Campbell, Crawford & Hesketh, 2007), highlighting the importance of parents and children sharing mealtimes.

Parental feeding practices (including parental modelling), have tended to be measured via self-report questionnaires. However, most existing measures have concentrated on controlling feeding practices, such as restriction and pressure to eat (e.g., the Child Feeding Questionnaire; Birch et al., 2001). Those that have included modelling have a number of limitations. These include having only a few items (Gregory et al., 2011; Musher-Eizenman & Holub, 2007; Tibbs et al., 2001) or a limited focus – for example, exploring only certain modelled behaviours, such as healthy eating (Cullen et al., 2001; Hubbs-Tait, Kennedy, Page & Topham, 2008; Young et al., 2004) or snacking behaviours (Hendy et al., 2008). In addition, some measures lack clarity and face validity, for example, including items which relate more to food restriction than parental modelling (e.g., “I limit my child’s high-fat snacks”) as part of a measure aiming to assess modelling (Tibbs et al., 2001). Existing measures have also not considered unintentional modelling or the perceived outcomes of such behaviour. Thus, currently available measures fail to fully assess the multidimensional nature of modelling within the context of eating.
In summary, the fairly limited research on modelling to date appears to suggest that parental modelling of eating or food intake can be linked to both healthy and unhealthy eating behaviours in children, yet specific details about the types of modelling behaviours that parents are displaying are lacking, mainly due to the paucity of appropriate measurement tools. Therefore, the current study had two aims. First, to develop and test the validity of a new measure to more fully assess parents’ modelling of eating behaviours to their children. Second, to explore the links between different modelling behaviours with healthy and unhealthy food intake among parents and children. It was hypothesised that higher levels of maternal modelling would be positively related to healthy food intake in children.

3.2. Method

3.2.1. Parental Modelling of Eating Behaviours Scale (PARM): Initial item development

Potential items were generated from an extensive review of the parental feeding practices and eating behaviour literature, a critical review of existing measures, theoretical reasoning, and discussions with clinicians and academics in the field. Eighteen items assessing modelling in the broadest sense were generated and collated into a questionnaire format. Respondents were required to respond to each item on a 7-point Likert scale, anchored with strongly disagree (1) to strongly agree (7).
3.2.2. Participants

Four hundred and ninety seven parents of children aged between 18 months and 8 years responded and returned/submitted completed questionnaires. As only 13 (2.6%) of these respondents were fathers they were subsequently excluded, leaving 484 mothers who were included in the analyses. Mothers within this sample ranged in age from 20 to 59 years (mean age 34.6 years, SD = 5.74) and were predominantly White/British (87.4% of sample), with only Asian (4.9%) and White/European (2.1%) scoring above 1% of sample. The mothers had a mean Body Mass Index (BMI) score of 24.9 (SD = 5.08) and reported working between 0 and 68 hours per week (mean 18.53 hours, SD = 15.83); the largest group (25.4%) were non-working mothers. Mothers had an average of 4.2 years of education after the age of 16 (responses ranged from 0 to 12 years, SD = 2.67).

The children ranged in age from 18 to 107 months and had a mean age of 51.7 months (SD = 22.95). Child gender was evenly spread (boys n = 239, 50.6%; girls n = 233, 49.4%) but 14 participants failed to provide the gender of their children so these data were coded as missing. The children were predominantly White/British (84.8% of the sample), the next largest ethnicity group was Asian/Asian British (5.6% of sample) and only White/European and Mixed Ethnicity scored above 1% (1.9% and 2.1%, respectively). The mean age and gender adjusted child BMI z-score was 0.15 (SD = 2.41) (Child Growth Foundation, 1996).

3.2.3. Measures and Procedure

Following Institutional Review Board ethical approval and parental informed consent, data collection proceeded via two methods. First, participants were recruited through
primary and junior schools, pre-schools and nurseries in the midlands region of England. Fifteen hundred questionnaires packs were distributed to mothers/primary caregivers of children aged between 18 months and 8 years and 313 were returned (a response rate of 21%). Second, the study recruited a further 184 participants through an online version of the questionnaire pack which was advertised on a number of parent forums and via two University email lists. Mandatory consent was required before the online questionnaire could be completed. Once completed and submitted, the data were only accessible via the researcher’s online account. Whether the online or paper format of the questionnaire was completed, mothers/caregivers provided background information for themselves and their child, including nationality, ethnicity, age, self-reported height, weight and gender. After this, each participant completed the items generated as part of the newly developed PARM questionnaire and recorded the number of meals eaten in the past seven days with their child (out of a possible 21 meals), along with completing the following pre-established questionnaires:

3.2.3.1. *Comprehensive Feeding Practices Questionnaire (CFPQ: Musher-Eizenman & Holub, 2007; Appendix M).*

The CFPQ was developed to explore a range of feeding practices. It consists of 14 subscales which each explore different parental feeding practices. However, for the purpose of this study, only the modelling subscale was used, which consists of four questions that assess modelling in relation to healthy eating: “I model healthy eating for my child by eating healthy foods myself”; “I try to show enthusiasm about eating healthy foods”; “I try to eat healthy foods in front of my child, even if they are not my favourite”; and, “I show my child how much I enjoy eating healthy foods”.

Responses are measured using a 5-point scale (1 = Strongly Disagree to 5 = Strongly Agree). Findings by Musher-Eizenman and Holub (2007) suggest considerable support for the validity of this measure using American and French samples of parents. The CFPQ has also been successfully used with British parents (e.g., Blissett, Haycraft & Farrow, 2010) and the modelling subscale attained good reliability in the current sample (Cronbach’s $\alpha = .77$).

3.2.3.2. Food Frequency Questionnaire (FFQ: Cooke, Wardle & Gibson, 2003: Appendix N).

The FFQ, developed by Cooke et al. (2003), is a parental self-report measure which assesses both the parent’s and child’s consumption of a range of foods by asking “How often do you eat the following items?” and “How often does your child eat the following items?” during a typical week. These questions are then followed by a list of six food types (see section 2.6.2.1.) but for this study only four items were administrated: (1) Fruit (fresh or tinned); (2) Vegetables (not including potatoes); (3) Cakes, biscuits, sweets or chocolate; (4) Rice, potatoes or pasta. Parents report their intake separately for themselves and for their child and possible responses ranged from ‘Never/Rarely’ (1) to ‘Four or more times a day’ (8). For the purpose of the current study, three more food items were added. One of the additions, “Savoury snacks (e.g., crisps)”, was added to enable an examination of consumption of snack foods (Brown & Ogden, 2004) which did not fall under the category of sweets and chocolates already covered by the original FFQ. The second addition to the measure was “salad items”, which were split from vegetables due to findings suggesting that these items should be considered separately to vegetables (Cullen et al., 2000). The third addition was “fresh fruit juice” which has been previously linked to healthier
diets in children (Baranowski et al., 2008) and to parental modelling (Woodward et al., 1996). The original FFQ has been successfully used in previous studies exploring how often items such as fruit and vegetables are consumed weekly by mothers and their child, and how these related to each other and to the nationally recommended daily intake (e.g., Cooke et al., 2003; Wardle, Carnell & Cooke, 2005).

3.2.4. Data analysis

Principal Components Analysis (PCA) was conducted on the 18 initial items of the modelling measure in order to establish coherent subscales. Spearman’s rho correlations were then used to examine correlations between the newly developed subscales with a previously established modelling subscale (CFPQ), in order to assess the new measure’s validity.

Kolmogorov-Smirnov tests established the dataset to be predominantly non-normally distributed and so non-parametric statistics were used when possible to test the study’s hypothesis. Due to the wide age range of children reported on within this sample (18 months to 8 years), a series of preliminary Mann Whitney U tests of difference were conducted to compare maternal scores for children below 71 months (5 years and 11 months) (younger children) and children aged above this cut off point (older children). The cut off point of 5 years and 11 months was selected due to evidence suggesting the first five years of a child’s life is a critical period in the development of eating behaviours (e.g., Kelder et al., 1994; Nicklas et al., 1991; Nicklaus et al., 2005; Skinner et al., 2002). Twelve of the mothers within this sample did not provide the age of their child so these were coded as missing and were not included in the following analysis. Mothers of younger and older children within this
sample did not vary significantly in their reported PARM scores (See Appendix W1) and so all subsequent analyses were conducted using the sample as a whole. Preliminary Mann Whitney U tests were also conducted to assess potential differences in maternal responses due to the gender of their child. However, no significant differences were found between mothers of boys and girls on any of the factors explored in this study (Appendix W2). Preliminary Spearman’s rho correlations were conducted between the three modelling subscales identified in the PCA and maternal and child food intake with child age, child BMI z scores, maternal age, maternal BMI and maternal education after age 16. Child BMI z scores, maternal age and maternal BMI did not significantly correlate with any of the food intake variables or modelling subscales. However, child age significantly correlated with child intake of cakes, biscuits, sweets or chocolate ($r = .10, p = 0.028$) and fresh fruit juice ($r = .13, p = 0.006$), with maternal intake of vegetables ($r = -.11, p = 0.015$), salad items ($r = .18, p = 0.001$), and rice, potatoes and pasta ($r = .13, p = 0.016$), and with verbal modelling ($r = .10, p = 0.034$). In addition, maternal education was found to be significantly correlated with maternal intake of vegetables ($r = .26, p < .001$), rice, potatoes and pasta ($r = .20, p < .001$), cakes, biscuits, sweets or chocolate ($r = .10, p = 0.038$), and savoury snacks ($r = -.10, p = 0.040$), as well as child fruit ($r = .13, p = 0.004$), vegetables ($r = .22, p < .001$), rice, potatoes and pasta ($r = .17, p < .001$), cakes, biscuits, sweets or chocolate ($r = -.11, p = 0.024$), and savoury snacks ($r = -.24, p < .001$) intake. Therefore, two-tailed partial correlations (due to a non-parametric version of this statistical test being unavailable), controlling for the age of the child and year of maternal education, were used to test the hypotheses that modelling would be positively related to child and maternal food intake. An alpha level of 0.01 was adopted to decrease the chance of type I errors, given the reasonable sample size.
3.3. Results

3.3.1. Factor analysis: Preliminary analyses

Initial analyses and screening were conducted to establish the factorability of the data. Missing data were replaced by the mean for the individual, not for the sample, where three items or more had been completed, in order to avoid a reduction in the sample size and the sample variance (Hill & Lewicki, 2005). The sample of 484 participants provided a good size for factor analysis (Comrey & Lee, 1992), easily satisfying Nunnally’s (1978) and Gurson’s (2008) recommendations of no fewer than ten participants/cases per item. A preliminary Principal Components Analysis was conducted separately for male and female children within this sample. Results confirmed that there were no gender differences in the number of factors retained and therefore all subsequent analyses were conducted using the entire sample.

3.3.1.1. Initial factor analysis and item elimination

To explore the relationship between the initial 18 items, data from the 484 participants were subjected to a Principal Components Analysis (PCA) with varimax rotation (orthogonal rotations criterion). Initially, using Kasier’s (1961) criterion (i.e. Eigenvalues greater than 1), the PCA suggested the retention of 4 factors which explained 58.6% of the variance. However, the Scree plot analysis (Cattell, 1966) suggested support for either a 3 or a 4 factor solution, and parallel analysis (Horn, 1965) supported the retention of only 3 factors, so a 3 factor solution was retained. The resultant 3 factor 18-item rotated matrix from the initial PCA was further examined to reduce overlap and exclude poor items. Two items were eliminated due to their lack of conceptual (face) validity, thereby ensuring that all retained items were
valid indicators of the construct being measured. Therefore, in total, 16 of the initial 18 items were retained.

3.3.1.2. **Analysis of remaining 16 items**

The remaining 16 items were then subjected to a second PCA with varimax rotation. All items loaded distinctly onto one factor with a factor loading of 0.55 or greater with the exception of one item. This item did not load at the inclusion value of >0.50 onto any of the factors and therefore did not contribute to the final model. This left a total of 15 items to form the new modelling measure (see Table 3.1).
Table 3.1: Factor loadings and corrected item-total correlations ($r_{it}$) of the final Parental Modelling of Eating Behaviours Scale (PARM) items (N = 484)

<table>
<thead>
<tr>
<th>Factors, items numbers, and item text</th>
<th>Factor Loading</th>
<th>$r_{it}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1: Verbal Modelling</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. I make comments on my eating behaviours / food choices when I am with my child (e.g., “I’ll be healthy and have vegetables”).</td>
<td>0.69</td>
<td>.41</td>
</tr>
<tr>
<td>7. I try to influence my child’s food preferences by verbally stating my own (e.g., “I love carrots, they’re one of my favourites”).</td>
<td>0.72</td>
<td>.56</td>
</tr>
<tr>
<td>9. I verbally encourage my child to copy my eating behaviours.</td>
<td>0.61</td>
<td>.48</td>
</tr>
<tr>
<td>13. I tend to talk more often about foods I would like my child to eat.</td>
<td>0.65</td>
<td>.43</td>
</tr>
<tr>
<td>14. I try to talk more often about foods I would like my child to eat.</td>
<td>0.75</td>
<td>.54</td>
</tr>
<tr>
<td>15. I explain my food choices verbally to my child (e.g., “I think I’m going to have some fruit for my pudding as I like it and it’s good for me”).</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td><strong>Factor 2: Unintentional Modelling</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My child has picked up eating behaviours from me which I have not intentionally encouraged him/her to adopt (e.g., having tomato sauce with most meals, or eating vegetables first).</td>
<td>0.63</td>
<td>.38</td>
</tr>
<tr>
<td>10. My child has picked up eating behaviours from me which I had tried to hide from him/her (e.g., avoiding certain foods).</td>
<td>0.81</td>
<td>.34</td>
</tr>
<tr>
<td>11. My child has adopted eating behaviours from me which I did not previously realise I did (e.g., eating certain foods first).</td>
<td>0.75</td>
<td>.38</td>
</tr>
<tr>
<td><strong>Factor 3: Behavioural Consequences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. If I intentionally emphasise certain eating behaviours/food preferences my child is more likely to copy them.</td>
<td>0.55</td>
<td>.58</td>
</tr>
<tr>
<td>3. When I show my child I enjoy fruits or vegetables, he/she tries them.</td>
<td>0.84</td>
<td>.56</td>
</tr>
<tr>
<td>4. The eating behaviours of other family members influence what my child eats.</td>
<td>0.67</td>
<td>.54</td>
</tr>
<tr>
<td>6. My child is more likely to try or eat new foods if I eat the new foods with him/her.</td>
<td>0.85</td>
<td>.61</td>
</tr>
<tr>
<td>8. My child is more likely to try new foods he/she has seen me eating.</td>
<td>0.85</td>
<td>.68</td>
</tr>
<tr>
<td>12. My child asks to try foods from my plate which he/she sees me eating.</td>
<td>0.55</td>
<td>.42</td>
</tr>
</tbody>
</table>

Eigenvalues: 5.14 1.44 1.96
Variance explained (%): 34.26 9.63 13.05
Cronbach’s alpha: 0.81 0.63 0.85
Mean: 4.81 3.48 5.00
(SD): (1.13) (1.21) (1.25)
Median: 4.84 3.67 5.17
3.3.1.2. **Factors**

This PCA suggested the retention of three factors explaining 56.94% of the variance (Factor 1, Eigenvalue = 5.14, Variance = 34.26; Factor 2, Eigenvalue = 1.44, Variance = 9.63; Factor 3, Eigenvalue = 1.97, Variance = 13.05). The three factor extraction was supported by the Scree plot analysis (Cattell, 1966) and parallel analysis (Horn, 1965). The first factor (6 items) contained items related to parental modelling through verbal communication (e.g., verbally stating own food preferences to influence child) and was labelled “Verbal modelling”. Factor two (3 items) reflected reported outcomes in children of indirect parental modelling (e.g., children adopting eating behaviours that the parents do themselves but that the parents hadn’t actively tried to promote) and so was named “Unintentional modelling”. Factor three (6 items) reflected parents’ perceived consequences of their modelling behaviours on their children’s eating behaviours and was therefore labelled “Behavioural consequences” (e.g., parents consider their child to be more inclined to eat a food item if the child observes a parent eating it). Each subscale represented the mean score of that factor (i.e., sum of items divided by the number of items). The items and factor loadings of the final questionnaire are presented in Table 3.1.

3.3.1.3. **Internal consistency**

Cronbach’s alpha for the overall scale was good (α = 0.86), with alpha coefficients for each of the subscales (see Table 3.1) ranging from acceptable to high (Nunnally, 1978). There was a mean item-total correlation of 0.49 and all other item-total correlations were greater than 0.34.
3.3.1.4. **Subscale intercorrelation**

Significant relationships were found between: Verbal modelling and Behavioural consequences ($r = .45, p < 0.001$); Verbal modelling and Unintentional modelling ($r = .30, p < 0.001$); and, Unintentional modelling and Behavioural consequences ($r = .36, p < 0.001$). Although there were significant correlations between the PARM subscales none of the correlations exceeded a correlation of 0.80 and consequently no multicollinearity was present (Field, 2005).

3.3.1.5. **Validity**

To test the convergent and concurrent validity of the PARM, a series of correlations (Spearman’s $r$) were conducted between the three subscales of the PARM and the Modelling subscale of the previously validated Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007). Two of the three PARM subscales were found to be positively correlated with the CFPQ’s modelling subscale (Verbal modelling, $r = .45, p < 0.001$; Behavioural consequences, $r = .31, p < 0.001$), lending support to the convergent and concurrent validity of the new measure.

3.3.1.6. **Factor analysis summary**

The results from the PCA supported a three factor model leading to the creation of three distinct subscales. These subscales reflect Verbal modelling (VM; modelling by talking with their child about eating/foods), Unintentional modelling (UM; children picking up eating behaviours exhibited by their parents which are not intentionally modelled by parents) and the final subscale denotes Behavioural consequences (BC; perceived parental outcomes to modelling, which is intended to alter their child’s
The PARM displayed good reliability and validity and these initial findings suggest that it is therefore suitable to further explore the construct of parental modelling in relation to other factors, as presented below.

### 3.3.2. Descriptive Statistics

Information about mother and child weekly food intake (FFQ) is provided in Table 3.2.

**Table 3.2: Descriptive statistics for mother and child food intake per week (FFQ).**

<table>
<thead>
<tr>
<th></th>
<th>Mother (n=480)</th>
<th>Child (n=478)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Median) (SD)</td>
<td>Mean (Median) (SD)</td>
</tr>
<tr>
<td>Fruit</td>
<td>4.98 (5.00) (1.79)</td>
<td>5.64 (6.00) (1.66)</td>
</tr>
<tr>
<td>Vegetables</td>
<td>5.09 (5.00) (1.48)</td>
<td>4.99 (5.00) (1.54)</td>
</tr>
<tr>
<td>Salad</td>
<td>3.74 (4.00) (1.70)</td>
<td>2.90 (3.00) (1.60)</td>
</tr>
<tr>
<td>Rice, potatoes pasta</td>
<td>4.42 (5.00) (1.15)</td>
<td>4.45 (5.00) (1.21)</td>
</tr>
<tr>
<td>Cake, biscuits, sweets or chocolate</td>
<td>3.68 (3.00) (1.59)</td>
<td>4.00 (4.00) (1.46)</td>
</tr>
<tr>
<td>Savoury snacks</td>
<td>2.69 (2.00) (4.64)</td>
<td>2.59 (2.00) (1.28)</td>
</tr>
<tr>
<td>Fresh fruit juice</td>
<td>3.20 (3.00) (1.79)</td>
<td>3.50 (3.00) (1.93)</td>
</tr>
</tbody>
</table>

1Possible response options on the FFQ range from (1) ‘Never/Rarely’ to (8) ‘Four or more times a day’.

Mothers’ reports of their own and their child’s food intake were all significantly and positively related ($r_s .48$ to $.70$, $p < 0.001$), with mothers who reported eating more of a food also reporting higher intake of that food in their child too. In line with previous research (e.g., Cooke et al., 2003), mothers and children within this sample reported similar but generally low amounts of fruit and vegetable intake. The mean fruit and vegetable intake scores were around 5 for parents and children, which
indicates that these foods were being eaten on average once per day. This is much lower than recommended guidelines for fruit and vegetable intake (Department of Health, 2007; Joint Health Surveys Unit, 2009; NHS Information Centre, 2009). Intake of savoury and sweet snack foods was similar for mothers and their children, also supporting previous research (Brown & Ogden, 2004).

Mothers reported eating meals with their children approximately 14 out of a possible 21 times per week (SD = 4.62). In general, mothers reported eating dinners (evening meals) with their children 5 times per week (SD = 2.11), lunches 4 times per week (SD = 3.51) and breakfasts 5 times per week (SD = 2.50). Mothers who reported eating more breakfasts with their child during the past week scored higher on PARM VM (r = .14, p = 0.004) and BM (r = .11, p = 0.01) subscales, but there were no significant relationships between breakfasts and the UM subscale (r = .05, p = 0.32). The number of lunches that mothers and children ate together did not significantly correlate with any of the PARM subscales. Mothers who reported eating more dinners during a week with their child had higher scores on the BC (r = .13, p = 0.004) and UM (r = .16, p = 0.001) subscales of the PARM. Mothers who reported eating more meals with their child within a week, scored higher on PARM VM (r = .12, p = 0.01) and PARM BC (r = .13, p = 0.006) subscales but, again, there was no significant relationship between mealtimes and the UM subscale (r = .08, p = 0.06).

To explore potential differences in scores on both the PARM and FFQ between the two methods of data collection used within this study, a series of Mann Whitney U tests of difference were conducted between the sample collected via schools, nurseries and play groups (who completed paper-based questionnaires) and the sample
collected online. While no significant differences were found between the two recruitment methods on any of the PARM subscales, significant differences were found in reported food intake for mothers and their children. Mothers who completed the online survey reported greater vegetable intake \((M = 5.47, Md = 6.00, n = 188)\) than those who completed paper questionnaires \((M = 4.88, Md = 5.00, n = 292, U = 31758.00, z = 4.465, p = 0.001)\). Similarly, child vegetable intake was also higher in the online sample \((M = 5.15, Md = 6.00, n = 188)\) compared with the paper-based sample \((M = 4.88, Md = 5.00, n = 290, U = 31155.00, z = 2.994, p = 0.003)\). Maternal rice, potatoes or pasta intake was significantly higher in the online sample \((M = 4.63, Md = 5.00, n = 188)\) compared with those recruited via schools \((M = 4.33, Md = 5.00, n = 292, U = 29177.00, z = 3.159, p = 0.002)\), and a similar finding was also present for child intake of these food items (online data: \(M = 4.58, Md = 5.00, n = 188\); paper-based: \(M = 4.39, Md = 5.00, n = 290, U = 29821.00, z = 2.423, p = 0.01\)). These differences indicate that mothers who completed online versions of the questionnaire tended to report higher levels of consumption of these food items, in both their own and their children’s diets.

Testing the hypothesis that higher levels of maternal modelling would be positively related to healthy food intake in children within this sample yielded some significant associations (see Table 3.3).
Table 3.3: Two-tailed partial correlations, controlling for child age and maternal education post 16 years, between maternal modelling with child and maternal food intake.

<table>
<thead>
<tr>
<th>PARM subscales</th>
<th>FFQ Items</th>
<th>Verbal Modelling</th>
<th>Unintentional Modelling</th>
<th>Behavioural Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Child food intake</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruit</td>
<td>-.066</td>
<td>.034</td>
<td>.238***</td>
</tr>
<tr>
<td></td>
<td>Vegetables</td>
<td>-.031</td>
<td>.082</td>
<td>.275***</td>
</tr>
<tr>
<td></td>
<td>Cake, biscuits, sweets or chocolate</td>
<td>-.103</td>
<td>.019</td>
<td>-.127**</td>
</tr>
<tr>
<td></td>
<td>Rice, potatoes and pasta</td>
<td>-.075</td>
<td>-.020</td>
<td>.116</td>
</tr>
<tr>
<td></td>
<td>Savoury snacks</td>
<td>.013</td>
<td>.122**</td>
<td>-.055</td>
</tr>
<tr>
<td></td>
<td>Salads</td>
<td>-.015</td>
<td>.004</td>
<td>.238***</td>
</tr>
<tr>
<td></td>
<td>Fresh Fruit juice</td>
<td>.107</td>
<td>.004</td>
<td>.040</td>
</tr>
<tr>
<td></td>
<td><strong>Maternal food intake</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruit</td>
<td>.061</td>
<td>.001</td>
<td>.146**</td>
</tr>
<tr>
<td></td>
<td>Vegetables</td>
<td>.033</td>
<td>.049</td>
<td>.125**</td>
</tr>
<tr>
<td></td>
<td>Cake, biscuits, sweets or chocolate</td>
<td>-.065</td>
<td>.007</td>
<td>-.043</td>
</tr>
<tr>
<td></td>
<td>Rice, potatoes and pasta</td>
<td>.001</td>
<td>.005</td>
<td>.098</td>
</tr>
<tr>
<td></td>
<td>Savoury snacks</td>
<td>-.005</td>
<td>.130**</td>
<td>.034</td>
</tr>
<tr>
<td></td>
<td>Salads</td>
<td>.071</td>
<td>-.068</td>
<td>.078</td>
</tr>
<tr>
<td></td>
<td>Fresh fruit juice</td>
<td>.152**</td>
<td>.027</td>
<td>.096</td>
</tr>
</tbody>
</table>

**p≤.01; ***p≤.001; FFQ = Food Frequency Questionnaire; PARM = Parental Modelling of Eating Behaviours Scale.

The PARM BC subscale was significantly and positively associated with children’s fruit, vegetable, and salad intake, as well as being negatively associated with children’s intake of cakes, biscuits, sweets or chocolate. PARM UM was positively associated with children’s savoury snack intake, but was not significantly related to any other foods. PARM VM was not significantly related to child food intake.
Children’s intake of cakes, biscuits, sweets or chocolate, rice, potatoes and pasta, and fresh fruit juice were not related to any maternal modelling subscales.

Significant associations were also found between PARM scores and mothers’ food intake (see Table 3.3). Increased VM was correlated with greater maternal fresh fruit juice intake. As with the reports of children’s food intake, PARM BC was positively associated with mothers’ fruit and vegetable intake. PARM UM was positively associated with mothers’ savoury snack intake. Maternal intake of vegetables, sweet snack foods (e.g., cakes and chocolates), rice, potatoes and, pasta, and salad intake were not significantly related to any of the three modelling subscales.

3.4. Discussion

The first aim of this research was to develop and validate a comprehensive parent report measure of parental modelling of eating behaviours. The Principal Component Analysis suggested that 15 retained items formed three distinct, coherent scales and initial examination of the validity and internal consistency of the Parental Modelling of Eating Behaviours Scale (PARM) yielded positive results. Whereas previous modelling measures have been limited in their size and scope, the three distinct sub-types of modelling identified by the PARM subscales provide researchers with a more in-depth measure of this complex behaviour.

The second aim was to use the PARM to explore relationships between maternal modelling and reported healthy and unhealthy food intake in children and their mothers. A number of interesting relationships were found. First, there was an association between mothers who perceive there to be consequences of their
modelling behaviours and reports of greater fruit and vegetable intake in both mothers and children, as well as higher salad intake in children and lower intake of sweet foods such as cakes and biscuits. Similar relationships have previously been found between parental modelling and child intake of fruit, vegetable and salad items (e.g., Cullen et al., 2001; Tibbs et al., 2001) but the current results extend previous findings to suggest that mothers who are aware of the outcomes of certain modelling behaviours, or who model with the specific intention of promoting certain food intake in their children, report that their children eat higher levels of healthier food items, such as fruit, vegetables and salad as well as lower intake of sweet snack foods. It therefore follows that mothers who use modelling as a feeding strategy tend to have higher levels of healthier food intake themselves, given that one important element of modelling is for the child to see the parent eating the food that the parent is trying to encourage the child to eat (Campbell et al., 2007), and the positive association between reports of maternal and child intake of foods lends further support to this notion.

Mothers in this study who modelled verbally reported having higher levels of fresh fruit juice intake, and there was a trend approaching significance between verbal modelling and children’s fruit juice intake too. Fruit juice consumption is considered a healthy option as it counts as one of the daily intake of five fruits and vegetables, which are recommended for adults and children in the UK (Department of Health, 2007; Joint Health Surveys Unit, 2009; NHS Information Centre, 2009). Thus, mothers who verbally model more, and who talk to their child more about foods and use this strategy to draw attention to their consumption of items they consider to be healthier options, choose to model healthier drink choices. However, verbal
modelling was not significantly associated with maternal or child intake of any other foods. The reasons for this are unknown and there could be a number of possible explanations, for example: mothers may be less aware of their use of this modelling strategy, they may be more likely to use verbal modelling for particular items, so may not associate this form of modelling with the wider food groups assessed by the FFQ, or they may not consider it to be influential on the food intake of children. Additional work is required with other samples and a more specific food intake measure to explore this further.

The results also indicated that mothers who scored higher on unintentional modelling (behaviours which are not intentionally modelled) reported higher intake of savoury snacks both in their children and themselves. This supports previous work by Brown and Ogden (2004) who also reported a relationship between children’s snacking behaviours and parental modelling, and expands on their findings by identifying unintentional modelling as the specific aspect of modelling that is linked with children’s increased intake of these less healthy snack foods. Taken together, the results of the current study may therefore suggest that while parents intentionally promote their children’s intake of healthy foods, such as fruit and vegetables, the modelling of less healthy snack food intake may be unintended. However, unlike Brown and Ogden’s research, the present study did not find supporting evidence of a relationship between parental modelling and higher intake of sweet snack foods, such as chocolate. This could be due to these sweet foods being eaten as desserts and savoury snack foods being seen more as treats and so considered less healthy choices, thus attracting the attention of mothers. Future research would benefit from making a distinction between sweet snack foods and items eaten as puddings.
An important factor in relation to modelling is the opportunity for parental behaviours to be observed by their child. Mothers who ate more meals with their children reported higher levels of modelling (specifically, verbal and behavioural consequences). In addition, shared breakfasts and dinner times both seem to be important in producing the opportunity for modelling to occur. Mothers who reported eating more breakfasts with their child also reported higher levels of verbal and behavioural consequences modelling. The link between verbal modelling and eating breakfast together may also be a factor in the findings relating verbal modelling to higher levels of fresh fruit juice intake, which is commonly consumed at this meal. Mothers who ate more evening meals with their child reported higher levels of unintentional and behavioural consequences modelling. This could be due to parents having more time during this meal, meaning that there is a greater opportunity for them to notice the consequences of their modelled eating behaviours (both intentional and unintentional). This study did not find any relationships between shared lunchtimes and modelling, which is probably due to the age range of the children in this sample resulting in a high percentage being in school or childcare for lunch. This would mean lunchtimes would provide less opportunity for modelling. These findings highlight the importance of shared mealtimes in the process of modelling and, potentially, in maternal awareness of the effects of acting as a role model for their children, and confirm that child age is important to consider in relation to modelling (Birch, 1999).

This study has made an important contribution to our ability to measure parental modelling of eating behaviours by identifying three distinct aspects of modelling
behaviour. However, there were a number of limitations. Although the goal was to create a measure of modelling that would be as comprehensive as possible, there may remain some aspects of parental modelling that have not been included in the PARM, such as modelling outside of the home environment, negative behaviours which may be modelled, or an absence of parental modelling of eating behaviours. It is also noted that other family members (e.g., siblings) may be important role models for children’s intake of foods but that unfortunately this cannot be assessed with the PARM. In addition, although the current study provided support for the validity of the PARM, the internal consistency (Cronbach’s alpha) value for the unintentional modelling subscale was slightly lower than for the other two PARM subscales. This may be due to the UM subscale only consisting of three items and the fact that it is a difficult construct of modelling to assess, due to parents having to think about the possible effects on their children’s eating behaviours of instances where they might unintentionally act as a role model. Furthermore, a study of test–retest reliability and further validation of the PARM with observations of family mealtimes would increase researchers’ confidence in the measure. In addition, the measures were self-report measures so relied on the accuracy of mothers’ reports and were not supported by an objective measure. The assessment of diet is known to be challenging and while the FFQ used in this study has been successfully employed in previous research (e.g., Cooke et al., 2003; Wardle et al., 2005), the measure only used a select number of items and these items referred to groups of food rather than individual items. Despite adding additional food groups for this study, using a more detailed measure of food intake or using food diaries or 24 hour recall could prove useful in future research. Moreover, the sample was predominantly white and generally well educated, which means that generalisation to the wider population is limited. There was also a modest
response rate (21%) for parents who completed a paper version of the questionnaire and the whole sample were self-selected mothers, who may differ from other parents who chose not to take part in this study. Finally, the cross-sectional nature of our data limits the implications that can be drawn.

The PARM was created for use with parents of children within a broad age range but, given the significant association between child age and maternal reports of verbal modelling and the changes that occur in children’s eating behaviours as they grow and develop, further work should consider child age as an important factor which may influence the opportunities for, and the methods of, parental modelling of eating behaviours.

In conclusion, the findings from this study support and extend previous research and highlight the possible role of maternal modelling in the development of the diets and food intake of young children. The key finding that increased parental awareness of behavioural consequences of modelling is related to greater reported healthy food intake in children is especially significant as it suggests that using modelling as a feeding strategy, or increasing parental awareness of the process of modelling, could provide an effective means for parents to positively influence the development of their children’s diets. The results also show that mothers can be aware of the potential impact (consequences) of their modelling behaviours which therefore suggests that targeting specific modelling behaviours could prove useful in future work aiming to improve children’s diets. However, the results also support previous research which has found modelling to be linked to less healthy food intake. The relationship between unintentional modelling and higher intake of snack foods in both mothers
and their children highlights the potentially negative outcomes of maternal modelling for child food intake. While further research into this area is required, it would appear that modelling can have both positive and negative influences on children’s food intake depending on the specific behaviours modelled by the parent. Interventions aimed at promoting children’s healthy food intake may benefit from targeting mothers’ modelling behaviours, specifically the modelling strategies which are intended to alter the child’s behaviour and raise awareness of the potential for negative behaviours to be modelled unintentionally by parents and adopted by their child. Further research into this area is required.
Title of Study 2: Unintentional role models: Links between maternal eating psychopathology and the modelling of eating behaviours.

Following on from the development of the PARM measure and its positive preliminary validation, study 2 aimed to further explore the potential relationships between maternal modelling (using the PARM) with other parental factors. Specifically, study 2 looked at aspects of maternal mental health (eating psychopathology, anxiety and depression) which have previously been related to parental feeding strategies and which were therefore hypothesised to be likely to be related to parental modelling of eating behaviours. Aspects of maternal eating psychopathology have previously been associated with modelling, and anxiety and depression have been shown to affect the parent-child relationship and mealtimes in general.

This chapter is based on a paper published in the *European Eating Disorders Review*.


The content of Chapter 4 (study 2) is the same as in the published paper, but the formatting and descriptive statistics have been altered so that it remains consistent with the rest of the thesis.
Unintentional roles models: Links between maternal eating psychopathology and the modelling of eating behaviours

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Running head: Modelling and maternal mental health.
Abstract

This study explored the relationships between maternal modelling of eating behaviours with reported symptoms of maternal eating psychopathology, anxiety and depression. Mothers (N=264) with a child aged 1.5 to 8 years completed three self-report measures designed to assess modelling of eating behaviours, eating psychopathology and levels of anxiety and depression. The study found that higher levels of maternal eating psychopathology were positively associated with eating behaviours that were unintentionally modelled by mothers but that maternal eating psychopathology was not associated with more overt/intentional forms of parental modelling. In addition, higher levels of maternal depression were associated with lower levels of both unintentional and intentional forms of maternal modelling whereas maternal anxiety was not found to correlate with modelling behaviours. This study highlights the possible detrimental influences of maternal mental health in relation to mothers providing their child with a positive parental role model around eating and feeding.

Keywords: anxiety; depression; role model; child feeding practices.
4.1. Introduction

The early years of an individual’s life are often referred to as a ‘critical period’ for the development of eating behaviours (Kelder, Perry, Klepp & Lytle, 1994) and the eating behaviours and food preferences formed within this timeframe are believed to remain relatively stable into adulthood (e.g., Kelder et al., 1994; Mannino, Lee, Mitchell, Smiciklas-Wright & Birch, 2004; Nicklas, Webber & Berenson, 1991; Nicklaus, Boggio, Chabanet, & Issanchou, 2005). The parent-child relationship is an important factor in child development (e.g., Field, 2010; Merikanagas, Dierker & Szatmari, 1998) and parents have been shown to play a significant role in the development of children’s food choices and eating behaviours, through factors such as the child feeding practices they employ and their control of children’s food intake (e.g. Birch & Fisher, 2000; Faith et al., 2004; Hughes, Shewchuk, Baskin, Nicklas & Qu, 2008).

Research exploring parental feeding strategies has tended to concentrate on food restriction and pressure to eat (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch, 2000; Faith et al., 2004). While some consideration has been given to a broader range of feeding practices (e.g., Musher-Eizenman & Holub, 2007), at present, comparatively little attention has been given to parents’ modelling of eating behaviours. Parents are constant role models for their children and therefore modelling can be both intentional (with parents purposely carrying out a desired behaviour in front of their child and hoping that their child will imitate it; Reinaerts et al., 2007), and unintentional (with children observing behaviours that parents are not intentionally modelling; Palfreyman, Haycraft & Meyer, 2012). This means that both intentionally and unintentionally modelled behaviours might be adopted by children. Intentional modelling of healthy eating has been found to predict lower levels of food fussiness in pre-school children (Gregory, Paxton & Brozovic, 2010) and maternal modelling
has also been associated with children’s healthy food intake (e.g., Palfreyman et al., 2012; Tibbs et al., 2001; Young, Fors & Hayes, 2004). In contrast, unintentional modelling has been related to less positive outcomes, for example, to a greater intake of unhealthy snack foods among children (Palfreyman et al., 2012). Research has also suggested modelling to be a factor in reported relationships between mothers’ and their children’s eating patterns. For example, dieting behaviours (Pike & Rodin, 1991), levels of dietary restraint (Cutting, Fisher, Grimm-Thomas & Birch, 1999; Hill, Weaver & Blundell, 1990; Stein, Woolley, Cooper & Winterbottom, 2006), levels of body dissatisfaction (Brown & Ogden, 2004; Hall & Brown, 1982), weight related attitudes (Hall & Brown, 1982; Keel, Fulkerson & Leon, 1997; Steiger et al., 1994; Stein et al., 2006) and bulimic pathology (Stice, 1998). Together, this research supports a role for the process of modelling in the transference of eating behaviours and attitudes.

One important factor that has been shown to reduce the quality of parent-child interactions is maternal mental health symptoms, such as eating psychopathology, anxiety and depression (e.g., Field, 2010; Franzen & Gerlingerhoff, 1997; Nicol-Harper, Harvey & Stein, 2007). Findings of correlational studies have shown that mothers who display higher levels of eating psychopathology have a greater tendency to employ restrictive feeding strategies (e.g., Duke, Bryson, Hammer & Agras., 2004; Haycraft & Blissett, 2008; Reba-Harrelson et al., 2010; Russell, Treasure & Eisler, 1998). In addition, they show greater rigidity and control during mealtimes (e.g., Blissett & Haycraft, 2011; Blissett, Meyer & Haycraft, 2006; Evans & le Grange, 1995; Stein et al., 2001, 2004). Indeed, mothers who report higher levels of eating disorder symptoms have also reported difficulties in feeding their children (Fahy & Treasure, 1989; Franzen & Gerlingerhoff, 1997; Micali, Simonoff & Treasure, 2009; 2011; Reba-Harrelson et al., 2010) and are less likely to eat with their children (Patel, Wheatcroft, Park &
Stein, 2002). This suggests that the feeding strategies employed by mothers are related to their own eating behaviours and attitudes and that mothers who restrict and control their own diets use similar restrictive feeding practices with their children (e.g., Birch & Fisher, 2000; Haycraft & Blissett, 2008; Reba-Harrelson et al., 2010; Stein, Woolley, Cooper & Fairburn, 1994).

In addition to eating psychopathology, depression and anxiety have been linked to maladaptive feeding practices. Specifically, maternal anxiety has been associated with the use of more restrictive feeding practices (e.g., Farrow & Blissett, 2005) and more negative mealtime interactions (Blissett, Meyer & Haycraft, 2007). Maternal expression of anxiety around feeding and food may mean that the child comes to associate this with feeding and finds feeding and mealtimes a less enjoyable experience. In relation to depression it has been suggested that depressed mothers have at least two different styles of interacting, including an intrusive and controlling style or a passive withdrawn style (Malphurs, Raag, Field, Pickens, & Pelaez-Nogueras, 1996). In the domain of eating behaviours this suggestion is supported by Haycraft and Blissett (2008), who proposed that for some mothers, depressive symptoms may result in more hostile and intrusive feeding practices, such as pressuring the child to eat, while for others it may result in maternal withdrawal from interactions and involvement during mealtimes. Further support is also provided by Paulson, Dauber and Leiferman (2006), who found both mothers and fathers with higher levels of depressive symptoms were less engaged with their children during mealtimes, and by Francis, Hofer and Birch (2001), who found a relationship between maternal depression and the use of pressuring feeding practices.
In summary, while the relationships between maternal mental health symptoms and parents’ use of controlling child feeding practices have been fairly well established, to date, no research has considered the relationship between symptoms of eating psychopathology, depression and anxiety with maternal modelling of eating behaviours. Given that parents continually act as role models for their children, and that the presence of symptoms of maternal eating psychopathology, depression and anxiety have been found to impair parents’ responsiveness to, and interactions with, their child during mealtimes (e.g., Paulson et al., 2006), it is possible that these symptoms may also influence the use of maternal modelling and its outcomes, and may reduce the opportunity for modelling of eating behaviours displayed to the child. Therefore, this study aimed to explore associations between maternal modelling behaviours and maternal mental health. It was hypothesised that mothers reporting higher levels of eating psychopathology, depression and anxiety would report significantly lower levels of maternal modelling of eating behaviours.

4.2. Method

4.2.1. Participants

Two hundred and sixty eight parents of children aged between 18 months and 8 years completed and returned questionnaires. Four of these respondents were fathers who were excluded from this sample due to the low number, leaving a final sample of 264 mothers who were included in the analyses. The mothers ranged in age from 20 to 50 years and had a mean age of 34.6 years (SD = 5.79). Mothers reported their ethnicity as predominantly White/British (84.5% of sample), with only Asian (8.3%), White/European (3%) and Mixed ethnicity (1.1%) scoring above 1% of sample. The mothers had a mean self-reported BMI score of 25.2 (SD = 5.13). This sample of mothers worked between 0 and 70 hours per week (mean working hours 18.5, SD = 14.88); the largest group (25.9%) were non-working
They reported a mean of 4.6 years of education after the age of 16 (responses ranged from 0 to 12 years, SD = 2.71).

The children were aged between 18.00 and 131.00 months with a mean age of 52.7 months (SD = 23.32). Child gender was split almost evenly (male n = 123, 47.5%; female n = 136, 52.5%) but five mothers failed to provide the gender of their children, so these data were coded as missing. The children were primarily White/British (80.7% of the sample). The next largest ethnicity group was Asian/Asian British (9.8% of sample) and only White/European 3% and Mixed Ethnicity 2.3%, scored above 1% of the sample. The mean age and gender adjusted child BMI z-score was 0.39 (SD = 2.56; Child Growth Foundation, 1996).

4.2.2. Measures and Procedure

Data collection for this study consisted of two methods, and commenced after receiving Institutional Review Board ethical approval. First, participants were recruited through pre-schools, nurseries, primary and junior schools, from Derbyshire, Leicestershire, Nottinghamshire and Staffordshire. Questionnaires packs were distributed to primary caregivers of children aged between 18 months and 8 years. Second, a further 188 participants were recruited through an online version of the questionnaire pack which was advertised on parenting websites and distributed via two university email lists and an eating disorder support website. Recruitment of mothers from an eating disorder support website was included in this study in order to try and obtain data from mothers with a range of eating psychopathology. Mandatory consent was required before the online questionnaire could be completed. Once completed and submitted, online data were only accessible via the researcher’s online account. Both the online and paper questionnaire required caregivers to
provide background information for themselves and their child, including nationality, ethnicity, age, self-reported height, weight and gender. After completing this, each participant completed the following self-report questionnaires:

4.2.2.1. **Parental Modelling of Eating Behaviours Scale (PARM; Palfreyman et al., 2012; Appendix L)**

This is a newly designed measure comprising 15 items, split into three subscales. The first subscale, Verbal Modelling (6 items; current sample $\alpha = .82$), explores ways in which parents model their eating behaviours and food choices through verbal communication (e.g., “I tend to talk more often about foods I would like my child to eat.”). The second subscale, Behavioural consequences (6 items; current sample $\alpha = .86$), measures outcomes associated with modelling by the parent (e.g., “My child is more likely to try new foods he/she has seen me eating.”). Finally, the third subscale, Unintentional modelling (3 items; current sample $\alpha = .67$), measures parental awareness of behaviours adopted by the child which were not intentionally modelled (e.g., “My child has picked up eating behaviours from me which I have not intentionally encouraged him/her to adopt”). Responses are recorded using a 7-point Likert-type scale with three anchors (Strongly disagree – Neutral – Strongly Agree). Higher scores indicate greater reported levels of modelling. The measure has been shown to have good internal consistency and validity (Palfreyman et al., 2012).

4.2.2.2. **Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Appendix O)**

The EDEQ is a 38 item self-report version of the interview based Eating Disorder Examination (Cooper & Fairburn, 1987). It measures four aspects of eating disorder psychopathology (restraint ($\alpha = .82$), eating concern ($\alpha = .84$), body shape concern ($\alpha = .91$), and部...
and body weight concern ($\alpha = .87$)) as well as having a global score ($\alpha = .95$). It addresses the respondent’s current state, focusing on the last 4 weeks. High scores on the EDEQ indicate more pathological eating attitudes and behaviours. It is widely used and has been found to be a reliable and valid measure in community samples (e.g., Fairburn & Beglin, 1994; Mond, Hay, Rodgers, Own & Beumont, 2004). For the purpose of this study a shortened version of the original instrument was used, with the 13 item diagnostic section being removed.

4.2.2.3. **Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; Appendix P)**

The HADS is a 14 item self-report measure assessing symptoms of anxiety and depression. Severely psychopathological symptoms are not covered which is thought to improve the scale’s acceptability and make it more sensitive to mild forms of psychiatric disorders, thus avoiding a ‘floor effect’ (Herrmann, 1996). The measure consists of two subscales, both of which have been shown to have high factorial validity (Herrmann, 1996). The depression subscale consists of 7 items ($\alpha = .50$), for example, “I still enjoy the things I used to enjoy”. The anxiety subscale also consists of 7 statements ($\alpha = .49$), for example, “I feel tense or wound up”. Responses are made on a 4 point likert response scale to assess the participant’s level of agreement with the statements. Higher scores on the subscales indicate higher levels of anxiety and/or depression. The measure has been found to perform well at assessing the symptom severity of anxiety and depression in clinical and in general populations (Bjelland, Dahl, Haug & Neckelmann, 2001; Herrmann, 1996).
4.2.3. **Data analysis**

A series of Kolmogorov-Smirnov tests established that all subscales were non-normally distributed. Transformation of the data was performed (squared transformation method) but it did not result in normal distribution of the study variables. Therefore, all analyses were conducted using the original, untransformed data and non-parametric analyses were conducted, when possible.

Mann-Whitney U tests identified no significant differences between mothers of boys and girls on any of the study’s variables (Appendix W3). Due to the large age range of children reported on within this sample (18 months to 8 years) a series of preliminary Mann Whitney U tests of difference were conducted, comparing maternal scores for children aged below and above 71 months (5 years and 11 months). Mothers of younger and older children within this sample did not vary in their reported PARM (see Appendix W4) and so all analyses were run on the whole sample. Preliminary two-tailed Spearman’s correlations indicated that child age was negatively correlated with maternal anxiety (r = -.25, p = .001) and depression (r = -.22, p = .001), and positively associated with verbal modelling (r = .16, p = .034). Maternal age negatively correlated with maternal anxiety (r = -.14, p = .021) and maternal BMI positively correlated with maternal anxiety (r = .16, p = .011) and all five of the EDE-Q subscales (rs 0.32 to 0.50, p <.01). Child BMI Z scores also negatively correlated with maternal depression (r = -.15, p = .036) while the number of years mothers spent in education after age 16 was positively correlated to maternal depression (r = .288, p < .001). Therefore, one-tailed partial correlations (due to a non-parametric version of this statistical test being unavailable), controlling for maternal BMI, were used to examine relationships between maternal modelling and maternal eating psychopathology. In addition, when testing for relationships between maternal anxiety and depression levels with maternal modelling, one-tailed partial
correlations controlling for maternal and child age, as well as maternal BMI, child BMI Z scores and maternal post 16 education were conducted. Finally, in order to identify the best predictors of maternal modelling, stepwise regressions were conducted. Significant correlates of each of the three modelling subscales were entered into regressions to determine the best statistical predictors of maternal modelling of eating behaviours. Significance was set at $p<0.01$.

4.3. Results

4.3.1. Descriptive Statistics

Mothers’ mean scores on the PARM, EDE-Q and HADS measures are provided in Table 4.1, below.

| Table 4.1: Descriptive statistics for maternal scores on PARM, EDE-Q and HADS measures ($N=264$). |
|--------------------------------------------------|--------------------------------------------------|
| Mean (Median) (SD) | 4.79 (4.83) (1.14) | 5.01 (5.17) (1.27) | 3.70 (3.67) (1.24) |
| PARM | Verbal modelling | Behavioural consequences | Unintentional modelling |
| EDE-Q | Restraint | 0.92 (1.00) (1.54) | Eating concern | 2.48 (2.29) (1.72) | Shape concern | 2.11 (2.00) (1.63) | Weight concern | 1.76 (1.59) (1.37) | Global score |
Table 4.1 cont: Descriptive statistics for maternal scores on PARM, EDE-Q and HADS measures (N=264).

<table>
<thead>
<tr>
<th></th>
<th>HADS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anxiety</td>
<td>8.11</td>
<td>(8.00)</td>
</tr>
<tr>
<td></td>
<td>Depression</td>
<td>9.77</td>
<td>(10.00)</td>
</tr>
<tr>
<td>Average sum of meals eaten with child per week</td>
<td>13.11</td>
<td>(13.00)</td>
<td>(4.57)</td>
</tr>
</tbody>
</table>

PARM = Parental Modelling of Eating Behaviours Scale; EDE-Q = Eating disorder Examination questionnaire; HADS = Hospital Anxiety and Depression Scale.

The mean PARM scores of this sub sample of 254 mothers are similar to those produced by the main sample of 484 mothers recruited and explored in Chapter 3 (Palfreyman et al., 2012) and suggest that verbal and behavioural modelling were used slightly more than unintentional modelling in this sample. The EDE-Q scores of this sample were similar to those reported in community samples by Fairburn and Beglin (1994) and Mond, Hay, Rodgers, Owen and Beumont (2004). The mean HADS scores in the current sample suggest mild symptoms of anxiety and depression, which are in line with other research using samples of parents with young children (e.g., Nærde, Tambs, Mathiesen, Dalgard & Samuelsen, 2000). The relationships between eating psychopathology, anxiety and depression symptoms were subsequently examined. Symptoms of depression were negatively related to four of the five EDE-Q subscales (r > -.162, p < .004 in all cases). Depression and eating concern were not significantly correlated (r = -.127, p > .01). Anxiety was significantly correlated with eating concern (r = .159, p = .005) but not with any of the other EDE-Q subscales (rs < .127, p > .01). In addition, within this sample, mothers reported eating an average of 13 meals out of a possible 21 per week with their child. The relationships between the average number of meals mothers ate per week with their child and the EDE-Q and HADS subscales were explored. All EDE-Q subscales were found to be significantly and negatively related to the number of meals mothers ate with their child (rs > -.130, p < .01). Anxiety (r = .020, p =
.214) and Depression (r = .059, p = .380) were not found to be significantly related to the number of meals mothers reported eating with their child during an average week.

To explore potential differences between the two methods of data collection used in this study, a series of Mann-Whitney tests of difference were conducted between the sample collected online and the sample collected through schools and nurseries on their scores on the above three measures. A significant difference in maternal levels of anxiety was revealed between mothers who provided data online (M = 9.02, Md = 9.00, n = 188) and those who were recruited via schools and nurseries (M = 5.87, Md = 5.00, n = 76, U = 11235.00, z = 7.55, p = .001). A significant difference was also found between maternal scores of depression reported online (M = 10.93, Md = 11.00, n = 188) and via schools (M = 6.91, Md = 7.00, n = 76), U = 12263.50, z = 9.268, p = .001). These two outcomes indicate that mothers who completed an online version of the questionnaire tended to report higher levels of anxiety and depression than mothers who completed paper versions of the questionnaire. Significant differences between the two groups were not found for any of the PARM or EDE-Q subscales.

Table 2 presents the results of the partial correlations between EDE-Q and PARM subscales, controlling for maternal BMI. Given that the age of the child was found to be positively correlated with verbal modelling, correlations conducted between verbal modelling and EDE-Q scores also controlled for this factor.
Table 4.2: One-tailed partial correlations between maternal eating psychopathology and maternal modelling, controlling for maternal BMI and (when required) child age.

<table>
<thead>
<tr>
<th>EDE-Q</th>
<th>Verbal Modelling</th>
<th>Behavioural Consequences</th>
<th>Unintentional Modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint</td>
<td>.114</td>
<td>.066</td>
<td>.076</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>.096</td>
<td>.114</td>
<td>.288**</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>.034</td>
<td>.063</td>
<td>.163**</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>.058</td>
<td>.059</td>
<td>.168**</td>
</tr>
<tr>
<td>Global Score</td>
<td>.086</td>
<td>.084</td>
<td>.193**</td>
</tr>
</tbody>
</table>

**p<.01

There were no significant associations between Verbal modelling or Behavioural consequences with any of the five EDE-Q subscales. Similarly, the Unintentional modelling subscale of the PARM was not significantly associated with the EDE-Q restraint subscale. However, Unintentional modelling scores were significantly and positively associated with the global EDE-Q subscale and with the other three EDE-Q subscales (eating concern, shape concern, weight concern).

Table 3 presents the results of the partial correlation analysis between the mothers’ HADS anxiety scores (controlling for maternal and child age, and maternal BMI) and HADS depression scores (controlling for child BMI z scores and child age) with the modelling subscales (PARM).
Table 4.3: One tailed partial correlations between maternal modelling and anxiety scores, controlling for child age, age of the mother and maternal BMI, and between maternal modelling and depression, controlling for child age, child BMI z scores and maternal post 16 education.

<table>
<thead>
<tr>
<th>PARM Subscales</th>
<th>HADS Subscales</th>
<th>Verbal Modelling</th>
<th>Behavioural Consequences</th>
<th>Unintentional Modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>-0.051</td>
<td>-0.074</td>
<td>0.107</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>-0.208**</td>
<td>-0.194**</td>
<td>-0.204**</td>
<td></td>
</tr>
</tbody>
</table>

**p<.01

Maternal anxiety was not found to be significantly correlated to any of the three maternal modelling subscales. Significant associations were found between maternal modelling and maternal depression within this sample. Verbal modelling, Unintentional modelling and Behavioural consequences of modelling were all significantly and negatively correlated with maternal depression.

Finally, in order to identify which of the significant correlates of Unintentional modelling were the best predictors, a stepwise multiple regression analysis was conducted. Child age, child BMI z scores and maternal BMI were entered into step 1. The variables found to be significantly correlated with Unintentional modelling previously (i.e. the EDE-Q subscales of eating concern, weight concern, shape concern, overall global score, and the HADS depression subscale) were entered into step 2. The overall model was significant (F 4.36, p = .001) and explained 11% of the variance. The only significant predictor of Unintentional modelling was maternal eating concern (t = 3.67, Beta = 0.30, p < .001). None of the other factors entered into the regression model were statistically significant predictors of Unintentional modelling when considered together.
4.4. Discussion

The aim of this study was to explore the relationships between different aspects of maternal mental health symptoms and maternal modelling practices in relation to children’s eating. A number of interesting relationships were found. Mothers who reported higher eating psychopathology, particularly greater concern about their own eating behaviours, also reported higher levels of awareness of their unintentional modelling, i.e. eating behaviours imitated by their children which they have not intentionally displayed. A possible explanation for this relationship is that these mothers may generally be more aware of their children’s eating behaviours. Previous research which supports this explanation found that mothers who reported higher levels of dietary restriction also report higher levels of monitoring behaviours (Birch, Fisher & Davison, 2003; Tiggemann & Lowes, 2002). There are a number of possible reasons for this increased awareness. It may be due to their own relationship with food and eating (Tiggemann & Lowes, 2002), or concerns about transmitting unhealthy eating behaviours to their children (Reba-Harrelson et al., 2010), or these mothers may be more consciously aware of their children displaying eating behaviours which they consider to be negative. Further to this are the potentially negative outcomes of this association in relation to the formation of children’s eating behaviours. Given that these mothers may have less adaptive food and eating related attitudes and might be engaging in less desirable eating behaviours themselves, the behaviours and attitudes they display may be more likely to have a detrimental effect on their children eating behaviours. Alternatively, the PARM may be tapping into maternal beliefs and concerns about transmitting negative eating behaviours to their child, rather than maternal awareness of their modelling behaviours being adopted by their children. This concern about transmitting unhealthy eating behaviours has been previously documented in mothers with eating disorders (e.g., Micali et al., 2009; Reba-Harrelson et al., 2010) and the association between these two variables also lends
support to the intergenerational transmission of eating psychopathology (e.g., Patel et al., 2002; Pike & Rodin, 1992; Stein et al., 2001; Whitehouse & Harris, 1998).

However, higher levels of eating psychopathology were not found to be associated with either verbal modelling or the consequences of intentional modelling. The lack of associations with more overt, intentional forms of modelling may be due to these mothers engaging in lower levels of interaction with their children in relation to food and eating, as has been previously found in mothers with eating disorders (e.g., Fahy & Treasure, 1989; Franzen & Gerlingerhoff, 1997; Patel et al., 2002). This explanation is further supported by the relationship found within this sample between mothers with higher levels of eating psychopathology reporting eating fewer meals per week with their child. Alternatively, mothers with their own eating concerns may find it easier to exhibit control around mealtimes (e.g., Blissett & Haycraft, 2011; Stein et al., 2001) rather than intentionally modelling behaviours to influence their child. Additionally, these mothers may be aware that their eating behaviours are not positive examples and so they may avoid showing them to their children when possible. It should also be noted that mothers within this sample reported a wide age range of between 20 and 50 years. This could have affected the levels of eating psychopathology as higher levels are generally found in younger individuals (Hudson, Hiripi, Harrison, Pope & Kessler, 2007). However, scores on the EDE-Q were similar to previous community samples (e.g., Mond et al., 2004).

The fact that maternal eating restraint was not found to be correlated with any of the modelling subscales is interesting, given that the transference from parent to child of restrictive and dieting behaviours has been previously suggested (e.g., Cutting, et al., 1999; Hill et al., 1990; Pike & Rodin, 1991). This could mean that levels of maternal restraint do
not influence the use of modelling as a feeding strategy by mothers or it may suggest that mothers with higher levels of restrictive behaviours are not aware of these behaviours being adopted by their child or consider them to be normal eating behaviours. Alternatively, it may be due to mothers within this sample reporting low levels of restrictive eating behaviours. Given that restrictive forms of eating disorder behaviours are less common in the population than other forms of eating psychopathology (e.g., Hudson, Hiripi, Pope Jr. & Kessler, 2007), this was not unexpected.

Mothers who reported higher levels of depression also reported lower levels of all three forms of modelling explored. These findings were anticipated due to mothers with higher levels of depression often exhibiting lower levels of interaction with their children (e.g., Nicol-Harper et al., 2007), poorer general awareness of their children’s cues (e.g., Field, 2010), and poorer parent-child relationships (e.g., Paulson et al., 2006), thus reducing the probability of overt modelling being employed by parents and the opportunity for children to observe their parents’ eating behaviours. These factors can also explain the negative relationship with unintentional maternal modelling, as the poorer relationship between parent and child could affect the parents’ awareness of their children’s eating behaviours in general and the lack of interaction would prevent the opportunity for all forms of modelling to be displayed to the child. The relationships between low levels of modelling and maternal depression may mean that mothers with symptoms of depression may fail to provide their child with a positive role model in relation to food and eating. This could lead children to look to others as role models in relation to food, such as family members (e.g., fathers or siblings) or they may have to look outside the home environment (e.g., to peers). This in turn could affect the development of children’s eating behaviours and attitudes to foods, which could have detrimental effects in the future. Further research with fathers is required to test this suggestion.
While depression supported the hypothesis and was negatively associated with all three of the maternal modelling subscales, anxiety was not found to be significantly related to maternal modelling. These findings could suggest that maternal anxiety may not be a factor in the use of maternal modelling as a feeding practice or be related to modelling in general. Mothers with higher levels of anxiety around foods and eating may be more likely to employ more controlling feeding practices, as has been found previously (e.g., Farrow & Blissett 2005). So, while mothers with higher levels of depression may become more withdrawn from mealtime interactions, thereby reducing the opportunities for modelling, mothers with higher levels of anxiety may become more controlling and intrusive in their feeding interactions, rather than adopting less intrusive feeding strategies, such as intentionally modelling eating behaviours. Alternatively, symptoms of maternal anxiety might impair parents’ ability to comment on their feeding interactions objectively. Variability in the way in which symptoms of anxiety and/or depression can impact on parent-child interactions may also contribute to explaining these findings and aligns with the absence of association between levels of anxiety or depression with the number of meals that parents reported eating with their child during an average week. The PARM modelling measure also concentrates on behaviours and may not tap into the factors which may be more prone to being affected by maternal anxiety, such as mealtime involvement. However, the lack of any associations between modelling and anxiety may also be due to the use of a broad measure of anxiety in this study rather than a specific measure of anxiety relating to food and eating behaviours, as no specific measure of eating anxiety is currently available. Further research is required into anxiety and its relationship to modelling.
While this study has provided insight into the potential relationships between maternal mental health and acting as a role model around eating behaviours, there are a number of limitations. First, data were collected from self-report measures relying on the accuracy of maternal report and mothers who took part online had significantly greater levels of anxiety and depression. Second, within this sample the levels of mental health symptoms were relatively low and future research would benefit from exploring a clinical sample of mothers. Third, the anxiety measure used in this study was a brief measure of general anxiety and was not specific to anxiety around eating and mealtimes, which may mean associations between anxiety and maternal modelling may have remained unidentified. Moreover, the sample was predominantly white and generally well educated, which means that generalisation to the wider population is limited. Finally, the cross-sectional nature of our data limits the implications that can be drawn.

In conclusion, the findings from this study support previous research in suggesting that maternal mental health factors are related to the feeding practices employed by mothers. The relationship between maternal eating psychopathology, particularly maternal eating concerns, and higher reported awareness of unintentional modelling is especially significant as these mothers may be modelling less desirable eating behaviours which their children may be picking up on, thus highlighting a potentially negative influence on the development of children’s eating behaviours. Alternatively, this relationship could suggest that mothers with higher eating psychopathology may be more concerned about the potential for transferring their less adaptive eating behaviours to their children through modelling. The relationships between depression and maternal modelling are also important and suggest that mothers with symptoms of depression may fail to provide their child with a positive role model in relation to food and eating. Thus children may need to look to another individual or they may
struggle to form adaptive relationships with food and eating, which could have detrimental future consequences. While preliminary, the current study's findings add further support to the potential value of early interventions in the form of educational programs and support for mothers with eating disorders, as suggested by Reba-Harrelson and colleagues (2010).
Title of Study 3: Associations between parenting styles and maternal modelling of eating behaviours.

Another parental factor which was thought likely to be related to parental modelling is general parenting style (authoritarian, authoritative, and permissive). Previous research has found relationships between the general parenting styles of parents and the feeding strategies they employ. In addition, preliminary research has suggested relationships between an authoritative parenting style and the use of parental modelling of eating behaviours as a feeding strategy. However, these studies did not take into account the varying dimensions of modelling. Study 3 therefore aimed to further explore this relationship using the PARM measure, which examines different facets of modelling, with the aim of expanding on the present knowledge regarding the association between parental modelling of eating behaviours and general styles of parenting.

This chapter is based on a brief report submitted to *Eating Behaviours*, where it is currently under review:

CHAPTER 5

Associations between parenting styles and maternal modelling of eating behaviours

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Running head: Maternal modelling and parenting styles.
Abstract

Objective: This study aimed to explore relationships between general parenting styles and the modelling of eating behaviours by mothers. Method: Two hundred and twenty nine mothers, with children aged between 18 months and 8 years, completed two self-report measures: the Parental Modelling of Eating Behaviours Scale (PARM) and the Parenting Styles and Dimensions Questionnaire. Results: Both Verbal modelling and Behavioural consequences of modelling which are overt, intentional forms of maternal modelling measured by the PARM, were found to be positively related to an authoritative parenting style. Authoritarian and permissive parenting styles were not found to be significantly related to maternal modelling. Conclusion: The findings suggest that intentional maternal modelling, especially in its verbal form, is more likely to be used by mothers with an authoritative parenting style. The preliminary findings of this study further strengthen support for modelling being an adaptive feeding strategy, which is employed by mothers who adopt a more adaptive (authoritative) general parenting style. Interventions targeting feeding behaviours or aimed at promoting healthy eating in children may benefit from considering parenting styles and parents’ role modelling.

Keywords: Eating Behaviours; Authoritative; Parental feeding strategies; Verbal modelling; Intentional role modelling.
5.1. **Introduction**

Diet and food preferences are developed early on within an individual’s life, particularly between birth and five years of age (e.g., Kelder, Perry, Klepp & Lytle, 1994; Nicklas, 1995). During this period, children’s eating patterns become influenced not just by their internal hunger cues but also in response to parental cues (e.g., Koivisto, Fellenius, & Sjoden, 1994). One way for parents to influence their children’s eating behaviours is through feeding strategies, such as modelling (e.g., Cullen, Baranowski, Rittenberry, & Olvera, 2000; Cutting, Fisher, Grimm-Thomas, & Birch, 1998; Tibbs et al., 2001).

Within the domain of children’s eating, modelling has received less research interest than other feeding strategies, such as food restriction or pressure to eat (e.g., Fisher & Birch 1999). Modelling can be both overt/intentional (where parents intentionally display behaviours with the intended outcome of influencing their children’s diet; Reinaerts, de Nooijer, Candel, & De Vries, 2007), and covert/unintentional (parents provide a constant role model for their child, which means behaviours which are not intentionally displayed by the parent may also be adopted by their child; Palfreyman, Haycraft & Meyer, 2012; Chapter 3). Intentional forms of modelling have been related to higher levels of healthy food intake and lower levels of food fussiness in children (e.g., Gregory, Paxton & Brozovic, 2010b; Palfreyman et al., 2012; Tibbs et al., 2008; Young, Fors & Hayes, 2004). In addition, unintentional modelling has been related to undesirable behaviours, such as greater intake of unhealthy snack foods (Palfreyman et al., 2012), elevated levels of dietary restraint (Cutting et al., 1998; Hill, Weaver & Blundell, 1990), and increased dieting behaviours (Pike & Rodin, 1991) in children. In relation to parenting style, limited research has explored its associations with parental modelling.
Parents’ feeding practices may be reflective of a general style of parenting (e.g., Blissett & Haycraft, 2008; Hubbs-Tait, Kennedy, Page, Topham & Harrist, 2008; Hughes, Power, Fisher, Mueller & Nicklas, 2005). Parenting styles reflect how parents vary on the dimensions of warmth/responsiveness and control/demandingness (Baumrind, 1979; 1991). Combinations of these dimensions have been categorised as authoritative, authoritarian, indulgent and neglectful, with these last two often being grouped together under the term permissive (Baumrind, 1979; 1991). While feeding practices may be reflective of these general parenting styles, to date, associations between these factors have been somewhat inconsistent. For example, research by Hughes et al. (2005) found an authoritarian parenting style was related to more controlling feeding practices (e.g., pressure to eat, restriction). In addition, they found an authoritative parenting style was positively related to monitoring behaviour, which controls a child’s diet but allows self-regulation to develop, while both forms of permissive parenting style were associated with less controlling feeding practices. Further research has found healthy food availability and greater encouragement of a varied diet to be related to a more authoritative but less authoritarian parenting styles (Patrick, Nicklas, Hughes, & Morales, 2005). However, other studies have failed to find any links between parenting style and feeding practices (e.g., Brann, & Skinner, 2005) and some have found contradictory findings. For example, Blissett and Haycraft (2008) found controlling feeding practices were positively associated with a permissive, but not authoritarian, parenting style.

In relation to parenting styles and modelling, a study conducted by Hubbs-Tait et al. (2008) found relationships between higher levels of modelling and an authoritative parenting style, while lower levels of modelling were related to both more authoritarian and permissive styles. However, the study utilised a small (six item) questionnaire to measure parental
modelling; the validity of which is questionable as the items appear to be more conceptually related to restriction, control of diet and the opportunity for modelling to take place, rather than the actual practice of acting as a role model. The study also did not take into account the possible differences between intentional and unintentional modelling which, as suggested by Cullen et al. (2000), may relate separately to different parenting styles (e.g., unintentional to permissive, intentional to authoritarian and to authoritative). While Hubbs-Tait et al.’s (2008) findings are encouraging, further research is required to explore possible relationships between parenting styles and different facets of modelling.

In summary, while parenting styles have been associated with a number of parental feeding strategies, research has only just begun to look at the relationship between such styles with parental modelling of eating behaviours. The aim of this study is to explore the possible associations between different forms of maternal modelling with authoritative, authoritarian and permissive parenting styles. It is hypothesised that intentional maternal modelling will be significantly, positively associated with an authoritative parenting style and significantly negatively associated with both authoritarian and permissive parenting styles. It is further hypothesised that a permissive parenting style will be significantly positively associated to unintentional maternal modelling.

5.2. Method

5.2.1. Participants

The sample consisted of 229 mothers of children aged between 1½-8 years. Mothers’ mean age was 34.7 years (SD = 5.69, range 21 to 59), their mean self-reported BMI was 24.67 (SD = 4.99), and they were predominantly White/British (92.1% of the sample). The children
reported on had a mean age of 50.7 months (SD = 22.51, range 18 to 107) and the mean age
and gender adjusted child BMI z-score for this sample was 0.25 (SD = 2.22) (Child Growth
Foundation, 1996). The children were predominantly White/British (90.8% of the sample)
and only mixed ethnicity scored above 1% (1.8%). Child gender was evenly spread (54%
boys, 46% girls). Mothers within this sample worked between 0 and 50 hours per week
(mean 18.26, SD = 14.03) and the largest group was non-working mothers (24.9%).
Mothers’ mean years of education after the age of 16 was 3.67 years (SD = 2.54 range 0 to
10), which is in line with other research with parents of young children (e.g., Blissett,
Haycraft & Farrow, 2010).

5.2.2. Measures and Procedure

Following Institutional Review Board ethical approval and informed consent, participants
were recruited through schools, pre-schools and nurseries from the East Midlands, UK.
Approximately 1000 questionnaires packs were distributed to mothers/primary caregivers of
children aged between 18 months and 8 years, of which 229 (22.9%) were returned
completed. This response rate is consistent with other surveys of this type (e.g., Blissett &
Haycraft, 2008). Initially, mothers provided background information about themselves and
their child and then completed the following self-report measures.

5.2.2.1. Parental Modelling of Eating Behaviours Scale (PARM: Palfreyman et al., 2012;
Appendix L).

The PARM is a recently designed measure, consisting of 15 parental self-report items split
into three subscales. Verbal modelling (6 items; α .80) examines ways in which parents
model their eating behaviours and food choices, through verbal communication with their
child (e.g., “I try to influence my child’s food preferences by verbally stating my own, e.g., I love carrots, they’re one of my favourites”). The Behavioural consequences subscale (6 items; $\alpha = .83$) explores parentally perceived outcomes associated with parents’ modelling behaviours (e.g., “My child is more likely to try new foods he/she has seen me eating”). Finally, Unintentional modelling (3 items; $\alpha = .59$) assesses parental awareness of behaviours adopted by their child, which were not intentionally modelled (e.g., “My child has picked up eating behaviours from me which I have not intentionally encouraged him/her to adopt”).

Responses are recorded using a 7-point Likert-scale with three anchors (Strongly disagree – Neutral – Strongly Agree). This measure has been successfully used in previous research and demonstrates adequate validity and reliability (Palfreyman et al., 2012).

5.2.2.2. Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Olsen & Hart, 1995; Appendix Q)

The PSDQ is a 32-item instrument composed of three scales measuring authoritarian, authoritative and permissive parenting. For ethical reasons, four physical coercion questions were removed prior to distribution, echoing previous research using similar samples (e.g., Blissett & Haycraft, 2008). This shortened (28 item) version includes: 15 authoritative items ($\alpha = .80$) reflecting reasoning, warmth and support, and democratic participation; 8 authoritarian items ($\alpha = .65$) reflecting verbal hostility and punitive strategies; and 5 permissive items ($\alpha = .66$) reflecting indulgence and failure to follow through. Items were answered using a 5-point scale (Never to Always). This measure has been used successfully in other research with similar parent samples (e.g., Blissett & Haycraft, 2008; Hubbs-Tait et al., 2008).
5.2.3. Data Analysis

Kolmogorov-Smirnov tests established that the data were non-normally distributed and hence non-parametric statistics were used. Mann-Whitney U tests identified no significant differences between mothers of girls versus boys on any of the subscales and therefore the sample was used as a whole for further analyses (Appendix W5). In addition, a series of preliminary Mann Whitney U tests of difference were conducted due to the wide age range of children reported on within this sample (18 months to 8 years), to compare maternal scores for children aged above (older children) and below (younger children) 71 months (5.11 years). Mothers of younger and older children within this sample did not vary significantly in their reported PARM scores (see Appendix W6). Preliminary two-tailed Spearman’s rho correlations were conducted between maternal age, child age, maternal BMI, child BMI Z scores and maternal post 16 education with all PSDQ and PARM subscales. These analyses yielded just one significant association between reported maternal verbal modelling and child BMI Z scores \( r = .153, p = .04 \). Thus, one-tailed partial correlations were used for analyses involving verbal modelling and one-tailed Spearman’s rho correlations were used to explore relationships between behavioural consequences of modelling and unintentional modelling with the PSDQ subscales. Significance was set at \( p<0.01 \).

5.3. Results

5.3.1. Descriptive Statistics

Information about maternal scores on the modelling (PARM) and parenting styles (PSDQ) measures is provided in Table 5.1, below.
Table 5.1: Descriptive statistics for maternal scores on PARM and PSDQ measures (N = 229).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean (Median)</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>4.82 (4.83)</td>
<td>1.11</td>
</tr>
<tr>
<td>Behavioural consequences</td>
<td>5.02 (5.17)</td>
<td>1.23</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>3.28 (3.33)</td>
<td>1.16</td>
</tr>
<tr>
<td><strong>PSDQ</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authoritative Parenting Style</td>
<td>4.04 (4.07)</td>
<td>0.43</td>
</tr>
<tr>
<td>Authoritarian Parenting Style</td>
<td>1.76 (1.75)</td>
<td>0.45</td>
</tr>
<tr>
<td>Permissive Parenting Style</td>
<td>2.03 (2.00)</td>
<td>0.54</td>
</tr>
</tbody>
</table>

PARM = Parental Modelling of Eating Behaviours Scale; PSDQ = Parenting Styles and Dimensions Questionnaire

The mean PARM scores for this sub sample of 229 mothers are similar to those produced by the collective sample of 484 mothers recruited and reported on in Chapter 3 (Palfreyman et al., 2012) and suggest that unintentional modelling was reported less frequently than verbal or behavioural modelling. The mean PSDQ scores are in line with previous studies which have used these measures with parents of young children (e.g., Haycraft & Blissett, 2010; Hubbs-Tait, et al., 2008).

Table 5.2 (below) presents the results of the Spearman’s correlations between maternal modelling (PARM) and parenting styles (PSDQ).
Table 5.2: One-tailed Spearman’s rho or partial correlations between maternal parenting styles and modelling (N = 229).

<table>
<thead>
<tr>
<th>PSDQ</th>
<th>Authoritative</th>
<th>Permissive</th>
<th>Authoritarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Modelling ^</td>
<td>.26**</td>
<td>.03</td>
<td>.01</td>
</tr>
<tr>
<td>Behavioural Consequences</td>
<td>.19**</td>
<td>-.05</td>
<td>-.05</td>
</tr>
<tr>
<td>Unintentional Modelling</td>
<td>.01</td>
<td>.07</td>
<td>.13</td>
</tr>
</tbody>
</table>

**p < .01

^ Partial correlations controlling for child BMI Z scores.

The results suggest positive, significant relationships between the PSDQ authoritative subscale and PARM verbal modelling and behavioural consequences of modelling subscales. PSDQ authoritarian and permissive subscales were not significantly related to any of the three modelling subscales.

5.4. Discussion

The aim of this study was to explore the relationships between reported consequences of maternal modelling of eating behaviours and parenting styles. The findings partially support the hypotheses. Specifically, the results indicate a relationship between an authoritative style of parenting and higher levels of verbal modelling and behavioural consequences of parental modelling. Similar findings linking these two factors have been reported previously (Hubbs-Tait et al., 2008) but the current study expands on this relationship by suggesting that mothers with a generally authoritative style of parenting are more likely to verbally model their food choices and preferences and that authoritative mothers in this study perceive their behavioural modelling to influence their child’s eating behaviours. These forms of modelling have been associated with higher child intake of healthy food items (e.g., Palfreyman et al., 2012; Chapter 3). Previously, an authoritative parenting style has been associated with the use of
more adaptive feeding practices by parents, such as monitoring and modelling (Hughes, et al., 2005; Hubbs-Tait et al., 2008), and this relationship with modelling adds further support to the positive associations between an authoritative parenting style and mothers’ child feeding practices.

In contrast, findings did not support the predicted negative relationships between intentional modelling and both authoritarian and permissive parenting styles, which previous research has suggested (Hubbs-Tait et al., 2008). This could suggest that mothers with either permissive or authoritarian parenting styles maybe too uninvolved (permissive) or too controlling to use, or to recognise using (authoritarian), modelling as a feeding strategy. Previously, both authoritarian and permissive parenting styles have been related to the use of more controlling parental feeding practices (e.g., Blissett & Haycraft, 2008; Hubbs-Tait et al., 2008). This has lead researchers to suggest a possible cross-over of feeding strategies between these two parenting styles (Hubbs-Tait et al., 2008), which could also explain why neither of these feeding practices was significantly related to modelling.

It is interesting to note that unintentional modelling was not found to be related to any of the parenting styles in this study. This may be due to the construct being difficult to measure via parental self-reports or the fact that parenting styles may simply not be related to parental reports of this construct, and so further research exploring unintentional modelling is required.

While this preliminary study has provided insight into the relationships between modelling and parenting styles there are several limitations. First, is the reliance solely on maternal self-reports. Second, the lack of diversity within the sample and the low response rate means
that generalisation to the wider population is limited. Finally, the exclusion of fathers from the study is an area which should be addressed in future research building on these findings.

In conclusion, whilst requiring replication with other samples, the findings of this study strengthen the support for a relationship between mothers who engage in modelling and also adopt a more adaptive general parenting style. These preliminary findings suggest that, in relation to feeding behaviours, it may be beneficial for parenting styles to be taken into consideration in intervention programmes aimed at promoting healthy eating in children.
Title of Study 4: Maternal and paternal modelling of eating behaviours in a non-clinical sample.

While previous research has primarily concentrated on mothers, this thesis recognises the importance that fathers can potentially have in the feeding domain, especially in relation to the modelling of eating behaviours. In view of the fact that the potential for an individual to be a role model for their child is not reliant on them being their child’s primary food provider, this suggests that fathers are still likely to be important role models of eating behaviours for their children. Study 4 is an exploratory study, which looks at both maternal and paternal modelling behaviours, and the parental factors found to be related to modelling in the previous studies within this thesis. This approach allowed for differences and similarities between the different facets of maternal and paternal modelling which are assessed by the PARM to be examined. The inclusion of mothers and fathers also enabled examination of the differences and similarities in the parental factors which are related to their modelling of eating behaviours.
CHAPTER 6

Maternal and paternal modelling of eating behaviours in a non-clinical sample.

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Running head: Maternal and paternal modelling
Abstract

Objective: This study had three aims: first, to explore differences between maternal and paternal modelling of eating behaviours; second, to explore the relationships between parental modelling with factors previously associated with modelling in mothers; and third, to explore relationships between both maternal and paternal modelling with their children’s eating behaviours. Method: Thirty-six matched father and mother pairs, with children aged between 18 months and 8 years, completed four self-report measures assessing parent reports of their modelling of eating behaviours, parenting styles, eating psychopathology and children’s eating behaviours. Results: Mothers and fathers did not differ significantly on any of their reported modelling behaviours. Modelling was negatively related to eating psychopathology in fathers but positively associated with maternal eating psychopathology. Paternal modelling was further found to be positively associated with an authoritative parenting style and maternal modelling was negatively related to a permissive parenting style. Finally, maternal and paternal modelling behaviours were found to be related to lower levels of food fussiness and increased food enjoyment in children. However, paternal modelling was also negatively related to satiety responsiveness in children and maternal modelling was positively correlated with emotional under eating in children. Conclusion: While preliminary and requiring replication, these findings suggest that mothers and fathers do not differ in their reported levels of modelling behaviours with their children. However, the findings also suggest that there are differences, as well as similarities, in the factors which are associated with maternal and paternal modelling behaviours and the reported consequences of these.

Keywords: Mother; Father; Eating Behaviours; Parental Mental Health; Child; Modelling; Parental feeding strategies; Questionnaire; PARM.
6.1. Introduction

Parents and caregivers have an important influence on the eating behaviours of their children, especially during infancy and early childhood (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch 2000; Faith, Scanton, Birch, Francis & Sherry, 2004; Hughes, Shewchuk, Baskin, Niklas & Qu, 2008; Ventura & Birch, 2008). Mothers are typically the main food providers for their children and so research has tended to concentrate on how mothers’ behaviours, such as their feeding practices and parenting styles, may be related to the development of children’s eating behaviours (e.g., Blissett & Farrow 2007; Birch & Fisher, 2000; May et al., 2007; Rhee et al., 2006). While mothers are clearly important, this focus on mothers has meant that the role of the father in feeding interactions has often been relatively overlooked (e.g., Fraiser et al., 2011; Haycraft & Blissett, 2012). However, fathers have been shown to be important in aspects such as decisions to breastfeed (e.g., Bar-Yam, 1999; Wolfberg et al., 2004), child body satisfaction (Davison & Birch, 2001), and the development of weight concerns and weight control practices among children (Field et al., 2001). As well as this, recent research has suggested that fathers may play an important role in child feeding (e.g., Blissett, Meyer & Haycraft, 2006; Haycraft & Blissett, 2008a, 2012; Johannsen, Johannsen & Specker, 2006). Therefore, it is important to consider the role of fathers as well as mothers when examining factors potentially related to children’s eating behaviours.

The child feeding practices employed by parents are of significant interest to researchers considering children’s healthy development (e.g., Fisher & Birch 1999; Faith et al., 2004; Francis, Hofer & Birch 2001). Research to date has tended to concentrate on less adaptive, more controlling feeding strategies, such as restriction and pressure to eat. Such practices have been shown to have detrimental effects on children’s ability to self-regulate their food intake (e.g., Birch, Fisher & Davison, 2003; Johnson & Birch, 1994) and have been
associated with poor weight-related outcomes in children (e.g., Faith et al., 2004). However, parents do use other feeding practices which are not controlling (e.g., Musher-Eizenman & Holub, 2007). One feeding practice which is of interest due to its intentional and unintentional influences on children’s eating is modelling. As outlined in Chapter 3, whilst receiving only marginal research attention, parental modelling around eating has been associated with both adaptive and less positive child outcomes. Specifically, modelling is associated with desirable consequences, such as higher levels of healthy food intake in children and lower levels of food fussiness (e.g., Fors & Hayes, 2004; Gregory, Paxton & Brozovic, 2010; Palfreyman, Haycraft & Meyer, 2012; Tibbs et al., 2001). However, modelling of eating behaviours has also been positively associated with a greater intake of unhealthy snack foods in children (Ogden & Brown, 2004; Palfreyman et al., 2012; Chapter 3) and to disturbances in eating patterns and eating related attitudes (e.g., Brown & Ogden, 2004; Cutting, Fisher, Grimm-Thomas & Birch, 1998; Hall & Brown, 1982; Hill, Weaver & Blundell, 1990; Keel et al., 1997; Pike & Rodin, 1991; Steiger, Stotland, Ghadirian, & Whitehead, 1994). Thus, modelling appears to be an important child feeding practice but much of the current research has only considered maternal modelling. While fathers are often not the main food provider within the home (e.g., Bliss et al., 2006), research has demonstrated that other individuals, such as peers or siblings, can be influential role models for the development of children’s diets (e.g., Birch, 1980), and so it is likely that fathers will also be an important role model for their children’s eating. The importance of paternal modelling on influencing children’s developing behaviours can be seen in other domains, such as physical activity, where higher levels of paternal physical activity have been associated with higher levels of physical activity in their children (e.g., Davison, Cutting & Birch, 2003; Raudsepp, 2006).
Studies which have explored the feeding strategies of mothers and fathers have suggested both variations and similarities in their feeding practices. For example, differences have been found between mothers and fathers with regards to their monitoring of children’s food consumption, with mothers tending to report higher levels of this feeding strategy than fathers (e.g., Blissett et al., 2006). In addition, fathers have been observed to use more pressure tactics with boys than mothers, while mothers used more praise with girls for eating than fathers (Orrell-Valente et al., 2007). In contrast, mothers and fathers have been found to be similar in their reported and observed use of pressuring and restrictive feeding behaviours (Blissett et al., 2006; Haycraft & Blissett, 2008a). This equivocality in the current research findings suggests that more work is required to look at the potential similarities and differences in mothers’ and fathers’ feeding practices. By furthering knowledge about the potential variation in mothers’ and fathers’ feeding practices, future family-based interventions aimed at promoting healthy eating in children will be able to be tailored specifically to mothers and to fathers (Fraiser et al., 2011).

A number of factors have been found to be associated with mothers’ and fathers’ feeding practices, such as parenting styles, levels of eating psychopathology and children’s eating behaviours (e.g., Blissett & Haycraft, 2008; Blissett et al., 2006; Farrow, Galloway & Fraser, 2009; Haycraft & Blissett, 2012). Parenting styles, levels of eating psychopathology (Chapter 4; Chapter 5), and certain child eating behaviours (Gregory, Paxton & Brozovic, 2010b) have all been related to maternal modelling of eating behaviours but, at present, they have not been considered in relation to fathers’ modelling and this omission needs addressing.
As detailed in Chapter 5, general parenting styles have been associated with the feeding strategies employed by parents, with less adaptive feeding strategies being associated with an authoritarian parenting style and more adaptive feeding practices being related to an authoritative parenting style (e.g., Hubbs-Tait, Kennedy, Page, Topham & Harrist, 2008; Hughes, Power, Fisher, Mueller & Nicklas, 2005). Differences have been found between mothers and fathers in the associations between their feeding practices and parenting styles. For example, a study by Blissett and Haycraft (2008) found that a permissive parenting style was associated with greater use of restrictive feeding practices in mothers but with greater application of pressure to eat in fathers. Parental modelling has been shown to be related to an authoritative feeding style (Chapter 5; Hubbs-Tait et al., 2008). Specifically, mothers’ verbal modelling of eating behaviours and perceived consequences of maternal modelling behaviours have been related to an authoritative parenting style but maternal modelling was not found to be related in any form to authoritarian or permissive parenting styles (see Chapter 5). However, associations between fathers’ modelling of eating behaviours and their parenting styles have not yet been explored.

Parental psychopathology, in particular symptoms of eating disorders, has also been related to the child feeding practices that parents use (e.g., Blissett et al., 2006; Francis, Hofer & Birch, 2001; Haycraft & Blissett, 2008b; Hurley, Black, Papas & Caulfield, 2008; Mitchell, Brennan, Hayes & Miles, 2009). While the relationships between symptoms of eating psychopathology and parents’ use of controlling child feeding practices have been fairly well established in mothers and fathers (e.g., Blissett et al., 2006; Blissett & Haycraft, 2011; Haycraft & Blissett, 2008b), associations between eating psychopathology and modelling have received less attention. Mothers with higher levels of eating disorder symptoms were found to report greater levels of unintentional modelling (see Chapter 4) and it would seem
logical that similar relationships may be evident for fathers who display higher levels of eating psychopathology.

The parent-child feeding relationship is bi-directional and so it follows that children’s own eating behaviours are likely to be related to the feeding strategies employed by parents (e.g., Webber, Cooke, Hill & Wardle, 2010). A study by Farrow, Galloway and Fraser (2009) found parents used different feeding practices with their children as a result of variations in the eating behaviours displayed by children. Parents reported using more restrictive feeding practices with children who were fussier and drank more than their siblings, and parents used more pressure to eat with siblings who displayed more food avoidant eating behaviours (e.g., were slower to eat or fussier). These findings suggest that parents’ feeding practices may be a response to their child’s eating behaviours and parents may use more controlling feeding practices with children who are more difficult eaters. However, the direction of these relationships is unclear. Parental modelling is also likely to be related to children’s eating behaviours and one study which examined this found that greater use of this more adaptive feeding practice by mothers predicted lower levels of food fussiness and higher interest in foods in children (Gregory et al., 2010). At present, research has not examined fathers’ modelling behaviours in relation to their children’s eating. Given the associations presented above, which suggest that maternal feeding practices are related to their children’s eating behaviours, it is likely that similar findings will be evident for fathers’ feeding practices.

In summary, while research has suggested that fathers may play a role in the development of children’s eating behaviours, little research has explored modelling in fathers or whether there are similarities or differences between mothers’ and fathers’ use of their modelling practices. Therefore, the first aim of this study is to explore the similarities and differences
between mothers and fathers in their reports of modelling eating behaviours with their children. Based on the equivocal findings regarding similarities and differences in maternal and paternal feeding practices, no a priori hypothesis was made. Second, this study also aims to explore the relationships between paternal modelling with factors which have previously been associated with modelling in mothers (parenting styles and eating psychopathology, see Chapters 4 and 5), and to identify any similarities or differences between mothers and fathers in these associations. It was hypothesised that maternal and paternal modelling behaviours will be positively associated with an authoritative parenting style, and both maternal and paternal modelling with be negatively associated with their reported eating psychopathology. Finally, this study aims to explore relationships between both maternal and paternal modelling with reports of their children’s eating behaviours. Based on the findings of Gregory et al. (2010b), it was hypothesised that maternal and paternal modelling will be negatively related to food fussiness in children and positively related to more adaptive aspects of children’s eating behaviours, such as enjoyment of food.

6.2. Method

6.2.1. Participants and Recruitment Procedure

Data collection for this study utilised four methods and commenced after receiving institutional review board ethical approval. In total 36 fathers and 36 mothers were recruited for this study via a number of methods. First, both maternal and paternal participants were recruited through pre-schools, nurseries, primary and junior schools, from Derbyshire, Leicestershire, Nottinghamshire and Staffordshire (see Table 2.1., data collection phase 1). Questionnaires packs (N = 1000) were distributed to caregivers of children aged between 18 months and 8 years. Two hundred and forty-four parents (25.4%) completed and returned
questionnaire packs. Of these, 229 were mothers (data from these mothers have been reported on elsewhere; see Chapters 3 & 5) and 15 were fathers; two of whom were subsequently excluded due to high levels of missing data. Due to the low response rate from fathers to the first phase of data collection, an online version of the questionnaire pack was designed and advertised on parenting websites aimed specifically at fathers, and was distributed via two University email lists (data collection phase 5). Nine more fathers were recruited through this method but two fathers were excluded from the analysis due to large amounts of the questionnaire being incomplete. Additional fathers were recruited by advertising the study at sporting activities, such as football training in and around the Derbyshire area. Approximately 50 paper questionnaires were handed out at these events along with a pre-paid envelope for the return of the completed questionnaire. Through this method another six fathers were recruited. Finally, fathers of families who were taking part in an observational study were asked to take part in this questionnaire study. Of these 18 families, 10 fathers agreed and returned completed questionnaires (55.6%). These data collection efforts resulted in a total sample of 36 fathers being recruited for this study.

The sample of 36 fathers was matched individually to 36 mothers taken from the 229 mothers recruited in the initial data recruitment (see matching process summary in Appendix X). Mothers were exactly matched to the sample of fathers firstly on child gender and the ethnicity of both the parent and the child. They were then matched as closely as possible on the age of the child (recorded in months) at the time of data collection. After the above criteria were met, mothers and fathers were then matched as closely as possible on parental age, child BMI z-scores, parent BMI, and finally on parental years of post-16 education. To ensure that there were no significant differences between the final samples of fathers and mothers, a series of Mann-Whitney U tests were run (see Table 6.1). No significant
differences were found between fathers and mothers on any of the matching variables. Thus, this resulted in a final, retained sample of 36 fathers and 36 mothers whose demographic variables were as close as possible, based on the available pool of parents.

In order to ensure that the sub-sample of matched mothers did not differ significantly from the original sample of 229 mothers (details provided in Chapter 5), a series of Mann Whitney U tests were conducted. The sub sample of 36 mothers were not found to significantly differ on any of the measures used within this study (PARM, CEBQ, EDEQ, PSDQ) compared to the original pool of 229 mothers. Differences were also not found in relation to the PARM subscales between the 36 mothers used in this study and the collective sample of mothers (n = 484) explored in Chapter 3.

<table>
<thead>
<tr>
<th></th>
<th>Fathers</th>
<th>Mothers</th>
<th>Mann Whitney U test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Median)</td>
<td>Mean (Median)</td>
<td>U</td>
</tr>
<tr>
<td>Child age (months)</td>
<td>53.92 (54.00)</td>
<td>52.83 (48.50)</td>
<td>656.50</td>
</tr>
<tr>
<td>Parental age</td>
<td>36.74 (38.00)</td>
<td>35.34 (36.00)</td>
<td>737.50</td>
</tr>
<tr>
<td>Child BMI z scores</td>
<td>1.32 (1.12)</td>
<td>0.49 (0.61)</td>
<td>557.00</td>
</tr>
<tr>
<td>Parent BMI</td>
<td>25.41 (25.55)</td>
<td>24.87 (24.40)</td>
<td>679.50</td>
</tr>
<tr>
<td>Years of post-16 education</td>
<td>5.38 (6.00)</td>
<td>4.64 (5.00)</td>
<td>704.50</td>
</tr>
</tbody>
</table>

The sample of mothers reported a mean age of 35.34 years (SD = 4.96, range 24 to 43 years) and the sample of fathers had a mean age of 36.74 years (SD = 5.80, range 24 to 46 years). Mothers and fathers reported their ethnicity as predominantly White/British (86.1% of sample) and 13.9% reported their ethnicity as Asian. Mothers within this sample had a mean BMI score of 24.87 (SD = 2.98) and fathers had a mean BMI score of 25.41 (SD = 3.64).
Mothers reported a mean of 4.6 years of education after the age of 16 (SD = 2.48, range 1 to 10 years) and fathers reported a mean of 5.4 years (SD = 2.99, range 0 to 12 years).

The children reported on within this sample had an average age of 53.4 months (SD = 21.51, range = 18 to 107) and there were 44 boys (61.1%) and 28 girls (38.9%). The children were primarily White/British (86.1% of the sample) with 13.9% of sample reported as Asian/Asian British. The mean age and gender adjusted child BMI z-score was 0.90 (SD = 2.41) (Child Growth Foundation, 1996).

6.2.2. Measures

The online and paper questionnaire required respondents (mothers/fathers/caregivers) to provide background information for themselves and their child, including nationality, ethnicity, age, self-reported height, weight and gender. Participants also completed questions asking about the number of meals they eat with their child during a typical week. After this, each participant completed the following questionnaires in the order presented below.

6.2.2.1. Parental Modelling of Eating Behaviours Scale (PARM: Palfreyman, Haycraft & Meyer, 2012; Chapter 3; Appendix L)

The PARM is a self-report measure which consists of 15 items, designed to measure parental modelling of eating behaviours, with responses recorded using a 7-point Likert-type scale with three anchors (Strongly disagree – Neutral – Strongly Agree). The measure consists of three subscales: Verbal modelling (6 items; $\alpha = .87$), Behavioural consequences (6 items; $\alpha = .82$), and Unintentional modelling (3 items; $\alpha = .66$). Higher scores indicate greater reported modelling. This measure has been successfully piloted in previous research with a maternal sample and showed adequate validity and reliability (Chapter 3 - Palfreyman et al., 2012).
6.2.2.2. **Children’s Eating Behaviours Questionnaire (CEBQ; Wardle, Guthrie, Sanderson & Rapoport, 2001; Appendix R).**

The CEBQ is a 35 item parental self-report measure, designed to assess eating styles in children using a five-point Likert frequency scale anchored ‘Never’ to ‘Always’. Individual CEBQ items were theoretically derived from research into the behavioural causes of obesity, and from parental reports of their children’s behaviours. The measure consists of eight dimensions of children’s eating behaviours, seven of which were used in this study: Food responsiveness (5 items; $\alpha = .70$); Enjoyment of food (4 items; $\alpha = .85$); Emotional over-eating (4 items; $\alpha = .63$); Emotional under-eating (4 items; $\alpha = .74$); Satiety responsiveness (5 items; $\alpha = .61$); Slowness in eating (4 items; $\alpha = .51$); and Food Fussiness (6 items; $\alpha = .90$). Higher scores indicate greater reports of each eating behaviour. The CEBQ has been found to have good internal validity (Webber, Cooke, Hill & Wardle, 2010) and has good test–retest reliability (Carnell & Wardle, 2007; Wardle, Guthrie, Sanderson & Rapoport, 2001).

6.2.2.3. **Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Appendix O)**

The EDE-Q is a 36 item self-report version of the interview based Eating Disorder Examination (Cooper & Fairburn, 1987) which addresses the respondent’s eating psychopathology, focusing on the last four weeks. As the aim of the current study was to explore attitudes and concerns of mothers and fathers, a shortened version of the original instrument was used with the 13 item diagnostic section removed. This shortened version measures four aspects of eating disorder psychopathology: restraint (5 items; $\alpha = .85$); eating concern (5 items; $\alpha = .85$); body shape concern (8 items; $\alpha = .93$); and body weight concern (5 items; $\alpha = .82$), as well as having a total (global) score ($\alpha = .91$). High scores on the EDE-Q
indicate more pathological eating attitudes and behaviours. Research has indicated that the 
EDE-Q is an effective screening tool for detecting eating disorders in various clinical 
populations (Black & Wilson, 1996; Carter, Aime & Mills, 2001; Fairburn & Beglin, 1994) 
and it has been found to be a reliable and valid measure in community samples (e.g., Fairburn 
& Beglin, 1994; Mond, Hay, Rodgers, Own & Beumont, 2004).

6.2.2.4. *Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, 
Olsen & Hart, 1995; Appendix Q).*

The PSDQ assesses how often a parent (mother or father) exhibits certain behaviours towards 
their child. It has 32 items, which are separated into three subscales measuring authoritarian, 
authoritative, and permissive parenting. Items are answered using a 5-point scale with 
anchors ‘Never’ to ‘Always’. Higher scores correspond to greater alignment with each 
particcular parenting style. For the purpose of this study, the physical coercion questions were 
removed due to ethical concerns about the content of the questions. The removal of these 
items echoes previous research using similar samples (e.g., Blissett & Haycraft, 2008). This 
shortened version (28 items) includes: 15 authoritative items (α = .89), reflecting 
reasoning/induction, warmth and support, democratic participation; 8 authoritarian items (α = 
.80) reflecting verbal and punitive strategies; and, 5 permissive items (α = .74) all reflecting 
indulgence and parental failure to follow through with disciplinary rules. The PSDQ has 
been shown to have adequate reliability and validity (Robinson et al., 2001; Russell et al., 
2003).
6.2.3. Data analysis

A series of Kolmogorov-Smirnov tests established that all subscales were non-normally distributed and therefore non-parametric statistics were used, when possible, to test the study’s hypotheses. Due to the large age range of the children recruited for this study (18 months to 8 years), a series of preliminary Mann-Whitney U tests were conducted to test for differences between fathers of younger (below 5 years and 11 months; n = 24) and older children (above 5 years and 11 months; n = 12), and mothers of younger and older children, on the PARM. No significant differences were found between mothers or fathers of younger and older children on any of the subscales of the PARM (see Appendix W7). Further Mann Whitney U tests were then run to explore differences between fathers of boys and girls, and mothers of boys and girls, on the PARM subscales. While mothers were not found to differ significantly on any of the PARM subscales, fathers of boys (M = 5.24, Md = 5.50, n = 22) were found to report higher levels of verbal modelling (U = 79.000, z = -2.294, p = 0.022) than fathers of girls (M = 4.45, Md = 4.42, n = 14). No other significant differences on the PARM were found within this sample.

Following this a further series of two-tailed Mann-Whitney U tests were conducted to explore any differences between maternal and paternal scores on the PARM subscales (aim 1), and also any differences on the PSDQ, EDE-Q, CEBQ subscales and the frequency of meals mothers and fathers eat with their child. In order to test for any potential confounding variables, preliminary two-tailed Spearman’s rho correlations were conducted to determine the associations between paternal scores on the three PARM subscales with the three PSDQ subscales, the five EDE-Q subscales and the eight CEBQ subscales with child age, child BMI z scores, paternal age, paternal BMI and paternal years of post-16 education. The correlations were repeated with the maternal scores exploring the same variables. Maternal
and paternal BMI positively correlated with all five of the EDE-Q subscales (maternal sample; rs 0.40 to 0.52, p < .01: paternal sample; rs 0.44 to 0.62, p < .01) and child BMI z scores correlated with paternal scores on the EDE-Q eating concern (r = .41, p < .05) and weight concern (r = .41, p < .05) subscales and the overall EDE-Q global score (r = .39, p < .05). Maternal post-16 education was found to be negatively related to maternal scores on the EDE-Q restraint subscale (r = -.46, p < .05). No other significant correlations were reported. Therefore, one-tailed partial correlations (due to there not being a non-parametric version of this statistical test), controlling for parental BMI and child z scores, were used to examine relationships between modelling and parental eating psychopathology. One-tailed Spearman’s rho correlations were used to examine the relationships between maternal and paternal modelling with the PSDQ and CEBQ subscales. Despite the number of associations, significance was set at p < 0.05, given the relatively modest sample size and the exploratory nature of this study. However, the results are interpreted cautiously.

6.3. Results

6.3.1. Descriptive statistics

Information about paternal and maternal scores on the modelling (PARM), parenting styles (PDSQ), parental eating psychopathology (EDE-Q), children’s eating behaviours (CEBQ) measures and parent-child mealtime frequency are presented in Table 6.2. Table 6.2 also shows the results of the series of Mann Whitney U tests conducted to explore differences between mothers’ and fathers’ PARM scores (aim 1) and also to explore differences in their responses on the PSDQ, EDE-Q, CEBQ measures and reported parent-child mealtime frequency.
Table 6.2: Descriptive statistics and two-tailed Mann Whitney U tests of difference for paternal and matched maternal scores on the PARM, PSDQ, EDE-Q, and CEBQ measures and parent-child meal frequency (Fathers n = 36, Mothers n = 36).

<table>
<thead>
<tr>
<th></th>
<th>Fathers’ Mean (Median)</th>
<th>(SD)</th>
<th>Mothers’ Mean (Median)</th>
<th>(SD)</th>
<th>Mann-Whitney U test U</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>4.95 (5.16)</td>
<td>(1.24)</td>
<td>5.04 (5.33)</td>
<td>(1.21)</td>
<td>558.00</td>
<td>0.45(NS)</td>
</tr>
<tr>
<td>Behavioural Consequences</td>
<td>5.27 (5.33)</td>
<td>(1.10)</td>
<td>5.37 (5.42)</td>
<td>(0.99)</td>
<td>557.50</td>
<td>0.45(NS)</td>
</tr>
<tr>
<td>Unintentional Modelling</td>
<td>4.02 (4.33)</td>
<td>(1.24)</td>
<td>3.50 (3.50)</td>
<td>(1.00)</td>
<td>738.50</td>
<td>1.73(NS)</td>
</tr>
<tr>
<td><strong>PSDQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authoritative Parenting Style</td>
<td>3.95 (4.07)</td>
<td>(0.60)</td>
<td>4.08 (4.20)</td>
<td>(0.5)</td>
<td>429.50</td>
<td>0.47(NS)</td>
</tr>
<tr>
<td>Authoritarian Parenting Style</td>
<td>1.97 (1.95)</td>
<td>(0.53)</td>
<td>1.94 (1.75)</td>
<td>(0.4)</td>
<td>458.50</td>
<td>0.51(NS)</td>
</tr>
<tr>
<td>Permissive Parenting Style</td>
<td>2.14 (2.20)</td>
<td>(0.83)</td>
<td>2.80 (2.11)</td>
<td>(0.57)</td>
<td>491.00</td>
<td>0.42(NS)</td>
</tr>
<tr>
<td><strong>EDE-Q</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td>1.21 (0.60)</td>
<td>(1.38)</td>
<td>1.40 (1.20)</td>
<td>(1.31)</td>
<td>490.50</td>
<td>0.70(NS)</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>0.73 (0.30)</td>
<td>(1.09)</td>
<td>0.68 (0.20)</td>
<td>(1.04)</td>
<td>553.50</td>
<td>0.12(NS)</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>1.99 (1.00)</td>
<td>(1.74)</td>
<td>2.44 (2.13)</td>
<td>(1.71)</td>
<td>438.50</td>
<td>1.18(NS)</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>1.38 (0.60)</td>
<td>(1.49)</td>
<td>1.74 (1.40)</td>
<td>(1.49)</td>
<td>435.00</td>
<td>1.22(NS)</td>
</tr>
<tr>
<td>Global Score</td>
<td>1.33 (0.68)</td>
<td>(1.29)</td>
<td>1.53 (1.16)</td>
<td>(1.22)</td>
<td>463.50</td>
<td>1.04(NS)</td>
</tr>
<tr>
<td></td>
<td>Fathers’ Mean (Median)</td>
<td>(SD)</td>
<td>Mothers’ Mean (Median)</td>
<td>(SD)</td>
<td>Mann-Whitney U test</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------</td>
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<td>------------------------</td>
<td>------</td>
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<td></td>
</tr>
<tr>
<td><strong>CEBQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Responsiveness</td>
<td>2.53 (2.60)</td>
<td>(0.58)</td>
<td>2.54 (2.60)</td>
<td>(0.74)</td>
<td>564.50 1.22(NS)</td>
<td></td>
</tr>
<tr>
<td>Food Enjoyment</td>
<td>3.82 (3.75)</td>
<td>(0.82)</td>
<td>3.98 (4.13)</td>
<td>(0.69)</td>
<td>546.00 1.31(NS)</td>
<td></td>
</tr>
<tr>
<td>Satiety Responsiveness</td>
<td>2.86 (2.80)</td>
<td>(0.58)</td>
<td>3.11 (3.20)</td>
<td>(0.58)</td>
<td>591.00 0.60(NS)</td>
<td></td>
</tr>
<tr>
<td>Food Fussiness</td>
<td>2.77 (2.67)</td>
<td>(0.84)</td>
<td>2.80 (2.83)</td>
<td>(0.81)</td>
<td>685.50 1.81(NS)</td>
<td></td>
</tr>
<tr>
<td>Slow Eating</td>
<td>3.03 (2.75)</td>
<td>(0.75)</td>
<td>3.32 (3.13)</td>
<td>(0.85)</td>
<td>602.00 0.74(NS)</td>
<td></td>
</tr>
<tr>
<td>Emotional Over-eating</td>
<td>1.79 (2.00)</td>
<td>(0.51)</td>
<td>1.80 (1.75)</td>
<td>(0.53)</td>
<td>633.50 1.66(NS)</td>
<td></td>
</tr>
<tr>
<td>Emotional Under-eating</td>
<td>3.19 (3.25)</td>
<td>(0.83)</td>
<td>3.21 (3.25)</td>
<td>(0.82)</td>
<td>695.00 1.94(NS)</td>
<td></td>
</tr>
<tr>
<td>Breakfast</td>
<td>3.97 (4.00)</td>
<td>(2.71)</td>
<td>4.29 (5.00)</td>
<td>(2.53)</td>
<td>578.50 0.41(NS)</td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td>1.97 (2.00)</td>
<td>(1.58)</td>
<td>3.09 (2.50)</td>
<td>(1.81)</td>
<td>379.00 2.910*</td>
<td></td>
</tr>
<tr>
<td>Dinner</td>
<td>4.43 (5.00)</td>
<td>(2.31)</td>
<td>4.94 (5.00)</td>
<td>(1.91)</td>
<td>546.30 0.79(NS)</td>
<td></td>
</tr>
<tr>
<td>Sum of meals</td>
<td>10.37 (1.50)</td>
<td>(4.24)</td>
<td>12.31 (12.50)</td>
<td>(3.55)</td>
<td>430.00 2.15*</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05; **p < .01

PARM = Parental Modelling of Eating Behaviours Scale; PSDQ = Parenting Styles and Dimensions Questionnaire; EDE-Q = Eating disorder Examination Questionnaire; CEBQ = Children’s Eating Behaviours Questionnaire.

The mean scores for fathers on the PARM are in line with scores from the sample of mothers reported on previously (Chapter 3, Palfreyman et al., 2012). The mean scores for the PDSQ subscales are in line with previous studies which have used the PDSQ with parents of young children (e.g., Haycraft & Blissett, 2010; Hubbs-Tait, et al., 2008), as are the mean EDE-Q scores in relation to community samples (Fairburn & Beglin, 1994; Mond, Hay, Rodgers, Owen & Beaumont, 2004). The mean scores for the CEBQ subscales are also comparable to those found in other UK samples (e.g., Wardle et al., 2001; Webber, Hill, Saxton, Jaarsveld & Wardle, 2009).
There were no significant differences between maternal and paternal reported modelling behaviours (aim 1). Furthermore, there were also no significant differences between mothers and fathers in their reported parenting styles, eating psychopathology or in reported child eating behaviours. In addition, there were no significant differences between fathers and mothers within this sample in terms of the number of breakfasts and dinners they ate with their children. However, mothers and fathers did differ significantly in the number of lunches and total meals eaten with their child, with mothers reporting on average eating one more lunchtime meal and two more meals per week with their child than fathers.

Given that the PARM has not been previously used with fathers, Cronbach’s alpha coefficients were calculated for all three of the PARM subscales on both the maternal and paternal samples for comparison (see Table 6.3).

<table>
<thead>
<tr>
<th>PARM</th>
<th>Fathers</th>
<th>Mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Modelling</td>
<td>0.86</td>
<td>0.88</td>
</tr>
<tr>
<td>Behavioural Consequences</td>
<td>0.84</td>
<td>0.80</td>
</tr>
<tr>
<td>Unintentional Modelling</td>
<td>0.70</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Maternal and paternal alpha levels reported for each subscale were similar and Cronbach’s alpha coefficients for all three of the PARM subscales ranged from acceptable to high (Nunnally, 1978).

While all the mothers included in this study completed paper based questionnaires collected via schools and nurseries, nine of the 36 fathers were recruited via an online version of the questionnaire. To check for differences in participants who were recruited via these different
means a series of Mann Whitney tests of difference were conducted. Fathers who provided data online reported significantly higher levels of EDE-Q shape concern ($M = 0.79$, $Md = 0.60$, $n = 9$) than those who were recruited via paper based questionnaires ($M = 0.63$, $Md = 0.20$, $n = 27$, $U = 64.50$, $z = 2.087$, $p = 0.03$). Significant differences were not found between the two groups for any of the other subscales included in this study.

In order to test the hypothesis that both maternal and paternal modelling behaviours will be associated with their reported parenting styles and eating psychopathology, a series of correlations were run (see Tables 6.4 and 6.5).

Table 6.4: One-tailed Spearman’s rho correlations between PARM scores and PSDQ scores (Fathers, $n = 36$; Mothers $n = 36$).

<table>
<thead>
<tr>
<th>PSDQ</th>
<th>Verbal Modelling</th>
<th>Behavioural Consequences</th>
<th>Unintentional Modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fathers</td>
<td>Mothers</td>
<td>Fathers</td>
</tr>
<tr>
<td>Authoritative Parenting Style</td>
<td>.414*</td>
<td>.145</td>
<td>.047</td>
</tr>
<tr>
<td>Authoritarian Parenting Style</td>
<td>-.044</td>
<td>.189</td>
<td>.182</td>
</tr>
<tr>
<td>Permissive Parenting Style</td>
<td>.192</td>
<td>-.395**</td>
<td>-.202</td>
</tr>
</tbody>
</table>

* $p < .05$; ** $p < .01$; *** $p < .001$

**Fathers:** Paternal scores on the verbal modelling subscale were positively and significantly correlated to the authoritative subscale of the PSDQ. No other significant relationships were reported between PARM modelling subscales and the PSDQ for fathers. **Mothers:** Maternal scores on the PARM verbal modelling subscale were negatively related to the permissive PSDQ subscale but no other significant relationships were present between maternal modelling and scores on the PSDQ.
Table 6.5: One-tailed partial correlations, controlling for parental BMI, and for child BMI z scores in paternal sample only, between PARM scores and EDE-Q scores (Fathers n = 36; Mothers n = 36).

<table>
<thead>
<tr>
<th>EDE-Q</th>
<th>Verbal Modelling</th>
<th>Behavioural Consequences</th>
<th>Unintentional Modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fathers</td>
<td>Mothers</td>
<td>Fathers</td>
</tr>
<tr>
<td>Restraint</td>
<td>.153</td>
<td>.002</td>
<td>.029</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>.039</td>
<td>.134</td>
<td>-.379*</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>.104</td>
<td>.073</td>
<td>-.123</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>-.067</td>
<td>.001</td>
<td>-.223</td>
</tr>
<tr>
<td>Global Score</td>
<td>.077</td>
<td>.105</td>
<td>-.080</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .001; ^ Within the maternal sample, partial correlations controlling for years of post-16 education were run between EDE-Q restraint scores and PARM scores

**Fathers:** No significant relationships were reported between verbal modelling and the EDE-Q for fathers. Paternal scores on the PARM behavioural consequences of modelling subscale were significantly negatively related to the EDE-Q eating concern subscale. However, no other relationships were reported between this subscale and paternal scores on any other EDE-Q subscales. Paternal scores on the PARM unintentional modelling subscale were significantly negatively related to the EDE-Q eating concern and weight concern subscales. No other relationships were reported between unintentional modelling and the EDE-Q for fathers.

**Mothers:** Maternal scores on the PARM verbal modelling subscale were not significantly related to scores on the EDE-Q. Maternal scores on the PARM behavioural consequences of modelling subscale were positively related to EDE-Q restraint subscale. No other relationships were found between this subscale and maternal scores on the EDE-Q subscales. Maternal scores on the PARM unintentional modelling subscale were positively associated to
maternal scores on the EDE-Q restraint subscale and global score. Maternal unintentional modelling was not found to be related to any of the other EDE-Q subscales.

In order to test the hypothesis that maternal and paternal modelling behaviours will be associated with reports of their children’s eating behaviours, a series of Spearman’s correlations were run (see Table 6.6).

Table 6.6: One-tailed Spearman’s rho correlations between PARM scores and CEBQ scores (Fathers n = 36; Mothers n = 36).

<table>
<thead>
<tr>
<th>CEBQ</th>
<th>PARM</th>
<th>Verbal Modelling</th>
<th>Behavioural Consequences</th>
<th>Unintentional Modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fathers</td>
<td>Mothers</td>
<td>Fathers</td>
</tr>
<tr>
<td>Food Responsiveness</td>
<td></td>
<td>.015</td>
<td>-.023</td>
<td>-.071</td>
</tr>
<tr>
<td>Food Enjoyment</td>
<td>.352*</td>
<td>.189</td>
<td>.177</td>
<td>.507**</td>
</tr>
<tr>
<td>Satiety Responsiveness</td>
<td>-.352*</td>
<td>-.062</td>
<td>.014</td>
<td>-.264</td>
</tr>
<tr>
<td>Food Fussiness</td>
<td>-.199</td>
<td>.130</td>
<td>-.340*</td>
<td>-.461**</td>
</tr>
<tr>
<td>Slow Eating</td>
<td>-.269</td>
<td>.130</td>
<td>-.162</td>
<td>-.021</td>
</tr>
<tr>
<td>Emotional Overeating</td>
<td>-.159</td>
<td>-.145</td>
<td>-.028</td>
<td>-.096</td>
</tr>
<tr>
<td>Emotional Under-eating</td>
<td>-.039</td>
<td>.122</td>
<td>-.039</td>
<td>-.045</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .001

*Fathers:* Paternal scores on the PARM verbal modelling subscale were found to be significantly and positively correlated with the CEBQ food enjoyment subscale and negatively related to the CEBQ satiety responsiveness subscale. No other relationships were reported between verbal modelling and the CEBQ for fathers. Paternal scores on the PARM behavioural consequences of modelling subscale were significantly, negatively related to the CEBQ food fussiness subscale. However, no other relationships were reported between this
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subscale and paternal scores on the CEBQ. Paternal scores on the PARM unintentional modelling subscale were not significantly related to any of the CEBQ subscales for fathers.

Mothers: No significant relationships were found between maternal verbal modelling and scores on the CEBQ. Maternal scores on the PARM behavioural consequences of modelling subscale were positively related to the CEBQ food enjoyment subscale and a significant negative correlation was also found with the CEBQ food fussiness subscale. No other relationships were found between this subscale and maternal scores on the CEBQ subscales. Maternal scores on the PARM unintentional modelling subscale were positively correlated to the CEBQ emotional under-eating subscale but were not significantly related to any of the other CEBQ subscales.

The only significant correlation found for both mothers and fathers was between PARM behavioural consequences and CEBQ food fussiness subscales. In keeping with the study’s second aim, to identify any similarities or differences between mothers and fathers in associations found, a calculation of the difference in the magnitudes of the correlation coefficients was conducted (IFA Services Statistics, 2012). This revealed that the relationship between food fussiness and behavioural consequences of modelling was not significantly greater for either mother or fathers (p > .05).

6.4. Discussion

The first aim of this study was to explore differences between maternal and paternal modelling of eating behaviours. Given the equivocal findings regarding similarities and differences in maternal and paternal feeding practices (e.g., Blissett et al., 2006; Haycraft & Blissett, 2008a; Orrell-Valente et al., 2007), a specific hypothesis was not stated. Within this
sample, mothers and fathers did not differ significantly in their reported use of the three facets of modelling explored, indicating that mothers and fathers may provide similar levels of both verbal and behavioural modelling for their children. This similarity between mothers and fathers in their use of modelling as a feeding strategy is comparable to other similarities reported between mothers and fathers in their use of feeding practices, such as pressure to eat and restriction (e.g., Blissett et al., 2006; Haycraft & Blissett, 2008a). However, within this sample mothers reported eating more lunches with their children than fathers, which may mean that mothers have more opportunities to both intentionally and unintentionally model eating behaviours than fathers. However, this increased opportunity for mothers is only slight as, on average, mothers reported eating only two more meals per week with their child than fathers did. Parents also did not vary significantly in their reported levels of unintentional modelling, suggesting that both mothers and fathers have similar levels of awareness of the potential outcomes of their modelled behaviours. However, unintentional modelling is a difficult facet of modelling to explore using self-report measures as parents must first be aware of this process before they can report on it. Further research would benefit from exploring how children perceive their parents’ eating behaviours and also whether children are more aware of their mother’s or their father’s eating behaviours and whether the gender of the parent or child plays a role in this awareness.

The Parental Modelling of Eating Behaviours Scale (PARM) has only previously been used with maternal samples, so establishing the reliability of the measure with a paternal sample was required. While the sample of fathers in this study was small, tests of reliability for all three subscales of the PARM yielded strong alpha values, similar to those for the maternal sample (Chapter 3 – Palfreyman et al., 2012), and thus supporting its reliability for use with fathers.
Mothers and fathers within this sample also did not differ in their reported parenting styles or levels of eating psychopathology. While this suggests that the mothers and fathers who were matched for this study were similar on these factors, it is interesting that a difference in eating psychopathology was not found. This is contrary to previous studies which have found higher levels of eating psychopathology in mothers than fathers (e.g., Blissett et al., 2006; Blissett & Haycraft, 2011). This may be due to the limited sample size or the measure used to assess eating psychopathology, which may be prone to a floor effect, especially within a small, non-clinical sample. The lack of variation between maternal and paternal parenting styles is also interesting as previous studies have suggested differences between co-habiting parents in their general parenting styles (e.g., Blissett & Haycraft, 2008b; Cowan, Cowan & Kerig, 1993; Winsler, Madigan & Aqilino, 2005), especially in relation to disciplinary strategies (e.g., Russell et al., 2008; Russell, Hart, Robinson & Olsen, 2003). While again the lack of significant differences in parenting styles for the current sample could be due to the limited sample size, further research looking at a cohabiting rather than a matched sample of mothers and fathers may provide further insight into variations in their parenting styles and eating psychopathology and how this may be related to parental modelling behaviours.

The second aim of this study was to explore both maternal and paternal modelling, and relationships with eating psychopathology and parenting styles, and to identify any similarities or differences between mothers and fathers in these associations.

In relation to parenting styles, the hypothesis that modelling in both mothers and fathers would be found to be positively associated to an authoritative parenting style in fathers was partially supported. The results indicate a relationship between paternal authoritative
parenting and higher levels of verbal modelling; an overt form of modelling similar to previous findings with maternal samples (Chapter 5; Hubbs-Tait et al., 2008). This suggests a similar relationship for fathers as has been previously found with mothers who report an authoritative parenting style. However, contrary to previous findings (Chapter 5; Hubbs-Tait et al., 2008), forms of overt maternal modelling were not found to be positively related to an authoritative parenting style. This may be due to the small sample size, which is likely to have affected the findings of this study by under-powering its ability to detect small to medium associations, or it may be due to this sample of mothers reporting, on average, slightly higher levels of permissive parenting than the mothers in Chapter 5. However, mothers within this sub-sample were not found to significantly differ from the original sample explored in Chapter 5 on any of the three parenting styles examined within this study. While the expected relationship between maternal modelling and parenting styles was not present, a more permissive parenting style in mothers was found to be related to lower levels of maternal verbal modelling. As permissive mothers tend to be less involved with their children (Baumrind, 1971; Darling & Steinberg, 1993; Paulson, 1994), it makes sense that the use of more overt forms of modelling, such as verbal modelling, would be less likely to be used by them as a feeding strategy. While the relationship between maternal modelling and authoritative parenting style was not supported by this study, the relationship between authoritative parenting in fathers and overt modelling adds further support to the association between an authoritative parenting style and parental feeding practices.

The findings relating to eating psychopathology reported by mothers and fathers also partially supported the hypotheses. Specifically, higher levels of maternal restraint and overall scores on the EDE-Q were found to be related to higher levels of unintentional and behavioural consequences of modelling in mothers. These findings align with earlier results (Chapter 4)
and extend them by suggesting that maternal eating psychopathology may be related to a greater awareness of, or concern about, the consequences of both unintentional and intentional behavioural modelling in some mothers. However, conversely, fathers who reported higher levels of eating and weight concern reported lower levels of unintentional modelling and consequences of their behavioural modelling. This could suggest that mothers with higher levels of eating psychopathology are more aware or concerned about their children’s eating behaviours than fathers with high symptomology. Or this different pattern of associations could be due to mothers in general being the primary food provider (e.g., Birch & Fisher, 2000; Blissett & Farrow 2007; Blissett et al., 2006; May et al., 2007; Rhee et al., 2006), meaning that they may be more aware of their children’s eating due to their higher level of involvement. Another possible explanation is that fathers may avoid modelling as a feeding strategy when they are concerned with their own weight and eating behaviours and it may be easier for them to do this if they eat fewer meals with their child and thereby reduce the opportunity for modelling to occur. This difference between mothers and fathers requires further investigation with a larger sample.

Finally, the study aimed to explore the relationships between both maternal and paternal modelling with reports of their children’s eating behaviours, and to identify any differences or similarities in these relationships. Maternal and paternal awareness of the consequences of their behavioural modelling was related to lower levels of food fussiness in their children. The relationship with food fussiness was not significantly stronger for either maternal or paternal modelling, suggesting similarity between mothers and fathers in the reported outcomes of their modelling behaviours and perceptions of their children as less fussy. Furthermore, maternal behavioural modelling and paternal verbal modelling were both positively related to reports of their child’s enjoyment of food. These findings could suggest
that both mothers and fathers who purposely model eating behaviours have children who are less fussy in their food intake and enjoy food more. However, it is noted that this study cannot identify cause and effect and so the direction of these relationships cannot be determined. Thus, another possible explanation is that parents may use modelling more with children who are more likely to respond positively; for example, with children who may be less fussy and enjoy food more. Associations between maternal modelling and lower levels of food fussiness have been found in previous research (Gregory et al., 2010b) and the current study expands on this by suggesting that the same relationship may also be present in fathers. Thus, modelling could be an effective strategy for both parents in relation to reducing food fussiness and increasing food variety and acceptance in children. Further to this, modelling could potentially prove to be an effective intervention method for both parents. However, more research is required with children who are difficult or fussy eaters to see whether modelling is effective at reducing children’s levels of pickiness.

Differences in relation to parental modelling and children’s eating behaviours were also found. Fathers (but not mothers) who reported a higher usage of verbal modelling also reported their children to be less responsive to their internal satiety cues. This link between paternal verbal modelling and a reduction in children’s responsiveness to their internal cues of fullness could suggest that fathers use verbal modelling with the aim of influencing their child’s intake, perhaps by talking to children about what and how much to eat. However, since the relationship reported in this study would suggest that higher levels of paternal verbal modelling are related to lower levels of responsiveness to internal cues in children, this could suggest a negative effect on the child’s ability to self-regulate their intake, especially if the verbal modelling becomes pressuring. Further research exploring verbal modelling and pressure in particular is therefore required to build on the results of this study. However, this
relationship was not found to be present in mothers within this sample, indicating a difference in verbal modelling between mothers and fathers (which may be related to differences in the samples of children). While the results did not suggest a significant difference between mothers and fathers in their verbal modelling scores, an alternative explanation is that the effects of verbal modelling on a child’s eating behaviour may vary depending on which parent is employing the feeding strategy. Further research with a larger sample is required to explore this difference between the effect of maternal and paternal verbal modelling on children’s eating behaviours, preferably using mother-father pairs of the same child.

Finally, maternal unintentional modelling was related to greater reported emotional under-eating in their child. A potential relationship between emotional eating via modelling has been proposed previously (Snoek, Rutger, Engel, Janssen & Strien, 2007) based on findings suggesting the transmission of attitudes and reasons for eating through modelling (Brown & Ogden, 2004). Given the findings linking maternal eating psychopathology and unintentional modelling, both in this study and in Chapter 4, it is possible that it is these mothers with greater eating disorder symptoms who perceive that their children eat less in response to emotions and feel that this behaviour may be unintentionally modelled by them. Further work with clinical samples of mothers with eating disorders is required to test this notion.

In summary, while this study provides insight into mothers’ and fathers’ modelling behaviours, and the relationships between modelling with potential parent and child factors which may influence the development of children’s eating behaviours, there are a number of limitations which must be considered. Firstly, the reliance on self-report data and the small sample size needs to be acknowledged. However, this study was exploratory and self-report methods are a useful and effective method for obtaining data (Whelan & Cooper, 2000) and
fathers are often a difficult cohort to recruit. It is acknowledged that, in view of the exploratory nature of this study, numerous correlations were run on a relatively small sample without adjusting the significance level and so the findings need to be interpreted cautiously. Furthermore, it is noted that mothers and fathers were matched rather than using cohabiting parents who reported on the same child. While the sample was well matched, research exploring cohabiting couples would add to the exploratory findings of this study and would also control for individual differences in the children being reported on by parents. Finally, the lack of diversity of the sample means generalisation to the wider population is limited.

In conclusion, while these findings are preliminary they suggest that mothers and fathers do not differ in their reported modelling behaviours. However, the findings also suggest that there are differences in the pattern of associations in relation to maternal and paternal modelling behaviours. Further research in this area is required to explore potential differences in factors relating to maternal and paternal modelling.
Title of Study 5: Observational validation of the Parental Modelling of Eating Behaviours Scale (PARM).

To provide further validation for the Parental Modelling of Eating Behaviours Scale (PARM), study 5 explored the relationship between maternal scores on the PARM and observations of maternal modelling of eating behaviours based on the constructs explored in the PARM. While self-report measures are widely used and have generally been found to be reliable, discrepancies have been found between self-reported parental feeding practices and their observed counterparts. This study aimed to assess whether maternal reports of modelling mapped on to observations during three family mealtimes.

The content of this chapter is being prepared for submission to Maternal and Child Nutrition:

CHAPTER 7

Observational Validation of the Parental Modelling of Eating Behaviours Scale (PARM).

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Running head: PARM observational validation
Abstract

Objective: This study aimed to provide validation for the newly developed Parental Modelling of Eating Behaviours Scale (PARM) by examining the relationships between maternal self-reported data on the PARM with the modelling of eating behaviours portrayed by the same mothers during a set of three family mealtime observations. Method: Seventeen mothers with children aged between 2 and 6 years agreed to take part in the study and were filmed repeatedly (three times on three separate occasions) whilst eating a meal with their child. The mothers also completed the PARM scale and provided demographic information pertaining to themselves and their child. Results: Findings provided validation for the PARM modelling measure and suggested that habituation to observations did not alter the feeding behaviours displayed by mothers. Conclusion: This study provides preliminary support for all three of the PARM subscales, which were positively associated with their observed counterparts on the observational coding scheme (PARM-O). Findings also suggest that maternal feeding behaviours do not alter as a result of participating in observational mealtime research, providing validation for previous research which has used single family observations.

Keywords: Maternal; Eating Behaviours; Child; Modelling; Parental feeding strategies; Mealtime interactions; Observations; Questionnaire; PARM; PARM-O.
7.1. Introduction

The modelling of eating behaviours and attitudes by parents and the related outcomes in their children is an under-researched area in comparison to other feeding practices, such as pressure to eat and restriction (e.g., Chapter 1; Chapter 3; Fisher & Birch 1999; Francis, Hofer & Birch 2001). Research has suggested that parental modelling can have positive outcomes, such as higher levels of healthy food intake (e.g. Palfreyman, Haycraft & Meyer, 2012; Tibbs et al., 2001; Young, Fors & Hayes, 2004) and lower levels of food fussiness in children (Gregory, Paxton & Brozovic, 2010b). However, modelling can also have negative outcomes, such as greater intake of unhealthy snack foods (Palfreyman et al., 2012), elevated levels of dietary restraint (Cutting, Fisher, Grimm-Thomas & Birch, 1999; Hill, Weaver & Blundell, 1990), and increased dieting behaviours (Pike & Rodin, 1991).

The measurement of maternal feeding practices (including parental modelling), has tended to be via self-report questionnaires, which have been shown in previous research to be generally reliable, accurate sources of data (e.g., Byers et al., 1993; Whelan & Cooper, 2000). However, many existing measures have concentrated on controlling feeding practices (e.g., the Child Feeding Questionnaire; Birch et al., 2001) and those that have included modelling have a number of limitations, such as small, unrepeated measures with limited scope (see Chapter 1; Chapter 3).

Modelling is a multidimensional construct (e.g., Cullen et al., 2001). Specifically, parents might use modelling as a feeding strategy by intentionally demonstrating preferred eating practices in front of their child. However, they might also unintentionally model eating behaviours that are perceived by the child. Modelling might also be behavioural or verbal, with parents directly modelling their eating behaviours through physical means (e.g., eating
certain foods in front of their child), or through verbal means (e.g., stating their food preferences). As outlined in Chapter 3, these limitations with previous measures of modelling resulted in the development of the Parental Modelling of Eating Behaviours (PARM; Palfreyman, Haycraft & Meyer, 2012; Chapter 3) scale, which aimed to address some of the issues referred to previously. Initial assessments of the PARM confirmed it to have good reliability and convergent and concurrent validity (Palfreyman et al., 2012). However, as has been done with other feeding practice measures (e.g., Stice, Fisher & Lowe, 2004), further validation is required to examine how well maternal self-report data on the PARM links to observations of mothers’ modelling of eating behaviours.

Few studies have examined the relationships between observed parental feeding practices and self-report data, but those that have done so have produced mixed results. For example, several studies have failed to find any significant associations between maternal self-reported data and observations of controlling feeding behaviours (e.g., Haycraft & Blissett, 2008; Lewis & Worobey, 2011; Sacco et al., 2007). However, Farrow and Blissett (2006) found maternal self-report data were significantly related to relevant observations of maternal feeding behaviours for pressure to eat but not for restriction. It remains to be seen whether self-reported modelling of eating behaviours will be significantly related to observations of corresponding behaviours at mealtimes.

Observational research has the benefit of capturing real-life interactions. This is a clear strength of this research methodology, particularly for researchers working in domains such as child eating. However, alongside this strength comes a potential threat to validity via the effect that the presence of the observer (or video camera) might have on the behaviours of the participants, which may alter their interactions and result in less naturalistic behaviours being
observed, as has been the case in other child behaviour research (e.g., Simons-Morton & Baranowski, 1991). Research which has explored maternal feeding behaviours has tended to use single observations of family mealtimes (e.g., Blissett, Farrow & Haycraft, 2010; Blissett & Haycraft, 2011; Drewett, Kasese-Hara & Wright, 2002; Haycraft & Blissett, 2008b; Sacco et al., 2007; Stein, Woolley, Cooper & Fairburn, 1994; Stein et al., 2001). This is common practice as observations are time-consuming for the participants and the researchers, are often difficult to recruit to, and can be costly to carry out (Simons-Morton & Baranowski, 1991).

Some research (e.g., Orrell-Valente et al., 2007) has conducted a series of observations to try and counter the effect of the observer through habituation and has calculated an average of the behaviours observed across all sessions. In addition, a study by Young and Drewett (2000) found variations in the eating behaviours of 1 year old children over four separate mealtim observations. However, as highlighted by the researchers, this age represents a transitional period between parental feeding and self-feeding, so it is highly likely that eating behaviours observed during this period would be different to those of older children whose eating behaviours are more established. While Young and Drewett’s study concentrated on the eating behaviours of children, they also reported variations over mealtimes in terms of parents’ feeding behaviours and this, coupled with evidence of a bidirectional relationship between parental feeding practices and children’s eating behaviours, would suggest that eating behaviours and feeding practices employed by parents are likely to vary over mealtimes. Thus, Young and Drewett (2000) recommended that future research within this area observes a minimum of two mealtimes. However, to date, research has not explored whether there is a difference between these two methods of collecting observational mealtime data (single versus multiple observations) and whether parental feeding strategies such as restriction or modelling captured during one observation are representative of these strategies captured over several sessions with young children (over the age of 1 year).
In summary, parental modelling of eating behaviours and attitudes could play a significant role in the development of children’s eating behaviours but this area has not received the in-depth research required. The PARM was developed as a tool to address this limitation, but further validation of this self-report measure is required. The preliminary aim of this study was to examine whether differences were present in maternal feeding behaviours between three mealtime observations. It is hypothesised that there will be a difference in maternal feeding behaviours between the three observations. The primary aim of this study is to provide validation for the PARM and its three individual subscales by examining the relationships between self-reported and observed modelling behaviours. It is hypothesised that self-reported maternal modelling will be positively related to observed maternal modelling.

7.2. Method

7.2.1. Participants

Initially, 18 families of children aged between 2 and 6 years responded to advertisements and, after speaking with the researcher, participated in this study. After data collection, one family was excluded due to the mother only eating with the target child on one of the three observed occasions, thereby not allowing for the potential to observe instances of behavioural modelling. This left 17 families in this study who were each observed/recorded on three separate mealtimes. Therefore, the total number of mealtime observations conducted was 51. Where families had more than one child in the required 2-6 year age range, the youngest child was selected as the target child for all families apart from two, where the oldest child was the target child due to familial time constraints.
The mothers within this sample ranged in age from 22 to 44 years and had a mean age of 34.0 years (SD = 6.22). Mothers reported their ethnicity as predominantly White/British with only 1 family reporting Asian ethnicity. Mothers’ mean self-reported BMI was 23.54 (SD = 2.19, range from 19.05 to 27.50) and the mean BMI calculated from measurements recorded by the researcher was 24.54 (SD = 2.09, range from 21.20 to 28.80). Mothers had an average of 5.5 years of education after the age of 16 (range 0 to 8 years, SD = 2.03) and reported working between 0 and 40 hours per week (mean 11.24 hours, SD = 11.42); the largest group (41.2%) were non-working mothers.

The children reported on within this sample had a mean age of 52.7 months (SD = 23.32; range =19 to 73 months). There were 10 male (58.8%) and seven female (41.2%) children in the sample. The mean age and gender adjusted child BMI z-score based on data provided by mothers was 0.47 (SD = 1.78; range -2.71 to 2.90) and using scores calculated from measurements taken by the research was 0.71 (SD = 1.28; range 1.07 to 2.94) (Child Growth Foundation, 1996). These values suggest generally healthy child weight.

### 7.2.2. Measures and Procedure

Recruitment for this study involved four forms of advertisement which were implemented after receiving Institutional Review Board ethical approval. Initially, an information sheet and a response sheet indicating interest in the study were sent to 35 families who had taken part in previous studies and who had agreed to be contacted about future research. Two of these families agreed to take part. Secondly, online posts were placed on a number of parenting sites (e.g., [www.netmums.com](http://www.netmums.com)), advertising the study and providing contact information, and eight families agreed to take part. Thirdly, posters were displayed in
nurseries, preschools and schools in four UK counties (Derbyshire, Leicestershire, Nottinghamshire and Staffordshire) and two universities also advertised the study on their research web pages. This method recruited four families. Finally, a snowball method was used and the researcher asked participants if they knew anyone else who would be interested in taking part and provided participants with flyers advertising the study to pass on to other families. Four families were recruited through this method, giving 18 families in total (one of which was later excluded, see 7.2.1).

Prior to the mealtime observations commencing, mandatory consent was provided by the mothers, consisting of their agreement for their family to take part in the study, for their mealtimes to be recorded, and for height and weight measurements to be taken from themselves and their child.

7.2.2.1. **Mealtime Observations**

The families were observed during a typical family mealtime, either lunch or dinner, at home on three separate occasions. All three repeated observations took place over a two week period and, when possible, within one week, dependent on the availability of the participants. Due to work commitments, 6 out of the 17 families (35%) were recorded over a two week period. Mothers and their child were asked to have “a normal family meal”. The researcher arrived 30 minutes before the pre-arranged mealtime and set up the recording equipment. A camcorder (Sony Handycam DCR-SR58E) was used to record the mealtimes. The researcher left the room during the mealtime (or removed themselves from the child’s line of sight when this was not possible). For 10 of the families participating, the researcher was not present for the second or third mealtime. The camcorder was left with the families, who were asked to record the mealtime(s) as had been done on the first occasion. Siblings were present for 30 of
the 51 mealtime observations (59%) and fathers were present for 15 (29%). However, neither siblings nor fathers were analysed for this validation study or the studies reported on in Chapters 8 and 9. Mealtime recordings were coded in real time using all occurrence sampling. The length of children’s mealtimes ranged from 13.57 minutes to 41.55 minutes, with an average child mealtime length of 22.1 minutes (SD = 7.70). Twenty-two percent (n=11) of the recorded observations were coded by a second, independent researcher in order to determine inter-rater reliability for all of the observational subscales used within this thesis. Intra-class correlation (ICC) coefficients ranged from .71 to 1.0 (p < 0.001), indicating high inter-rater coding. Full details of the ICC coefficients are presented in Appendix X.

7.2.2.2. **Parental Modelling of Eating Behaviours Observational Coding Scale (PARM-O; Palfreyman, Haycraft & Meyer – in preparation; Appendix S).**

The Parental Modelling of Eating Behaviours Observational Coding Scale (PARM-O) was developed specifically for this study and was based largely on the three subscales of the PARM (verbal modelling, behavioural consequences of modelling and unintentional modelling). The scale was developed from behaviours and consequences highlighted by items included in the PARM and was used to record modelling behaviours observed in the mealtime. The coding scheme has four subscales which explore: behavioural modelling; verbal modelling; unintentional modelling; and, the similarity of meals served. Brief descriptions are provided below (for further details see section 2.6.1.2. and Appendix S). High scores on all of the four PARM-O subscales mean mothers were recorded as displaying more instances of verbal, behavioural and unintentional modelling, as well as greater similarity in the foods that mother and child were provided with during mealtimes.
a) Verbal modelling

Verbal modelling was coded by tallying the number of instances mothers verbally modelled their eating behaviours (e.g., “I can’t eat my chips because I’m on a diet”), their likes and dislikes (e.g., “peas are my favourite”) or produced positive/negative food-related vocalisations during the mealtime (e.g., “mmm lovely” or “ugh”).

b) Behavioural modelling

To explore observations of behavioural modelling, two aspects of maternal eating relating to the PARM behavioural consequences of modelling subscale were explored. Firstly, the number of times mothers modelled eating behaviours, such as eating certain items first, sharing foods from plates and selecting items in front of their child, which their child could copy were tallied. This included forms of intentional modelling in which mothers drew attention to their behaviour.

c) Similarities in meals

The third subscale coded for a subcomponent of behavioural modelling, specifically; the similarity of the foods served at the start of a meal for both the mother and the child. This was coded on a 3-point scale, with 1 representing completely different meals, 2 representing similar meals but with some differences, and 3 representing exactly the same meals. For families who ate two courses, this coding was completed again for puddings and an average was calculated, providing an overall score ranging from 1-3 for each mealtime.

d) Experimenter Assessed Unintentional modelling
Unintentional modelling was coded for by counting the number of times the target child copied a behaviour displayed by the mother, which was assessed by the researcher as being unintentionally modelled. An example of this would be the mother leaving an item of food uneaten and the child also leaving the same item.

7.2.2.3. Other observed maternal feeding practices

Additional maternal feeding practices were coded for using the Family Mealtime Coding System (FMCS; Haycraft & Blissett, 2008) and two other variables, devised specifically for use in this thesis. These subscales are used and reported on in Chapter 9 and these coding schemes are described in detail in Chapters 2 and 9 (also see Appendix T, U & V). However, these variables are included in this chapter’s preliminary aim; to test for differences in maternal feeding behaviours between the first observation and an average of two subsequent mealtime observations.

7.2.3. Self-report data collection

Mothers were also given a questionnaire pack to complete during the observational period. The pack required mothers to provide background information about themselves and their child, including nationality, ethnicity, age, self-reported height, weight and gender. Mothers also answered questions asking about the number of meals they typically eat with their child per week and completed the PARM questionnaire, described below. When all the observation and questionnaire data had been collected, the researcher took height and weight measurements from the mother and the target child. Participants were asked to remove their shoes and then their weight was recorded to the nearest 0.1kg using Salter electronic scales. Height measurements to the nearest 0.5cm were taken for both the mother and the target
child, by measuring the participant when they were standing tall against a wall with their heels back and their feet flat.

7.2.3.1. **Parental Modelling of Eating Behaviours Scale (PARM: Palfreyman, Haycraft & Meyer, 2012; Chapter 3; Appendix L).**

The PARM is a self-report measure consisting of 15 items, designed to measure parental modelling of eating behaviours using a 7-point Likert-type scale with three anchors (Strongly disagree – Neutral – Strongly Agree). The measure consists of three subscales: Verbal Modelling (6 items; current sample $\alpha = .81$); Behavioural consequences (6 items; current sample $\alpha = .88$); and, Unintentional modelling (3 items; current sample $\alpha = .78$). This measure has been shown to have adequate validity and reliability with a maternal sample (Palfreyman et al., 2012).

7.2.4. **Data analysis**

A series of Kolmogorov-Smirnov tests established that, in this sample, all subscales were non-normally distributed and therefore non-parametric statistics were used, when possible, to test the study’s hypothesis. For all observed variables described within this chapter, overall subscale scores were calculated for each of the three observations. This allowed for a comparison between maternal feeding behaviours observed during observation 1, 2 and 3. The reason for this comparison was to enable an examination of whether mothers’ feeding behaviours alter significantly from the initial experience with the observational process (observation 1) to subsequent experiences of the observation where there may be increased familiarity with the process (observations 2 & 3). To test for any differences between the
observed maternal feeding behaviour during observations 1, 2 and 3, a series of Friedman tests of difference were conducted.

Following this, preliminary two-tailed Spearman’s rho correlations were conducted between the three modelling subscales from the PARM and the four subscales from the PARM-O with child age, maternal age, maternal years of education post 16, child BMI z scores, and maternal BMI (as calculated by researcher measurements). The PARM verbal modelling subscale correlated positively with measured maternal BMI (r = .632; p = .006) and mothers’ post 16 education positively correlated with the PARM-O behavioural modelling subscale (r = .525, p = .031). The PARM behavioural consequences and unintentional modelling subscales, and the other three PARM-O subscales were not found to be significantly correlated to any of the above factors. One-tailed Spearman’s rho correlations (or partial correlations, controlling for maternal BMI for all analyses involving PARM verbal modelling, or maternal education for tests exploring PARM-O behavioural modelling) were conducted to test the study’s hypothesis. Significance was set at p<0.05, given the moderate sample size and the exploratory nature of this study.

In addition, a series of preliminary Mann-Whitney U tests of difference were conducted to explore potential differences between observed maternal feeding behaviours when: a) the researcher was/was not present; b) the father was/was not present; and c) siblings were/were not present during mealtime observations. Significant differences were found in relation to the presence of the researcher during the mealtime observation. Specifically, mothers were observed to talk more about food knowledge during mealtimes when the researcher was present (M = 8.8, Md = 6.00, n = 16) than when absent (M = 3.14, Md = 3.00, n = 35, U = 155.50, z = -2.20, p = .03) and to use more negative comments when the researcher was not
present \((M = 18.57, Md = 18.00, n = 35)\) compared to when they were \((M = 9.51, Md, 10.00, n = 16, U = 412.50, z = 3.25, p = .001)\). While no significant differences were found between the observed maternal feeding practices used during mealtimes in which the father was present or absent, significant differences were found in relation to the presence of siblings during mealt ime observations. Mothers were observed to verbally model more to the target child when siblings were present \((M = 11.71, Md = 12.00, n = 30)\) compared to meals with only the target child present \((M = 7.05, Md = 5.00, n = 21, U = 160.00, z = -2.81, p = .01)\). Maternal neutral comments during mealtimes were also found to differ, with higher levels observed when siblings were present \((M = 42.41, Md = 41.00, n = 30)\) compared to mealtimes when only the target child was there \((M = 21.37, Md = 19.00, n = 21, U = 104.00, z = -3.90, p = .001)\).

7.3. Results

To explore whether there were any differences between observed maternal modelling and feeding practices between the first, second and third observations, a series of Friedman tests of differences were run (see Table 7.1). Descriptive statistics for the sample can also be seen in Table 7.1.
Table 7.1: Descriptive statistics and two-tailed Friedman tests of difference between observed maternal modelling and feeding practices in observations 1, 2 and 3 (n = 17).

<table>
<thead>
<tr>
<th></th>
<th>Observation 1</th>
<th></th>
<th>Observation 2</th>
<th></th>
<th>Observation 3</th>
<th></th>
<th>Friedman test of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Median)</td>
<td>SD</td>
<td>Mean (Median)</td>
<td>SD</td>
<td>Mean (Median)</td>
<td>SD</td>
<td>χ²</td>
</tr>
<tr>
<td><strong>PARM-O</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>9.41 (8.00)</td>
<td>5.22</td>
<td>10.00 (8.00)</td>
<td>8.11</td>
<td>10.53 (9.00)</td>
<td>7.85</td>
<td>0.75</td>
</tr>
<tr>
<td>Behavioural modelling</td>
<td>2.88 (3.00)</td>
<td>2.29</td>
<td>4.18 (3.00)</td>
<td>3.38</td>
<td>2.77 (2.00)</td>
<td>2.00</td>
<td>0.12</td>
</tr>
<tr>
<td>Similarities in meals</td>
<td>1.65 (2.00)</td>
<td>0.93</td>
<td>2.00 (2.00)</td>
<td>2.05</td>
<td>2.59 (3.00)</td>
<td>1.42</td>
<td>0.14</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>0.94 (1.00)</td>
<td>1.14</td>
<td>0.88 (0.00)</td>
<td>1.58</td>
<td>0.77 (0.00)</td>
<td>1.20</td>
<td>0.43</td>
</tr>
<tr>
<td>Knowledge of food and nutrition</td>
<td>4.53 (4.00)</td>
<td>3.91</td>
<td>6.47 (4.00)</td>
<td>6.61</td>
<td>6.47 (6.00)</td>
<td>5.20</td>
<td>0.98</td>
</tr>
<tr>
<td>Encouragement</td>
<td>2.88 (2.00)</td>
<td>3.00</td>
<td>3.76 (2.00)</td>
<td>3.70</td>
<td>3.88 (2.00)</td>
<td>5.71</td>
<td>1.40</td>
</tr>
<tr>
<td><strong>FMCS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal verbal pressure</td>
<td>5.00 (4.00)</td>
<td>4.03</td>
<td>7.00 (1.00)</td>
<td>8.14</td>
<td>5.88 (5.00)</td>
<td>4.85</td>
<td>0.63</td>
</tr>
<tr>
<td>Maternal physical prompt</td>
<td>6.12 (2.00)</td>
<td>3.12</td>
<td>7.00 (1.00)</td>
<td>10.42</td>
<td>4.18 (1.00)</td>
<td>5.87</td>
<td>1.61</td>
</tr>
<tr>
<td>Maternal verbal restriction</td>
<td>1.06 (1.00)</td>
<td>1.30</td>
<td>0.66 (0.00)</td>
<td>0.86</td>
<td>1.36 (0.00)</td>
<td>2.32</td>
<td>0.58</td>
</tr>
<tr>
<td>Maternal physical restriction</td>
<td>0.35 (0.00)</td>
<td>0.79</td>
<td>0.65 (0.00)</td>
<td>1.22</td>
<td>0.42 (0.00)</td>
<td>1.06</td>
<td>0.61</td>
</tr>
<tr>
<td>Maternal use of incentive / conditions</td>
<td>1.18 (1.00)</td>
<td>1.07</td>
<td>0.94 (0.00)</td>
<td>1.85</td>
<td>1.65 (1.00)</td>
<td>3.60</td>
<td>2.21</td>
</tr>
<tr>
<td>Positive comments</td>
<td>8.94 (6.00)</td>
<td>8.77</td>
<td>9.00 (4.00)</td>
<td>11.46</td>
<td>8.52 (6.00)</td>
<td>9.68</td>
<td>0.27</td>
</tr>
<tr>
<td>Neutral comments</td>
<td>35.29 (37.00)</td>
<td>8.72</td>
<td>31.71 (25.00)</td>
<td>26.54</td>
<td>36.71 (37.00)</td>
<td>16.1</td>
<td>8</td>
</tr>
<tr>
<td>Negative comments</td>
<td>9.76 (10.00)</td>
<td>5.79</td>
<td>15.53 (12.00)</td>
<td>9.75</td>
<td>10.70 (10.00)</td>
<td>7.97</td>
<td>4.29</td>
</tr>
</tbody>
</table>

PARM-O: Parental Modelling of Eating Behaviours Observational Coding Scale; FMCS: Family Mealtime Coding System

The results above show that there were no significant differences between maternal modelling or feeding strategies observed in any of the three mealtime observations.
Given that there were no significant differences in the observation of mealtime feeding interactions and practices across the three mealtimes, average scores were subsequently calculated for all observed parental feeding strategies using the data obtained from all three mealtime observations. Descriptive statistics for these variables are presented in Table 7.2. Note that only variables used within the remainder of this chapter are presented below.

Table 7.2: Descriptive statistics for maternal scores on PARM and average scores on PARM-O taken over 3 observations (n = 17).

<table>
<thead>
<tr>
<th></th>
<th>Mean (Median)</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>5.42</td>
<td>1.17</td>
</tr>
<tr>
<td>(5.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioural Consequences</td>
<td>5.30</td>
<td>1.45</td>
</tr>
<tr>
<td>(5.43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>4.08</td>
<td>1.65</td>
</tr>
<tr>
<td>(4.33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PARM-O</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>9.98</td>
<td>5.79</td>
</tr>
<tr>
<td>(9.67)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioural Modelling</td>
<td>3.28</td>
<td>1.85</td>
</tr>
<tr>
<td>(2.08)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Similarities in meals</td>
<td>2.08</td>
<td>0.80</td>
</tr>
<tr>
<td>(1.67)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unintentional Modelling</td>
<td>0.86</td>
<td>.081</td>
</tr>
<tr>
<td>(0.67)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PARM: Parental Modelling of Eating Behaviours Questionnaire; PARM-O: Parental Modelling of Eating Behaviours Observational Coding Scale

Modelling scores on the PARM are consistent to those reported in previous research using this measure (Palfreyman et al., 2012). PARM-O subscale scores indicate that high levels of verbal modelling and low levels of unintentional modelling were observed.

Following this, in order to test the hypothesis that self-reported maternal modelling (PARM) will be positively related to observed maternal modelling (PARM-O), a one-tailed partial correlation, controlling for maternal age, was conducted between the PARM and PARM-O
Verbal modelling subscales. Maternal scores on the PARM verbal modelling subscale were significantly, positively correlated to observed verbal modelling scores ($r = .519$, $p = .020$). One-tailed Spearman’s correlations were then conducted between PARM and PARM-O Behavioural and Unintentional Modelling subscales. PARM scores on the behavioural consequences of modelling subscale were positively and significantly related to PARM-O behavioural modelling ($r = .578$, $p = .01$) and to PARM-O similarities in meals during observations ($r = .523$, $p = .02$). Finally, although also not reaching significance, maternal PARM scores on the unintentional modelling subscale were positively related to observed maternal unintentional modelling ($r = .232$, $p = .19$).

7.4. Discussion

The preliminary aim of this study was to explore whether there were differences in maternal feeding behaviours between the first, second and third mealtime observations. While this preliminary aim was exploratory in nature it was hypothesised that there would be differences between the three observations. The main aim of the study was to provide validation for the newly developed Parental Modelling of Eating Behaviours Scale (PARM) by exploring associations between maternal self-reports of modelling behaviours with their observed modelling behaviours, as assessed via the PARM-O coding scale.

Contrary to expectations there were no significant differences in the frequency of the maternal feeding practices used by mothers in the first, second or third observations. Although an average score over a number of observations may provide a wider view of mealtime behaviours, these preliminary findings would suggest that mothers’ feeding behaviours do not alter significantly as they become more accustomed to being observed. This is contrary to research with infants which has suggested variation across mealtimes
(Young & Drewett, 2000) but may be related to the older age of the sample of children studied here or the more in depth analysis of parental feeding practices conducted within this study. While this study’s finding does not mean that feeding behaviours are not affected by the presence of an observer or video camera it does provide support for the reliability of data from studies that have used only one observation of individual families (e.g., Blissett, Farrow & Haycraft, 2010; Blissett & Haycraft, 2011; Farrow & Blissett, 2006; Haycraft & Blissett, 2008; Stein et al., 1994; Sacco et al., 2007). These findings are also beneficial for future research design and funding, as a series of individual observations are less time consuming and less expensive (Bruce et al., 1991). Given the focus of this thesis, this study concentrated on maternal behaviour and it would be interesting for future research to explore whether children’s eating behaviours alter over a series of observations.

The findings partially support the hypothesised outcomes of the primary aim of this study. Specifically, the results found a strong, significant relationship between maternal self-reported and observed verbal modelling data providing validation for the PARM verbal modelling subscale. The findings also provide support for the validation of the behavioural consequences of modelling subscale, suggesting that mothers who report higher levels of outcomes relating to their modelling behaviours display higher levels of behavioural modelling in general. The relationship between the PARM behavioural consequences of modelling and higher similarities between mothers and their children’s meals could suggest that mothers who model more also consider eating similar meals to their child to be important, which therefore creates more opportunities for modelling. However, this study did not assess the types of foods being eaten and, while children eating more similar meals to their mothers has been associated with positive outcomes (see Table 8.3), when considering modelling, the type and quantity of foods being consumed are important to consider in
relation to whether they are positive (healthy) or negative (unhealthy). Alternatively, mothers who report higher levels of modelling, and are observed to model more, may have children who are less fussy/picky eaters and so may consider modelling to be effective and so do not feel the need to employ any other, more controlling feeding practices. While the relationships between self-reported and unintentional modelling did not reach significance, the relationship was positive and in the expected direction and the absence of significant associations is likely to be related to the moderate size of the current sample and to the fact that only low levels of unintentional modelling were recorded during mealtimes. Research with a larger sample may have produced a significant relationship. Unintentional modelling is also a difficult construct to measure observationally, as parents provide a continuous role model for their child. In relation to this study, this meant that observational coding criteria had to be devised that would code only behaviours which could be isolated as unintentionally modelled behaviour, and this led to the decision that the target child had to copy the unintentional behaviour within the observed mealtime. The result of this may be that other unintentional modelling, which may have influenced the child’s eating behaviours, may not have been recorded. Further research may benefit from comparing children’s reports of their parents eating behaviours and parental reports of their modelling behaviours. Also, a greater understanding of more intentional forms of modelling would allow for unintentional modelling to be more easily addressed in future research.

The validation of the PARM means that there is now a brief, multifaceted self-report measure of parental modelling of eating behaviours available to explore this construct. Not only is a self-report measure a good tool to have in exploring parental feeding practices, but the inclusion of three distinct facets of modelling will enable researchers using the PARM to unpack the relationships between aspects of modelling and other factors. The PARM has
already helped to provide further understanding of the relationships between modelling and factors such as maternal and child healthy food intake (Palfreyman et al., 2012). Indeed, the relationship between unintentional modelling and higher levels of snack intake in children highlights the importance of parents’ own diets and eating behaviours in their children’s eating behaviours. In addition, preliminary associations with verbal modelling (Chapter 5; Chapter 6) also draw attention to a facet of modelling that parents may not necessarily have been aware of and the potential of verbal modelling as a feeding strategy. This validation study also supports the newly developed PARM-O coding scheme which, to date, is the only observational coding scheme to explore parental modelling of eating behaviours. This means that future observational research in this area will have a basis to work on and a coding measure to use.

In addition, while the focus of this study was not on exploring any differences in observed feeding practices during mealtimes when other individuals were or were not present, preliminary analyses identified some relationships which need to be acknowledged and considered in future research. The finding that, when the researcher was present, mothers exhibited greater discussion about food knowledge and were less likely to use negative comments with their children could suggest that these mothers want to be seen in a positive light. Future research should consider this as even though the research was in another room or out of sight for the duration of the meal, their presence in the house or potentially before the meal may increase mothers’ concerns about how they will be viewed. Removing the researcher completely from the home or leaving a significant gap between meeting/setting up equipment and the mealtime commencing could help to reduce any alterations in maternal behaviours due to social biases and ensure that natural behaviours are being observed. Furthermore, the differences in mealtimes found when siblings were present also seem
logical considering that more conversation is likely to take place when more members of the family are present, as is reflected in the increased number of neutral comments made by mothers to the child. Similarly, higher levels of verbal modelling directed at the target child when siblings are present could be due to a number of factors, including: mothers being more verbally active due to higher levels of conversation; mothers using verbal modelling to highlight the eating behaviours of the other siblings which they consider to be good/bad; or mothers employing verbal modelling more as a means of trying to override behaviours displayed by siblings that they deem as negative and so do not wish the target child to adopt.

Future research should consider the influence of siblings on maternal verbal modelling practices. It is interesting to note that differences were not reported between meals in which fathers were and were not present. Mothers do tend to be the main food providers within a family (e.g. Blissett & Farrow, 2007; Birch & Fisher, 2000; Rhee et al., 2006) and this study, while preliminary, would appear to support this and suggest that even when fathers are present mothers’ feeding behaviours do not tend to alter. Further research is required with a larger sample to explore this further.

While this study has provided preliminary validation for the PARM, particularly the verbal and behavioural consequences of modelling subscales, the study did have a number of limitations. The study was exploratory and observational, requesting that families took part in three mealtime observations. This resulted in a fairly small sample size which is likely to have affected the findings of the study by under-powering it to detect significant associations and further research would benefit from a larger sample. In addition, coding of certain maternal modelling behaviours proved to be challenging. This was due to the fact that parents provide a continuous role model for the child throughout the meal and deciding on which aspects should be picked out as definite instances of behavioural and unintentional
modelling was a difficult task, especially as these two facets of modelling can overlap. Strengths of this study included the use of multiple observations (Pellegrini, 2003) of mealtimes and the creation of an observational coding scheme (PARM-O) to complement the self-report measure.

In conclusion, preliminary support has been obtained for all three of the PARM subscales which were positively, albeit not always significantly, associated with their observed counterparts on the PARM-O. This increases researchers’ confidence in using the PARM and the PARM-O for further research into maternal modelling of eating behaviours. Again, although preliminary, this study also suggests that maternal feeding behaviours do not alter due to participating in mealtime interaction research (e.g., the presence of a video camera/research), providing validation for research which has used single family observations.
Title of Study 6: Observed maternal modelling and relationships with self-reported child and parent factors.

To date, previous research has not explored maternal modelling via observations. Due to the potential for there to be variation between self-reported and observed maternal modelling behaviours, study 6 explored the relationships between observed maternal modelling with a range of factors that have been previous highlighted as potentially important correlates of modelling within this thesis, specifically; maternal eating psychopathology and children’s eating behaviours. The global aim was to identify whether similar patterns of association were found between these factors with observed maternal modelling as had been found in earlier chapters (Chapters 4 and 6) with self-reported modelling.
CHAPTER 8

Observed maternal modelling and relationships with self-reported child and parent factors

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Caroline Meyer PhD ¹

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Running head: Parent and child correlates of observed maternal modelling
Abstract

Objective: This study aimed to explore the relationships between observed maternal modelling practices and a range of self-reported parental and child factors previously associated with maternal modelling. Method: Mothers with a child aged 2-6 years (N=17) were video recorded during three separate family mealtimes. Mothers also completed a series of questionnaires exploring symptoms of maternal mental health (e.g., eating psychopathology, anxiety and depression) and their children’s eating behaviours. Results: Observed behavioural modelling was found to be negatively related to maternal eating psychopathology scores. However, no significant relationships were present between observed modelling with any other mental health symptoms. Observed unintentional and behavioural modelling were both negatively related to reported food fussiness in children and observed behavioural modelling was also related to children’s increased food enjoyment. Observed maternal verbal and behavioural modelling were both found to be negatively related to emotional over-eating in children. Conclusion: While preliminary, these findings provide further evidence of the relationships between maternal eating psychopathology and maternal modelling. In addition, this study also provided further evidence of the relationship between parental modelling and lower levels of food fussiness and higher levels of food enjoyment in children.

Keywords: Mother; Child; Eating behaviours; Modelling; Eating psychopathology; Mealtime observations; Maternal mental health; Food fussiness.
8.1. Introduction

The use of parental feeding strategies, such as modelling, can be influenced by numerous parent and child factors (e.g., Blissett & Farrow, 2007; Blissett & Haycraft, 2008; Francis, Hofer & Birch, 2001; Hubbs-Tait, Kennedy, Page, & Topham, , 2008; Mitchell, Brennan, Hayes & Miles, 2009; Tiggemann & Lowes, 2002) and parental feeding practices have also been related to both food intake and weight-related outcomes in children (e.g., Brown & Ogden, 2004; Clark, Goyder & Peters, 2007; Faith et al., 2004; Hughes, Shewchuk, Baskin, Nicklas & Qu, 2008). The effect of parental modelling of eating behaviours on the development of children’s eating behaviours is an under-researched area (see Chapters 1 and 3; Palfreyman, Haycraft & Meyer, 2012). Maternal self-reports of modelling have been associated with positive outcomes in children’s dietary development, such as higher levels of healthy food intake (e.g., Palfreyman et al., 2012; Tibbs et al., 2001; Young, Fors & Hayes, 2004). However, negative associations have also been found, such as maternal modelling being associated with increased snack food intake in their children (Brown & Ogden, 2004; Palfreyman et al., 2012; Chapter 3). Relationships have also been found between self-reports of maternal modelling of eating behaviours and parental factors, such as maternal mental health symptoms (Chapter 4 & 6), adding to previous research which suggests the potential for the transmission from parent to child of maladaptive eating behaviours through modelling (e.g., Cutting et al., 1999; Hill, Weaver & Blundell, 1990; Keel, Fulkerson & Leon, 1997; Pike & Rodin, 1991). Maternal modelling has also been associated with child factors, such as children’s eating behaviours (Chapter 6; Gregory, Paxton & Brozovic, 2010b). However, to date, these relationships have not been explored using observed maternal modelling, so it is not clear whether these factors are related to objective assessments of maternal modelling or just to maternal reports. This is an important omission given that studies have found observations of mothers’ controlling feeding practices do not necessarily map on to self-
reports of these behaviours (e.g., Haycraft & Blissett, 2008; Lewis & Worobey, 2011; Sacco et al., 2007).

Maternal mental health symptoms have been previously associated with the feeding practices employed by parents. In particular, symptoms of eating psychopathology, anxiety and depression have all been related to parents’ child feeding practices (e.g., Blissett et al., 2006; Blissett & Haycraft, 2011; Cummings & Davies, 1994; Farrow & Blissett, 2005; Haycraft & Blissett, 2008; see also Chapter 4). There are a number of ways in which maternal mental health symptoms may influence the feeding strategies employed by parents. For example, mothers with higher levels of eating psychopathology (e.g., greater use of dietary control or restriction of intake) use more controlling, restrictive feeding practices with their children, suggesting a relationship between mothers’ own eating behaviours and the feeding strategies they employ (e.g., Birch & Fisher, 2000; Haycraft & Blissett, 2008; Reba-Harrelson et al., 2010; Stein, Woolley, Cooper & Fairburn, 1994; Stein et al., 2001). In addition, eating psychopathology, depression and anxiety have also been shown to impact negatively on parenting practices, such that parents with greater symptoms may be less sensitive or more controlling in their interactions with their children across various parenting domains, including feeding (e.g., Blissett, Meyer & Haycraft, 2007; Cummings & Davies, 1994; Farrow & Blissett, 2005; Haycraft & Blissett, 2008; Patel, Wheatcroft, Park & Stein, 2002; Paulson, Dauber & Leiferman, 2006). While the relationship between maternal mental health symptoms and controlling feeding practices is established (e.g., Blissett et al., 2006; Blissett & Haycraft, 2011; Farrow & Blissett, 2005; Haycraft & Blissett, 2008), the relationship between modelling and parents’ mental health symptoms has received less attention. A preliminary study (see Chapter 4) found maternal eating disorder symptoms and levels of
depression, but not anxiety, to be significantly related to self-reported maternal modelling of eating behaviours, but these findings require replication.

Parents’ feeding strategies have also been found to be related to children’s eating behaviours (e.g., Farrow, Galloway & Fraser, 2009; Webber, Cooke, Hill & Wardle, 2010), although the direction of this relationship is unclear. Modelling is a feeding practice which is also likely to be related to children’s eating behaviours. For example, parents may model more with fussy eaters to try and increase the variety of their child’s intake or they may use more controlling strategies, such as pressure to eat, in response to this fussy behaviour. Although modelling and children’s eating behaviours have received little research attention, a study by Gregory et al. (2010) found that greater use of modelling by mothers predicted lower levels of food fussiness and higher interest in foods in their children. Similar findings relating self-reported parental modelling to lower levels of food fussiness and higher levels of food enjoyment have also been found in an exploratory study with both mothers and fathers in this thesis (see Chapter 6). The potential relationship between children’s eating behaviours and parental modelling requires further research.

Much of the existing research into child feeding practices has used maternal self-reports of their feeding behaviours, which have been shown to be fairly reliable, accurate sources of data (e.g., Byers et al., 1993; Whelan & Cooper, 2000). Thus, there is great value in using self-reports (see Chapters 1, 2, & 7), particularly when exploring a less researched feeding practice such as modelling. Observational research can add to self-report data by providing an objective assessment of parental feeding practices (see sections 2.7 and 7.1). However, some research has suggested variation between mothers’ self-reported and observed use of controlling feeding practices (e.g., Haycraft & Blissett, 2008; Lewis & Worobey, 2011;
Sacco et al., 2007). Interestingly, maternal self-reported and observed modelling of eating behaviours were found to be positively related (see Chapter 7). While requiring further research, these preliminary findings could suggest that mothers may be generally more accurate in reporting more adaptive feeding strategies, such as modelling, rather than those considered to be more controlling. However, further research into observations versus self-reports of modelling is required to test this.

In summary, while self-reports of maternal modelling have been found to be related to a number of parent and child factors, to date, a study looking at the relationships between observed maternal modelling with these factors has not been conducted. Therefore, the first aim of this study was to explore the relationships between observed maternal modelling of eating behaviours with the parental factors which have already been linked to self-reported maternal modelling behaviours within this thesis; specifically, mental health symptoms (see Chapter 4). It was hypothesised that maternal levels of eating psychopathology would be negatively associated with modelling, especially unintentional modelling. Further to this, it was hypothesised that observed maternal modelling would be negatively related to maternal depression and significantly related to maternal anxiety. The second aim of this study was to explore the relationships between observed maternal modelling with a child factor previously related to self-reported maternal modelling; children’s eating behaviours (see Chapter 6). It was hypothesised that observed maternal modelling would be significantly related to children’s eating behaviours, especially food fussiness.
8.2. Method

8.2.1. Participants

Demographic information for the sample of 17 mothers and their child aged between 2 and 6 years involved in this study are recorded previously in this thesis (see Chapter 7 for details).

8.2.2. Measures and Procedure

Details of the recruitment of this sample are described in Chapter 7 of this thesis.

8.2.2.1. Mealtime Observations

Details of the mealtime observations and coding procedure are reported in Chapter 7 (for further details see Chapter 2 and Appendix S, T & U). Inter-rater reliabilities for the PARM-O variables are summarised in Chapter 7 (for details, see Appendix Y).

8.2.2.1.1. Parental Modelling of Eating Behaviours Observational Coding Scheme (PARM-O; Palfreyman, Haycraft & Meyer, in preparation; Appendix L).

The PARM-O was developed from the three subscales of the Parental Modelling of Eating Behaviours Scale (PARM): verbal modelling, behavioural consequences of modelling and unintentional modelling. Brief operational definitions for the four observational subscales are given below (for further details see Chapter 2 & Appendix S). As in Chapter 7, average scores from all three observations for each PARM-O subscale were used in the analyses. Higher scores reflect more frequent instances of each observed type of modelling and greater similarity in mother-child meals.
a) **Verbal modelling**

Instances of verbal modelling were recorded using the coding scheme and a sum total was calculated. Examples of verbal modelling include; mothers expressing likes and dislikes, such as “This is my favourite pudding”, or producing positive/negative vocalisations during the mealtime, such as “yuk” or “mmm”.

b) **Behavioural modelling**

Two aspects of maternal behavioural modelling were coded. First, the number of times mothers modelled eating behaviours, such as selecting foods from plates, which their child did or could copy. Scores were summed to create an overall score for behavioural modelling.

c) **Similarities in meals**

A subcomponent of behavioural modelling was also coded for separately. This subscale explored the level of similarity between the mother and child in the foods served at the start of the meal and was coded on a scale of 1-3 (1 = dissimilar; 2 = some similarity; 3 = very similar). This was also repeated for dessert items (where relevant) and an average score calculated.

d) **Unintentional modelling**

Unintentional modelling was coded for by counting the number of times the target child copied a behaviour displayed by the mother, which did not appear to be intentional. Examples include: reaching for the tomato sauce after the mother has done the same; or, leaving a certain food item (e.g., peas). Instances of this form of modelling were tallied and totalled for each observation.
8.2.2.2. **Self-report questionnaires**

Mothers were also given a questionnaire pack to complete during the observational period. The pack required mothers to provide background information for themselves and their child, including nationality, ethnicity, age, self-reported height, weight and gender, and participants also completed questions asking about the number of meals they eat with their child. After completing this, mothers completed the questionnaires in the order described below.

8.2.2.2.1. **Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Appendix O)**

A shortened version of the 36 item self-report EDE-Q was used for this study (see 2.6.3.1; Appendix O). The EDE-Q addresses the respondent’s current state, focusing on the last 4 weeks, and measures four aspects of eating disorder psychopathology: restraint (5 items, $\alpha = .82$), eating concern (5 items, $\alpha = .98$), body shape concern (8 items, $\alpha = .91$), and body weight concern (5 items, $\alpha = .91$), as well as having a total (global) score ($\alpha = .94$). High scores on the EDE-Q indicate more pathological eating attitudes and behaviours. Research supports the reliability and validity of the EDE-Q in its use with community samples (e.g., Fairburn & Beglin, 1994; Mond, Hay, Rodgers, Own & Beaumont, 2004).

8.2.2.2.2. **Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; Appendix P)**

The HADS is a 14 item self-report measure assessing symptoms of anxiety and depression. The measure is split into a 7 item depression subscale ($\alpha = .44$) and an anxiety subscale also consisting of 7 items ($\alpha = .54$), and both subscales have been shown to have high factorial validity (Herrmann, 1996). Responses are made on a 4 point Likert response scale and higher
scores indicate higher levels of anxiety and/or depression. The measure has been found to perform well in a variety of populations, including in the general population (e.g., Bjelland, Dahl, Haug & Neckelmann, 2001; Herrmann; 1996).

8.2.2.2.3. Children’s Eating Behaviour Questionnaire: (CEBQ: Wardle, Guthrie, Sanderson & Rapoport, 2001: Appendix R).

The CEBQ is a 35 item parental self-report measure, designed to assess eating styles in children using a five-point Likert frequency scale ranging from ‘Never’ to ‘Always’. The measure consists of 8 subscales but, for the studies within this thesis, the ‘desire to drink’ subscale was removed (see Chapters 2 & 6). This left Food responsiveness (5 items; current sample $\alpha = .75$), Enjoyment of food (4 items current sample $\alpha = .91$), Emotional over-eating (4 items; current sample $\alpha = .64$), Emotional under-eating (4 items; current sample $\alpha = .66$), Satiety responsiveness (5 items; $\alpha = .71$), Slowness in eating (4 items; $\alpha = .76$), and Food Fussiness (6 items; $\alpha = .96$). The CEBQ has been found to have good internal validity (Webber, Cooke, Hill & Wardle, 2010) and good test–retest reliability (Carnell & Wardle, 2007; Wardle et al., 2001).

8.2.3. Data analysis

A series of Kolmogorov-Smirnov tests established that all subscales were non-normally distributed and therefore, when possible, non-parametric statistics were used to test the study’s hypotheses. Preliminary two-tailed Spearman’s rho correlations were conducted between the PARM-O, EDE-Q, HADS and CEBQ subscales with child age, child BMI z scores, maternal age, maternal BMI and maternal education post 16 years. Child BMI z scores were positively and significantly related to the EDE-Q shape concern subscale ($r = .483$, $p = 0.050$). Maternal age was significantly and positively correlated to the CEBQ
satiety responsiveness ($r = .538, p = 0.026$) and slowness in eating ($r = .571, p = 0.017$) subscales. Maternal education was significantly and positively correlated to the PARM-O behavioural modelling subscale ($r = .526, p = 0.031$). No further relationships were found with observed maternal modelling or reported maternal levels of anxiety and depression. Therefore, one-tailed partial correlations (due to a non-parametric version of the statistical test being unavailable), were used for all analyses involving these four subscales. One-tailed Spearman’s rho correlations were used to examine the relationships between observed verbal, behavioural and unintentional modelling with all the remaining EDE-Q, HADS, and CEBQ subscales. Given the modest sample size and the exploratory nature of this study, significance was set at $p < 0.05$.

8.3. Results

8.3.1. Descriptive statistics.

Descriptive information is presented in Table 8.1. (below) for the observed maternal modelling subscales (PARM-O) and maternal eating psychopathology (EDE-Q), mental health (HADS), and children’s eating behaviours (CEBQ).

<table>
<thead>
<tr>
<th>PARM-O</th>
<th>Mean (Median)</th>
<th>Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal modelling</td>
<td>9.98 (9.67)</td>
<td>5.79</td>
</tr>
<tr>
<td>Behavioural modelling</td>
<td>3.28 (2.33)</td>
<td>0.80</td>
</tr>
<tr>
<td>Similarities in meals</td>
<td>2.08 (1.67)</td>
<td>1.85</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>0.86 (0.67)</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Table 8.1: Descriptive statistics for maternal scores on the PARM-O, EDE-Q, HADS, and CEBQ ($N = 17$).
Table 8.1 cont: Descriptive statistics for maternal scores on the PARM-O, EDE-Q, HADS, and CEBQ (N = 17).

<table>
<thead>
<tr>
<th></th>
<th>Mean (Median)</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDE-Q</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td>1.27 (1.00)</td>
<td>(1.40)</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>0.64 (0.20)</td>
<td>(1.41)</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>1.54 (1.15)</td>
<td>(1.44)</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>1.38 (1.00)</td>
<td>(1.49)</td>
</tr>
<tr>
<td>Global Score</td>
<td>1.21 (0.84)</td>
<td>(1.34)</td>
</tr>
<tr>
<td><strong>HADS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>6.11 (6.00)</td>
<td>(3.22)</td>
</tr>
<tr>
<td>Depression</td>
<td>4.59 (4.00)</td>
<td>(2.92)</td>
</tr>
<tr>
<td><strong>CEBQ</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Responsiveness</td>
<td>2.41 (2.20)</td>
<td>(0.62)</td>
</tr>
<tr>
<td>Food Enjoyment</td>
<td>3.66 (4.00)</td>
<td>(0.83)</td>
</tr>
<tr>
<td>Satiety Responsiveness</td>
<td>2.95 (2.80)</td>
<td>(0.56)</td>
</tr>
<tr>
<td>Food Fussiness</td>
<td>2.76 (2.34)</td>
<td>(1.11)</td>
</tr>
<tr>
<td>Slow Eating</td>
<td>2.85 (2.75)</td>
<td>(0.76)</td>
</tr>
<tr>
<td>Emotional Over–Eating</td>
<td>1.69 (1.75)</td>
<td>(0.52)</td>
</tr>
<tr>
<td>Emotional Under-Eating</td>
<td>3.60 (3.00)</td>
<td>(2.40)</td>
</tr>
</tbody>
</table>

PARM-O = Parental Modelling of Eating Behaviours Observational Coding Scheme; EDE-Q = Eating Disorder Examination Questionnaire; Hospital Anxiety and Depression Scale; CEBQ = Children’s Eating Behaviour Questionnaire.

The mean observed modelling scores show that there were higher level of verbal modelling observed in mothers than other forms of modelling, and cases of observed unintentional modelling were low. The mean EDE-Q subscale scores in this sample were similar to those reported in community samples (e.g., Chapter 4; Fairburn & Beglin, 1994; Mond, Hay, Rodgers, Owen & Beaumont, 2004). The mean HADS scores in the current sample suggest
low to mild symptoms of anxiety and depression, which is in line with previous research using parental samples with young children (e.g., Haycraft, Farrow & Blissett, in press; Nærde, Tambs, Mathiesen, Dalgard & Samuelsen, 2000). The mean scores for the CEBQ subscales were similar to those found in previous studies with UK samples (e.g., Wardle et al., 2001; Webber, Hill, Saxton, Van Jaarsveld & Wardle, 2009).

A series of Mann-Whitney U tests of difference showed that there were no significance differences in maternal self-reported or observed modelling between family mealtimes where only the mother and the child were present compared with mealtimes where other family member(s) were present (data not shown).

In order to test the hypothesis that symptoms of maternal mental health would be negatively related to observed maternal modelling, a series of bivariate and partial correlations were conducted (see Table 8.2.).
Table 8.2: One tailed Spearman’s rho correlations (unless otherwise stated) between observed maternal modelling and scores on the EDE-Q and HADS (N = 17).

<table>
<thead>
<tr>
<th>Observed Maternal Modelling (PARM-O)</th>
<th>Verbal Modelling</th>
<th>Behavioural Modelling »</th>
<th>Similarities in meals</th>
<th>Unintentional modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDE-Q</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained</td>
<td>-.008</td>
<td>-.299</td>
<td>-.226</td>
<td>-.048</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>.330</td>
<td>-.170</td>
<td>-.434*</td>
<td>-.051</td>
</tr>
<tr>
<td>Shape Concern †</td>
<td>-.069</td>
<td>-.385</td>
<td>-.443*</td>
<td>-.333</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>.003</td>
<td>-.263</td>
<td>-.521*</td>
<td>-.214</td>
</tr>
<tr>
<td>Global Score</td>
<td>.037</td>
<td>-.248</td>
<td>-.475*</td>
<td>-.195</td>
</tr>
<tr>
<td>HADS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>.193</td>
<td>-.187</td>
<td>-.131</td>
<td>-.073</td>
</tr>
<tr>
<td>Depression</td>
<td>-.189</td>
<td>-.054</td>
<td>-.239</td>
<td>-.226</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01; ***p<.001
† Partial correlations controlling for child BMI z scores; » Partial correlations controlling for maternal post 16 education.

Three of the four PARM-O subscales (verbal, unintentional and behavioural modelling) were not significantly related to any of the EDE-Q or HADS subscales in this sample. However, the PARM-O subscale which examines similarity between mothers’ and children’s meals was negatively associated with the EDE-Q eating concern, weight concern, and shape concern subscales and with the EDE-Q global score.

In order to test the hypothesis that observed maternal modelling would be related to children’s eating behaviours reported by mothers, a series of correlations were run (see Table 8.3).
### Table 8.3: One tailed Spearman’s rho correlations (unless otherwise stated) between observed maternal modelling and scores on the CEBQ (N = 17).

<table>
<thead>
<tr>
<th>Observed Maternal Modelling (PARM-O)</th>
<th>CEBQ</th>
<th>Verbal Modelling</th>
<th>Behavioural Modelling</th>
<th>Similarities in meals</th>
<th>Unintentional modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Responsiveness</td>
<td></td>
<td>-.533*</td>
<td>-.060</td>
<td>-.144</td>
<td>-.128</td>
</tr>
<tr>
<td>Food Enjoyment</td>
<td></td>
<td>.107</td>
<td>.526*</td>
<td>.548*</td>
<td>.126</td>
</tr>
<tr>
<td>Satiety Responsiveness</td>
<td></td>
<td>.093</td>
<td>.079</td>
<td>-.199</td>
<td>-.378</td>
</tr>
<tr>
<td>Food Fussiness</td>
<td></td>
<td>-.110</td>
<td>-.320</td>
<td>-.449*</td>
<td>-.403*</td>
</tr>
<tr>
<td>Slow Eating</td>
<td></td>
<td>.130</td>
<td>.101</td>
<td>-.077</td>
<td>-.155</td>
</tr>
<tr>
<td>Emotional Over-Eating</td>
<td></td>
<td>-.485*</td>
<td>-.529*</td>
<td>-.079</td>
<td>-.388</td>
</tr>
<tr>
<td>Emotional Under-Eating</td>
<td></td>
<td>.225</td>
<td>.280</td>
<td>-.132</td>
<td>-.036</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01; ***p<.001

^ Partial correlations controlling for maternal age; » Partial correlations controlling for maternal post 16 education.

Observed maternal verbal modelling was found to be significantly, negatively associated with the CEBQ subscales of food responsiveness and emotional over-eating. Observed maternal behavioural modelling was found to be significantly negatively correlated to emotional over-eating and significantly positively related to food enjoyment but was not significantly correlated to any of the other CEBQ subscales included in this study. Greater similarity between mothers’ and children’s meals was positively associated with the CEBQ food enjoyment subscale and negatively associated with the food fussiness subscale. Unintentional modelling was negatively associated with the CEBQ subscale food fussiness. No other significant correlations were found with unintentional maternal modelling.

### 8.4. Discussion

The aim of this study was to explore the relationships between observed maternal modelling of eating behaviours with parent and child factors which have been previously related to
maternal reports of modelling (symptoms of maternal mental health and children’s eating behaviours) in preliminary studies (Chapters 4 & 6). Overall, the findings partially support the hypotheses of this study.

Firstly, as previously found (Chapter 4), the results indicate a relationship between maternal eating psychopathology and maternal modelling. However, the negative relationship found with self-reported unintentional modelling (see Chapter 4) was not replicated with observed scores of this behaviour. This may be due to the small sample size used in this study, as the correlation coefficients for weight and shape concern were larger than those in Chapter 4, but the sample size in this study is considerable smaller, which will have affected power to detect significant relationships. Instead the findings suggest that mothers with higher levels of eating psychopathology are less likely to eat similar meals to their children. The importance of parents eating foods in front of their children to increase consumption and willingness to try new foods is clear (Addessi et al., 2005). This variation in meals could be due to these mothers engaging in dieting behaviours, which could also mean they may be modelling their dieting behaviours and food choices to their children. This could be detrimental as the potential for the transmission of dieting behaviours from parent to child has been previously documented (e.g., Pike & Roden, 1992). Alternatively, the finding could suggest that mothers with higher levels of eating psychopathology, while not eating the same meal as their child, may be trying to positively influence their children’s diets by intentionally providing meals which are different to their own. So, while the relationship with modelling is different in this study to previous findings, it is no less interesting and highlights another potential influence of maternal eating disorder symptoms on the development of children’s eating behaviours.
In contrast, the findings did not support the hypothesised relationships between depression or anxiety with any form of observed maternal modelling, however the relationships between maternal depression and observed maternal modelling, while not significant, were in the same direction as those reported in Chapter 4. The lack of any significant relationships with these factors may, again, be due to the limited sample size, which may have reduced this study’s ability to detect significant relationships, or to the low levels of anxiety and depression symptoms present in this sample. Indeed, it is noteworthy that the average HADS scores in this sample were in the ‘normal’ level but average scores for the sample reported on in Chapter 4 suggested ‘mild’ levels of anxiety and depression symptoms (Zigmond & Snaith, 1983), which could be a factor in the different findings of these two studies. The general measure of anxiety used, rather than a measure aimed specifically at mealtime anxiety, may also have contributed to these findings, as previously referred to in Chapter 4.

It was hypothesised that observed maternal modelling would be related to children’s eating behaviours, especially food fussiness. As with previous research (Chapter 6; Gregory et al., 2010), higher levels of food enjoyment were significantly related to maternal modelling and, in particular, behavioural modelling. While food fussiness was not found to be related to behavioural modelling, lower levels of food fussiness and higher levels of food enjoyment were both associated with mothers who reported eating more similar meals to their child, which is a subcomponent of behavioural modelling. Greater food fussiness was also related to lower levels of unintentional modelling. These findings suggest that parental modelling in general may be important in helping to reduce fussiness in children and that maternal modelling may also be associated with children’s increased food enjoyment. Alternatively, the characteristics of the child may alter the level of parental modelling; for example, children who display high levels of food enjoyment may be more responsive to parental
modelling while mothers of children who are less fussy may be more likely to prepare similar meals, thereby increasing the opportunities for modelling. Interestingly, mothers who displayed higher levels of verbal modelling also reported that their children were less responsive to food and were less likely to over-eat in response to emotional cues; these relationships are both likely to be important in the development of adaptive children’s eating behaviours and the prevention of overweight (e.g., Blissett, Haycraft & Farrow, 2010; Oliver, Wardle & Gibson, 2000). However, it must be remembered that while verbal modelling was observed, the eating behaviours of the children within this sample were reported by mothers.

The significant relationships found within this study between observed maternal modelling with eating psychopathology and children’s eating behaviours adds further support to previous findings reported on in this thesis (Chapter 4 & 6) and further expands our knowledge on maternal modelling. Strengths of this study include the use of observations of maternal modelling of eating behaviours and the fact that families were recorded on three separate occasions. However, this study did have a number of limitations. The study was exploratory and observational, resulting in a fairly small sample size, which is likely to have affected the findings of the study by under-powering it to detect significant associations and further research would benefit from a larger sample. In addition, as previously mentioned, while observations are more objective than self-reports, the difficulty of assessing maternal modelling via mealtime observations, particularly given the inclusion of unintentional modelling, was not without its challenges. Furthermore, the PARM-O is newly developed and requires further validation and testing. The study also used self-report measures to explore both parental and child factors; some of the limitations of which have been mentioned previously, for example, the use of a general anxiety measure (Chapter 4).
In conclusion, while it is acknowledged that these findings are preliminary and require replication, this study provides evidence which suggests that independent observations of maternal modelling of eating behaviours are related to a variety of self-reported parent and child factors. Behavioural modelling, especially in the form of shared meal similarity between mothers and their children, seems to be an important factor, given its relationship with maternal eating disorder symptoms and children’s eating behaviours. These relationships warrant further research but potentially suggest the positive influence of mothers sharing similar foods at mealtime with their children. Further research with larger samples is needed to replicate and expand on this study’s findings.
Title of Study 7: Relationships between observed maternal modelling and observed maternal feeding practices.

Evidence suggests that the use of certain parental feeding strategies by parents may co-occur. This may be due to parents employing a variety of feeding strategies which are similar in their levels of control (e.g., using pressure for their child to eat vegetables and restricting intake of high fat foods). Alternatively, factors such as their child’s weight levels may determine the feeding practices used (e.g., parents concerned about their child’s weight may use a variety of practices in an attempt to alter their child’s weights status). Previous, preliminary research has suggested relationships between parental modelling of eating behaviours and other adaptive, non directive feeding practices employed by parents. Study 7 expanded on this past research and aimed to explore the associations between observed maternal modelling with observations of other parental feeding practices during family mealtimes.
CHAPTER 9

Relationships between observed maternal modelling and observed maternal feeding practices

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Running head: Relationships between observed maternal feeding practices
Abstract

Objective: This study aimed to explore the relationships between observed maternal modelling and observations of other maternal feeding practices during typical family mealtimes. Method: Seventeen families of children aged between 2 and 6 years were observed across a series of three independent mealtimes. Maternal modelling was coded using a coding system which was developed based on the facets of modelling measured by the Parental Modelling of Eating Behaviours scale; a parental self-report measure. Results: Findings suggest that maternal modelling was positively associated with observed encouragement to eat and observations of maternal discussion about foods and nutrition. Maternal modelling was also found to be negatively related to the more directive controlling feeding practice of restriction. Conclusion: These findings suggest that the use of overt forms of parental modelling in mothers is likely to coincide with other, more adaptive feeding practices. The results also suggest that mothers who display higher levels of modelling behaviours are less likely to employ more direct form of controlling feeding practices, such as restriction.

Keywords: Mother; Child; Modelling; Parental feeding strategies; Family Mealtime observations; Restriction; Encouragement.
9.1. Introduction

Despite a paucity of research, parental modelling is generally thought to be an adaptive feeding practice, given the established relationships between modelling and children’s healthy food intake and less fussy eating behaviours (e.g., Brown & Ogden, 2004; Chapters 3, 6 & 8; Gregory, Paxton & Brovoic, 2010b; Palfreyman, Haycraft & Meyer, 2012). Parents’ use of other, more controlling feeding strategies have often been found to co-occur, with parents who employ restriction being found to be more likely to employ other, less adaptive feeding practices such as pressure to eat (Gregory, Paxton & Brovoic, 2010a). However, research has not fully examined the potential relationships between modelling of eating behaviours and parents’ use of other feeding practices.

Research into parental use of controlling child feeding practices has suggested that parents may use more than one of these practices when feeding their children. For example, Gregory et al. (2010a) found that parents who reported using more restriction of foods also reported greater pressure to eat. Musher-Eizenman and Holub (2007), using a self-report measure where the modelling subscale comprised just four items, examined the relationships between modelling and a variety of other feeding practices. They found positive associations between modelling and healthy feeding practices, such as providing a healthy food environment, monitoring children’s food intake, involving children in mealtimes, and teaching children about nutrition. Moreover, Musher-Eizenman and Holub found that modelling was not significantly related to any of the controlling feeding practices, such as restriction or pressure to eat, included in their study. These findings suggest that parents who model healthy eating behaviours may also use other, healthy feeding practices and be less likely to use controlling feeding strategies. This suggestion is further supported by research which has found strong, positive links between parental reports of encouragement for children to eat, a less controlling
form of the ‘pressure to eat’ feeding practice, and parental modelling (e.g., Baumrind, 1971; Hubbs-Tait, Kennedy, Page, Topham & Harrist, 2008; Young et al., 2004). However, the research to date is limited by the use of brief measures of modelling (e.g., Cullen et al., 2001; Gregory et al., 2010b; Hubbs-Tait et al., 2008; Musher-Eizenman & Holub, 2007) and the reliance on self-reports (e.g., Cullen et al., 2001; Gregory et al., 2010a; Hubbs-Tait et al., 2008; Musher-Eizenman & Holub, 2007).

Observational studies which have explored feeding practices have often concentrated on the more controlling and overt forms of feeding, such as restriction of foods and pressure to eat (e.g., Blissett & Haycraft, 2011; Orrell-Valente et al., 2007; Moens et al., 2007). Parents’ self-reports have been found to be accurate sources of information (e.g., Byers et al., 1993; Whelan & Cooper, 2000). However, some observational studies have found variation between reported and observed behaviours, especially controlling feeding practices, where parents’ observed feeding practices have not always been found to concur with their reported behaviours (e.g., Haycraft & Blissett, 2008; Lewis & Worobey, 2011; Sacco et al., 2007). Given these discrepancies between self-reported and observed feeding practices, it would seem logical to observe both maternal modelling and their use of other feeding practices, to see if a consistent measurement approach removes any inconsistencies brought about by combining observations and self-reports and yields significant relationships.

In summary, little observational research has explored maternal modelling of eating behaviours and preliminary research has suggested a need for further research to explore the potential links between modelling and other forms of parental feeding strategies. The aim of this study was to explore the relationships between observed maternal modelling and other parental feeding practices used by mothers. In keeping with the findings of Musher-
Eizenman and Holub (2007), it was hypothesised that observed maternal modelling will be positively associated with observations of other forms of adaptive feeding strategies (e.g., teaching about nutrition, providing a healthy food environment).

9.2. Method

9.2.1. Participants

Participants were 17 mother-child pairs. Full details are described in Chapter 7.

9.2.2. Measures and Procedure

Recruitment of the sample, and the procedures followed for this study, have been described previously (see Chapter 7 and Appendices T, U & V).

9.2.2.1. Mealtime observations

Details of the mealtime observations are presented in Chapter 7. As in Chapters 7 and 8, an average from the three observations was calculated for all of the subscales included in this chapter. This was done to provide a more detailed and accurate account of mothers’ mealtime feeding behaviours. Inter-rater reliability for all of the observed variables reported on in this chapter is summarised in Chapter 7 (see also Appendix X).

9.2.2.2. Parental Modelling of Eating Behaviours Observational Coding Scheme

(Maternal Modelling of Eating Behaviours Observational Coding Scheme (PARM-O; Palfreyman, Haycraft & Meyer, in preparation; Appendix S).)

Maternal modelling of eating behaviours was coded using a scale developed from the three subscales of the Parental Modelling of Eating Behaviours Scale (PARM). Definitions of the
four subscales of the PARM-O (Verbal modelling, Behavioural modelling, Similarities in meals, and Experimenter assessed unintentional modelling) are provided briefly in Chapters 7 and 8, and in more detail in Chapter 2 and Appendix S. Average scores were calculated for each PARM-O subscale from all three observations and are used in the analyses. Higher scores on the four subscales mean mothers have been observed to display more instances of the three forms of modelling recorded by the PARM-O and greater similarity in mother-child meals.

9.2.2.3. **Other parental feeding strategies**

Two further observed variables were specifically created for this study to explore: (1) discussion about food and nutrition; and, (2) encouragement to eat. Observations of parents’ controlling feeding practices were coded using the previously developed Family Mealtime Coding System (see below). Brief descriptions of these subscales are provided below. For further details see Chapter 2 and Appendix U.

9.2.2.3.1. **Discussion about food and nutrition (Appendix T)**

All instances of maternal discussion about foods with the target child during the observed mealtime were coded for. The creation of this subscale was based on the subscales of *Encourage balance and variety* and *Teaching about nutrition* from the Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007; see 2.7.2). Examples of behaviours coded within this variable are: “there are peppers and tomatoes in this”; “this is a treat so we only have it every now and again”; and “we need iron from our broccoli to make us strong and healthy”. Every time the mother was observed to verbally display food- or nutrition-related beliefs and attitudes, the behaviours were logged and tallied.
The behaviours captured by this variable were distinct from verbal modelling as they are not stated likes or dislikes, and do not refer to the mother’s eating behaviours, but aim to teach the child about, and expand the child’s knowledge of, foods/nutrition. Scores were totalled for each mealtime observation and then an average score was calculated from the three observations.

9.2.2.3.2. **Encouragement to eat (Appendix U)**

Maternal encouragement for the target child to eat was also coded for. Encouragement was split into verbal (e.g., “Oh well done, can you do it again?”) and physical (e.g., mother smiled or clapped when the target child completed an eating related behaviour the mother viewed as positive). Both forms of encouragement were coded for by tallying the number of instances that the mother was observed to display the behaviour. For this chapter’s analysis, the verbal and physical encouragement variables were collapsed into one factor and a total encouragement score (sum) was created for each mealtime. An average score, based on the three observations, was then calculated and used in this chapter’s analysis.

9.2.2.3.3. **Family Mealtime Coding System (FMCS; Haycraft, 2007; Haycraft & Blissett, 2008; Appendix V)**

The FMCS observational coding scheme was developed in order to assess more controlling forms of parental feeding practices. The FMCS can be used with all children present at the mealtime but, for the purpose of this study, only the target child was of interest. Six of the FMCS subscales are included in this chapter: (a) pressure for target child to eat; (b) physical prompts for target child to eat; (c) verbal restriction of target child’s food consumption; (d) physical restriction of target child’s food consumption; (e) use of incentives/rewards for
eating; and, (f) maternal vocalisations to the child (positive, neutral or negative). Brief operational definitions for these six subscales are provided below and further details can be found in Chapter 2 & Appendix V. A total frequency score is created for each subscale.

\textit{a) Pressure from mother for target child to eat.} \\
This subscale assesses parental use of \textit{verbal} pressure or coercion for the child to consume more food, such as: “\textit{eat a little bit more}”, “\textit{just have one more bite}”, or “\textit{eat three more mouthfuls}”. It includes gentle use of coercion, such as “\textit{just eat your beans}”, but does not include encouraging comments, such as “\textit{well done, why don’t you try some more}?”.

\textit{b) Physical prompt from mother for target child to eat.} \\
Parents’ use of \textit{physical} behaviours to try and get their child to eat is assessed by this subscale. For example, placing food on the spoon/fork and offering it to the child, or serving a second portion without asking the child first.

\textit{c) Verbal and physical restriction of target child’s food intake by mother.} \\
These subscales consider how often parents limit children’s consumption of foods, for example, by not letting them have any more of a certain food or by restricting the amount of a food that the child is allowed to eat. For this study, restriction is broken down into two separate variables: verbal restriction (for example, “\textit{you can’t have any more}”), and physical restriction (such as moving the garlic bread out of the child’s reach).
d) *Use of incentives/conditions by mother with target child.*

This subscale measures the use of verbal incentives or bargaining by the parent in an attempt to increase children’s food consumption. For example, “*eat this and then you can play outside*”.


e) *Maternal vocalisations*

Based on the tone and content of the speech all maternal comments directed at the target child during the mealtime were coded into one of three groups: Positive; Neutral; or Negative. All comments not previously coded under one of the above subscales were coded. Example vocalisations included: (i) food-related general comments (e.g., “*do you want a yoghurt or some fruit?*”); (ii) comments about school (e.g., “*how was your maths test today?*”); and (iii) comments about mealtime behaviours (e.g., “*please wait until your sister has finished eating before you leave the table*”). Scores for each group were summed to create total scores for each type of maternal vocalisation.

### 9.2.3. Data analysis

A series of Kolmogorov-Smirnov tests confirmed that the data were non-normally distributed and so non-parametric statistics were used, when possible, to test the study’s hypotheses. Preliminary two-tailed Spearman’s rho correlations were conducted between all of the observed subscales (PARM-O, encouragement, discussion, and FMCS) with maternal age, child age, maternal BMI, child BMI z scores (BMI/BMI z calculated from researcher measurements, see Chapter 7) and number of years of maternal education after the age of 16. Maternal age and child BMI were not significantly related to any of the observed variables considered in this study. Maternal BMI was significantly, positively correlated with observed pressure (r = .64, p = 0.006), incentives (r = .61, p = 0.009) and neutral comments (r = .64, p
In addition, child age was significantly, negatively correlated with physical prompts ($r = -.58$, $p = 0.015$), physical restriction ($r = -.64$, $p = 0.006$), encouragement ($r = -.64$, $p = 0.006$) and positive comments ($r = -.53$, $p = 0.006$). Maternal education was found to be significantly positively correlated with behavioural modelling ($r = .585$, $p = 0.014$) and neutral comments ($r = .585$, $p = 0.014$). Therefore, to test the hypothesis that observed maternal modelling would be significantly, positively related to other adaptive feeding strategies, a series of one-tailed Spearman’s rho correlations were used to examine the relationships between observed verbal, behavioural and unintentional modelling and other feeding strategies. When required, partial correlations (due to a non-parametric test being unavailable) were used in order to control for the confounding variables described above. Given the modest sample size and the exploratory nature of this study, significance was set at $p < 0.05$.

9.3. Results

9.3.1. Descriptive statistics of sample

Information (means, standard deviations) is presented in Table 9.1 (below) for all of the observed maternal feeding practice subscales considered within this chapter.
Table 9.1: Descriptive statistics for observed maternal feeding practices (N = 17).

<table>
<thead>
<tr>
<th></th>
<th>Mean (Median)</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observed Maternal Modelling (PARM-O)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>9.98 (9.67)</td>
<td>(5.79)</td>
</tr>
<tr>
<td>Behavioural modelling</td>
<td>3.28 (2.33)</td>
<td>(0.80)</td>
</tr>
<tr>
<td>Similarities in meals</td>
<td>2.08 (1.67)</td>
<td>(1.85)</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>0.86 (0.67)</td>
<td>(0.81)</td>
</tr>
<tr>
<td>Knowledge about food and nutrition</td>
<td>5.82 (5.00)</td>
<td>(4.40)</td>
</tr>
<tr>
<td>Encouragement to eat</td>
<td>3.51 (3.00)</td>
<td>(3.25)</td>
</tr>
<tr>
<td><strong>Family Mealtime Coding System (FMCS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal pressure</td>
<td>5.98 (5.67)</td>
<td>(3.90)</td>
</tr>
<tr>
<td>Maternal physical prompt</td>
<td>5.77 (2.34)</td>
<td>(9.17)</td>
</tr>
<tr>
<td>Maternal verbal restriction</td>
<td>1.02 (0.67)</td>
<td>(1.04)</td>
</tr>
<tr>
<td>Maternal physical restriction</td>
<td>0.47 (0.00)</td>
<td>(0.88)</td>
</tr>
<tr>
<td>Maternal use of incentive/conditions</td>
<td>1.26 (0.67)</td>
<td>(1.84)</td>
</tr>
<tr>
<td>General positive comments</td>
<td>8.82 (7.67)</td>
<td>(8.31)</td>
</tr>
<tr>
<td>General neutral comments</td>
<td>34.57 (31.67)</td>
<td>(18.68)</td>
</tr>
<tr>
<td>General negative comments</td>
<td>12.00 (11.00)</td>
<td>(6.15)</td>
</tr>
</tbody>
</table>

Within this sample, the most common form of modelling that mothers were observed to use was verbal modelling. There were low instances of unintentional modelling observed. This trend is similar to self-reported counts of these modelling behaviours (Palfreyman et al., 2012; Chapter 3). Also, as with previous research (e.g., Haycraft & Blissett, 2008a), observed instances of restriction were low during the mealtime observations whereas pressure
and prompting were used more often. Finally, the majority of comments made by mothers during the mealtimes were neutral.

In addition, Spearman’s rho correlations were conducted to assess the reliability of maternal reports of height and weight, given that participants had self-reported these data and had also had them measured by the researcher. Significant positive correlations were found between maternal reports and independent assessment of their height (r = .97, p < 0.001), weight (r = .96, p < 0.001) and BMI (r = .80, p < 0.001), and also between maternal reports and researcher measurements of children’s height (r = .95, p < 0.001), weight (r = .75, p < 0.001), and BMI z scores (r = .64, p = 0.004).

In order to test the hypothesis that observed maternal modelling would be related to observed maternal feeding practices, a series of correlations were run (see Table 9.2).
Table 9.2: One-tailed Spearman’s (unless otherwise stated) correlations between observed modelling (PARM-O) with other observed feeding practices (N = 17).

<table>
<thead>
<tr>
<th></th>
<th>Verbal modelling</th>
<th>Behavioural modelling</th>
<th>Similarities in meals</th>
<th>Unintentional modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion about food and nutrition</td>
<td>.426*</td>
<td>.293</td>
<td>.426*</td>
<td>-.177</td>
</tr>
<tr>
<td>Encouragement to eat</td>
<td>.665**</td>
<td>.609**</td>
<td>-.485*</td>
<td>-.366</td>
</tr>
<tr>
<td><strong>FMCS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal pressure †</td>
<td>.318</td>
<td>.203</td>
<td>.404</td>
<td>-.041</td>
</tr>
<tr>
<td>Maternal physical prompt ^</td>
<td>.178</td>
<td>-.050</td>
<td>-.528*</td>
<td>-.344</td>
</tr>
<tr>
<td>Maternal verbal restriction</td>
<td>.149</td>
<td>.143</td>
<td>-.212</td>
<td>-.323</td>
</tr>
<tr>
<td>Maternal physical restriction ^</td>
<td>.030</td>
<td>.050</td>
<td>-.580**</td>
<td>-.636**</td>
</tr>
<tr>
<td>Maternal use of incentives/conditions †</td>
<td>.167</td>
<td>.203</td>
<td>.504*</td>
<td>-.053</td>
</tr>
<tr>
<td>Positive comments ^</td>
<td>.490*</td>
<td>.414</td>
<td>-.232</td>
<td>-.079</td>
</tr>
<tr>
<td>Neutral comments †</td>
<td>.556*</td>
<td>.333*</td>
<td>.194</td>
<td>-.258</td>
</tr>
<tr>
<td>Negative comments</td>
<td>.195</td>
<td>.000</td>
<td>.182</td>
<td>-.322</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01; ***p<.001
^ Partial correlations controlling for maternal BMI; † Partial correlations controlling for child age: » Partial correlations controlling for maternal education post 16.

**Verbal modelling**

PARM-O verbal modelling scores were found to be significantly and positively correlated to observed maternal encouragement, discussion about food and nutrition, and to positive and neutral maternal comments. No other significant relationships were present between PARM-O verbal modelling and any other observed feeding practices.

**Behavioural modelling and similarities in meals**

PARM-O behavioural modelling scores were found to be significantly, positively related to observed maternal encouragement and neutral maternal comments. Similarity in parent-child meals (a subcomponent of behavioural modelling) was significantly, negatively related to
observed maternal encouragement, maternal physical prompts and maternal physical restriction. There was also a significant, positive relationship between similarity in parent-child meals with observed maternal use of incentives and discussion about food and nutrition. No other significant relationships were present.

*Unintentional Modelling*

Observed unintentional modelling was found to be significantly, negatively related to observed maternal restriction. No other significant relationships were found between any other observed feeding strategies and observed unintentional modelling.

### 9.4. Discussion

The main aim of this study was to explore the relationships between observed maternal modelling and other observed feeding strategies. Findings partially support the initial hypothesis, which predicted that maternal modelling would be positively related to other forms of more adaptive feeding strategies.

Mothers who were observed to verbally and behaviourally model more to their children were also found to engage in higher levels of encouragement to eat. Thus, these findings suggest that mothers who are observed to engage in more modelling also use more encouragement for their child to eat, which supports previous, preliminary work looking at modelling (e.g., Hubbs-Tait et al., 2008; Young et al., 2004). Encouragement to eat can be verbal (e.g., “it would be really good if you just tried a mouthful”) and Baumrind, (1971) suggested when the child mimics a behaviour, a parent is likely to verbally encourage and support the child’s action with the aim of helping the behaviour to become habitual. These findings further support the suggestion that parents who employ modelling may also use encouragement to
increase the likelihood that behaviours will be adopted by their children. However, this relationship between modelling and encouragement to eat also raises another interesting issue. Specifically, encouragement and pressure are often difficult to define and the distinction between what is pressure for a child to eat and what constitutes encouragement is often unclear. While the subscales of pressure and encouragement to eat in this study were clearly delineated, there were positive, albeit non-significant relationships found between both verbal and behavioural modelling with maternal pressure and, in relation to verbal modelling in particular, these findings could suggest that this form of modelling may become a pressuring strategy if over used. This has potential implications for the development of children’s healthy relationships with food, given the relationships between the use of pressure and lower liking of foods (Batesell, Brown, Ansfield & Paschall, 2002; Galloway, Fiorito, Francis & Birch, 2006) and lower weight levels (Galloway et al., 2006). Further research into this is recommended.

Mothers who were observed to use higher levels of verbal modelling were also observed to demonstrate higher levels of general communication with their children in both positive and neutral tones, which is a logical association. Verbal modelling requires mothers to speak to their children and it seems that mothers who engage in more verbal modelling also talk more generally to their children during mealtimes and that the tone of this speech tends to be positive or neutral, rather than negative. It is likely that verbal modelling spoken in a positive or neutral tone may be more successful than modelling using a harsher, negative tone but further research which examines the tone of verbally modelled behaviours is required to test this.
The above relationship, which suggests that mothers who were observed to verbal model more frequently with their children also tend to talk more generally to their children, is supported and expanded by the significant relationship that was present between verbal modelling and maternal discussion about food and nutrition. As with modelling, it is likely that a positive or neutral tone would be beneficial for this discussion-based feeding strategy to be effective at promoting healthy child eating behaviours but further research into this construct is required. In addition, mothers who were observed to frequently discuss foods or nutrition with their child also reported higher levels of behavioural modelling, especially similarities in parent-child meals. The consumption by children of similar meals to their mothers rather than the preparation of separate meals could suggest this strategy may be influential in reducing food fussiness and increasing food acceptance. However, these findings are based on a small sample and so further research is required to explore this feeding strategy further and to look at its relationship with children’s eating behaviours.

Some other interesting relationships were found for mothers who ate similar meals to their children. Specifically, mothers who ate a more similar (or the same) meal as their child used less encouragement for their child to eat, lower levels of physical prompts and physical restriction, but greater incentives or conditions for eating. These findings suggest that, where children’s meals are similar to their parents, there is less need for mothers to encourage or prompt children’s food intake or to exhibit physical feeding practices. This could suggest that these children are less fussy and so the mother doesn’t need to use feeding strategies to encourage their child to eat. However, these findings also indicate that mothers may use more incentives or bargaining as a way to get their child to perhaps eat more than he/she wishes or to try to get their child to finish all of their meal. This study coded for the similarity of parent-child meals but did not assess how much of the meal a child consumed or
left. Leaving lots of food may result in mothers employing strategies in an attempt to get their child to eat more or clear their plate, and the mothers in this study may choose to use incentives. These relationships are interesting and, while only preliminary, they could suggest that mothers who eat similar meals to their child are less likely to use controlling strategies but are more likely to use incentives, which have been shown to have negative outcomes in relation to food intake and preferences (e.g., Faith et al., 2004; Vereecken, Keukier & Maes, 2004). Further research into this potentially important area is required.

Maternal unintentional modelling of eating behaviours was found to be negatively associated with physical restriction of foods. This could suggest that mothers who have children who regularly copy their behaviours do not feel the need to regulate and restrict their intake during mealtimes. However, the fact that this relationship was found for unintentional modelling, but not for verbal or behavioural modelling, is intriguing and requires further investigation.

It is interesting to note that, in line with Musher-Eizenman and Holub’s (2007) findings, maternal modelling was not found to be associated with the use of pressure to eat or verbal restriction. These preliminary findings could suggest that the co-occurrence of modelling with more controlling feeding strategies is unlikely. Maternal modelling was also not found to be significantly related to maternal negative comments made during the mealtime. The frequency of negative comments in comparison to neutral and positive comments was lower (see section 9.2.) but this lack of a significant relationship between modelling and negative vocalisations is more likely to do with negative tones being unsuited to modelling.

This observational study has extended the previous self-report literature by examining the relationships between maternal modelling and a variety of other child feeding practices. Its strengths included the use of an observational methodology and the multiple assessments of
family mealtimes. However, there were some limitations. As noted previously, the study’s sample size is small, meaning it is under-powered to detect significant associations. Indeed, there were several other relationships which were in the expected direction, displayed reasonable correlation coefficients (>.3) and were nearing significance (e.g., between pressure to eat and modelling subscales), but which did not attain significance in this study, suggesting that replication with a larger sample would be a logical next step. In addition, as previously mentioned, coding of some of the maternal modelling behaviours proved to be difficult (see Chapter 7) and the PARM-O is a new measure which requires further validation and testing. Finally, two new subscales were created for this exploratory study (discussion about food/nutrition and encouragement to eat) and validation of these is required.

As a subsidiary aim, the study explored the relationship between maternal self-reports of their child’s and their own height and weight with objective measurements. Previous research into this is mixed, with some studies suggesting that mothers can provide accurate data (e.g., Haycraft & Blissett, 2008) and other research suggesting that mothers may underestimate their child’s weight (e.g., Dubois & Girad, 2006). The current study found that maternal self-report data and exact measurements of height and weight were significantly and positively correlated, therefore supporting the validity of self-report data and the findings of Haycraft and Blissett (2008a). However, research by Keel, Heatherton, Harden and Hornig (1997) found that parents differed on their views of under- and overweight and may consider their child to be under- or overweight when they are not. Given that research has suggested parents’ perceptions of their child’s weight may influence or be related to their choice of feeding strategies (e.g., Pearson et al., 2009), this could suggest that parents’ perception of their child’s weight status (rather than the child’s actual weight) needs to be considered in
future research into parents’ feeding practices, rather than looking at self-reported or actual child weights.

In conclusion, this study has demonstrated relationships between observations of maternal modelling with maternal use of encouragement, mealtime vocalisations and lower use of controlling feeding practices during the mealtime. Furthermore, more controlling feeding practices were either negatively related or not significantly related to maternal modelling. This study builds on the existing literature by examining the relationships between maternal modelling with other mealtime practices, using observations of family mealtimes. Although preliminary, these findings suggest that mothers who use modelling as a feeding practice may also use other, non directive feeding practices. Such findings may be beneficial for future parent-based interventions, which could encourage parents to use more role modelling, encouragement and discussion about foods rather than pressure or restriction. However, further research into the relationships between these feeding practices and children’s food intake and eating behaviours is required, to assess whether the use of such adaptive feeding practices is actually related to healthy eating and weight outcomes in children.
CHAPTER 10
GENERAL DISCUSSION

10.1. Introduction to the general discussion

This chapter provides an overview of the findings from this thesis. The initial aims of this scheme of work will be re-stated, followed by a summary and discussion of the key findings. Suggestions will be made for future work, and the strengths and limitations of the research reported on within the thesis will be briefly summarised.

10.2. Aims of the thesis

This thesis aimed to expand on the limited research which had been conducted into parental modelling of eating behaviours to date, and had four specific aims. The first aim of this thesis was to develop a self-report measure (the Parental Modelling of Eating Behaviours Scale; PARM) to enable parental modelling of eating behaviours to be assessed in more detail. The second aim was to examine which of a variety of parent and child factors were associated with parental modelling of eating behaviours. Specifically, these factors were: child and maternal food intake; maternal mental health; general parenting styles; and, children’s eating behaviours. The third aim of this thesis was to provide further validation for the PARM by comparing maternal self-reports of modelling with observed maternal modelling (using the PARM-O, an observational coding scheme based on the PARM). The fourth and final aim was to examine the relationships between observations of maternal modelling with: a) self-reported maternal mental health and children’s eating behaviours; b) observed maternal feeding practices.
10.3. Pathways of significant relationships

The significant relationships found within the studies reported on in this thesis are summarised in Figure 10.1, below, and will be discussed in section 10.4.
Parental Modelling of Eating Behaviours

- Healthy food intake
- Parent and child food intake
- Children’s eating behaviours
- Parenting styles
  - Authoritarian
  - Authoritative
  - Permissive
- Parental feeding strategies
- Parental Education
- Parental mental health
- Maternal, Paternal and Child BMI
- Adaptive
- Maladaptive
- Eating Psychopathology
  - Depression
  - Anxiety
- Parental education positively associated with observed behavioural modelling.
- Maternal education positively associated with observed parental modelling.
- Self-reported maternal & child BMI not related to maternal modelling.
- Maternal depression negatively associated to maternal modelling.
- Parental modelling negatively related to food fussiness.
- Parental modelling positively related to food enjoyment in children.
- Same relationships found with maternal observational data.
- Parental feeding strategies
  - Directive
  - Non-direct
- Observed maternal modelling either not related or negatively related to directive controlling feeding strategies.
- Observed maternal modelling positively related to other non-directive feeding strategies.
- Parental modellers negatively related to food fussiness.
- Parental modellers positively related to food enjoyment in children.
- Same relationships found with parental observational data.

Maternal VM and BM positively related to reported maternal and child healthy food intake.
Maternal UM positively related to reported child and maternal savoury snack intake.
Maternal VM negatively related to an authoritative PS in mothers.
Paternal VM positively related to an authoritative PS
Maternal VM negatively associated with a permissive PS.

Figure 10.2: Model to show where significant associations were found between modelling of eating behaviours with the parent and child factors tested within this thesis.

Note: VM = verbal modelling; BM = Behavioural consequences of modelling; UM = Unintentional modelling; PS = Parenting style.
10.4. **Summary of chapter findings**

The need for a measure which had the capacity to explore modelling in more depth led to the development of the Parental Modelling of Eating Behaviours Scale (PARM), which allowed for aspects of modelling not previously explored, e.g., unintentional modelling, to be examined. Within this study, self-reported maternal modelling and its outcomes were found to be related to both healthy and unhealthy maternal and child food intake, maternal mental health, parenting styles and child eating behaviours. These findings suggest that modelling could potentially be a beneficial parenting style to encourage in parents. However, the negative relationships suggested within this thesis between modelling behaviours and both unhealthy food intake and maternal mental health highlights the importance of considering the specific behaviours being modelled by parents and this should also be included in advice provided for parents. In addition, while exploratory, mothers and fathers were not found to differ in their reported modelling behaviours, and paternal modelling was also found to be related to eating psychopathology, parenting styles and children’s eating behaviours. These findings suggest the relevance of including fathers in research exploring potential role models for children’s eating behaviours. To provide validation for the measure, maternal scores on the PARM were explored in relation to their observed modelling counterparts and, although preliminary, the findings provided partial validation for the PARM. Finally, observed maternal modelling was investigated with an exploratory sample of mothers. Observed modelling of eating behaviours and similarities in meals were found to be related to maternal eating psychopathology and children’s eating behaviours. These findings further strengthen those presented earlier in this thesis. In addition, observed maternal modelling was found to be related to other adaptive forms of observed maternal feeding practices, suggesting that mothers who employ modelling are more likely to use other adaptive feeding practices and be less likely to use more directive control in regulating their children’s diets.
Study 1 – Chapter 3; Development of the Parental Modelling of Eating Behaviours

Scale (PARM): Links with food intake among children and their mothers.

The significant gap in research exploring parental modelling of eating behaviours and their potential to influence the development of children’s eating behaviours, combined with the methodological inconsistencies of the preliminary studies which have begun to address this area, resulted in the need for an appropriate measure of parental modelling to be developed. Thus, the Parental Modelling of Eating Behaviours scale (PARM) was created in Chapter 3, which aimed to assess different facets of modelling, in order that the relationships found and suggested in previous research could be explored in more depth. The results of the Principal Components Analysis for the PARM suggested a three factor (subscale) model consisting of 15 items. These subscales reflect Verbal modelling (modelling through verbal communication with child), Behavioural consequences of modelling (perceived outcomes of parental modelling), and Unintentional modelling (parental perception of behaviours not intentionally modelled by them being adopted by their child). The initial findings found the PARM to have good concurrent and convergent validity, good internal consistency and no multicolinearity between the subscales (see Chapter 3). Therefore, although the PARM required further validation, it was deemed suitable for exploring the construct of parental modelling of eating behaviours further.

Food intake has probably received the most research attention to date in relation to parental modelling and so it was a logical initial factor to explore as a correlate of modelling, as assessed via the PARM. The findings suggested that maternal verbal modelling and parentally perceived outcomes of behavioural modelling were positively associated with both the child’s and mother’s healthy food intake. Specifically, mothers who reported modelling
more also reported that their children consumed more fruit, salad and vegetables, as well as reportedly consuming more fruit, vegetables and fruit juice themselves. These findings extend on previous research (e.g., Gregory et al., 2011) to suggest that mothers who are aware of the outcomes of certain modelling behaviours, or who model intentionally to promote certain food intake in their children, report that their children eat higher levels of healthier foods, such as fruits and vegetables. The fact that within this sample mothers who reported higher levels of verbal modelling and consequences of behavioural modelling also reported higher intake of healthy food items was anticipated, given that one important element of modelling is the parent eating the food in front of the child (Campbell, et al., 2007). This relationship supports the suggestion by Haire-Joshu and Nanney (2002) that modelling may help to improve parents’ diets, through their desire to provide positive healthy role models for their children. Furthermore, positive relationships were found between shared parent-child meals and modelling behaviours which supports the notion that modelling can only occur when children see their parent(s) eating (e.g., Campbell et al., 2007).

However, supporting other previous research (e.g., Brown & Ogden, 2004; Gibson et al., 1998) another relationship was also present between unhealthy eating behaviours and maternal unintentional modelling. Mothers who reported higher levels of unintentional modelling reported that they and their children consumed more savoury snacks, such as crisps. This highlights the importance of considering which specific behaviours are being modelled by the parent (for example, whether they are healthy or unhealthy) and also highlights that the potential for the outcomes of maternal modelling to be both positive and negative is likely to be related to this. These outcomes may be related to whether modelling is intentional or unintentional, and it is possible that parents will intentionally model healthy behaviours but unintentionally model unhealthy ones, such as eating unhealthy snacks.
To summarise, the findings of study 1 support and extend previous research (e.g., Gregory et al., 2011; Reinaerts et al., 2007; Tibbs et al., 2001; Young, Fors, Fasha & Hayes, 2004) by highlighting the possible role of maternal modelling in the development of young children’s diets. The finding that increased parental awareness of the consequences of their behavioural modelling is related to greater reported healthy food intake in children is especially significant as it suggests that an effective means for parents to positively influence the development of their children’s diets could be achieved through the use of modelling as a feeding strategy. Future dietary interventions aimed at children’s diets could benefit from targeting or including mothers’ modelling behaviours, specifically the modelling strategies which are intended to alter the child’s behaviour and the general eating behaviours of parents.

In addition, study 1 added to previous research (e.g., Brown & Ogden, 2004; Gibson et al., 1998) by linking unintentional modelling to the negative outcome of higher levels of less healthy food consumption in both children and their mothers. Future interventions should consider including advice for parents on the potential detrimental effects of modelling and the positive effect of improving their own eating behaviours on their child’s diets.

**Study 2 – Chapter 4: Unintentional role models: Links between maternal eating psychopathology and the modelling of eating behaviours.**

The relationship between symptoms of maternal mental health and parents’ use of controlling child feeding practices has been well established (e.g., Blissett et al., 2006; Blissett & Haycraft, 2011; Haycraft & Blissett, 2008a) but, prior to the work reported on in this thesis, parental mental health had not been explored in relation to parental modelling. The second study (Chapter 4) therefore explored the relationships between maternal mental health and modelling, as assessed by the newly developed PARM measure.
Mothers who reported higher levels of eating psychopathology, particularly greater concern about their own eating behaviours, also reported higher levels of awareness of their children imitating behaviours that they hadn’t intentionally modelled. There are a number of potential reasons that these mothers may have had an increased awareness of the outcomes of their food-related behaviours. For example, mothers with higher levels of eating psychopathology may be more aware of their children’s eating behaviours due to their own relationship with food or as a result of concerns that their children may adopt their less adaptive behaviours. Alternatively, the PARM may be assessing maternal beliefs and concerns about transmitting negative eating behaviours to their child, which has previously been found in mothers with eating disorders (e.g. Micali, Simonoff & Treasure, 2009; Reba-Harrelson et al., 2010). This finding is of further potential interest due to the relationship found in study 1 between less adaptive eating outcomes (unhealthy snack food intake) in children and maternal modelling. Given that these mothers in Chapter 4 may have more disordered eating behaviours, this relationship with unintentional modelling is potentially problematic as it highlights an avenue by which children of mothers with eating disorders may pick up less healthy eating behaviours that have been (unintentionally) modelled by their mothers. In addition, the eating behaviours during mealtimes of these mothers with greater levels of eating psychopathology may be more extreme and so may gain more attention from the child, which could increase the likelihood of children adopting these potentially less adaptive or healthy behaviours. This finding could have important implications for health professionals working with mothers with eating disorders.

In addition, the relationship between higher levels of maternal depression and lower reported levels of all forms of modelling was anticipated, based on previous research which suggested
that mothers with higher levels of depression may interact less with their children (e.g., Nicol-Harper et al., 2007; Paulson, Dauber & Leiferman, 2006), thus reducing the opportunity for modelling to occur. This prediction was supported as mothers with higher levels of depression symptoms reported lower levels of modelling. These findings from Chapter 4 suggest that the presence of depression in this sample may result in maternal withdrawal from feeding interactions, which may mean that these mothers cannot be a positive role model for their children in relation to eating. However, contrary to predictions, maternal anxiety was not found to be related to any of the forms of modelling explored by the PARM. This absence of any significant associations may be due to the use of a general anxiety scale, may indicate that anxiety is not related to maternal modelling, or may suggest that anxious mothers may be more likely to employ more controlling feeding practices rather than intentionally modelling eating behaviours. Further research exploring the above associations is required.

To summarise, study 2 provided partial support for previous research by suggesting that certain maternal mental health symptoms (i.e. eating and depression psychopathology) are related to parental modelling and its reported outcomes. The relationship between maternal eating psychopathology and unintentional modelling is potentially problematic, as these mothers may be unintentionally modelling less adaptive eating behaviours in front of their child. This could be of potential interest when considering providing advice for mothers with disordered eating patterns. However, the results also indicated that mothers with higher levels of eating psychopathology reported eating fewer meals with their child, which could potentially be a positive strategy employed by mothers who are concerned about transmitting their own maladaptive eating behaviours to their child. The relationship between lower levels of modelling and higher reported maternal depression is also interesting. Mothers with
symptoms of depression may fail to provide a positive role model for their children in relation to eating, which may mean children have to look else were for a role model (e.g., fathers, siblings, peers). While preliminary, study 2 adds further support for the suggested potential value of early interventions in the form of educational programmes and support for mothers with eating disorders (Reba-Harrelson et al., 2010).

**Study 3 – Chapter 5: Associations between parenting styles and maternal modelling of eating behaviours.**

Research has suggested that parents’ feeding practices may be reflective of their general styles of parenting (e.g., Blissett & Haycraft, 2008; Hubbs-Tait, et al., 2008; Hughes, Power, Fisher, Mueller & Nicklas, 2005). However, associations between general parenting styles and parental feeding practices have been contradictory and research looking at modelling and parenting styles has been limited (see section 5.1).

The results of study 3 (Chapter 5) support previous, preliminary research which has linked parental modelling to an authoritative parenting style (Hubbs-Tait et al., 2008). However, study 3 expands on this relationship by suggesting that mothers with an authoritative parenting style are more likely to verbally model their food choices and preferences and to perceive their behavioural modelling as influencing their child’s eating behaviours. This is of further interest in relation to the association found in study 1 (Chapter 3) between these more overt and intentional forms of modelling (verbal, behavioural consequences) and higher child and parent intake of healthy food items (e.g., Palfreyman, Haycraft & Meyer, 2012). However, contrary to the suggestion that different forms of modelling may be related to different general parenting styles (Cullen et al. 2001), this study did not find any significant
relationships between maternal modelling with either permissive or authoritarian general parenting styles.

In summary, study 3 strengthens and adds to previous research suggesting that more overt or intentional forms of modelling are employed by mothers with a generally adaptive (authoritative) parenting style. Authoritative parenting is typified by lower levels of control and greater warmth; behaviours which align with the non-directive nature of parental modelling. Furthermore, these findings suggest that modelling is not a feeding practice typically used by parents who consider their general parenting styles to be authoritarian or permissive. Future interventions may benefit from taking into consideration general parenting styles when designing healthy eating interventions for families.

**Study 4 – Chapter 6; Maternal and paternal modelling of eating behaviours in a non-clinical sample.**

In the feeding domain, fathers have not received the same research attention as mothers. This is due to mothers, in general, being the main food providers for their children within the home environment (e.g., Birch & Fisher, 2000; Blissett & Farrow 2007; Blissett, Meyer & Haycraft, 2006; May et al., 2007; Rhee et al., 2006). Studies which have included fathers have suggested that they can impact on their child’s weight, eating behaviours and food intake (e.g., Blissett et al., 2006; Haycraft & Blissett, 2008a, 2012; Johannsen, Johannsen & Specker, 2006) and that mothers and fathers may vary in their feeding practices (e.g., Blissett et al., 2006; Orrell-Valente et al., 2007). Study 4 aimed to explore modelling in fathers as well as mothers.
The results of study 4 indicate that mothers and fathers within this sample did not differ in their reported modelling behaviours and suggest that mothers and fathers may use similar levels of verbal and behavioural modelling with their children. This is contrary to research with other feeding practices, such as monitoring, where mothers and fathers have been found to differ (Blissett et al., 2006). In addition, mothers and fathers within this sample were not found to significantly differ in their general parenting styles, eating psychopathology or the reported eating behaviours of their children. However, this was a matched sample of mothers and fathers and future research to expand on these findings would benefit from exploring differences between co-habiting parents reporting on the same child in these factors (including modelling).

While greater maternal awareness of their unintentional modelling was related to increased levels of eating psychopathology, the specific pattern of relationships was different from previous findings in Chapter 4. In study 6, a positive relationship was found between unintentional modelling with maternal restraint and overall (global) eating disorder symptoms. In addition, awareness of the consequences of maternal behavioural modelling was related to restraint and global EDEQ scores. These findings, in conjunction with those from study 2, suggest that mothers with higher levels of eating psychopathology tend to be more aware of their children’s eating behaviours and may be more concerned about the fact that their children could potentially be adopting their behaviours. However, conversely, fathers who reported higher eating and weight concerns were less aware of their unintentional modelling behaviours and reported less behavioural modelling. This difference could be due to fathers being better able to avoid modelling when they are concerned with their own eating behaviours (e.g., by withdrawing from mealtimes and allowing mothers to continue as the main food providers) and so they might report lower awareness of their children adopting
their behaviours. These preliminary findings could suggest that parental eating psychopathology may have differing effects on maternal and paternal modelling outcomes. Future interventions and advice provided for parents with higher levels of eating psychopathology should take into account this relationship between modelling and parental eating psychopathology, and target advice differently for mothers or fathers.

In relation to parenting styles, there was a similar positive relationship between paternal verbal modelling and an authoritative parenting style, which supports the findings with a maternal sample in study 3 (Chapter 5). However, this study did not replicate the relationship found in study 3 with mothers. Instead, maternal verbal modelling was negatively related to a permissive parenting style in mothers. This relationship is logical considering that permissive parents tend to be less involved with their children (Baumrind, 1971; Darling & Steinberg, 1993), so the use of overt forms of modelling would be less likely by these parents. This relationship does not contradict the earlier findings from study 3, but it may suggest a further relationship between lower levels of modelling and a more permissive parenting style. A potential reason that this relationship was not present in study 3 may be due to the slightly higher levels of permissive parenting styles reported in this sub-sample (study 6) compared to the larger sample used in study 3. Further research may benefit from the inclusion of a measure which breaks down the different sub-dimensions of a permissive parenting style (i.e. neglectful and indulgent behaviours) to identify any differences in the associations between these distinct elements of permissive parenting and parental modelling.

Study 4 also included parental reports of their children’s eating behaviours. Mothers and fathers in this sample who reported higher awareness of the consequences of their behavioural modelling also reported lower levels of food fussiness in their children. In
addition to this relationship, both maternal behavioural modelling and paternal verbal modelling were both positively related to greater reports of their child enjoying food. These findings suggest that both mothers and fathers who display higher levels of overt forms of modelling have children who are less fussy in their food intake and enjoy food more. Alternatively, parents of less fussy eaters may be more likely to employ less controlling feeding practices, such as modelling, or consider the process to have positive outcomes on their children’s eating behaviours. These findings support previous associations between maternal modelling and lower levels of food fussiness and higher food enjoyment in children (Gregory et al., 2010b), and expand on this research by suggesting that the same relationship may also be present in fathers. These results highlight the potential for modelling to be an effective strategy for both parents in relation to reducing food fussiness and increasing food variety and acceptance in children.

Further to this, it is noteworthy that unintentional maternal modelling was found to be positively related to children’s emotional over-eating. A relationship between these two factors has been suggested previously (Snoek, Rutger, Engel, Janssen & Strien, 2007) and this finding supports this theory. Given the findings linking maternal eating psychopathology and unintentional modelling, both in this study and in study 2 (Chapter 4), it is possible that mothers with greater eating disorder symptoms perceive their children to eat less in response to emotions and feel that this behaviour may be unintentionally modelled by them. Alternatively, mothers who under-eat in response to emotions may have noticed this behaviour in their children and believe their child may have copied the behaviour from them. Further research is required with larger samples and with clinical samples to explore this relationship further.
In addition, the PARM measure had only previously been used with maternal samples, so its reliability needed to be established with a paternal sample. While the paternal sample in study 5 was small, tests of reliability yielded strong positive results for all three of the PARM subscales similar to the maternal sample in study 1 (Chapter 3 – Palfreyman et al., 2012), supporting its reliability in assessing paternal modelling behaviours.

To summarise, while preliminary, these findings suggest that mothers and fathers do not differ significantly in their reported modelling behaviours but the study has identified differences in the pattern of associations in relation to maternal and paternal modelling behaviours.

**Study 5 – Chapter 7: Observational validation of the Parental Modelling of Eating Behaviours Scale (PARM)**

This study aimed to validate the PARM measure against observed maternal modelling behaviours and to examine differences between observed maternal behaviours recorded in three separate mealtime observations. The Parental Modelling of Eating Behaviours Observational Coding Scheme (PARM-O) was developed and used to validate the PARM.

Study 5 found a strong, significant relationship between self-reported and observed maternal verbal modelling. A strong, significant relationship was also found between reported consequences of behavioural modelling and both observed behavioural modelling and similarities in the parent-child meals provided during observations. These findings provide validation for both the verbal modelling and consequences of behavioural modelling subscales of the PARM. While not reaching significance, the relationship between observed and self-reported unintentional modelling was in a positive direction, and probably failed to
reach significance due to the moderate sample size and the fact that observed instances of unintentional modelling were lower than other types of modelling reported by mothers (see 5.3.). It should also be noted that unintentional modelling proved to be a difficult construct to code and this could have been a factor in the relationship between maternally reported and experimenter assessed unintentional modelling not reaching significance in this study.

Mothers in study 5 were observed to verbally model nearly twice as often as they reported verbally modelling on the PARM in this study (see section 7.3.) and in studies 1, 2 and 3 (see sections 3.3., 4.3. & 5.3.), which suggests a difference in frequency between how often mothers believe they verbally model and how often they are observed to verbally model. This could suggest that the PARM is recording intentional verbal modelling, which the parent is aware of, but that the PARM-O has recorded both intentional and also more unintentional verbal modelling (e.g., “I don’t really like carrots”) that the parent is not aware of doing. This variation in frequency could suggest that observations may be a more appropriate method to use when exploring verbal modelling of eating behaviours and future research should consider splitting verbal modelling into intentional and unintentional forms.

As well as providing validation for the PARM, a new self-report research tool, study 5 also provided future research studies with a coding scheme for use with observations of parental modelling of eating behaviours; the PARM-O. This coding scheme adds to the current tools available to researchers to explore parents’ feeding strategies and, in particular, provides a tool for assessing a more adaptive, non-directive parental feeding practice, which may be of potential interest in future interventions. The development of the PARM and the PARM-O is also important in view of the fact that modelling can also have negative effects and so the
ability to examine these relationships in more detail is a positive advance for future research into the development of children’s eating behaviours and health-promoting interventions.

Finally, study 5 (Chapter, 7) also provides validation for studies which have used single observations (e.g., Blissett, Farrow & Haycraft, 2010; Blissett & Haycraft, 2011; Haycraft & Blissett, 2008; Sacco et al., 2007; Stein, Woolley, Cooper & Fairburn, 1994). Results indicated that there were no significant differences between the frequency of maternal feeding practices observed over the three observations. While obtaining a series of observation may provide a wider view of mealtime interactions, it appears that the behaviour of the mother does not alter as they become more comfortable with the observational setting. Although this does not mean that maternal feeding behaviours are not affected by the presence of an observer or video camera (for example, differences were present in this study, with mothers being observed to increase discussion on foods and reduce negative comments when researcher was present), it does provide support for the reliability of previous studies that have used individual family observations (e.g., Blissett, Farrow & Haycraft, 2010; Blissett & Haycraft, 2011; Haycraft & Blissett, 2008; Sacco et al., 2007; Stein et al., 1994). These results are also beneficial for future research design and funding, as a series of individual observations is less time consuming and less expensive (Morton & Baranowski, 1991). The focus of this thesis was on maternal feeding practices, so it would be interesting for future research to explore whether children’s eating behaviours alter over a series of observations.

In summary, study 5 provided partial validation for the PARM scale. Although not all the relationships between the PARM self-report subscales and observed maternal modelling were significant, they were all positively related, suggesting observed and self-reports of modelling
map onto each other. Whilst requiring replication with a larger sample, this study could suggest that mothers may provide accurate self-reports of feeding practices such as modelling.

**Study 6 – Chapter 8: Observed maternal modelling and relationships to self-reported child and parent factors.**

Study 6 (Chapter 8) aimed to explore the relationships between observed maternal modelling, as coded by the PARM-O, with factors previously related to self-reported maternal modelling (mental health symptoms and children’s eating behaviours). As suggested by Birch (1999), one way to further explore relationships found with self-reported data is to use observational research.

The findings from study 6 support those in studies 2 and 5 (Chapter 3 & 6) by indicating a relationship between modelling and maternal eating psychopathology. However, unlike in previous studies, no relationships were present between maternal eating psychopathology and unintentional modelling. Instead, this study found higher levels of eating psychopathology to be negatively related to an aspect of observed behavioural modelling; namely, that of similarities in parent-child meals. The failure to replicate the findings with unintentional modelling may be due to the significantly lower levels of this form of modelling being observed in comparison to the self-reported levels recorded in studies 1, 2, 3 & 4 (see sections 3.3, 4.3, 5.3 & 6.3.). Another possible explanation is that the observed PARM-O coding scheme is highlighting a relationship that the PARM self-report measure is not able to assess – for example, differences in meals provided. However, as with study 2 but contrary to the findings of study 5, no relationship was present between any of the facets of maternal modelling and levels of restraint.
In addition, the negative relationships between maternal depression and self-reported maternal modelling found in study 2 (Chapter 4) were not replicated with observed maternal modelling in this study. However, the relationships were all in the same direction as previously found in study 2 suggesting they may not have reached significance due to the smaller sample size potentially under powering this study or due to the lower mean levels of both depression and anxiety reported by this sample (see section 6.3.) compared to the average levels for the maternal sample in study 2 (see section 4.3.). However, although anxiety levels were lower in this sample, as with study 2, maternal anxiety was not found to be significantly related to any of the facets of modelling explored in this study. While these findings could suggest that general maternal anxiety is not related to maternal modelling of eating behaviours, further research is required using a more specific measure aimed at assessing mealtime anxiety.

Maternal reports of children’s eating behaviours were also explored within this study to further expand on the findings from study 4 (Chapter 6). Observed verbal modelling in mothers was negatively related to children’s food responsiveness and emotional over-eating. Higher levels of observed behavioural modelling were negatively related to emotional over-eating in children, and similarity between mothers’ and their children’s meals (a subcomponent of behavioural modelling) was positively related to food enjoyment and negatively related to food fussiness. Finally, unintentional maternal modelling was found to also be negatively related to food fussiness in children. These relationships between maternal modelling and higher levels of food enjoyment and reduced food fussiness in children support similar findings with self-reported modelling behaviours in study 4 (Chapter 6) and previous research (Gregory et al., 2010b). The relationships between verbal modelling and
both lower levels of food responsiveness and emotional over-eating in children were not found previously (study 4). These findings suggest that mothers who were observed to verbally model more had children who were less responsive to food and were less likely to over-eat in response to emotional cues. These relationships are potentially important for the development of adaptive eating behaviours in children and the prevention of children becoming overweight (e.g., Blissett, Haycraft & Farrow, 2010; Oliver, Wardle & Gibson, 2000), as they suggest that verbal modelling may be related to less obesogenic eating behaviours. However, while verbal modelling was observed, it must be taken into account that the eating behaviours of their children were reported by mothers. Future research would benefit from exploring observations of children’s eating behaviours and mothers’ modelling behaviours.

In summary, while the findings from study 6 are preliminary, they indicate that observations of maternal modelling of eating are related to both self-reported parent and child factors. They provide further support for the relationship between maternal modelling and lower levels of fussy eating in children and higher levels of food enjoyment; however, the causes of this relationship require further research. The findings also suggest that the similarity of meals eaten by mothers and their children is important due to the relationships with maternal eating psychopathology and children’s eating behaviours. While further research is required, these relationships suggest the positive influence that mothers and children eating similar foods at mealtimes may have on the development of healthy eating behaviours in children.
Study 7 – Chapter 9: Relationships between observed maternal modelling and observed maternal feeding practices.

The final empirical study (study 7) explored the relationships between observed maternal modelling and other observed feeding practices displayed by mothers during typical family mealtimes. The PARM-O (assessing modelling), the Family Mealtime Coding System (assessing controlling feeding practices and mealtime vocalisations; Haycraft & Blissett, 2008a) and two newly-developed coding subscales (encouragement to eat and discussion about foods/nutrition) were used in this study.

As hypothesised, mothers who were observed to model more used more adaptive, non-directive feeding strategies and used fewer less adaptive, more controlling feeding strategies. More overt forms of observed maternal modelling (verbal and behavioural) were positively related to both maternal encouragement to eat and mothers discussing food with their children. It is noted that the relationship between behavioural modelling and maternal discussion about food and nutrition did not reach significance but displayed an adequate correlation coefficient (> .3) and was approaching significance, suggesting that this relationship was under-powered due to the sample size. These relationships support and extend previous self-report findings which have associated modelling with other adaptive parental feeding strategies, such as encouragement and teaching about nutrition (e.g., Cullen et al., 2001; Hubbs-Tait et al., 2008; Musher-Eizenman & Holub, 2007). The relationship between maternal encouragement to eat and similarities in meals was negative, suggesting mothers are less likely to use encouragement when their meals are more similar to their child’s. The relationship between similar meals and lower levels of food fussiness and higher levels of food enjoyment found in study 6 (Chapter 8) and previous research (Gregory et al., 2010b) may further explain this relationship. If eating similar meals reduces fussiness in
children and results in higher food enjoyment, then parents would not need to encourage their child to eat. Alternatively, mothers of less fussy eaters may be more likely to share similar meals and be less likely to need to prepare separate meals for their child as well as being less likely to encourage these less fussy children to eat. Again, while not reaching significance, the negative relationship between unintentional modelling and encouragement produced an adequate correlation coefficient (>0.3), suggesting that the lack of power in this study was again an issue.

Physical restriction and maternal use of physical prompts were negatively related to similarities in meals and physical restriction was also negatively related to unintentional modelling. These findings suggest mothers who eat similar meals to their children are less likely to physically restrict their children’s food intake or feel the need to use physical prompts to get their child to eat. These associations may be further explained by the relationship between similarities in meals and lower food fussiness and higher food enjoyment in children found previously (Chapter 8). If children are generally less fussy and enjoy foods, mothers are unlikely to feel the need to prompt their children to eat. The relationship between restriction and unintentional modelling is less clear, but may be due to mothers whose children are more likely to copy their (potentially healthy) eating behaviours being less likely to feel the need to restrict foods. The lack of relationships between other controlling feeding practices (e.g., pressure to eat) and maternal modelling is in line with Musher-Eizenman and Holub’s (2007) findings. These results, combined with the negative relationships between physical restriction and prompts with maternal modelling, could suggest that modelling is unlikely to co-occur with more controlling feeding strategies. However, maternal use of incentives, a factor which is part of the restriction subscale of the Child Feeding Questionnaire (Birch et al., 2001), was found to be positively related to
similarities in meals. A possible explanation for this relationship is that incentives may not be used to get these children who are potentially less fussy with their foods to eat, but may be used by mothers to get the child to eat more towards the end of the meal.

The tone of the meal was also explored within this study by examining maternal vocalisations. Verbal modelling was positively related to positive and neutral comments made by mothers during the mealtime. There was also a trend approaching significance for behavioural modelling to be related to neutral comments. These findings suggest that modelling is related to greater use of positive and neutral vocalisations by mothers during mealtimes, which may mean that mealtimes which include modelling are generally more positive, although further research is required to explicitly test this notion. Maternal modelling was not found to be related to negative comments and, while the frequency of negative comments in comparison to neutral and positive comments was lower (see section 9.2.), this lack of a significant relationship between modelling and negative vocalisations is more likely to do with negative tones being unsuited to modelling.

In addition, study 7 also explored the relationship between maternal self-reports of their child’s and their own height and weight with objective measurements taken by the researcher. Previous research is contradictory, with some studies suggesting that mothers can provide both accurate data (e.g., Haycraft & Blissett, 2008a) and other studies suggesting that mothers may underestimate their child’s weight (e.g., Dubois & Girad, 2006). This study found that maternal self-report data and exact measurements of height and weight were significantly and positively correlated, for both their children and themselves, therefore supporting the validity of self-reported height and weight data. However, research by Keel, Heatherton, Harden and Hornig (1997) found that some parents may consider their child to be
under- or overweight when, in fact, they are not. Given that research has suggested that parents’ choice of feeding strategies, including modelling (e.g., Gregory et al., 2010a) may be related to their perceptions of their child’s weight, and/or to their child’s actual weight levels (e.g., May et al., 2007; Pearson et al., 2009), there is value in examining child BMI in relation to modelling (see demographic factors sub-section, below), but there is also value in future research examining parents’ perceptions of their child’s weight, in addition to their actual weight/BMI.

To summarise, this observational study extended the previous self-report literature (e.g., Musher-Eizenman & Holub, 2007) by examining the relationships between maternal modelling and a variety of child feeding practices. Relationships were found between observations of maternal modelling with maternal use of encouragement, positive and neutral mealtime vocalisations, and lower use of controlling feeding practices during the mealtime. Furthermore, more controlling feeding practices were either negatively related or not significantly associated with maternal modelling. Although preliminary, these findings suggest that maternal modelling is more likely to co-occur with other non-directive feeding practices. This may be beneficial for future parent-based interventions, which may benefit from advising parents to use more role modelling, encouragement and discussion about foods rather than pressure or restriction. However, further research into this is required to build on these exploratory findings using larger samples.

**Studies 1-8 - Chapters 3-9: Modelling and demographic factors**

The relationships between parental modelling of eating behaviours with a selection of demographic factors which had previously been related to parents’ feeding practices were also considered in this thesis.
Due to previous associations between child age and child feeding (e.g., Cooke & Wardle, 2005), and the broad age range recruited for the self-report studies within this thesis (Chapters 3-6), the relationship between maternal modelling and child age was considered in all studies. In study 1 (Chapter 3), child age was found to be positively related to self-reported verbal modelling in mothers. This suggests that mothers use higher levels of this modelling behaviour with older children. However, no other relationships were present in the thesis between child age and other forms of modelling explored by the PARM or observed maternal modelling. Further research should consider parents’ use of verbal modelling over time, in relation to the age of the child, to see how parents’ use of this strategy may vary with child age. Parental age was also explored, based on previous research findings which have related it to child feeding practices (e.g., Faith et al., 2004), but no significant relationships were found between parental age with either self-reported or observed maternal modelling behaviours in any of the studies within this thesis.

The employment of feeding strategies by mothers has previously been related to the weight status of the child (e.g., Carnell et al., 2007; Faith et al., 2004; Fisher & Birch, 2000; Gregory et al., 2010a; Murashima et al., 2012). Within this thesis, child BMI z scores calculated from both maternally reported data and measurements taken by the researcher were not found to be significantly related to any of the forms of modelling explored within this research (see data analysis sections in Chapters 3-9). This supports the findings of Gregory et al. (2011), who suggested that modelling was not related to child BMI, but contradicts Gregory et al.’s earlier (2010a) findings.
Parental BMI has also been related to the child feeding practices employed. For example, maternal and paternal BMI positively correlated with observations of more controlling feeding practices (Haycraft & Blissett, 2008a). In this thesis, parental BMI (calculated from self-reports or researcher measurements) was not found to be significantly related to either self-reported or observed parental modelling, with one exception. Maternal BMI (measured) was positively related to self-reported verbal modelling in study 5 (Chapter 7). This suggests that mothers with higher BMI levels may try to improve their children’s eating behaviours by using verbal modelling, which is a more overt form of modelling. However, maternal BMI was not significantly related to observed instances of verbal modelling in the same sample and so this relationship requires further study.

Parental education was also explored in this thesis due to previous research providing evidence of relationships between this factor and both parental feeding strategies and child food intake (e.g., Hendricks, Briefel, Novak & Ziegler, 2006). Self-reported maternal modelling was not found to be related to maternal education in any study, however, observed behavioural modelling by mothers was found to be positively correlated with maternal years of education after the age of 16. This would suggest that mothers with higher education levels are more likely to engage in modelling, or may be more aware of their own eating behaviours and aim to present a good example of eating to their child. Income levels, although not assessed within this thesis, may also be a factor in this relationship, as mothers with higher levels of education are more likely to have higher incomes and thus are less likely to be constrained in their food choices by price and accessibility. This could positively influence the behaviours being modelled. This suggestion is supported by the differences in self-reported maternal and child food intake found in mothers who reported higher levels of post 16 years education (Chapter 3). Maternal education was found to be positively
correlated to higher reported intake of healthier food items in mothers (e.g., vegetables) and children (e.g., fruit), whereas maternal education level was negatively related to maternal and child intake of foods considered to be less healthy (mothers - e.g. savoury snacks; children - e.g. chocolate, biscuits and savoury snacks). This would suggest that education has a positive influence on both maternal and child food intake. Maternal education was also found to be positively related to maternal depression in Chapter 4 and this relationship between individuals with higher levels of education and greater symptoms of depression has been found previously (e.g., Shanahan, 2000). This associating could be due to mothers with higher education levels being more likely to be employed in more pressurised roles, which in turn could increase stress and concern surrounding the work-family balance. Since maternal depression was found to be negatively associated with all three self-reported modelling subscales (see Chapter 4), the relationship between maternal education and depression warrants further examination. While this thesis did not include other social economic variables such as income or occupation future research would benefit from the inclusion of these factors for both the mother and the family as a whole.

10.5. Differences in data collection methods
Data collection for the questionnaire based studies (1, 2 & 4) in this thesis used two different recruitment methods: (1) papers questionnaires distributed via schools, nurseries and pre-schools and (2) an online questionnaire advertised on parenting websites. Previous research has not explored differences between these two forms of data collection and few studies within the feeding domain have collected data online so potential differences needed to be considered. A number of differences were found between data provided online and via paper questionnaires. In study 1 (Chapter 3) mothers who provided online data reported higher intake of vegetables and rice, potatoes and pasta intake in both their children and themselves.
In study 2, mothers who provided online data reported higher levels of depression and anxiety and in study 4 fathers who provided information online reported higher levels of concern about their body shape. These differences could suggest that parents are more likely to provide accurate reports online due to a heightened feeling of anonymity or parents who may have avoided completing paper questionnaires collected via schools etc may be more willing to complete studies online. While requiring further research, these relationships could suggest that collecting data online may provide an avenue for researchers to recruit more diverse samples.

10.6. Methodological strengths and limitations

The research within this thesis has a number of strengths. The sample sizes for the first three self-report studies were relatively large and, while the observational sample was fairly small (N=17), each family was observed on three separate occasions (equating to 51 mealtime observations) which provided a wider and potentially more representative view of mealtime interactions. The recruitment of such a large sample size (almost 500) for study 1 (Chapter 3) enabled appropriate execution of the factor analysis for the newly-developed modelling measure (PARM). Another strength relating to the samples within this thesis is the inclusion of fathers in addition to mothers. Fathers are often an under-researched cohort within the child feeding domain and, while only a small sub-sample (n=36) was explored due to time constraints relating to recruitment, their inclusion added further understanding of parental modelling and complemented the other studies within this thesis. In addition, both self-reported and observed parental modelling data were collected for this research which, together, provided a broader understanding of maternal modelling. A further strength was the inclusion of both maternally reported and independently recorded height and weight measurements for both the mother and the child, which were found to be highly correlated.
Finally, one of the greatest strengths of this research was the development of two measures of modelling (the PARM and PARM-O), which have the potential to assess various facets of the multidimensional construct of modelling via self-reports and observations, and to progress the field in terms of research into modelling as a feeding practice.

However, despite these strengths, there are also a number of limitations. General limitations of this research are the cross-sectional design of data within this thesis which limits the implications that can be drawn from the findings and precludes any determination of cause and effect. Also, as with a large proportion of research within this domain, despite efforts to recruit diverse samples, the samples recruited were predominantly white, two parent families, and parents were generally well educated, which reduces the generalisability of the findings. This thesis predominately concentrated on mothers but the potential for other family members to be role models for children must be taken into account. While a small sub-sample of fathers was explored, future research with a larger sample of fathers is recommended and other potential role models within the home (e.g., siblings, other family members) should be included in future research. A further limitation, due to the moderate sample recruited for the observational studies, is the potential for analyses within these studies to be under-powered to detect significant results. This meant that reasonably strong associations (r > .3) were often not significant and this influenced the significant findings reported on in this thesis.

There were also limitations with the measures used in this research. Although the goal was to create a measure of modelling (the PARM) that would be as comprehensive as possible, there may remain some aspects of parental modelling that have not been included in the PARM, such as modelling outside of the home environment and negative behaviours which may be
modelled. In addition, due to the measure concentrating on eating behaviours other modelled behaviours, such as weight and food related attitudes, may have been overlooked. The general measure used to assess maternal anxiety (HADS) may also have failed to detect relationships between maternal anxiety relating to feeding and maternal modelling behaviours. Both behavioural and unintentional modelling proved difficult to define in a format which allowed for observational coding (see 7.4.). This is due to parents potentially being a continuous role model (e.g., everything the parent does is modelling) and the resultant coding decisions may have implications for the study’s findings. Finally, while observational research has the benefit of capturing real-life interactions the presence of the observer (or video) camera may affect the validity of the behaviours being observed (Morton & Baranowski, 1991; see also Chapter 7) and it is not known how the presence of the video camera may have impacted on children’s eating behaviours and so, in turn, parents’ feeding practices.

10.7. Future directions

Due to the exploratory nature of the research within this thesis, the results presented require further replication with other samples. In addition to replication of these findings, there are a number of potential directions for future research to take. For example, the findings between maternal modelling with parental psychopathology, particularly eating psychopathology, would benefit from further research with clinical samples. There are also a number of other parent and child factors which could potentially be related to parental modelling of eating behaviours, and which weren’t able to be assessed in this thesis in order to minimise participant burden, that future research could explore. For example, child temperament could play a mediating role in the use of modelling by parents as a feeding strategy. Examining child temperament was beyond the scope of this thesis but, given that it has been related to
children’s eating behaviours (Haycraft, Farrow, Meyer, Powell & Blissett, 2011), it is likely that it may be implicated in the relationships between parental modelling and eating-related outcomes in children. Parent and child gender would be another potential area of interest. It is possible that role modelling may be influenced by child and parent gender, for example, mothers may be more powerful role models for their daughters. Also, further research exploring fathers and other potential role models, such as siblings, is required to provide further understanding of the influence of modelling, from a variety of sources, on the development of children’s eating behaviours. It would also be beneficial to research children’s eating behaviours and maternal modelling with a larger sample to further explore the relationship between reduced food fussiness and higher food enjoyment found in children of mothers who display higher modelling behaviours, and to include objective assessments of children’s eating behaviours and examine their relationships to observed modelling.

10.8. Contribution of research in this thesis to existing feeding research

The research within this thesis contributes to the understanding of feeding research in a number of ways. Firstly, by providing researchers with a new, parental self-report measure of modelling with the scope to explore various facets of the multidimensional construct of parental modelling of eating behaviours. The Parental Modelling of Eating Behaviours scale (PARM) was found to have good concurrent validity, and further validation with observed maternal modelling behaviours was provided. The research within this thesis also developed an observational coding scheme for assessing parental modelling of eating behaviours based on the PARM measure (the Parental Modelling of Eating Behaviours Observational Coding Scale; PARM-O), which is also available for future use by researchers.
Secondly, this research contributes to the existing literature on child feeding by providing support for previous, preliminary associations between maternal modelling and: both healthy and unhealthy food intake in mothers and their children; an authoritative parenting style; and lower levels of food fussiness and higher levels of food enjoyment reported in children. As well as providing support for these relationships, the research within this thesis further expands the present understanding of these associations by highlighting that certain aspects of modelling are specifically related to these factors. For example, maternal awareness of unintentional modelling was found to be positively related to maternal and child snack intake. These findings further highlight the importance of considering what behaviour is being displayed (e.g., whether they are negative or positive behaviours) through the process of parental modelling.

Research within this thesis also provides support for relationships between symptoms of maternal mental health and maternal modelling, which have been suggested in previous research but have not been directly explored with a measure of maternal modelling of eating behaviours and perceived outcomes. While there is some inconsistency in the findings of the studies in this thesis, the relationship between mental health and modelling means that, for certain mothers, modelling may not be the ideal feeding strategy to use or that these mothers could benefit from advice-based interventions to increase their awareness of the potentially detrimental effects they may be having on their children’s eating behaviours through the process of modelling.

The research within this thesis has also increased the research base regarding parental feeding practices/strategies in two ways. Firstly, by examining a potentially adaptive parental feeding practice (modelling) which had previously been under-researched and, secondly, by exploring
modelling and its relationship to a variety of other feeding practices. While requiring replication, the findings suggest that more adaptive (non-directive) feeding practices are likely to co-occur and that maternal modelling of eating behaviours is unlikely to be used by mothers who rely on more direct forms of controlling feeding practices, such as pressure to eat or restriction.

Parental modelling can potentially influence children’s eating behaviours and food intake; however, it would appear that the outcome of this influence may be reliant on the type of behaviours modelled, both intentionally and unintentionally, by the parent. This means future health-related interventions should include modelling as a potentially adaptive feeding strategy that parents should be encouraged to use. However, interventions should include advice relating to the possible negative outcomes related to modelling, particularly for parents who are more likely to be modelling less adaptive behaviours (e.g., mothers with higher levels of disordered eating symptoms).

In addition, findings within this thesis provide support for the use of single observations in research exploring parental feeding strategies. Mothers were not found to differ in their observed feeding strategies recoded over three separate mealtime observations. This finding is important for validating previous research and also for future research, which may benefit from knowing that mothers’ feeding practices with young children do not vary significantly over time.

10.9. Conclusions

In conclusion, the findings from this thesis clearly highlight the potential of parental modelling to both positively and negatively influence the eating behaviours of children.
Future interventions could aim to improve families’ eating patterns and encourage parents to use more adaptive child feeding strategies, such as modelling instead of restriction or pressure to eat, due to the related outcomes of these feeding practices. In addition, the importance of parents’ own eating patterns in the process of modelling needs to be considered. The benefits of increased parental modelling of healthy eating behaviours are likely to be two-fold, benefitting the parent and the child. Indeed, if parents can be encouraged to improve their own dietary intake and eating behaviours then the potential for any detrimental eating behaviour to be modelled to their children would be reduced. However, the potential detrimental effect of parental modelling also has to be taken into account and advice-based interventions should include information about both the positive and negative relationships and potential outcomes of parental modelling. This is also likely to be a key factor when providing advice for mothers who have eating and weight concerns. Thus, there are numerous potential benefits that could be brought about by increased parental modelling of healthy eating behaviours and the research in this thesis has made an important step forward in terms of studying modelling. Further research into parenting modelling of eating behaviours is required.
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Example letter to Schools/Nurseries

Loughborough University
Department of Human Sciences
Loughborough University
Loughborough
Leicestershire
LE11 3TU
[00/00/00]

Dear

Parent and Child Eating Research Study

My name is Zoe Palfreyman and I am a Ph.D student at Loughborough University. I am currently conducting research into children’s eating behaviours and parental influences on these at Loughborough University, working with Dr. Emma Haycraft and Dr. Caroline Meyer. I am writing to ask if you would be able to help me with the research I am currently conducting. As part of my on-going research I am piloting a new questionnaire which has been designed to look at parent-child interactions with regards to healthy eating behaviours and food choices. At present, little research has looked into this area and I hope that my research will further develop knowledge to provide parents with a better understanding of their children’s eating behaviours as well as potential intervention strategies to produce healthier dietary outcomes.

The research involves the completion of questionnaires by mothers/female caregivers with a child aged 18 months to 8-years and I am writing to request your help by distributing questionnaires for me. **You would have to do no more than distribute the questionnaire packs to parents with a child in your school/nursery.** It states clearly on the information sheet that the parents do not have to take part in the study, that this research is independent of your school/nursery and that all responses are anonymous and confidential. If parents choose to fill in the questionnaires they are asked to return them to the school/nursery in the envelopes provided. I will then come in and collect all returned questionnaires at a mutually convenient time, a few weeks after distribution.

If you would be willing to distribute sets of questionnaires, I would be grateful to you. I can be contacted by email z.v.palfreyman@lboro.ac.uk by telephone 01509 228473 or 07954323114, or at the address above. I would be happy to answer any questions you may have or arrange a meeting to discuss this further with you. If you agree to help me with this research, please let me know how many questionnaire sets I should send to you for you to distribute.

Thank you very much for taking the time to read my letter and, in anticipation, for your help with my research. I do appreciate that it is not always convenient for schools and nurseries to partake in research studies, but hope that you will be able to help me with this element of my research. I look forward to hearing from you.

Yours sincerely,

Zoe Palfreyman
Dear Parent/Caregiver,

There is currently a great deal of concern about our children’s diets in relation to their health. As part of my Ph.D at Loughborough University I am piloting a new questionnaire which looks at parent-child interaction with regard to eating and food choices. It is hoped that from this research we will gain a greater understanding of children’s eating behaviours, and how they may vary with age, as well as being able to provide greater support for parents to use to improve the range or types of foods their children are willing to eat.

What is the questionnaire about?
- This questionnaire explores potential ways in which parents/caregivers may promote healthy diets and eating behaviours in their children. It also looks at parental attitudes and behaviours that may be involved.

Who is taking part?
- About 500 mothers of children aged between 1½ and 8 years are required to take part.

What will I have to do?
- Please read and complete the attached questionnaire and return it to your child’s school in the envelope provided.
- If you choose not to complete the questionnaire, please return it back to the school blank.

What happens to the information?
- All the information you provide is anonymous and confidential. When your questionnaire is returned the consent form will be detached and kept separately from the questionnaire. Consent forms are only accessible to the researchers. Only the researchers will have access to the anonymous questionnaires, which will be stored in a locked cabinet at Loughborough University and destroyed after 10 years.
- The data will be analysed and written up as a group so no individual can be identified and no-one will know who participated in the study.

Do I have to participate in this study?
- You are under no obligation to take part and you have the right to withdraw at any time.
- You do not have to answer any questions that you do not want to.

What if I have more questions or do not understand something?
- Further information can be obtained from:
Appendix B
Information sheet

- Zoe Palfreyman, Department of Human Sciences, Loughborough University, Leicestershire, LE11 3TU. Tel. 01509 228473, Email: z.v.palfreyman@lboro.ac.uk.
- Dr. Emma Haycraft, Department of Human Sciences, Loughborough University, Leicestershire LE11 3TU. Tel: 01509 228160, Email: e.haycraft@lboro.ac.uk.

- If you have any concerns after completing this questionnaire, please contact one of the organisations listed on the reverse of this sheet.

What happens now if I decide to take part?
- Please complete the consent form and questionnaire and return them in the attached envelope to your child’s school as soon as possible.

Thank you very much for your help with my research
Zoe Palfreyman

Some of the questions may raise issues that you need to discuss further. If you have concerns about your eating, or your child’s eating, please contact one of the following:

- Your G.P.
- The School Nurse
- NHS Direct - Tel: 0845 46 47
- Beat (formerly The Eating Disorders Association) - Tel: 0845 634 1414

If you have felt upset in any way by this survey please do take advantage of available support.
CONSENT FORM: PARENT - CHILD HEALTHY EATING STUDY

Important – Please read and sign this consent form before completing the attached questionnaire. It will be detached when the questionnaire is returned so that your responses will be anonymous.

Please ensure that you have read the attached information sheet and that you understand that you do not have to complete or submit the questionnaire if you do not wish to. All your responses will remain anonymous and confidential.

I give my consent to participate in this study. I understand that I do not have to complete the questionnaires and that I can withdraw from the study at anytime.

Name:…………………………………………………..
Signed:…………………………………………………..
Date:……………………

If you would be interested in taking part in a related observational study of family mealtimes then please provide your full postal address and phone number below:

Address:...........................................................................................................

Phone number:.................................................................................................
Parent and Child Healthy Eating Questionnaire

Ways to promote children’s healthy eating are key aims for parents and researchers.

We hope our research can help to provide a better understanding of children’s eating behaviours, as well as more help and advice for parents.

This is why we need the information from the questionnaires which you have been asked to fill in.

So please, please, please can you take a few minutes to fill them in and send them back.

Your help is very much appreciated and needed!!!!

Thank you
Example Email to Websites:

Dear Mumsnet,

I am a PhD student based at Loughborough University and I am hoping you will be able to help me with my present research. I spoke to a member of your team and it was recommended that I contact your research request centre and provide details of the study and what will be required by yourselves and your members.

My research interest is in the development of children’s eating behaviours with the aim of providing further help and information in the future for parents. My present study consists of a questionnaire pack, all but one of the questionnaires contained in this pack have been used previously in this research area. I’ve attached a copy of the questionnaire pack to this email for you to look at.

If you are able to help me in my research all I require is to place an advert on your forum explaining the study with a link to an online version of the questionnaire pack. The advert will also contain my contact details so if parents wish to, they can contact me for further details or to request a paper version of the pack. All data will be kept securely and parents can withdraw from the study at any point.

If you are able to help me with this study it would be very much appreciated.

Thank you for your time and I hope to hear from you soon,

Zoe Palfreyman

LUCREDE
Loughborough University
z.v.palfreyman@lboro.ac.uk
Welcome

Welcome to the Parent and Child Healthy Eating Study.

This UK-wide study based at Loughborough University aims to gain a greater understanding of children's eating behaviours, and how they may vary with age, as well as being able to provide greater support for parents to use to improve the range or types of foods their children are willing to eat.

We are looking for parents/caregivers of children aged between 18 months and 8 years to take part in this study. At present we have recruited around 250 mothers and are hoping to double this number so your help would be very much appreciated.

The survey is completed anonymously, can be saved part way through and only takes around 15 minutes to compete. You are under no obligation to take part in the study or to answer every question.

If you have any questions please contact:
Zoe Palfreyman, Loughborough University Centre for Research into Eating Disorders, School of Sport, Exercise & Health Sciences, Leicestershire, LE11 3TU. Email: z.v.palfreyman@lboro.ac.uk.

Dr Emma Haycraft, Loughborough University Centre for Research into Eating Disorders, School of Sport, Exercise & Health Sciences, Leicestershire, LE11 3TU. Email: e.haycraft@lboro.ac.uk.

Thank you very much for taking the time to read this information sheet and for your help with my research

Zoe Palfreyman

Page 2

1. I give consent to participate in this study. I understand that I do not have to complete the questionnaires and that I can withdraw from the study at anytime.

☐ YES ☐ NO

Page 3

Data Protection

All data collected in this survey will be held anonymously and securely. Only the researcher will have access to the anonymous questionnaires, which will be downloaded onto disks and stored in a locked cabinet at Loughborough University and destroyed after 10 years.
Dear Mother/Caregiver,

I am writing to thank you for your recent help by participating in my Parent – Child Healthy Eating Study. This initial stage of my project was a great success, and it would not have been possible without your assistance. I received a fantastic response rate and I am sincerely grateful to you and all of the parents that kindly took part. I am currently in the process of writing up the study and will notify you of the key findings as soon as the write-up is complete.

For the next stage of my project, I am going to be carrying out home observations of natural family mealtimes and looking at parent-child interactions. I notice that you expressed an interest in possibly taking part in further research and therefore I am writing to ask if you would be willing to help in this new aspect of my project? Your input into this research would be greatly appreciated and if you are interested in taking part in this further study, please read on. Below is some more information about the study and what it entails.

**What is the research about?**
- This research aims to further explore the potential ways in which parents/caregivers may promote healthy diets and eating behaviours in their children and to provide further information on the development of children's eating behaviours. It aims to look at typical family mealtimes at home, in an attempt to gain information about everyday family interactions around food and eating.

**Who is taking part?**
- About 50 families of children aged between 2 and 6 years are required to take part.

**What will I have to do?**
- At three mutually convenient mealtimes, I will come to your home to video record your typical family mealtime. These meals can be either lunchtimes or evening meals, depending on which would be easier for your family. You would just need to carry out the mealtime as usual. You will also be asked to complete a questionnaire set similar to the one you completed for the Parent – Child Healthy Eating Study and, if you agree, height and weight measurements will also be collected from you and your child during the first observation.

**Participation in this study**
- You are under no obligation to take part in this study and you have the right to withdraw at any time during the research. If you choose to withdraw your data will be destroyed immediately.
- In addition you do not have to answer any questions that you do not want to.

***As a thank you for helping with this research, all participants will receive £15 (or £5 per observation completed). ***
What happens now if I decide to take part or would like further information about the study?
- Your input into this study really would be appreciated. If you are willing to take part in this study please complete the enclosed form and return it to me as soon as possible using the pre-paid envelope attached. Alternatively, you can contact me via email (z.v.palfreyman@lboro.ac.uk) or over the phone (01509 228473 / 07954323114). We can then arrange a convenient time for the first visit. If you have any questions, or should you wish to discuss this study further, please do not hesitate to contact me using the details below. Your help really would be greatly appreciated.

Thank you very much for your time and your help with my research.

Zoe Palfreyman
Hi everyone,

I'm a PhD student at Loughborough University with a 5 year old son who is a very fussy eater. It is my own experiences and those of friends and family members that has lead me to try and find ways to better understand children’s eating behaviours, as well as to provide more help and advice for parents.

We are looking for families with children aged between 2 and 6 years to take part in our observational study.

The observations will take place at three mutually convenient mealtimes. These meals can be either lunchtimes or evening meals, depending on which would be easier for your family. You would just need to carry out the mealtime as usual. You will also be asked to complete a questionnaire and, if you agree, height and weight measurements will also be collected from you and your child after the last observation.

***As a thank you for helping with this research, all participants will receive £15 (or £5 per observation completed). ***

So if you think you maybe interested in taking part in this research please contact me.

z.v.palfreyman@lboro.ac.uk
OR
01509 228473
07954323114

Your help is very much appreciated and needed! Thank You
Parent and Child Mealtime Study

We are looking for families with a child aged between 2 and 6 years to take part in our mealtime observation study.

We hope our research can help to provide a better understanding of children’s eating behaviours, as well as more help and advice for parents.

***As a thank you for helping with this research, all participants will receive £15 (or £5 per observation)***

So if you think you may be interested in taking part in this research please contact us.

z.v.palfreyman@lboro.ac.uk

Or

01509 228473

Your help is very much appreciated and needed!!!!

Thank you

Zoe Palfreyman, Dr. Emma Haycraft and Prof. Caroline Meyer.
Loughborough University Centre for Research into Eating Disorders. Department of Human Sciences, Loughborough University, Loughborough. Leicestershire, LE11 3TJ
Dear Parent/Caregiver,

There is currently a great deal of concern about our children’s diets in relation to their health. As part of my Ph.D at Loughborough I am conducting an observational study, which looks at parent-child interaction with regard to eating and food choices. It is hoped that from this research we will gain a greater understanding of children’s eating behaviours, and how they may vary with age, as well as being able to provide greater support for parents to use to improve the range or types of foods their children are willing to eat.

What is the research about?
- This research hopes to further explore potential ways in which parents/caregivers may promote healthy diets and eating behaviours in their children and to provide further information on how the development of children’s eating behaviours.

Who is taking part?
- About 30 mothers of children aged between 1½ and 6 years are required to take part.

What will I have to do?
At times pre-determined by yourself a researcher will record three family mealtimes, these can be either lunchtimes or evening meal depending on which would be easier for your family. You will also be asked to complete a questionnaire set similar to the one you complete for the Parent – Child Healthy Eating Study and if you agree, height and weight measurements will be collected from your child by the researcher during the first observation.

What happens to the information?
- All the information you provide is anonymous and confidential. The data will be coded and stored separately from your consent forms and questionnaire data. Consent forms are only accessible to the researchers. Only the researchers will have access to the anonymous data, which will be stored in a locked cabinet at Loughborough University and destroyed after 10 years.
- The data will be analysed and written up as a group so no individual can be identified and no-one will know who participated in the study.

Do I have to participate in this study?
- You are under no obligation to take part and you have the right to withdraw at any time.
- You do not have to answer any questions that you do not want to.

What if I have more questions or do not understand something?
- Further information can be obtained from:
  - Zoe Palfreyman, Department of Human Sciences, Loughborough University, Leicestershire, LE11 3TU. Tel. 01509 228473, Email: z.v.palfreyman@lboro.ac.uk.
Dr. Emma Haycraft, Department of Human Sciences, Loughborough University, Leicestershire LE11 3TU. Tel: 01509 228160, Email: e.haycraft@lboro.ac.uk.
- If you have any concerns after completing this questionnaire, please contact one of the organisations listed on the reverse of this sheet.

What happens now if I decide to take part?
- If you decide you would like to take part please complete the attached form and I will contact you to discuss the study and to arrange a convenient time to begin the observations.

Thank you very much for your help with my research
Zoe Palfreyman

Some of the questions may raise issues that you need to discuss further. If you have concerns about your eating, or your child’s eating, please contact one of the following:

- Your G.P.
- The School Nurse
- NHS Direct - Tel: 0845 46 47
- Beat (formerly The Eating Disorders Association) - Tel: 0845 634 1414
INFORMED CONSENT FORM
(to be completed after Participant Information Sheet has been read)

- The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

- I have read and understood the information sheet and this consent form.

- I have had an opportunity to ask questions about my own and my child’s participation.

- I understand that I am under no obligation to take part in the study.

- I understand that my child is under no obligation to take part in the study.

- I understand that both my child and I have the right to withdraw from this study at any stage for any reason, and that neither my child or I will be required to explain reasons for withdrawing, and there will be no penalty for withdrawing from this study.

- I understand that all the information we provide will be treated in strict confidence.

Please tick the following where they apply:

[ ] I agree to complete questionnaires as part of this study

[ ] I agree to my child and I being weighed and measured for this study

[ ] I give consent for my child to take part in this study

[ ] I agree to be video recorded during mealtimes with my child as part of this study

Name: ___________________________________

Signed: __________________________________

Date: ____________________________________

Signature of investigator: __________________________
Appendix L
Parental Modelling of Eating Behaviours Scale (PARM) and coding

**Instructions:** Please respond to the following statements about food-based interactions with your child to indicate how much you agree or disagree with them.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Neutral</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I make comments on my healthy eating behaviours / food choices when I am with my child (e.g. &quot;I'll be healthy and have vegetables&quot;).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. If I intentionally emphasise certain eating behaviours / food preferences my child is more likely to copy them.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. When I show my child I enjoy fruits or vegetables, he/she tries them.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. The eating behaviours of other family members influence what my child eats.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My child has picked up eating behaviours from me which I have not intentionally encouraged him/her to adopt (e.g. having tomato sauce with most meals, or eating vegetables first).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. My child is more likely to try or eat new foods if I eat the new foods with him/her.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I try to influence my child’s food preferences by verbally stating my own (e.g. &quot;I love carrots, they're one of my favourites&quot;).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. My child is more likely to try new foods he/she has seen me eating.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I verbally encourage my child to copy my eating behaviour.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. My child has picked up eating behaviours from me which I had tried to hide from him/her (e.g. avoiding certain foods).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. My child has adopted eating behaviours from me which I did not previously realise I did (e.g. eating certain foods first).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I make comments when I am with my child about unhealthy foods (e.g. &quot;I shouldn't be eating this&quot;).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. My child asks to try foods from my plate which he/she sees me eating.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I try to encourage my child to eat new foods by stating my food preferences (e.g. &quot;I love peas, why don't you try them?&quot;).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I explain my food choices verbally to my child (e.g. &quot;I think I'm going to have some fruit for my pudding as I like it and it's good for me&quot;).</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Instructions for coding:**

Verbal Modelling (6): 1, 7, 9, 12, 14, 15

Behavioural modelling (6): 2, 3, 4, 6, 8, 13

Indirect Modelling (3): 5, 10, 21

Mean scores are calculated for the above three subscales by summing item scores for contained in each subscale as shown above. The higher the score the higher the reported level of modelling behaviour.
Instructions: Please answer the following questions as honestly as possible with your child in mind.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I model healthy eating for my child by eating healthy foods myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I try to eat healthy foods in front of my child, even if they are not my favourite.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I try to show enthusiasm about eating healthy foods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I show my child how much I enjoy eating healthy foods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Instructions for coding:

Modelling Subscale (4): 5, 6, 7, 8

Mean scores are calculated from the summed score of the four items within the subscale. Items within this subscale did not require reverse coding.
These questions ask about your own AND your child’s usual eating habits.

Please indicate how often YOUR CHILD eats the following items using a C.

Please indicate how often YOU eat the following items using a P.

<table>
<thead>
<tr>
<th>Example</th>
<th>Never/Rarely</th>
<th>Once or twice a week</th>
<th>3-4 times a week</th>
<th>5-6 times a week</th>
<th>Once a day</th>
<th>Twice a day</th>
<th>Three times a day</th>
<th>Four or more times a day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fruit (fresh or tinned)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Vegetables (not potatoes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Cakes, biscuits, sweets or chocolate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Rice, potatoes or pasta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Processed meats (e.g. sausages, burgers, chicken nuggets etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Savoury snacks (e.g. crisps)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Salad items</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Fresh fruit juice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix N
Food Frequency Questionnaire (FFQ) and coding

Instructions for scoring:

Parents are asked to report both their own and their child’s intake (e.g., P & C). For each variable, assign the relevant number from 1 to 8 (as shown on above) to both the parent’s and the child’s reported intake. A higher number (score) corresponds with greater reported intake of each type of food.

<table>
<thead>
<tr>
<th>Example</th>
<th>Never/Rarely</th>
<th>Once or twice a week</th>
<th>3-4 times a week</th>
<th>5-6 times a week</th>
<th>Once a day</th>
<th>Twice a day</th>
<th>Three times a day</th>
<th>Four or more times a day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fruit (fresh or tinned)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>2. Vegetables (not potatoes)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>3. Cakes, biscuits, sweets or chocolate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>4. Rice, potatoes or pasta</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>5. Processed meats (e.g. sausages, burgers, chicken nuggets etc.)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>6. Savoury snacks (e.g. crisps)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>7. Salad items</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>8. Fresh fruit juice</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>
### Instructions

The following questions are concerned with the PAST FOUR WEEKS ONLY (28 days). Please read each question carefully and circle the appropriate number on the right. Please answer all the questions.

<table>
<thead>
<tr>
<th>ON HOW MANY DAYS OUT OF THE PAST 28 DAYS ……..</th>
<th>No days</th>
<th>1-5 days</th>
<th>6-12 days</th>
<th>13-15 days</th>
<th>16-22 days</th>
<th>23-27 days</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. Have you gone for long periods of time (8 hours or more) without eating anything in order to influence your shape or weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. Have you tried to avoid eating any foods which you like in order to influence your shape or weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. Have you tried to follow definite rules regarding your eating in order to influence your shape or weight; for example, a calorie limit, a set amount of food, or rules about what or when you should eat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5. Have you wanted your stomach to be empty?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. Has thinking about food or its calorie content made it much more difficult to concentrate on things you are interested in; for example, read, watch TV, or follow a conversation?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7. Have you been afraid of losing control over eating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9. Have you eaten in secret? (Do not count binges.)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10. Have you definitely wanted your stomach to be flat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>11. Has thinking about shape or weight made it more difficult to concentrate on things you are interested in; for example read, watch TV or follow a conversation?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>12. Have you had a definite fear that you might gain weight or become fat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>13. Have you felt fat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>14. Have you had a strong desire to lose weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>15. On what proportion of times that you have eaten have you felt guilty because of the effect on your shape or weight? (Do not count binges.)</td>
<td>0 – None of the times</td>
<td>1 – A few of the times</td>
<td>2 – Less than half the times</td>
<td>3 – Half the times</td>
<td>4 – More than half the times</td>
<td>5 – Most of the times</td>
<td>6 – Every time</td>
</tr>
</tbody>
</table>

(Circle the number which applies.)
Appendix O
Eating Disorder Examination Questionnaire (EDE-Q) and coding

### Instructions for coding:

This is the shortened 22 item questionnaire version and provides 4 subscale scores and a global score. Each item is scored from 0 to 6 as indicated on the questionnaire.

The items comprising the 4 subscales are:

- **Restraint (5):** 1, 2, 3, 4, 5
- **Eating concern (5):** 6, 7, 9, 15, 34
- **Shape concern (8):** 10, 11, 12, 13, 30, 33, 35, 36
- **Weight concern (5):** 11, 14, 29, 31, 32

To calculate a mean score for each subscale, sum the total of the items for each subscale and divide by the number of items. To calculate the global score sum the four subscale scores together and divide 4 (the number of subscales).

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>Has your weight influenced how you think about (judge) yourself as a person?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>30</td>
<td>Has your shape influenced how you think about (judge) yourself as a person?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>31</td>
<td>How much would it upset you if you had to weigh yourself once a week for the next four weeks?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>32</td>
<td>How dissatisfied have you felt about your weight?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>33</td>
<td>How dissatisfied have you felt about your shape?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>34</td>
<td>How concerned have you been about other people seeing you eat?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>35</td>
<td>How uncomfortable have you felt seeing your body; for example, in the mirror, in shop window reflections, while undressing or taking a bath or shower?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>36</td>
<td>How uncomfortable have you felt about others seeing your body; for example, in communal changing rooms, when swimming or wearing tight clothes?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Appendix P</td>
<td>Hospital Anxiety and Depression Scale (HADS) and coding</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>

**Tick only one box in each section**

### I feel tense or ‘wound up’:
- Most of the time
- A lot of the time
- Time to time, occasionally
- Not at all

### I feel as if I am slowed down:
- Nearly all the time
- Very often
- Sometimes
- Not at all

### I still enjoy the things I used to enjoy:
- Definitely as much
- Not quite so much
- Only a little
- Hardly at all

### I get a sort of frightened feeling like ‘butterflies’ in the stomach:
- Not at all
- Occasionally
- Quite often
- Very often

### I get a sort of frightened feeling as if something awful is about to happen:
- Very definitely and quite badly
- Yes, but not too badly
- A little, but it doesn’t worry me
- Not at all

### I can laugh and see the funny side of things:
- As much as I always could
- Not quite so much now
- Definitely not so much now
- Not at all

### I feel restless as if I have to be on the move:
- Very much indeed
- Quite a lot
- Not very much
- Not at all

### I have lost interest in my appearance:
- Definitely
- I don’t take so much care as I should
- I may not take quite as much care
- I take just as much care as ever
### I feel cheerful:
- Not at all
- Not often
- Sometimes
- Most of the time

### I get sudden feelings of panic:
- Very often indeed
- Quite often
- Not very often
- Not at all

### I can sit at ease and feel relaxed:
- Definitely
- Usually
- Not often
- Not at all

### I can enjoy a good book or radio or TV programme:
- Often
- Sometimes
- Not often
- Very seldom

### Worrying thoughts go through my mind:
- A great deal of the time
- A lot of the time
- From time to time, but not too often
- Only occasionally

### I look forward with enjoyment to things:
- As much as ever I did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all
**Instructions for scoring:**

The questions relating to anxiety are marked ‘Anx’ and to depression ‘Dep’. The score awarded to each item are shown in the column marked ‘Score’.

<table>
<thead>
<tr>
<th></th>
<th>Anx</th>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anx</td>
<td>I feel tense or ‘wound up’</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most of the time</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A lot of the time</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time to time, occasionally</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Dep</td>
<td>I still enjoy the things I used to enjoy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definitely as much</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not quite so much</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only a little</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hardly at all</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Anx</td>
<td>I get a sort of frightened feeling as if something awful is about to happen</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very definitely and quite badly</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, but not too badly</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A little, but it doesn’t worry me</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Dep</td>
<td>I can laugh and see the funny side of things</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>As much as I always could</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not quite so much now</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definitely not so much now</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Anx</td>
<td>Worrying thoughts go through my mind</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A great deal of the time</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A lot of the time</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>From time to time, but not too often</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only occasionally</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Dep</td>
<td>I feel cheerful</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not often</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sometimes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most of the time</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Anx</td>
<td>I can sit at ease and feel relaxed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definitely</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Usually</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not often</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>3</td>
</tr>
</tbody>
</table>
# Hospital Anxiety and Depression Scale (HADS) and coding

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Dep</td>
<td>I feel as if I am slowed down</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nearly all the time: 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very often: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sometimes: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all: 0</td>
</tr>
<tr>
<td>9</td>
<td>Anx</td>
<td>I get a sort of frightened feeling like ‘butterflies’ in the stomach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occasionally: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quite often: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very often: 3</td>
</tr>
<tr>
<td>10</td>
<td>Dep</td>
<td>I have lost interest in my appearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definitely: 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I don’t take so much care as I should: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I may not take quite as much care: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I take just as much care as ever: 0</td>
</tr>
<tr>
<td>11</td>
<td>Anx</td>
<td>I feel restless as if I have to be on the move</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very much indeed: 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quite a lot: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not very much: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all: 0</td>
</tr>
<tr>
<td>12</td>
<td>Dep</td>
<td>I look forward with enjoyment to things</td>
</tr>
<tr>
<td></td>
<td></td>
<td>As much as ever I did: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rather less than I used to: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definitely less than I used to: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hardly at all: 3</td>
</tr>
<tr>
<td>13</td>
<td>Anx</td>
<td>I get sudden feelings of panic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very often indeed: 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quite often: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not very often: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all: 0</td>
</tr>
<tr>
<td>14</td>
<td>Dep</td>
<td>I can enjoy a good book or radio or TV programme</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Often: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sometimes: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not often: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very seldom: 3</td>
</tr>
</tbody>
</table>

Odd question numbers are anxiety, even question numbers are depression.
Appendix P

Hospital Anxiety and Depression Scale (HADS) and coding

Instructions for scoring:

To score the HADS, add the seven anxiety (Anx) scores together and add the seven depression (Dep) scores together which provides a final score for each variable.

Scores can then be put into one of the four groups below providing a level of anxiety and depression:

- 0 – 7 = Normal
- 8 – 10 = Mild
- 11 – 14 = Moderate
- 15 – 21 = Severe
**Instructions:** This questionnaire is designed to measure how often you exhibit certain behaviours towards your child.

Please rate how often you exhibit this behaviour with your child.

**I exhibit this behaviour........**

<table>
<thead>
<tr>
<th>Item</th>
<th>Never</th>
<th>Once in a While</th>
<th>About Half of the Time</th>
<th>Very Often</th>
<th>Always</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>2</td>
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<td>4</td>
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<td>11</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Instructions for scoring:

Authoritative Subscale (15): 1, 2, 4, 5, 7, 9, 10, 12, 16, 18, 19, 22, 24, 26, 28

A mean Authoritative score is obtained by calculating responses to the above 15 questions.

Permissive Subscale (5): 6, 13, 15, 17, 21

A mean score for the Permissive subscale can be calculated using the 5 questions above.

Authoritarian Subscale (With Physical Coercion subscale removed)

(8): 11, 14, 20, 27, 3, 8, 23, 25

An overall mean Authoritarian score can be obtained using responses to the above 8 statements.
Instructions: Please read the following statements and tick the boxes which are most appropriate to your child’s eating behaviour. Please answer these questions about your child who is in this study. If a question is irrelevant because of your child’s age, please leave it out.

<table>
<thead>
<tr>
<th>Question</th>
<th>ever</th>
<th>rarely</th>
<th>sometimes</th>
<th>often</th>
<th>always</th>
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</thead>
<tbody>
<tr>
<td>My child loves food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats more when worried</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child has a big appetite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child finishes his/her meal quickly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child is interested in food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child always asking for a drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child refuses new foods at first</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats slowly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats less when angry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats more when s/he is tired</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child is always asking for food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats more when annoyed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If allowed to, my child would eat too much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats more when anxious</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child enjoys tasting new foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child leaves food on his/her plate at the end of a meal</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>My child takes more than 30 minutes to finish a meal</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Given the choice, my child would eat most of the meal</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child looks forward to mealtimes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child gets full before his/her meal is finished</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child enjoys eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats more when s/he is happy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child is difficult to please with meals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats less when upset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child gets full up easily</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats more when s/he has nothing else to do</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Even if my child is full up s/he finds room to eat his/her favourite food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If given the chance, my child would drink continuously throughout the day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child cannot eat a meal if s/he has had a snack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If given the chance, my child would always be having a drink</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child is interested in tasting food s/he hasn’t tasted before</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child decides that s/he doesn’t like a food, even without tasting it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If given the chance, my child would always have food in his/her mouth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My child eats more and more slowly during the course of a meal</td>
<td></td>
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</tr>
</tbody>
</table>
CEBQ Scoring:

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12, 14, 19, 28, 34</td>
<td>Food Responsiveness (5)</td>
</tr>
<tr>
<td>1, 5, 20, 22</td>
<td>Enjoyment of Food (4)</td>
</tr>
<tr>
<td>3*, 17, 21, 26, 30</td>
<td>Satiety Responsiveness (5)</td>
</tr>
<tr>
<td>7, 10*, 16*, 24, 32*, 33</td>
<td>Food Fussiness (6)</td>
</tr>
<tr>
<td>4*, 8, 18, 35</td>
<td>Slowness in Eating (4)</td>
</tr>
<tr>
<td>2, 13, 15, 27</td>
<td>Emotional Over-Eating (4)</td>
</tr>
<tr>
<td>9, 11, 23, 25</td>
<td>Emotional Under-Eating (4)</td>
</tr>
<tr>
<td>6, 29, 31</td>
<td>Desire to Drink (3)</td>
</tr>
</tbody>
</table>

(Items marked with * require reverse coding).

Calculate mean subscale scores by summing the numbers corresponding to boxes ticked in response to the following questions:
### Appendix S
Parental Modelling of Eating Behaviours Observational (PARM-O) coding scheme

<table>
<thead>
<tr>
<th>Behavioural Modelling: Operational Definitions and coding sheet</th>
<th>Definition</th>
<th>Response</th>
<th>Item</th>
<th>How often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Eating the same meal</td>
<td>Eating similar food as the child allows the parent to model the intake of foods available to the child during the same meal. This also provides the child with the opportunity to model the intake of their parents, were differences in meals could make modelling intake difficult. The meal and the dessert of both the parent and the target child are recorded in the boxes provided to the right. The similarity of the meals are scored; 1 = large variations in foods consumed; 2 = similarities and difference and 3 = represents that the same meals were consumed by parent and child.</td>
<td>1, 2, 3</td>
<td>Parent’s meal</td>
<td>Child’s meal</td>
</tr>
<tr>
<td>2. Eating the same pudding</td>
<td>Parent’s pudding</td>
<td>Child’s pudding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Eating certain items first or last.</td>
<td>Parents may model their likes and dislikes by eating certain items first, such as chips, and leaving items they don’t like till last. Parents may also model their dislikes by leaving item on their plate at the end of the meal. These behaviours are tallied and totalled to provide a score.</td>
<td>Item</td>
<td>How often</td>
<td></td>
</tr>
<tr>
<td>4. Choosing foods in front of child or sharing food from plates.</td>
<td>Selecting items in front of target child during the meal, this does not include meal selection. This can consist of behaviours such as taking an extra portion of a certain food item, using condiments such as tomato sauce or selecting food such as garlic bread from serving dishes. Parents may model by eating items from their child’s plate or from serving dishes to encourage their child to eat the item by showing their preference. They may also offer to eat foods their child refused or eat little of, to model their consumption and liking of the food. Instances of these behaviours are tallied and totalled to provide a score.</td>
<td>(how often)</td>
<td>Child’s</td>
<td>Mum’s</td>
</tr>
<tr>
<td>5. Child eat/asks for food from mum’s plate</td>
<td>This item explores children’s active involvement in the modelling process. If they see a parent enjoying eating a certain item they may ask to try the food. This behaviour would indicate a positive reaction to modelling. The number of instances of this type of behaviour was tallied and summed together to create a final score.</td>
<td>(how often)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Intentional modelling</td>
<td>This is when parents intentionally model a behaviour they wish their child to copy. They may draw attention to their behaviour verbally e.g. ‘look at mummy’ or physically by exaggerated the behaviour. Instances of intentional modelling were tallied and totalled at the end of coding.</td>
<td>(how often)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix S

Parental Modelling of Eating Behaviours Observational (PARM-O) coding scheme

Behavioural modelling of meal similarities consists of scores on item 1 and 2. The higher the number the more similar the meal.

Behavioural modelling consists of items 2, 3, 4, 5 and 6, which are all scored by the summing the total number of recorded instances of these behaviours.

**Verbal modelling: Operational Definitions and coding sheet**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Tally/count</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent states likes and dislikes</strong></td>
<td></td>
</tr>
<tr>
<td>Parent talks about their enjoyment of the meal e.g., ‘these are my favourite’, these can also be coded as healthy and unhealthy (this distinction was not included in thesis). Parents do not have to specifically state a like or dislike comments such as “I’m not eating that” still convey the parent’s preferences.</td>
<td></td>
</tr>
<tr>
<td><strong>Positive vocalisation of sounds</strong></td>
<td></td>
</tr>
<tr>
<td>Sound such as “mmm” or the use of one off words such as “lovely” are coded as one instance of this form of verbal modelling. If the parent makes a positive vocalisation such as “mmm mm mmmm” and is still referring to the same item then this is coded as one instance of this behaviour. The same applied to negative vocalisation such as “ugh”.</td>
<td>(How often)</td>
</tr>
<tr>
<td><strong>Negative vocalisation of sounds</strong></td>
<td></td>
</tr>
<tr>
<td>Parent states partner’s likes and dislikes with or without the aim of encouraging the child to follow these behaviours e.g., ‘these are your brothers favourite’ or ‘we best save some of these for Daddy, he won’t be happy if we eat them all’.</td>
<td>(How often)</td>
</tr>
<tr>
<td><strong>Parent siblings likes and dislikes</strong></td>
<td></td>
</tr>
<tr>
<td>Parent does the same as above but uses themselves as the model e.g. “Mummy’s going to have some carrots”</td>
<td>(How often)</td>
</tr>
<tr>
<td><strong>Parent uses themselves as examples</strong></td>
<td></td>
</tr>
<tr>
<td>e.g., ‘your father always sits nicely at the table’ or ‘look how nicely ‘Henry’s sitting’.</td>
<td>(How often)</td>
</tr>
</tbody>
</table>
Observed instances of verbal modelling were tallied for each of the above factors and then summed together to create an overall verbal modelling score.

**Indirect Modelling: Operational Definitions and coding sheet**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Tally/count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unintentional modelling</td>
<td>Behaviours were considered to be unintentional parental modelling when the parent did not verbally or physically draw attention to their behaviour. For example asking the child to watch them or by exaggerating the behaviour. The child also had to be seen to copy the behaviour displayed by the parent during the mealtime.</td>
</tr>
<tr>
<td>Copying parents eating behaviours</td>
<td>This may mean that a substantial amount of unintentional modelling was missed. However, the adoption of the behaviour by the child was the only way to accurately define a behaviour as a form of unintentional modelling.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Healthy</td>
</tr>
</tbody>
</table>

As previously, counts of unintentional modelling were tallied for each item coded and then scores were summed to create an overall unintentional modelling score. The opportunity to code these behaviours as either healthy or unhealthy was also considered but was not undertaken for this present study.
## Discussion about Food and Nutrition: Operational Definitions and Coding Sheet

<table>
<thead>
<tr>
<th>Definition</th>
<th>Tally/Count</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Talks about foods with child</strong></td>
<td></td>
</tr>
<tr>
<td>Examples of way in which parents may discuss food with their child.</td>
<td></td>
</tr>
<tr>
<td>• Ingredients used in meals</td>
<td></td>
</tr>
<tr>
<td>• Food in general</td>
<td></td>
</tr>
<tr>
<td>• Where foods come from</td>
<td></td>
</tr>
<tr>
<td><strong>Good foods vs bad foods</strong></td>
<td>Healthy</td>
</tr>
<tr>
<td>Parents may talk about foods in terms of being good or bad for use.</td>
<td>Unhealthy</td>
</tr>
<tr>
<td>Examples of ways in which parents may discuss this with their child are provided below.</td>
<td></td>
</tr>
<tr>
<td>• This is a treat</td>
<td></td>
</tr>
<tr>
<td>• We can’t have this very often because it’s bad for us</td>
<td></td>
</tr>
<tr>
<td>• You need to eat your fruit because it’s a good for you</td>
<td></td>
</tr>
<tr>
<td>• That’s good for you and that’s bad for you.</td>
<td></td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td></td>
</tr>
<tr>
<td>The importance of a balanced and varied diet may also be potentially</td>
<td></td>
</tr>
<tr>
<td>discussed by parents with their child. Examples are provided below.</td>
<td></td>
</tr>
<tr>
<td>• You have to eat a bit of everything to have a balanced meal</td>
<td></td>
</tr>
<tr>
<td>• Your body needs lots of different foods to work properly</td>
<td></td>
</tr>
<tr>
<td>• Encourage child to try new foods</td>
<td></td>
</tr>
<tr>
<td><strong>Discuss the nutritional value of foods</strong></td>
<td></td>
</tr>
<tr>
<td>Parents may discuss the nutritional content of foods with their child to</td>
<td></td>
</tr>
<tr>
<td>explain/justify the need to eat certain foods.</td>
<td></td>
</tr>
<tr>
<td>For example food which make the body work e.g., ‘<em>You need to eat your</em></td>
<td></td>
</tr>
<tr>
<td><em>vegetables because they’re full of minerals which make our bodies work</em></td>
<td></td>
</tr>
<tr>
<td>or ‘<em>Broccoli is very good for you because it’s full of iron, which</em></td>
<td></td>
</tr>
<tr>
<td><em>makes your blood nice and healthy</em>’</td>
<td></td>
</tr>
</tbody>
</table>

This coding scheme was based on the CPFQ Teaching about nutrition and Encouragement of balance and variety subscales. The type of items parents could potentially discuss, are outline above with examples. As with the PARM-O coding scheme observed counts of parents discussing foods with their child were tallied and then totalled.
Appendix U

‘Encouragement to eat’ coding scheme

<table>
<thead>
<tr>
<th>Encouragement to Eat: Operational Definitions and coding sheet</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbally encourages child’s eating behaviours</td>
<td>Definition</td>
<td>Tally/count</td>
</tr>
<tr>
<td></td>
<td>Encouragement to eat was coded by tallying instance of gentle encouragement, which focused more on praising the child’s behaviours and did not apply pressure to the child to eat a food.</td>
<td>Eating behaviours</td>
</tr>
<tr>
<td></td>
<td>e.g., “well done for trying your carrots”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e.g., “would you like some peas?”</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical encouragement of eating behaviours</th>
<th>Definition</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>e.g., smiles or claps when child displays behaviours considered adaptive/positive by the parent</td>
<td></td>
</tr>
<tr>
<td>Variable coded</td>
<td>Recipient</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pressure to eat</td>
<td>Target child</td>
<td>Parental verbal encouragement to consume more food, such as: “eat a little bit more”, “have some peas” or “eat three more mouthfuls”. Includes gentle use of coercion, such as: “just eat the meat”, or “try a mouthful”.</td>
</tr>
<tr>
<td>Pressure to Drink</td>
<td>Target child</td>
<td>Parental use of physical encouragements to get child to eat, usually by offering food to the child. Includes placing food on the spoon/fork and offering it to the child, or putting food on the cutlery ready for the child to pick up and eat.</td>
</tr>
<tr>
<td>Verbal restriction</td>
<td>Target child</td>
<td>Verbally limiting children’s consumption of foods, for example, by not letting them have any more cheese or garlic bread, or by restricting the amount of biscuits the child is allowed to eat. An example could be: “you can’t have any more” or “you’ve had enough of that”.</td>
</tr>
<tr>
<td>Physical restriction</td>
<td>Target child</td>
<td>Physically limiting children’s consumption of foods, for example, by not letting them have any more cheese or garlic bread, or by restricting the amount of biscuits the child is allowed to eat. This could be by moving the garlic bread away or taking a food away from the child/table. Note: this does not refer to controlling or limiting portion sizes which are given to the child.</td>
</tr>
<tr>
<td>Use of incentives / conditions</td>
<td>Target child</td>
<td>Verbal use of incentives or bargaining in an attempt to increase children’s food consumption. For example, “Mummy will be so happy if you eat your beans”, or “eat this and then you can have some pudding”.</td>
</tr>
<tr>
<td>Negative comments</td>
<td>Target child</td>
<td>Vocalisations spoken with a negative tone. Involves telling child off, or reprimanding them e.g., “James, don’t do that!”. Also includes ordering the child to do things e.g., “pass that”, “sit down”, or to stop doing things “enough now”, and negative statements e.g., “I told you not to do that”. Tone of words spoken to child must be negative. Can include comments about food.</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral comments</td>
<td>Target child</td>
<td>General comments to child, about things such as what they have done that day, instructions for things to do, comments on nursery. Also includes questions, such as “have you brushed your hair?”, “have you been to the toilet?”. Tone is neither negative nor positive. Can include comments about food, such as “please pass the salt”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive comments</td>
<td>Target child</td>
<td>Anything said in a positive tone or praise for the child. Examples include “well done” or “your teacher said you worked really hard at nursery today”. Can include comments about food, such as “well done for trying that broccoli”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative comments</td>
<td>Other parent</td>
<td>Words spoken with a negative, hostile tone, including some form of criticism or disagreement, for example “what did you do that for?” or “leave him, he can feed himself”.</td>
</tr>
<tr>
<td>Neutral comments</td>
<td>Other parent</td>
<td>General comments to other parent, including talking about day to day matters, work, school, children, plans for the weekend. Also, asking questions such as “please can you pass the salad?”.</td>
</tr>
<tr>
<td>Positive comments</td>
<td>Other parent</td>
<td>Praise or positive comments made from one parent to the other. Includes comments such as “this meal is delicious” and “thanks for doing that”.</td>
</tr>
</tbody>
</table>

Instances of the above behaviours/actions were tallied to create an overall score for each variable. For the purpose of the research contained in this thesis only instances referring to the target child were used in analysis as shown above.
Table showing results of Mann Whitney U tests of difference run to compare the average PARM subscales scores of mothers of younger (< 5 years 11 months) and older (> 6 years old) children.

<table>
<thead>
<tr>
<th>PARM</th>
<th>Mean (Median) Child age 71 months and under</th>
<th>SD</th>
<th>N</th>
<th>Mean (Median) Child age 72 months and over</th>
<th>SD</th>
<th>N</th>
<th>Mann-Whitney U tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Appendix W1 (Chapter 3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>4.81 (4.83)</td>
<td>1.08</td>
<td>372</td>
<td>4.75 (4.67)</td>
<td>1.25</td>
<td>102</td>
<td>17,524.00 -0.43 0.67</td>
</tr>
<tr>
<td>Behavioural consequences</td>
<td>5.03 (5.17)</td>
<td>1.23</td>
<td>372</td>
<td>4.92 (4.92)</td>
<td>1.21</td>
<td>102</td>
<td>16,734.00 -1.10 0.27</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>3.51 (3.61)</td>
<td>1.20</td>
<td>372</td>
<td>3.44 (3.33)</td>
<td>1.25</td>
<td>102</td>
<td>17,156.00 0.74 0.46</td>
</tr>
<tr>
<td><strong>Appendix W4 (Chapter 4)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>4.78 (4.83)</td>
<td>1.11</td>
<td>199</td>
<td>4.90 (4.67)</td>
<td>1.24</td>
<td>59</td>
<td>6,106.00 0.47 0.64</td>
</tr>
<tr>
<td>Behavioural consequences</td>
<td>5.06 (5.17)</td>
<td>1.24</td>
<td>199</td>
<td>4.91 (4.86)</td>
<td>1.35</td>
<td>59</td>
<td>5,431.50 0.82 0.41</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>3.70 (3.67)</td>
<td>1.25</td>
<td>199</td>
<td>3.74 (3.67)</td>
<td>1.25</td>
<td>59</td>
<td>5,821.50 0.04 0.97</td>
</tr>
<tr>
<td><strong>Appendix W6 (Chapter 5)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>4.82 (4.83)</td>
<td>1.07</td>
<td>176</td>
<td>4.64 (4.50)</td>
<td>1.56</td>
<td>43</td>
<td>3,333.50 0.94 0.35</td>
</tr>
<tr>
<td>Behavioural consequences</td>
<td>5.02 (5.17)</td>
<td>1.27</td>
<td>176</td>
<td>4.88 (4.92)</td>
<td>1.04</td>
<td>43</td>
<td>31,140.50 -1.51 0.13</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>3.35 (3.33)</td>
<td>1.16</td>
<td>176</td>
<td>3.07 (3.00)</td>
<td>1.12</td>
<td>43</td>
<td>3,174.50 -1.43 0.15</td>
</tr>
</tbody>
</table>
Table showing results of Mann Whitney U tests of difference run to compare maternal and paternal scores on the PARM subscales between younger (< 5 years 11 months) and older (> 6 years) children.

<table>
<thead>
<tr>
<th>PARM</th>
<th>Mean (Median) Child age 71 months and under</th>
<th>SD</th>
<th>N</th>
<th>Sample</th>
<th>Mean (Median) Child age 72 months and over</th>
<th>N</th>
<th>Mann-Whitney U tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Median) Female</td>
<td></td>
<td></td>
<td></td>
<td>Mean (Median) Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD N</td>
<td></td>
<td></td>
<td></td>
<td>SD N</td>
<td></td>
<td>U Z P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers (Chapter 6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>5.04</td>
<td>1.26</td>
<td>26</td>
<td>5.03</td>
<td>1.09</td>
<td>10</td>
<td>124.50 -0.20 0.85</td>
</tr>
<tr>
<td>Behavioural consequences</td>
<td>5.36</td>
<td>1.02</td>
<td>26</td>
<td>5.25</td>
<td>1.03</td>
<td>10</td>
<td>116.50 -0.48 0.64</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>3.44</td>
<td>0.98</td>
<td>26</td>
<td>3.50</td>
<td>1.15</td>
<td>10</td>
<td>130.00 0.00 1.00</td>
</tr>
<tr>
<td>Fathers (Chapter 6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal modelling</td>
<td>5.04</td>
<td>1.21</td>
<td>26</td>
<td>4.70</td>
<td>1.34</td>
<td>10</td>
<td>113.00 -0.44 0.68</td>
</tr>
<tr>
<td>Behavioural consequences</td>
<td>5.41</td>
<td>1.11</td>
<td>26</td>
<td>4.77</td>
<td>0.98</td>
<td>10</td>
<td>77.00 -1.76 0.83</td>
</tr>
<tr>
<td>Unintentional modelling</td>
<td>3.95</td>
<td>1.38</td>
<td>26</td>
<td>3.20</td>
<td>1.30</td>
<td>10</td>
<td>153.50 1.05 0.30</td>
</tr>
</tbody>
</table>
Sample of mothers match exactly to sample of fathers at **Step 1** and **Step 2**

**Step 1**

Child Gender

**Step 2**

Parent ethnicity | Child ethnicity

Sample of mothers matched to sample of fathers as closely as possible at **Step 3**

**Step 3**

Child age in months

Mothers who meet the above criteria for one of the recruited fathers were then matched on the variables in **Step 4**

**Step 4**


The mother from the sub sample created at the end of **Step 3** who mapped as closely as possible onto the paternal participant at **Step 4** were matched.
Appendix Y
Inter-class correlations for the observations

<table>
<thead>
<tr>
<th>Observational Coding</th>
<th>Inter-class correlation coefficient</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Modelling</td>
<td>0.95</td>
<td>.001</td>
</tr>
<tr>
<td>Behavioural Modelling</td>
<td>0.94</td>
<td>.001</td>
</tr>
<tr>
<td>Behavioural Modelling similaris in meals</td>
<td>1.00</td>
<td>.001</td>
</tr>
<tr>
<td>Unintentional Modelling</td>
<td>0.92</td>
<td>.001</td>
</tr>
<tr>
<td>Encouragement</td>
<td>0.85</td>
<td>.001</td>
</tr>
<tr>
<td>Discussion about food</td>
<td>0.94</td>
<td>.001</td>
</tr>
<tr>
<td>Pressure</td>
<td>0.86</td>
<td>.001</td>
</tr>
<tr>
<td>Prompt</td>
<td>0.98</td>
<td>.001</td>
</tr>
<tr>
<td>Verbal restriction</td>
<td>0.98</td>
<td>.001</td>
</tr>
<tr>
<td>Physical restriction</td>
<td>0.95</td>
<td>.001</td>
</tr>
<tr>
<td>Incentives</td>
<td>0.87</td>
<td>.001</td>
</tr>
<tr>
<td>Negative comments</td>
<td>0.71</td>
<td>.002</td>
</tr>
<tr>
<td>Neutral comments</td>
<td>0.89</td>
<td>.002</td>
</tr>
<tr>
<td>Positive comments</td>
<td>0.79</td>
<td>.001</td>
</tr>
</tbody>
</table>

Table showing inter-class correlation coefficients between first and second researcher scores on PARM-O and FMCS