

Peer and friend influences on eating behaviour in school children

By

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Abstract

Currently there is limited research addressing the eating behaviours of preadolescent children, despite evidence suggesting that friends and peers may contribute to the developing eating attitudes and behaviours of children of this age. Eating behaviours in terms of this thesis include both under- and over- eating behaviours, with a specific focus on the under-eating behaviour, dietary restraint, and the over-eating behaviours emotional eating and external eating. The fundamental aim of this thesis was to examine friend and peer influences on children's eating behaviours, with a specific focus on a community sample of preadolescent children. Based on links established in the literature between childhood eating behaviours (dietary restraint, emotional eating and external eating) and parental controlling feeding practices (pressure to eat and restriction) and childhood symptoms of anxiety and depression, these factors were also considered alongside the contribution of friends and peers, both cross-sectionally and longitudinally. The longitudinal stability and continuity of self-reported eating behaviours and perceived parental feeding practices in preadolescent children were also examined in this thesis. A pilot study and experimental study provided an objective measure of children's snack food intake following a school lunchtime, when offered a selection (healthy and unhealthy) of snack foods in the presence of friends and peers. Links between food intake in the presence of friends and peers, and self-reported eating behaviours, parental controlling feeding practices, child symptoms of anxiety and depression and BMI were further explored. The research in this thesis suggests that friends' dieting behaviours predict individual children's dieting behaviours, and also highlights links between problematic eating and anxiety in preadolescent children. Parental controlling feeding practices were found to have a negative impact on preadolescents' eating behaviours and were also found to be potentially linked to the development or maintenance of anxiety and depression symptoms in children of this age. Preadolescents' reports of eating behaviours and

perceptions of the controlling feeding practices their parents utilised with them were stable over time, but, with the exception of restriction, lacked continuity. Dietary restraint, emotional eating and external eating decreased over a 12 month period.

While some of the research in this thesis requires replication, the results present many novel and interesting findings. Using longitudinal and experimental data, the research reported on in this thesis highlights the important contributions of friends, peers, parents and individual anxiety and low mood to the eating attitudes and behaviours of preadolescent aged children.

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Dedication

This thesis is dedicated to Nanna, who sadly didn't get to see me finish my PhD journey, but who would have been so proud.

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Publications and presentations from the research in this thesis

Chapter 1: The content of Chapter 1 is largely the same as a review paper published as:

Houldcroft, L., Haycraft, E., & Farrow, C. (2014). Peer and friend influences on children's eating. *Social Development*, 23, 19-40.

Chapter 3: The study reported in Chapter 3 has been submitted for publication as:
Houldcroft, L., Haycraft, E., & Farrow, C. (under review). Social and individual influences on eating in preadolescents: The role of friends' eating behaviours and individual anxiety and depression. *Appetite*.

The findings from this study also formed part of an oral presentation:

Houldcroft, L., Farrow, C. & Haycraft, E. (2012). *Eating behaviours during preadolescence: Associations with peer eating, parental feeding practices and children's symptoms of anxiety and depression*. Oral presentation delivered at the British Psychological Society Developmental Section Annual Conference, Strathclyde University, Glasgow, 7 September 2012.

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The findings from this study also formed part of an oral presentation:

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Chapter 1: Introduction

This Chapter has been published as:

Houldcroft, L., Haycraft, E., & Farrow, C. (2014). Peer and friend influences on children's eating. *Social Development*, 23, 19-40.

The content of Chapter 1 is largely the same as in the published paper, but the formatting and presentation has been altered so that it remains consistent with the rest of the thesis.

Introduction

1.1 Aims of the literature review

This literature review will introduce eating behaviours in children and define the main eating behaviours researched in this age group. It will then define the important time period of preadolescence, on which this thesis focuses, and discuss eating behaviours which are prevalent during this time. The literature review will next discuss and evaluate previous research and current understanding of the influences that friends and peers have on eating behaviours during childhood and preadolescence. The review will then assess the literature relating to two further risk factors for problematic eating behaviours in preadolescent children: parental feeding practices (specifically pressure to eat and restriction) and childhood symptoms of anxiety and depression. The literature review will conclude with an overview of the present thesis and statement of the thesis aims.

1.2 Children's eating behaviours

Problematic eating in children and adolescents is common (see Birch, Fisher & Ventura, 2007, for a review of the development of children's eating behaviours). Both over- and under-eating behaviours in community samples of children can be problematic (e.g., Moy, Petrie, Dockendorff, Greenleaf & Martin, 2013; Tanofsky-Kraff, Faden, Yanovski, Wilfley & Yanovski, 2005; Wildermuth, Mesman & Ward, 2013). The two most commonly researched problematic *over-eating* behaviours that occur in non-clinical samples of children are emotional eating and external eating (Marcus & Kalarchian, 2003). Emotional eating (i.e. eating in response to emotions rather than internal hunger and satiety cues) occurs when an individual responds to emotional arousal by over-eating. External eating (i.e. eating in response to external cues for

food) occurs when an individual responds to external rather than internal hunger and satiety cues (for example, seeing or smelling food and having a desire to eat the food straight away). On the other hand, the most frequently researched problematic *under-eating* behaviour in children is dietary restraint (Marcus & Kalarchian, 2003). Dietary restraint (i.e. restricting one's intake of food) occurs regardless of the individual's internal feelings of hunger, with the main purpose of the individual exhibiting this behaviour being to either lose or maintain weight.

The importance of understanding eating behaviours in children is fundamental because research suggests that non-clinically defined under-eating behaviours in childhood can be associated with the development of disordered eating in later childhood and adolescence (e.g., Davison, Markey & Birch, 2003; Kotler, Cohen, Davies, Pine & Walsh, 2001) and, similarly, non-clinical over-eating behaviours in childhood have been linked to over-eating and obesity in later childhood and adulthood (Guo, Wu, Chumlea & Roche, 2002; World Health Organisation, 2014).

Developmental research suggests that concerns about body image, weight-loss and dieting behaviours commonly emerge during middle-to-late childhood, or *preadolescence*, and research has begun to investigate this important time period in relation to eating behaviours (e.g., Bartle, Hill, Webber, van Jaarsveld & Wardle, 2013; Ricciardelli, McCabe, Holt & Finemore, 2003; Schur, Sanders & Steiner, 2000; Stice, Agras & Hammer, 1999).

1.3 Preadolescence

1.3.1 Defining preadolescence

Preadolescence, the period between childhood and adolescence that precedes puberty, commences at different ages for each individual child, although it is thought to

occur "somewhere between eight-and-a-half and ten" years of age (Sullivan, 1953, p. 245). During the preadolescent years, children prepare developmentally for the physical and psychological changes that accompany the imminent stage of puberty (Sullivan, 1953). Puberty is a process, rather than a single event, that incorporates biological, sexual, physical, social and emotional changes in the child (Susman & Dorn, 2009).

1.3.2 Eating behaviours during preadolescence

Research suggests that the preadolescent ages of 8 to 11 are of fundamental importance to enhancing our understanding of the development of body image concerns, strategies of body change and problematic eating behaviours (Ricciardelli et al., 2003). The onset of problematic under-eating behaviours during preadolescence may lead to several detrimental outcomes, for example: delays in puberty; stunted growth and physical development; and impaired cognitive functioning (National Institute for Health and Care Excellence, 2004). Research has also linked problematic eating behaviours during preadolescence to the onset and development of clinical eating disorders in adolescence and adulthood (e.g., Combs, Pearson, Zapolski & Smith, 2013; Kotler et al., 2001).

Despite a wealth of research into the risk factors and predictors of problematic eating behaviours in adolescents, most notably in the United States by Diane Neumark-Sztainer and colleagues (e.g., Neumark-Sztainer, Wall, Guo, Story, Haines & Eisenberg, 2006; Neumark-Sztainer, Wall, Haines, Story, Sherwood & van den Berg, 2007; Story, Neumark-Sztainer & French, 2002), there remains a dearth of research examining eating behaviours during the preadolescent period. It is imperative, therefore, that research considers the factors and predictors of problematic eating

behaviours in preadolescents, at an age before eating pathology most commonly onsets. The primary aim of this thesis was to examine how preadolescents' eating behaviours may be influenced by their peers and friends. This included examining preadolescent eating behaviours in terms of self-reported under-and over- eating behaviours (e.g., Farrow, Haycraft & Meyer, 2011; Hutchinson & Rapee, 2007; Paxton, Schutz, Wertheim & Muir, 1999), and eating in terms of consumption, or food intake (e.g. Birch, 1980; Duncker, 1938; Hendy & Raudenbush, 2000; Salvy, Coelho, Kieffer, & Epstein, 2007a; Salvy, Romero, Paluch, & Epstein, 2007b). The literature in the subsequent sections of this introduction covers research into both aspects of these eating behaviours in children (see also Table 1.1).

1.4 Peers and friends

There are multiple people who influence children's food intake, however two key groups of individuals are peers/friends and parents (e.g., Houldcroft, Haycraft & Farrow, 2014; Salvy, de la Haye, Bowker & Hermans, 2012; Scaglioni, Salvioni & Galimberti, 2008; see Section 1.6 for a review of parental influences). Evidence suggests that peers and friends are important role models for children's developing eating attitudes and behaviours (e.g., Birch, 1980; Duncker, 1938; Hendy & Raudenbush, 2000; Salvy et al., 2007a; Salvy et al., 2007b). Children spend a substantial amount of time in the company of both friends and peers, predominantly in school, and these individuals are a central source of influence on school-aged children. As children progress through childhood and their schooling lives, their independence increases and the time they spend interacting with peers and friends becomes greater (Sullivan, 1953) and less supervised by their parents (Gifford-Smith & Brownell, 2003). Solid friendship groups are usually found in children older than 8 years of age, when children are likely to have formed a close group of friends with a

secure structure (Foot, Chapman & Smith, 1980). This age coincides with the suggested time when preadolescence commences (Sullivan, 1953).

During the period of preadolescence, the social needs children require from their friendships change; in childhood they need friends for companionship, but in early adolescence this shifts to requiring friends for close friendships and intimacy (Sullivan, 1953). The peer group increases in importance during preadolescence, as does social awareness and social anxiety (Hayward, 2003). It is therefore possible that the influences friends have on children in their friendship group may change over this time period.

1.4.1 Peer and friend social influences on children

Peers and friends play an important role in influencing children's developing attitudes and behaviours as children look to these individuals for advice and they act as a social source of reinforcement for children's evolving attitudes and behaviours (Hartup, 1984; Sullivan, 1953), gradually becoming more influential as children progress through childhood and into preadolescence (Rubin, Bukowski, & Parker, 2006). In children and adolescents, peer modelling of behaviours and the influences of friends have been studied in several domains, including: delinquency (Mears, Ploeger & Warr, 1998); self-efficacy (Weiss, McCullagh, Smith & Berlant, 1998); risk-taking behaviours (e.g., smoking, alcohol consumption and drug-use; Hoffman, Sussman, Unger & Valente, 2006; Musher-Eizenman, Holub & Arnett, 2003), and eating behaviours (e.g., Birch, 1980; Duncker, 1938; Hendy & Raudenbush, 2000; Salvy, Coelho, Kieffer, & Epstein, 2007a; Salvy, Romero, Paluch, & Epstein, 2007b).

1.5 Theories of social influence on eating

A theory that is considered key to the underpinnings of our understanding of the influence of individuals on one another's behaviour is Bandura's (1977) *social learning theory*. Social learning theory proposes that the majority of human behaviour is learned through the observation of others' behaviour (observational learning), however, unlike behaviourist theories, social learning theory acknowledges cognitive processes as mediating factors between the interactions of the environment and individual behaviour. Bandura's social learning theory is a social cognitive theory, as opposed to a behavioural model of learning, as it includes the importance of cognitive states, or intrinsic reinforcement (e.g., pride, confidence or satisfaction in behaviours performed), alongside environmental reinforcement of behaviours.

According to social learning theory, learning is developed from direct experiences and reinforcement, with an emphasis on the role of others as reinforcers of behaviour.

Bandura suggests two key types of reinforcement; vicarious reinforcement (seeing others reinforced motivates an individual to perform the reinforced behaviour) and self-reinforcement (evaluating ones' own behaviour on the basis of how others have reacted to it) (Bandura, 1977). In the case of vicarious reinforcement, if a person is observed being reinforced for their actions, then imitation of the reinforced behaviour becomes more likely. However, if the model is observed being discouraged, or punished for their actions, then the behaviour may not be repeated (Bandura, 1977).

A key component of social learning theory is the concept of learning through modelling, or the influence of others' example. Modelling is influenced by a number of factors including attention (how much you attend to the situation, which depends on the importance of the model); retention (the ability to store the information learned);

reproduction (practicing the learned behaviour), motivation to perform the behaviour (whether the learned behaviour is reinforced or punished). According to Bandura, people are most likely to model the behaviours of an individual who they perceive to be similar to them and with whom they associate most regularly, since repeated exposure to a behaviour allows it to be learned more comprehensively (Bandura, 1977).

Bandura (1969, p. 241) suggests that “prestige, power, competence, socio-economic status and expertise” affect modelling behaviours. Some individuals command more attention than others, and models with interesting or influential qualities are sought out over those lacking these qualities. In instances where there are several models displaying differing patterns of behaviour, individuals may select more than one individual and amalgamate different elements from different individuals (Bandura, 1977).

Applied to eating behaviours, social learning theory would suggest that the people children spend a significant amount of time interacting with in an eating environment would likely be influential modellers of food consumption and liking. Since children spend time with their peers and friends during school lunch and snack times, and possibly in other eating situations outside of school, peers and friends are likely to be influential modellers of children's food intake, particularly those children who are deemed to be interesting and influential to a child.

In their review of the effect that other individuals can have on food intake, Herman, Roth and Polivy (2003) highlight three main bodies of literature that have developed in this area: social facilitation; modelling; and, impression management. Experimental and diary studies of social facilitation suggest that, in general, people eat more when in the presence of others than when alone (e.g., de Castro, 1990; de Castro, Brewer,

Elmore, & Orozco, 1990; de Castro, 1991; Klesges, Bartsch, Norwood, Kautzman, & Haugrud, 1984; Patel & Schlundt, 2001), and this has been shown to be greater when eating in the presence of a spouse or family member (de Castro, 1994). In studies that have looked at modelling of eating (how the presence of others during eating situations facilitates or inhibits food intake, and is linked to Bandura's (1977) social learning theory), people eat more when their co-eaters eat more, and less when co-eaters eat less (e.g., Conger, Conger, Costanzo, Wright, & Matter, 1980; Goldman, Herman, & Polivy, 1991; Roth, Herman, Polivy, & Pliner, 2001). Moreover, recent research with adults suggests that factors specific to the co-eater, such as weight (e.g., Hermans, Larsen, Herman, & Engels, 2008), gender (e.g., Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007c), familiarity (e.g., Salvy et al., 2007c) and the quality of the social interaction between co-eaters (e.g., Hermans, Engels, Larsen, & Herman, 2009) may influence the modelling effects observed. Research suggests that people eat less when in the presence of others who they believe are observing or evaluating them, compared to when eating alone (e.g., Roth et al., 2001).

Impression management research explains *why* people eat more or less in the presence of others (Herman et al., 2003). Herman et al. (2003) suggest that consumption rates rely on individuals' social comparisons of intake and the social approval they wish to gain from the other individuals present. The desire to convey a positive impression can influence food intake in social situations based on consumption stereotypes. Children, or adults, may eat in a particular way (e.g., eating minimal amounts, or eating large amounts) to convey a good impression to others present (e.g., femininity, or masculinity) (Vartanian, Herman & Polivy, 2007). Such consumption stereotypes can become internalised and influence food intake long-term in order to establish or maintain a desired impression.

Based on their review of the literature relating to social facilitation, modelling and impression management, Herman et al. (2003) developed the *normative model of eating*, which posits that eating is directed by norms specific to the social eating situation, notably the eating behaviours of others present and how important their social approval is deemed to be. Applied to children eating in the presence of peers and friends, the normative model of eating suggests that the presence of these individuals may increase or limit eating, dependent on the cues children are given by the social situation, as well as the individual factors of children and their co-eaters.

Previous research evaluating the influence of friends and peers on food intake in children has used both *familiar* and *unfamiliar* peers. Peers who are familiar to a child are suggested to facilitate children's responses in a social situation, whereas unfamiliar peers are thought to stimulate inhibition and wariness (Lewis, Young, Brooks, & Michelson, 1975). It is possible that familiar peers may be considered by target children to be desirable as friends in such a way that the social approval of these individuals may be exaggerated and this may be reflected in the outcomes of such studies. The purpose of the following section of this literature review is to synthesise and evaluate the literature relating to peer and friend influences on children's eating (see Table 1.1 for an overview of all studies included in this review section). In view of the fact that research using preadolescent children remains limited, the following review includes all research findings in this area pertinent to childhood.

Table 1.1: Summary of reviewed studies addressing peer and friend influences on children's eating

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Birch (1980)	USA	Peers- groups of unfamiliar, older peers	2-5 years; mixed gender; N= 17; weight not measured.	Experimental	Children were grouped with 3 or 4 older peers who had high preferences for the target child's disliked food. Children were exposed to 4 lunchtimes of peer modelling on consecutive days.	Food preference and consumption	Children's consumption and preference of initially disliked foods increased after 4 days of peer modelling.
Cullen et al. (2001)	USA	Peers- familiar	9-11 years; mixed gender; N= 230; weight not measured.	Non-experimental- questionnaires	Children completed measures of peer (and family) influences on their fruit and vegetable consumption, as well as completing a daily food record form.	Fruit and vegetable consumption	Children's perceptions of their peers' beliefs about consuming fruit and vegetables were negatively associated with their own fruit and vegetable consumption (i.e. children believing that their peers thought eating fruits and vegetables was a good thing, had lower levels of fruit and vegetable consumption themselves).
Duncker (1938)	USA	Peers- unfamiliar and fictional peers	2-6 years; mixed gender; N= 22; weight not measured.	Experimental	Children's food preferences were assessed pre-experiment. They were then paired with a peer who had different food preferences. The same method was used by telling children a story about a fictional hero who had food preferences that differed to their own.	Food preference	Children's food preferences shifted to match the preferences of the peer, when the peer was real or fictional.

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Farrow, Haycraft & Meyer (2011)	UK	Friends-self-reported	8-11 years (M=10.47); mixed gender; N=154; weight self-reported	Non-experimental-questionnaires	Children completed measures of their eating and weight attitudes, body dissatisfaction and levels of anxiety. Children reported the names of other children in their friendship clique and friendship groups were constructed by the authors using social network analysis techniques.	Friend similarities in eating attitudes and behaviours	Children's dietary restraint, body dissatisfaction, and external eating were significantly related to their friendship groups' dietary restraint. Children's individual levels of anxiety moderated the relationships between friendship group dietary restraint and individual external eating. Group dietary restraint levels predicted higher levels of external eating in children with moderate or high anxiety.
Greenhalgh et al. (2009)	UK	Peers-unfamiliar	5-7 years (Study 1; N=35). 3-4 years (Study 2; N=44); mixed gender; weight not measured.	Experimental	Target children assigned to one of 3 groups and presented with a novel food. Within groups, each child was given the novel food on four snack occasions. Group A received positive modelling of the novel food on the first and third occasions, but were alone when receiving the novel food on the second and fourth occasions. Group B had negative modelling first, positive modelling third, and ate alone on the second and fourth; Group C ate alone on all four occasions.	Food (novel) consumption	When negative peer modelling was employed alongside presentation of a novel food, food consumption was inhibited. In younger children (3-4 years), this was difficult to reverse. Positive peer modelling increased consumption of a novel food, but required more than one exposure.

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Hendy (2002)	USA	Peers-familiar trained to model novel foods	3-6 years (M= 54.8 months); mixed gender; N= 22; weight not measured.	Experimental	Children were presented with 3 novel foods: 1 food had no modelling; 1 was modelled by a male familiar peer; 1 was modelled by a female familiar peer. Toys were used as rewards for novel food consumption. Children were randomly selected to model the novel foods, and received training in modelling from their teachers prior to the intervention.	Food consumption-bites of novel food consumed at baseline, following modelling, and 1 month later	Children (male and female) were most likely to increase acceptance of novel foods (increased from baseline) when modelled by female peers. At 1 month follow-up, food acceptance was not maintained. However, trained peer models reported maintained acceptance of foods they modelled to target children.
Hendy & Raudenbush (2000; Study 5)	USA	Peers-unfamiliar; alone; familiar teachers	4-5 years; mixed gender; N=14; weight not measured.	Experimental	Children were exposed to one of 3 conditions: teacher modelling of a new food; unfamiliar peer modelling of a new food; exposure only to new food (no modelling).	Food 'acceptance' (bites) of a new food immediately, and at 1 month	For immediate food acceptance there were no differences found by condition (unfamiliar peer/ teacher/ alone). Girls accepted new foods more when they were modelled by peers, both immediately and at follow-up.

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Hutchinson & Rapee (2007)	Australia	Friends-self-reported	10-14 years (M= 12.3 y); girls only; N=1094; weight measured but not used as inclusion or exclusion criteria.	Non-experimental-questionnaires	Girls completed measures of body image concerns, eating behaviours, weight-loss and binge eating behaviours. They also completed measures of their friends' concerns with eating and dieting and how much their friends influenced them, as well as a scale of weight-related teasing from friends. Girls further completed measures of self-esteem and depression. Girls reported the names of other girls in their friendship clique and friendship groups were constructed by the authors using social network analysis techniques.	Friends' influences on girls' eating attitudes and behaviours	Friends shared similar scores on measures of eating, dieting, weight-loss and binge eating, but not body image. Girls' own dieting and weight-loss behaviours could be predicted by her friends' scores. Friendship group scores for eating, dieting, weight-loss and binge eating were significantly associated with friendship group perceptions of peer influences on eating, actual body mass index and psychological variables. Girls' perceptions of their friends' influences on their eating predicted girls' own dieting, weight-loss and binge-eating behaviours.
Oliver & Thelen (1996)	USA	Peers, familiar	8-12 years; mixed gender; N= 264; weight measured but not used as inclusion or exclusion criteria.	Non-experimental-questionnaires	Children completed questionnaire measures of: their peers' influence on their eating and body image; their own body image and eating attitudes; and their eating disorder symptomology.	Children's perceptions of peer influence on their own eating attitudes and concerns	Children's perceptions of the influences their peers had on their eating were linked with their own eating and body image concerns. How much children believed they were liked by their peers was the strongest predictor of children's eating-related concerns. Similarly, children's reports of the negative messages peers gave them about their bodies were related to their own eating and body concerns.

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Paxton et al. (1999)	Australia	Friends-self-reported	Age M= 15.5 years; girls only; N=523; weight and height measured but not used as inclusion or exclusion criteria	Non-experimental-questionnaires	Girls completed measures of eating behaviours, body image concern and binge eating. Girls also completed measures of friend support, friend influences on their body image and dieting, pressure from peers to be thin, media pressure to be thin, and family support they received. Girls completed psychological measures of self-esteem, depression. Girls reported the names of other children in their friendship group and friendship cliques were constructed using social network analysis techniques.	Friend similarities in eating attitudes and behaviours, dieting and binge eating	Similarities for friends' body image, dietary restraint and eating and weight loss was greater within-groups than between-groups. Friends' attitudes to eating predicted girls' individual eating and body image. Friends' use of eating and weight loss behaviours predicted girls' individual use of such behaviours.
Romero, Epstein & Salvy (2009)	USA	Peer-unfamiliar, seen on video	8-12 years; girls only; N= 44; 22 overweight 22 non-overweight	Experimental	Overweight and non-overweight girls watched a video model consume a large or small serving size of cookies, using a 2 (weight status) x 2 (serving size) factorial design.	Food consumption	Girls in the large serving size condition consumed more cookies than those in the small serving size. Overweight girls consumed more cookies than non-overweight girls. There was no interaction of weight status by serving size.

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Salvy et al. (2007a)	Netherlands/ USA	Condition 1: Peers-unfamiliar Condition 2: Alone	6-10 years; mixed gender; N= 32; 15 lean and 17 overweight	Experimental	Following a preload, children were given free access to consume pizzas, while playing with a variety of toys and games, both alone and in groups (containing 4 children). A 2x2 factorial design with children's weight status (overweight/ normal weight) as a between-subjects factor, and social context (group/ alone as a within-subjects factor. The order children took part in the study was counterbalanced.	Food consumption following a preload	Overweight children consumed more when alone than when in a group. Healthy-weight children consumed more with others than when alone.
Salvy et al. (2007b)	USA	Peers-unfamiliar	8-12 years; girls only; N= 46 (23 lean: =/<85 th BMI percentile and 23 overweight or at risk for becoming overweight: >85 th BMI percentile).	Experimental	Children were paired with a peer and completed a sorting task for 45 minutes, with free access to snack foods. A between-groups design was used, with weight status as the between-subjects factor. Half of the sample was paired with weight-concordant peers (lean+ lean/ overweight+ overweight) and half paired with weight-discordant peers (lean+ overweight). Dyads were age-matched.	Food consumption (kilocalories)	Overweight-overweight pairings consumed more kilocalories than overweight-lean dyads. Lean girls paired with overweight girls ate a similar amount to lean-lean dyads. Peer intake significantly predicted the paired girls' consumption.

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Salvy et al. (2008a)	USA	Condition 1: Peers-unfamiliar Condition 2: Alone	10-12 years; mixed gender; N= 39 (21 healthy weight: $\leq 85^{\text{th}}$ BMI percentile and 18 overweight/risk for becoming overweight: >85 th BMI percentile).	Experimental	Children had access to nutrient dense and energy dense snacks and were given games as alternative to eating. Children completed the task alone, or in pairs. A 2x2 factorial design with children's weight status (overweight/ healthy weight) as a between-subjects factor, and social context (pair/ alone) as a within-subjects factor. The order children took part in the study was counterbalanced.	Food consumption and nutrient/ energy dense food choice	Overweight children consumed significantly more when alone than when paired with an unfamiliar peer. Overweight children also consumed more alone than did non-overweight children when alone. Non-overweight children's consumption did not differ by social context. Children's consumption of nutrient-dense (healthy), but not energy dense (unhealthy), snacks, was predicted by their peers' consumption of these snacks.
Salvy et al. (2008b)	USA	Siblings pairs, unfamiliar peer pairs and alone	5-11 years(M= 6.8);mixed gender; N= 44(16 paired with sibling; 10 with unfamiliar peer; 18 alone); all non-overweight	Experimental	Children had access to a large amount of cookies and were given a sorting task to complete. Children were paired with a sibling, an unfamiliar peer, or completed the task alone.	Food consumption	Children paired with siblings consumed more than children eating with an unfamiliar peer, or alone. Children paired with siblings displayed less matching of food intake than did children paired with an unfamiliar child/ eating alone.

Author/s	Country	Friend or Peer (familiar or unfamiliar) or Other	Age/ Gender/ Sample size/ Weight	Experimental/ Non-experimental	Methodology	Key variables of interest	Key findings
Salvy et al. (2009)	USA	Friends and unfamiliar peers	9- 15 years (M= 13 years); mixed gender; N= 65 (42 non-overweight, 15 th -85 th BMI percentile and 23 overweight: >85 th BMI percentile).	Experimental	Children had access to nutrient dense and energy dense snacks and were given games as alternative to eating. Children were paired with a similar aged friend or unfamiliar peer. A 2x2 factorial design with children's weight status (overweight/ non-overweight) as a between-subjects factor, and friendship (friend/ unfamiliar peer) as a within-subjects factor.	Food consumption and nutrient/ energy dense food choice	Children paired with a friend consumed significantly more than those paired with an unfamiliar peer. Overweight children paired with an overweight child consumed more snacks than overweight children paired with a non-overweight partner. Overweight-overweight friend pairs consumed significantly more than children in other conditions. Non-overweight children paired with an overweight unfamiliar peer consumed less energy than non-overweight children paired with non-overweight unfamiliar peers. Non-overweight children paired with friends consumed more snacks regardless of their friends' weight status (non-overweight/ overweight).
Wind et al. (2005)	Belgium and Netherlands	Friends	11 year olds; mixed gender; N= 2468; weight not measured	Non-experimental-questionnaires	Children completed questionnaire measures specifically designed by the authors for this study, to measure children's fruit and vegetable intake. Questions about modelling of food intake from friends were also used.	Fruit and vegetable consumption	Children who reported greater fruit and vegetable consumption also reported perceiving more food modelling behaviours from their friends, although many other social and demographic factors were also associated.

1.5.1 Peer and friend influences on children's eating behaviours

In order to effectively review the literature on peer and friend influences on children's eating behaviours it is important to note the distinction between *friends* and *peers*. The terms cause problems when reviewing literature in this field as they are often used interchangeably by authors, yet are conceptually different in terms of the type of relationship each provide (Dunn, 2004). By definition, *peers* are said to be "individuals who are similar to the child in age and/or developmental level...who do not share kinship or reside within the same family" (Ladd, 1989, p. 5). Using this description, peers include a wide-range of individuals that a child frequently interacts with, for example, a "friend, acquaintance, classmate and teammate" (Ladd, 1989, p.1). On the other hand, the term *friend* infers a reciprocated relationship between the child and another individual that both enter into voluntarily (Ladd & Kochenderfer, 1998); a friendship being "a particular type of experience that takes place between two individuals" (Bukowski & Hoza, 1989, p.19).

It is possible that research using peers compared to friends may actually be considering two distinct groups who have differing relationships with children and who may impose different influences on them (see Dunn, 2004, for a detailed account of the value of children's friendships). For the purposes of this review and throughout the thesis, articles that use both the terms 'peers' and 'friends' have been included, making clear as much as possible how the authors have utilised the terms in their research, and distinguishing between the use of peers known to the child (e.g., someone they have interacted with previously, such as a member of their school class) and unfamiliar peers (e.g., someone similar in developmental level, who they have not had previous interactions with and are not known to the child).

1.5.2 Peer modelling of eating

As mentioned in Section 1.5, modelling studies examine how the presence of others in eating environments facilitates or inhibits food intake. In the 1930s, Duncker (1938) was one of the first to explore the influence of peer models on children in the context of eating. Twenty-two target pre-school children (aged 2-6 years) were paired with an unfamiliar peer who showed preferences for foods that differed from the target children's own preferences (as assessed prior to the experiment). Following the peer's selection of foods, target children's food preferences shifted to match the preferences of the peer. The same effect was observed when children were told a story about the food preferences of a fictional hero; children's preferences for a previously disliked food changed to match the preferences of the hero (Duncker, 1938). More recently, a similarly designed study indicated that young children (aged 2-5 years) displayed a shift in preference for initially disliked foods following four days of exposure to peer modelling (Birch, 1980). Seventeen children were grouped with three or four unfamiliar peers who were older and who showed high preference for the target child's disliked food. Following peer modelling during lunch times, target children's consumption and preference of the initially disliked target food increased (Birch, 1980). Although using small sample sizes, these seminal studies (Birch, 1980; Duncker, 1938) provided preliminary evidence that exposure to peer modelling can influence young children's food preferences and consumption, inducing them to consume and prefer foods that they initially had disliked, over foods that they had previously liked. Contemporary research focussing on food consumption in late childhood reports similar findings. In a study using peer modelling on a video, Romero, Epstein and Salvy (2009) found that 8-12 year old girls' intake of cookies matched that of a 10 year old girl they watched in a video (who was seen to consume a small or large serving of cookies), highlighting the powerful nature of modelling and children's social comparisons of food intake in affecting their own intake of food.

Experimental work has examined the influence of peer modelling on children's consumption of a novel food, directly comparing negative (e.g., peer making negative comments about the target novel foods) and positive (e.g., peer making positive comments about the target novel foods) modelling (Greenhalgh, Dowey, Horne, Lowe, Griffiths & Whitaker, 2009). Consumption of a novel blue food in children aged 3-4 and 5-7 was found to decrease following exposure to *negative* modelling from unfamiliar peers, however, despite a trend in the data, consumption following positive peer modelling did not differ significantly between children exposed to modelling compared to controls (Greenhalgh et al., 2009). By introducing *positive* peer modelling after negative modelling, the authors reported that the effects of negative modelling were successfully reversed in children aged 5-7, but not for younger children (3-4 years). The implication of such findings is that the effects of negative peer modelling may be more potent and enduring than those of positive modelling, particularly for younger children.

1.5.3 Friends' and peers' eating behaviours

Given the evidence which suggests that children are influenced through observational modelling of peers' behaviour (e.g., Birch, 1980; Duncker, 1938; Greenhalgh et al., 2009), it is also possible that children's perceptions of their peers' and friends' attitudes towards eating may influence their own eating. Social network analysis (Paxton et al., 1999) is a relatively novel practice which researchers have utilised to explore similarities in the eating attitudes and behaviours of friendship groups. The technique involves asking children to name the children they are closest to and spend most time with, allowing researchers to establish friendship cliques or social networks. The similarities of attitudes and behaviours within friendship groups can then be explored (Paxton et al., 1999). In research such as this, the focus is on *friends*, rather than peers who tend to be the focus in experimental research.

Using social network analysis, adolescent girls have been found to report body image concerns, dietary restraint and weight-loss behaviours that are similar to those of girls in their friendship cliques (Hutchinson & Rapee, 2007; Paxton et al., 1999). In a preadolescent sample (aged 8-11 years), Farrow et al. (2011) reported similar findings, with children's (both boys' and girls') levels of dietary restraint, body dissatisfaction and external eating being significantly associated with those of other children in their friendship group. Furthermore, friendship group attitudes towards eating did not appear to impact individual children's eating attitudes directly, but were found to be moderated by the child's own anxiety, with children who were more anxious being more susceptible to friend influences (Farrow et al., 2011). This suggests that children's individual symptoms of anxiety may make them more susceptible to friend influences on their eating. A similar pattern has also been found with symptoms of depression and self-esteem: Hutchinson and Rapee (2007) reported that 10-14 year old girls who were members of friendship cliques and regularly dieted or used behaviours to reduce their eating and weight, reported significantly lower self-esteem, higher levels of depression and greater negative emotions.

Studies not employing social network analysis have reported similar results to those using social network analysis in identifying similarities between the eating behaviours of children and their friends and peers. For example, a study by Wind et al. (2006) found that perceived modelling of fruit and vegetable consumption by friends (and parents) was positively correlated with 11 year old children's self-reported intake of fruit and vegetables. In a pilot study using their own measure of peer influences on children's eating (the Inventory of Peer Influence on Eating Concerns), Oliver and Thelen (1996) reported that 8 to 12 year old children's perceptions of peer influences on their eating, particularly negative peer messages about their body and the belief that peers would like them more if they were thinner, were related to children's own maladaptive eating behaviours and negative eating concerns. Interestingly, Cullen,

Baranowski, Rittenberry, Cosart, Hebert and de Moor (2001) reported that 9 to 11 year old children's belief that their peers thought that eating fruits and vegetables was good was negatively associated with children's own reported consumption of these foods, as measured by food diaries and a questionnaire designed specifically for the study. Although all three studies suggest that children's perceptions of their peers' and friends' beliefs about eating have a substantial influence on children's own eating behaviours and attitudes to eating, it is important to note that these findings are cross-sectional and also, that children's perceptions may not represent the reality of their peers' and friends' influences. As noted above, other factors appear to be involved in children's perceptions, for example, symptoms of child anxiety and depression and low self-esteem; Farrow et al., 2011; Hutchinson & Rapee, 2007; see also Section 1.7), and these, along with variability in the outcome measures used, may help to explain discrepancies in previous results. It is also plausible that there may be individual differences that are related to children's susceptibility to their own eating behaviours being influenced by perceptions of their peers' and friends' attitudes towards eating.

1.5.4 Peer and friend individual differences

Several individual factors have been suggested to be associated with the effect of peer and friend influences on children's eating, including gender, weight, age, and familiarity. Each of these is discussed in turn, below.

1.5.4.1 Gender

There may be gender differences in children's susceptibility to peer and friend influences on eating. In a series of studies that compared the effectiveness of teachers versus peers as food modellers, Hendy and Raudenbush (2000; study five) found that when new foods were promoted by unfamiliar peers, pre-school *girls* (4-5 years old) were more likely to accept the new food than were boys of a similar age. However, the small sample size of this study (6 boys, 8 girls) limits its generalisability.

A questionnaire-based study with a much larger sample of 264 preadolescents (aged 9-11) reported that girls, rather than boys, were more likely to believe that being thin would increase their peer likeability (Oliver & Thelen, 1996). However, in both boys and girls, the belief that being thin would increase likeability by their peers significantly predicted weight and body concerns. Research has further examined the gender of peer co-eaters, rather than the target child. Familiar female peers modelling eating of novel foods have been found to be more effective than familiar male models at increasing acceptance and consumption of novel fruits and vegetables in both male and female children aged 3 to 6 years (Hendy, 2002). However, at a follow-up one month later, this effect was not maintained (Hendy, 2002).

Results such as those above are noteworthy, given the evidence that preadolescent and adolescent girls report higher levels of body dissatisfaction, eating concern and dieting behaviours compared to boys of the same age (e.g., Thomas, Ricciardelli, & Williams, 2000; Wood, Becker, & Thompson, 1996). Numerous studies addressing peer and friend influences on children's eating have employed a sample consisting only of girls, particularly those utilising a preadolescent age group (from 8 years of age) (e.g., Hutchinson & Rapee, 2007; Romero et al., 2009; Salvy et al., 2007b). However, a study using both boys and girls did not report gender differences in peer influences (e.g., Farrow et al., 2011). Farrow et al. (2011) found no gender differences in friend influences on the eating of preadolescent children, aged 8 to 11 years. The differences in the results obtained could be partly attributed to the different designs, with some studies being experimental and focussing on peers (Romero et al., 2009; Salvy et al., 2007b) and others being non-experimental and focussing on friends (Farrow et al., 2011; Hutchinson & Rapee, 2007).

1.5.4.2 Weight

Research evaluating the effect of the weight status of the peer/friend and target child on children's food consumption has produced mixed results. Two studies found that overweight children paired with either overweight unfamiliar peers (Salvy et al., 2007b) or overweight friends (Salvy, Howard, Read, & Mele, 2009) consumed more food, when compared to overweight/non-overweight matched dyads. Furthermore, overweight children have been found to consume more when alone than when in the presence of an unfamiliar peer (Salvy, Kieffer, & Epstein, 2008a) or a group of unfamiliar peers (Salvy et al. 2007a). In contrast, non-overweight children consumed more when eating with unfamiliar peers than when eating alone (Salvy et al., 2007a). These mixed findings suggest that children's social eating environment, in particular whether they eat alone or are paired with peers or friends, and how important their co-eaters' social approval is deemed to be, can have an important influence on their eating behaviour (Herman et al., 2003), and that the weight status of the child and/or co-eater may affect this influence. It is worth noting, however, that previous research has focussed on overweight and healthy weight children, and no research has been conducted examining underweight children, which could be an important oversight.

1.5.4.3 Age

Child age may also be associated with children's susceptibility to peer influences on eating. In experimental studies using young children (2-6 years), the food choices of younger children were shown to be more influenced by peers than were the choices of the older children (Birch, 1980; Duncker, 1938). Evidence also suggests that younger (2-6 years of age) children's eating is strongly influenced by peers older than themselves (Birch, 1980; Duncker, 1938), even when older peers were mixed with peers of the same age as the target children (Birch, 1980). Greenhalgh et al.'s (2009) finding that negative modelling was not successfully reversed by positive modelling for younger children (aged 3-4 years) in contrast to its effect with older children (5-7

years), further adds to this evidence and suggests that the effects of modelling may be more persistent and difficult to reverse in children in early childhood. However, experimental research using age groups across middle and late childhood does not report associations between peer influences and age (e.g., Romero et al., 2009), implying that age may only be a factor associated with peer influences in younger children. It is possible that during early childhood, individuals may be more susceptible to peer modelling as they, unlike individuals in middle and late childhood, are still in the early stages of developing their own food preferences.

1.5.4.4 Familiarity

The familiarity of the peer to the target child can also be a significant factor influencing eating behaviours, as suggested by studies examining the influence of peers on children's eating. Experimental evidence reports that children eating with a familiar peer consume more food than children eating in the presence of an unfamiliar peer (Salvy, Vartanian, Coelho, Jarrin, & Pliner, 2008b; Salvy et al., 2009). These findings parallel the results of de Castro (1994), who established that for adults, food consumption was greater when eating in the presence of family or friends than in the presence of unfamiliar co-eaters. Furthermore, Salvy et al.'s (2009) study, addressing both the familiarity and weight status of the peer co-eater and target child, found that non-overweight children who ate with an overweight unfamiliar child consumed less than when eating with a non-overweight unfamiliar peer. Findings such as these emphasise the importance of familiarity to co-eaters when predicting eating behaviours, but also suggest that familiarity may be inter-related with weight status.

1.6 Parental influences on children's eating

As well the evidence suggesting that peers and friends influence children's food intake, a further factor shown to influence children's eating behaviours is parental influence (see Savage, Fisher & Birch, 2007, for a review). A strong body of research has

identified the influences of parents, in particular mothers, on younger children's eating attitudes and behaviours (e.g., Faith, Scanlon, Birch, Francis, & Sherry, 2004; Scaglioni et al., 2008; Wardle & Carnell, 2007). Parents are responsible for the majority of feeding interactions that their children experience and maintain the feeding environments their children are exposed to, for example, food choices and feeding practices (for reviews, see Faith et al., 2004; Wardle & Carnell, 2007). Although younger children have less autonomy over their eating, parental influences over food choices, portion sizes and general mealtime environments continue to be relevant throughout childhood and into adolescence (e.g., Savage et al., 2007; Walsh & Nelson, 2010). The occurrence of children and parents eating together remains frequent throughout childhood and adolescence (Fulkerson, Neumark-Sztainer & Story, 2006) and frequently eating meals together as a family has been shown to protect against the development of disordered eating behaviours in children and adolescents (e.g., Neumark-Sztainer, Hannan, Story, Croll & Perry, 2003; Neumark-Sztainer, Wall, Story & Fulkerson, 2004; White, Haycraft & Meyer, 2014).

1.6.1 Controlling parental feeding practices

Parental control over their child's food intake and, in particular, the predictors of such control have received much attention (for reviews, see Faith et al., 2004; Scaglioni et al., 2008). Parents have been shown to use controlling feeding practices with young children through to adolescents (e.g., Farrow & Blissett, 2008; Gregory, Paxton & Brozovic, 2010; Haycraft, Goodwin & Meyer, 2014; White et al., 2014). High levels of general control over children's feeding have been shown to be counterproductive (Faith et al., 2004; Farrow & Blissett, 2008) and have been linked with children's inability to respond appropriately to internal hunger and satiety signals as they instead associate the process of eating with external cues (Birch & Fisher, 2000; Carper, Fisher & Birch, 2000), or with disordered eating behaviours (Haycraft et al., 2014). Research implies that high levels of *any* parental control of their child's feeding is not

only counterproductive, but may also be detrimental to the child's eating behaviours (Faith et al., 2004). The two most commonly studied controlling feeding practices are *pressure to eat* and *restriction* (Birch, Fisher, Grimm-Thomas, Markey, Sawyer & Johnson, 2001) and these are discussed below.

1.6.2 Pressure to eat

Parental pressure for their child to eat refers to parents' tendency to pressure their child to eat more, typically occurring during mealtimes (Birch et al., 2001). There are several different types of pressure, including pressure of healthy foods, pressure of liked foods, and pressure of disliked or novel foods. Pressuring children to eat foods that are healthy, or their parents perceive as being good for them, such as fruit and vegetables is a commonly reported practice with young children (Birch et al., 2001) and has been linked to lower fruit and vegetable intake and picky eating (e.g., Galloway, Fiorito, Lee & Birch, 2005) as well as reduced weight gain (Wardle & Carnell, 2007). However, research has also found that pressure to eat of non-healthy, liked foods (e.g., soup) yields similar results in terms of reduced intake (Galloway, Fiorito, Francis & Birch, 2006). Pressure to eat of disliked or novel foods is less well researched, but research suggest that greater parental pressure and prompting results in a greater intake of a novel food (e.g., Blissett, Bennett, Donohoe, Rogers & Higgs, 2012), however it remains unclear how this affects long-term intake and liking of such foods.

In preadolescents, perceptions of parental pressure to eat have found to be related to emotional and external eating behaviours (van Strien & Bazelier, 2007). In adolescents, perceptions of pressure have been linked to disordered eating attitudes and behaviours (Haycraft et al., 2014). Furthermore, a study using adults suggested that the effects of pressure to eat may be longstanding, with adults reporting a continued dislike and a permanent lack of willingness to eat foods they retrospectively

recall being pressured to eat as a child (Batsell, Brown, Anfield & Paschall, 2002). Although parents' use of pressure to eat is often in response to the belief that their child is underweight (Francis, Hofer & Birch, 2001), with the intention of increasing their child's weight through pressuring food intake, research suggests that the good intentions of pressure can often have counterproductive outcomes, such as children actually eating *less* of the pressured food (e.g., Galloway et al., 2006).

1.6.3 Restriction

Another commonly used controlling feeding practice is restriction of food, whereby parents overtly or covertly restrict, or limit, the type of food or amount of food that their child eats, typically at mealtimes or with snacks (Birch et al., 2001). Restriction typically relates to limiting access to unhealthy foods but can also be applied more generally, such as restriction of all foods through portion-size control at mealtimes (Birch et al., 2001). In children aged 7-11 years, parental restriction has been shown to be the type of food management most frequently reported by children (Hart, Bishop & Truby, 2002). Despite the intentions associated with parental use of restriction, typically to *limit* children's intake of unhealthy foods, restriction can actually often *increase* the child's intake of restricted foods and promote general over-eating (e.g., Birch, Fisher & Davison, 2003; Rollins, Loken, Savage & Birch, 2014). Furthermore, restrictive feeding practices have been evidenced to be related to increased child weight in pre-school aged children (Birch & Fisher, 2000), although other studies have failed to replicate these findings (e.g., Matheson, Robinson, Varady & Killen, 2006).

In adolescents, perceptions of parents' use of greater levels of controlling feeding practices (pressure and restriction) have been linked to higher levels of problematic eating (Haycraft et al., 2014). However, to date, only one previous study has examined perceptions of parental controlling feeding practices in a preadolescent sample of children. Van Strien and Bazelier's (2007) Dutch study found that perceptions of

greater levels of parental pressure to eat were associated with greater reports of emotional and external over eating in boys (but not girls). However, for both genders, perceptions of parental restriction were found to be negatively related to their emotional and external eating, although positively associated with their restrained eating behaviours (van Strien & Bazelier, 2007). Such findings highlight the important associations between controlling parental feeding practices and child obesogenic and under-eating behaviours in preadolescence, and further research of this kind is warranted.

1.7 Child symptoms of anxiety and depression

The body of evidence above reports on the importance of peers, friends and parents in influencing children's eating behaviours. However, there are individual factors that are linked to the susceptibility to, and maintenance of, problematic eating behaviours; specifically, symptoms of anxiety and depression. In both adults (e.g., Mischoulon et al., 2011; Pallister & Waller, 2008; Swinbourne & Touyz, 2007) and children/adolescents (e.g., Stice, Burton & Shaw, 2004; Touchette et al., 2007), disordered eating behaviours often co-occur with symptoms of other psychological disorders, notably anxiety and depression. In relation to the present thesis and as discussed above (Section 1.5.3), two previous studies to date have examined anxiety or depression alongside friendship group eating behaviours, and explored their association with children's eating behaviours.

Hutchinson and Rapee (2007) found that 10-14 year old girls' levels of depression predicted their levels of restrained eating, as did their friends' eating behaviours. Similarly, in a preadolescent sample of boys and girls, Farrow and colleagues (2011) found that friendship group attitudes towards eating did not affect individual children's eating attitudes directly, but were found to be moderated by the child's own anxiety, with children who were more anxious being more susceptible to peer influences

(Farrow et al., 2011). Taken together, these two studies suggest that children's individual anxiety and depression symptoms may make them more susceptible to friend influences on their eating behaviours. However, to date, no research has considered the role of children's individual anxiety *and* depression symptomology together with friends' eating behaviours, in predicting preadolescents' eating behaviours. Similarly, in the experimental literature that examines peer and friend influences on children's eating, children's individual anxiety and depression symptomology remains unconsidered and previous research does not report measuring these important variables, despite the non-experimental evidence which suggests that children's anxiety and depression symptoms can be linked to their increased susceptibility to peer and friend influences on eating.

Furthermore, in relation to parental feeding practices (Section 1.6), evidence also suggests an association between controlling parenting styles and children's symptoms of anxiety and depression (e.g., Bögels & van Melick, 2004; Feng, Shaw, & Silk, 2008; Hudson & Rapee, 2001; LeMoyné & Buchanan, 2011). Anxiety and depression in children are now discussed in more detail.

1.7.1 Anxiety

Anxiety can be categorised as *state* or *trait* (Spielberger, 1966). State anxiety refers to an individual's emotional response to fear or danger and the psychological arousal this causes, whereas trait anxiety refers to an individual's predisposed response to react to situations consistently based on traits related to their personality (see Endler & Kocovski, 2001 for an overview). The clinical view of anxiety, as defined by the American Psychological Association (2014a), is "an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure. People with anxiety disorders usually have recurring intrusive thoughts or concerns. They may avoid certain situations out of worry. They may also have physical

symptoms such as sweating, trembling, dizziness or a rapid heartbeat.” There are numerous types of anxiety in childhood, including separation, generalised, panic, post-traumatic, obsessive-compulsive, social phobia and specific phobias (American Psychiatric Association, 2000) and anxiety disorders can have a debilitating effect on individuals (see Koury & Rapaport, 2007, for a review). Psychometric assessments of clinical anxiety include multidimensional assessments, covering both state and trait anxiety (e.g., The State–Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983); the Endler Multi-dimensional Anxiety Scales (Endler, Parker, Bagby & Cox, 1991).

Anxiety is the most common psychological disorder of childhood (Cartwright-Hatton, McNicol & Doubleday, 2006), with a recent meta-analysis reporting that during middle childhood, 12.3% of children met the criteria for an anxiety disorder, as classified by the Diagnostic and Statistical Manual-IV (Costello, Egger, Copeland, Erkanli & Angold, 2011). The mean age of onset of the majority of child anxiety disorders has been reported as between 6 and 9 years (Costello et al., 2011). Anxiety in childhood is likely to continue into adulthood, with childhood anxiety predicting adolescent symptoms of anxiety (Bittner, Egger, Erkanli, Costello, Foley & Angold, 2007).

1.7.2 Depression

Depression, as defined by the American Psychological Association (2014b), is “more than just sadness. People with depression may experience a lack of interest and pleasure in daily activities, significant weight loss or gain, insomnia or excessive sleeping, lack of energy, inability to concentrate, feelings of worthlessness or excessive guilt and recurrent thoughts of death or suicide.” Likewise to anxiety, depression can have serious debilitating impacts on sufferers.

Although less prevalent in childhood than anxiety (e.g., Costello et al., 2011), a diagnosis of depression has been reported to occur in 2.8% of children under 13 years (Costello, Erkanli & Angold, 2006). As with anxiety, depression in childhood is likely to continue into adulthood, with childhood and adolescent depression predicting adulthood depression (e.g., Harrington, Fudge, Rutter, Pickles & Hill, 1990; Pine, Cohen, Gurley, Brook & Ma, 1998).

1.7.3 Anxiety, depression and eating behaviours

Clearly, anxiety and depression are important individual factors linked to problematic eating behaviours and future research should not discount their importance. In 10 year old preadolescent children, depression has been suggested to precede disordered eating in a longitudinal study of the risk factors for disordered eating (Gardner, Stark, Friedman & Jackson, 2000) and similar results have been found suggesting that anxiety symptomology predates eating disorders in an adult population (e.g., Pallister & Waller, 2008). Anxiety and depression occur on a continuum with children (and adults) experiencing symptoms which may not be significant enough for a clinical diagnosis (Beesdo, Knappe & Pine, 2009). Further understanding of the potential relationships between eating behaviours, anxiety and depression in community samples of children is therefore imperative to inform future feeding and eating interventions aimed at parents and children, by highlighting the importance of considering children's levels of anxiety and/or depression when designing such interventions.

1.8 Overall summary of the literature and proposed research

Taken together, the evidence presented in this literature review suggests that children possess eating attitudes and behaviours similar to those of their peers and friends, and that modelling of food preferences and consumption by peers can result in an increase in children's consumption and liking of modelled foods. Increases in consumption and

liking have been seen for foods already consumed regularly as well as for novel foods, and those increases can generalise to non-targeted foods. Experimental research such as the work of Salvy and colleagues (Salvy et al., 2007a; Salvy et al., 2007b; Salvy et al., 2008a; Salvy et al., 2008b; Salvy et al., 2009) has been particularly valuable in drawing attention to the influential roles of peer modelling and peer individual factors such as familiarity, weight status, gender and age on children's eating.

Non-experimental research that has focussed on children's perceived norms of their peers' and friends' eating has also contributed to our understanding in this area, highlighting the role of perceptions of peers' or friends' eating behaviours (e.g., Cullen et al., 2001; Oliver & Thelen, 1996; Wind et al., 2006) as well as friendship cliques and groups, in influencing children's attitudes to eating and their eating behaviours (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999). Furthermore, some of this work has emphasised the importance of considering child anxiety and depression symptoms when studying the influence of peers and friends on children's eating (Farrow et al., 2011; Hutchinson & Rapee, 2007). Since anxiety and depression have been shown to be co-morbid with problematic eating behaviours in children (e.g., Stice et al., 2004; Touchette et al., 2011), inclusion of these variables is important to any future research in this area.

Experimental investigations into friend and peer modelling to date have failed to consider children's individual symptoms of anxiety and depression. Future experimental research should consider these complex inter-relationships. In addition, experimental work that compares the role of familiar peers and friends in influencing children's eating would be of particular benefit as it could provide evidence to suggest that peers familiar to the child (e.g., in their school class) and friends should be considered differently when designing interventions aimed at improving children's

eating attitudes and behaviours that incorporate these individuals. Such work should also take into account the relative status of the peers and the friends as the social approval children might seek from these individuals is likely to impact the influences those peers and friends would have on children's eating attitudes and behaviours.

Many studies in this review chose to use only girls, presumably because of the higher incidence of eating disorders in adolescent females compared to males (e.g., Field et al., 2008). Since a study that included boys and girls found similar results for both in relation to peer influences (Farrow et al., 2011), neglecting males when researching this area is likely to be a significant oversight.

Although the primary focus of this review, and thesis, is peer and friend influences on eating in preadolescents, the role of parents should not be overlooked. Since parents continue to be the main providers of food throughout childhood and into adolescence (e.g., Savage et al., 2007; Walsh & Nelson, 2010), and the occurrence of family mealtimes is reported to remain frequent throughout childhood and adolescence (Fulkerson et al., 2006; White et al., 2014), parents are also key to understanding eating behaviours during this preadolescent time period. Only one previous study, conducted in the Netherlands, has considered preadolescents' perceptions of their parents' feeding practices and the association with preadolescent's problematic eating behaviours. Such research warrants replication in a UK sample, along with the inclusion of measures of children's individual symptoms of anxiety and depression, to examine possible relationships and potentially extend such findings further.

As highlighted in this review, previous work with preadolescent children is limited, and given the significance of the childhood and pre-adolescent periods for the onset of eating and dieting disorders and concerns (Davison et al., 2003; Kotler et al., 2001), as well as over-eating (Guo et al., 2002; WHO, 2014), further research with younger age

groups is imperative if we are to better understand the importance of peers and friends in the development of children's eating attitudes and behaviours. The behaviours of peers and friends are more difficult to modify than parental behaviours, in part because of the number of other individuals involved, but also because of their status as children, and the complexity of their relationships. Children spend a significant amount of time in the presence of friends and peers, with the amount of time increasing with age (Sullivan, 1953) and becoming less supervised by parents (Gifford-Smith & Brownell, 2003). If peers and friends are to serve as agents of positive change in childhood, interventions aimed at improving children's eating attitudes and behaviours need to be grounded in a deep understanding of the ways in which these influential figures can affect children's eating behaviours.

1.9 Aims of the thesis

The overall aim of this thesis is to examine peer and friend influences on children's eating behaviours, specifically looking at preadolescent children, and considering the role of parents (controlling feeding practices) and child anxiety and depression symptomology in predicting eating behaviours (see Figure 1.1 for an overview of the factors to be tested). Based on the limitations of previous research highlighted in this literature review, the current thesis will employ a longitudinal design and include experimental measures. Specific aims are detailed below, along with the chapters that address each aim.

1. To examine cross-sectionally the relationships between preadolescents' reports of their own eating behaviours and those reported by their friendship group, and their anxiety and depression symptomology (Chapter 3).
2. To examine cross-sectionally the relationships between preadolescents' reports of their own eating behaviours and their perceptions of the controlling feeding practices used by their parents, and their anxiety and depression symptomology (Chapter 4).

3. To examine longitudinally the relationships between preadolescents' reports of their own eating behaviours and those reported by their friendship group, and their anxiety and depression symptomology (Chapter 5).
4. To examine longitudinally the relationships between preadolescents' reports of their own eating behaviours and their perceptions of the controlling feeding practices used by their parents, and their anxiety and depression symptomology (Chapter 6).
5. To examine the stability and continuity of eating behaviours over 12 months in preadolescents (Chapter 5).
6. To examine the stability and continuity of perceived parental feeding practices over 12 months in preadolescents (Chapter 6).
7. To conduct a feasibility study to examine the effect of friends versus peers on preadolescents' eating behaviour (specifically their food intake), experimentally (Chapter 7).
8. To examine the effect of friends versus peers on preadolescent's eating behaviours (specifically their food intake) experimentally (Chapter 8).
9. To explore the relationships between self-reported eating behaviours, body mass index (BMI), perceived parental feeding practices, anxiety and depression, and preadolescents' actual eating behaviours (specifically, food intake) (Chapter 9).

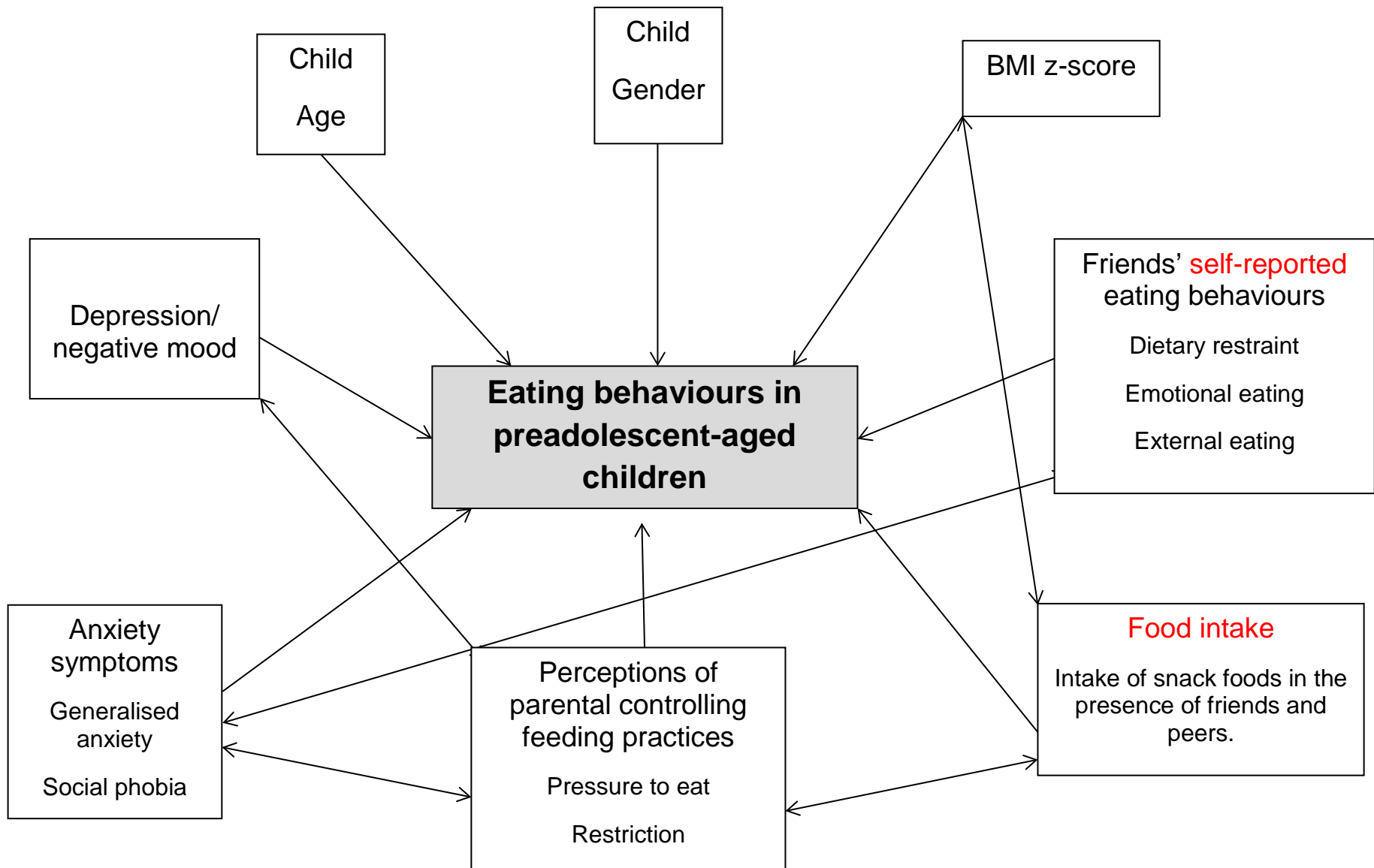


Figure 1.1: Model to show potential associations between eating behaviours in preadolescents with the child and parent factors tested within this thesis.

Chapter 2: Methodology

Methodology

2.1 Introduction

The present chapter details the methodologies used in this thesis. First, this chapter will briefly outline previous methodologies used in research identified in Chapter 1, followed by a discussion of the research designs chosen for this thesis. Details of the measures used in the thesis will then be presented. This chapter ends with an overview of the data analysis strategy implemented within this thesis.

2.2 Research design

Previous research addressing peer and friend influences on children's eating has employed multiple designs and methodologies. Chapter 1 discusses the different types of research in the area of childhood eating behaviours, both non-experimental and experimental, and an overview of these is now presented.

2.2.1 Non-experimental studies

Previous non-experimental research examining peer and friendship eating behaviours and their associations with children's own eating behaviours is limited by cross-sectional designs and a lack of consideration of associated child and parent variables (e.g., symptoms of anxiety and depression and parental feeding practices, see Chapter 1). The majority of previous non-experimental research has utilised questionnaires cross-sectionally (e.g., Cullen, Baranowski, Rittenberry, Cosart, Hebert & de Moor, 2001; Farrow, Haycraft & Meyer, 2011; Hutchinson & Rapee, 2007; Oliver & Thelen, 1996; Paxton, Schutz, Wertheim & Muir, 1999; Wind et al., 2006), with much variance in the questionnaire measures administered and the key variables of interest (see Chapter 1 and Table 1.1). In order to build on previous findings, a longitudinal design would allow for the relationship between variables over time to be examined, as

well as permitting exploration of the causal relationship between variables over time. Since the variables in this thesis (child eating behaviours, perceived parental feeding practices, and child symptoms of anxiety and depression) have not been researched in combination in previous cross-sectional research, this thesis aimed to examine the relationships between these factors both cross-sectionally and longitudinally.

Previous non-experimental literature addressing peer and friend influences on children's own eating behaviours is largely based on self-report data. Given the target age range of participants reported on in the present thesis (preadolescent children aged 8-10 years), using questionnaires which were suitable for the study's purpose but could be understood by children in this age group was essential. Self-report questionnaires were utilised in much of this thesis (Chapters 3-6 and 9). By administering questionnaires to classes of school children, collection of large amounts of data in a shorter space of time was permitted. This further limited the time constraints placed on the schools participating in the non-experimental aspects of this research and facilitated the collection of a good sized sample of children.

2.2.2 Experimental studies

Similar to non-experimental research, previous experimental research examining peer and friend influences on children's eating behaviours has varied in the methodologies used and the variables of interest (e.g., Birch, 1980; Duncker, 1938; Greenhalgh, Dowey, Horne, Lowe, Griffiths & Whitaker, 2009; Hendy, 2002; Hendy & Raudenbush, 2000; Romero, Epstein & Salvy, 2009; Salvy, Coelho, Kieffer & Epstein, 2007a; Salvy, Romero, Paluch, & Epstein, 2007b; Salvy, Kieffer, & Epstein, 2008a; Salvy, Vartanian, Coelho, Jarrin, & Pliner, 2008b; Salvy, Howard, Read, & Mele, 2009; see also Chapter 1 and Table 1.1). In order to extend the findings of the self-reported data reported in Chapters 3-6 of this thesis, an experimental design was piloted to examine objectively the influences of friends versus peers in predicting children's eating behaviours

(Chapter 7). This pilot study subsequently informed a full experimental study, which is reported on in Chapters 8 and 9.

The experimental design chosen (Chapters 7, 8 & 9) was based largely on a study assessing children's social context and eating behaviours (Salvy et al., 2007a), which is the only previous study to look at the influence of *groups* of children on eating behaviours. The design was adapted to take place in a real-life setting for a child, a school classroom, to eliminate the demands of a laboratory setting, which can be both unnatural and unnerving for children. The focus in previous research has been on friends or *unfamiliar* peers (e.g., Salvy et al., 2007a; Salvy et al., 2007b; Salvy et al., 2008a; Salvy et al., 2008b) yet being in an eating situation with unfamiliar peers is unusual for young children, who predominantly socialise with their friends and class peers. Previous research designs have also focussed on friends or peers independent of one another, with only one study examining the effects of friends compared to unfamiliar peers (Salvy et al., 2009), using a between-subjects design. In order to build upon previous work, the design of the experimental studies reported in this thesis sought to compare how groups of friends and groups of familiar peers may differently influence children's eating, using a within-subjects design where the social context of eating was manipulated (i.e., eating in the presence of friends, or peers).

2.3 Research samples

Ethical permission for all studies reported on within this thesis was granted by Loughborough University Ethics Approvals (Human Participants) Sub-Committee prior to the studies commencing. Details of the participants for each aspect of the research for this thesis are provided in Table 2.1.

Table 2.1. Overview of the sample participating in each aspect of research

Chapter	N opted out	Final N participants	Mean age (years)	SD age	Range age (years)
3	5	343	8.75	0.57	7.25-10.25
4	5	356	8.75	0.57	7.25-10.25
5	0	288*	9.71	0.62	8.25-11.25
6	0	254*	9.73	0.62	8.25-11.25
7	3	26	8.82	0.26	8.37-9.21
8	3	48	9.22	0.28	8.67-9.75
9	3	48	9.22	0.28	8.67-9.75

* indicates participants who had also taken part in the data collection for Chapters 3 and 4 (time point 1) and were therefore eligible to take part in the subsequent longitudinal analyses (time point 2) of Chapters 5 and 6.

Chapters 3 and 4 utilised the same sample of 356 children; however 13 children were excluded from Chapter 3 analyses as they did not form part of friendship groups as required by the analyses of Chapter 3. Chapters 5 and 6 used the same children as Chapters 3 and 4, who completed the same measures at baseline (time point 1; Chapters 3 & 4) and again 12 months later (time point 2; Chapters 5 & 6). Chapter 7 reports on a different sample of children that took part in a pilot study. Chapters 8 and 9 again utilised a different sample to all previous Chapters, however the same sample of 48 children are reported on in both Chapters 8 and 9.

2.3.1 Non-experimental

Following ethical clearance, recruitment for the non-experimental aspects of the research was completed by writing to primary school head teachers in four counties within the Midlands of the UK: Staffordshire, Derbyshire, Nottinghamshire and Leicestershire (see Appendix A). Both Private and Local Education Authority (LEA) schools were approached. Approximately 100 LEA schools and 15 private schools were invited to participate in the initial non-experimental aspects of the research (Chapters 3 & 4), described as a study investigating the influences of friendship groups on children's eating behaviours. Schools' participation was confirmed by follow-up telephone calls, with eight schools agreeing to participate in the research (one private; seven LEA). Reasons schools provided for not wishing to participate in the research were time constraints and commitments to other research/ projects. Participating schools sent home letters to parents/primary caregivers of children in classes within the target age range (8 to 10 years; school years 4-6), informing them about the study, and allowing them to opt their child out from participating (see Appendix B). While the target age range for participation was 8-10 years, some younger and older children were recruited due to some schools containing mixed age group classes.

Twelve months after initial data collection, all schools who participated in the original study (T1) were contacted to invite them to participate in the longitudinal aspects of the research (T2) and were provided with a lay summary of the results from T1 (see Appendix C). Six of the original eight schools (75%) participated in time point two data collection. Reasons given from the two schools that discontinued participation were a change in school Head Teacher and competing time commitments. Parents were again informed about the second phase of the research by letter, allowing them to opt their child out from participating (see Appendix D). Some individual children from T1 did not take part in T2 despite their school continuing participation in the research as

they were absent on the day of T2 collection but no children actively opted out, or were opted out of the research by their parents (Chapters 5 & 6, $n=0$).

2.3.2 Experimental

Recruitment for the experimental research reported in this thesis was conducted by writing to the six schools who had participated in both aspects of the non-experimental studies (see Appendix E), since good links had been established with these schools through this previous work. One school agreed to participate in the experimental research, which was presented to the head teacher as a study exploring the influences of friends and peers on preadolescent children's food intake. Parents of children in the target age-range (8-9 years of age; school years 4-5) were sent a letter outlining the nature of the study and were asked to provide opt-in consent for their child to participate, as well as details of any food allergies their child may have (see Appendix F). Opt-in consent was used for this study because children were being offered food and would be in the presence of the researcher without a teacher present. Three parents did not provide consent for their child to take part in the feasibility study (Chapter 7; 11.5% of the potential participants), and three parents did not provide consent for their child to take part in the experimental study (Chapters 8 & 9; 5.6% of the eligible participants).

2.3.3 Selection bias

Approximately 115 schools were contacted to take part in the research reported in this thesis, however as only eight schools agreed to participate, it is likely that there may have been selection bias in the participants who formed the samples for all aspects of the research. Head teachers/schools with a particular interest in the area of research may have selected to take part in the studies. On the other hand, head teachers/schools who knowingly had pupils who displayed eating or symptoms of anxiety or depression may have intentionally avoided participating after reading the research

brief (Appendix A). It is possible that some schools may have invested time in educating children in relation to their eating behaviours and anxiety and depression levels and may have had policies in place to support children presenting with problematic eating behaviours or symptoms of anxiety or depression, which may have influenced both their participation, and the data obtained from the children attending such schools. Some head teachers asked to view the study questionnaires before agreeing to participate and declined to participate based on this (n= 6). No incentives were provided for schools or children to participate in any aspects of the research, but each school was offered the delivery of a workshop on healthy eating, delivered by the researcher after the data collection had taken place. Six of the eight schools at T1 took up this offer, and all six schools took up the offer at T2.

2.3.4 Inclusion/exclusion criteria

All male and female children who were part of the school classes identified as being within the target age range for the studies in this thesis (8-10 years) were eligible to be included in all studies. In the non-experimental aspects of the research that focussed on friendship groups (Chapters 3 & 5), children who did not form part of a friendship group were excluded from the analyses (n= 13). In order to be in a friendship group, an individual had to have been reciprocally chosen the majority of individuals in that group (see Paxton et al., 1999, for further details). Individuals were only able to be part of one friendship group, to maintain independence of groups for analyses. Friendship groups were cross-checked by the class teacher for the experimental studies.

Parents from children in classes participating in the experimental aspects of the thesis (Chapters 7, 8 & 9) were asked to complete details of any allergies that their children had. No children were excluded on the basis of this information, but one child

(participating in Chapters 8 & 9) was not given one of the snack foods (cookies) due to a food allergy.

2.4 Procedures

The procedures implemented in the non-experimental and experimental studies reported on in this thesis are outlined below.

2.4.1 Non-experimental

Data collection for the non-experimental studies (Chapters 3, 4, 5 & 6) was conducted as part of a class lesson, facilitated by the class teacher. At the beginning of the lesson the research study was described to each class of children. All children were required to provide verbal assent to take part before completing questionnaire packs. Children were asked to complete the questionnaire pack on their own, and in silence, and to ask for help if they did not understand any questions. An alternative activity of a word search was prepared for children who did not wish to participate or did whose parents had opted them out ($n=5$ at T1; $n=0$ at T2). This procedure was followed again for T2 data collection.

2.4.2 Experimental

Data collection for the experimental studies (Chapters 7, 8 & 9) began by asking each child to complete questions about their demographic background and to: "write down the full names of your best friends in your class. That is, the people you usually spend time with at school and enjoy being with"; a statement adapted from previous work by Paxton et al. (1999), Hutchinson and Rapee (2007) and Farrow et al. (2011). The completion of these questions was done as part of a normal classroom lesson, facilitated by the class teacher. Children's *friendship* groups were subsequently constructed by the researcher and cross-checked with the class teacher to ensure children were placed in the correct groups with their friends. Children's *peer* groups

were then created by mixing children's friendship groups, ensuring as much as possible that the *peer* groups contained children who were different to children's *friendship* groups (see Figure 2.1 for an example of how this was achieved).

Child ID	Friendship	Peer
A	1	1
B	1	2
C	1	3
D	1	4
E	1	5
F	2	1
G	2	2
H	2	3
I	2	4
J	2	5
K	3	1
L	3	2
M	3	3
N	3	4
O	3	5
P	4	1
Q	4	2
R	4	3
S	4	4
T	5	1
U	5	2
V	5	3
W	5	5

In this example, friendship group 1 contains children A, B, C, D and E. These children are then grouped with different children for their peer group (e.g., Child A is grouped with Child F, K, P and T for their peer group, whereas Child E is grouped with Child J, O and W for their peer group).

Figure 2.1 Constructing friendship and peer groups for the pilot and experimental studies.

On two instances in the experimental study (Chapters 8 & 9) one member of a child's friendship group was also in their peer group due to inconsistencies in friendship group sizes. Where this occurred, the child in the friendship group that they had the weakest links to was selected to be in the peer group. All other peer groups did not contain any children who reported being friends.

Children were grouped with their natural friendship groups or with their peers. Each child took part in the experiment twice: once in a group with their friends and once in a group with peers, with the order they participated counterbalanced. Sessions for each school class took place over a three-week period.

Immediately following their school lunch break, children were allocated into small groups by the researcher (either with *friends* or *peers*). The children were asked to go in these groups with the researcher to a separate classroom where they were to take part in a game task. Children were seated around a table which had an age-appropriate game of snakes and ladders presented in the middle. As all children had just eaten lunch, they were initially asked to complete a visual rating scale assessing their hunger levels (see Appendix G) and were told by the researcher to think about how full their tummy was with food (in case any children had difficulty interpreting the term 'hungry').

Children were then given their own standardised plate of pre-weighed food, containing carrots, apples, crisps and cookies. They were told they could eat as much or as little as they wanted and if they wanted any more food, they were told to ask the researcher and pre-weighed bowls of all snack foods were visible to the children. Children were told to eat only the food on their own plate and to not share plates. A cup of water was provided for each child and refilled on request. Children played the game and ate the snacks while the researcher sat at a separate table, interacting with the children only

when asked a direct question. After 20 minutes, all snack foods were removed from the table. Children then returned to their classroom and the researcher subsequently calculated consumption rates by weighing the remaining snack foods. Following their participation in the second experimental session, children were weighed and measured by the researcher with their shoes removed.

As well as consumption levels, children also completed a questionnaire pack following the experiment, details of which are presented in Section 2.5. The questionnaire was completed after children had participated in both aspects of the experimental research (friends and peers) and was completed as part of a class lesson, with the researcher present.

2.5 Questionnaire measures

This section details the questionnaires used to measure each variable of interest to the research in this thesis. A summary of the questionnaires used throughout this thesis, along with the subscale reliabilities, is presented in Table 2.2.

Table 2.2 Summary of the questionnaires used in the thesis and subscale reliabilities

Questionnaire	Subscale	Number of items	Chapter	N	Cronbach's α
EPIC	Dietary restraint	8	3	343	0.85
			4	356	0.85
			5	288	0.88
			6	254	0.88
			9	48	0.82
	External eating	5	3	343	0.78
			4	356	0.78
			5	288	0.82
			6	254	0.82
			9	48	0.74
	Emotional eating	4	3	343	0.75
			4	356	0.75
			5	288	0.79
			6	254	0.79
			9	48	0.78
KCFQ	Pressure to eat	8	4	356	0.68*
			6	254	0.56*
			9	48	0.58*
	Restriction	5	4	356	0.60*
			6	254	0.62*
			9	48	0.28* [#]
SCAS	Social phobia	6	3	343	0.71
			4	356	0.71
			5	288	0.73
			6	254	0.73
			9	48	0.44* [#]
	Generalised anxiety	6	3	343	0.77

			4	356	0.77
			5	288	0.82
			6	254	0.82
			9	48	0.72
CDI:S	Negative mood	3	3	343	0.52*
			4	356	0.52*
			5	288	0.67*
			6	254	0.67*
	Full measure	10	9	48	0.79

EPIC: Eating Pattern Inventory for Children; KCFQ: Kids Child Feeding Questionnaire; SCAS: Spence Children's Anxiety Scale; CDI:S: Children's Depression Inventory Short Form.

** alpha levels falling below the acceptable value of 0.7 (Field, 2005).*

subscales excluded from analyses in corresponding Chapters.

The generally accepted reliability level, or Cronbach's alpha, in psychological research is 0.7 or greater (Cortina, 1993; Field, 2005). Several subscales in the present thesis fell below this accepted level. In Chapters 4, 6 and 9, the pressure to eat and restriction subscales of the Kids Child Feeding Questionnaire (Carper, Fisher & Birch, 2000; section 2.5.2) fell below the accepted level (with α levels ranging from 0.28 to 0.68). Chapter's 4 and 6 were based on replicating and extending the findings of a previously published study by van Strien and Bazelier (2007) who altered the factor structure of the original KCFQ pressure and restriction scales (see section 2.5.2). The same factor structure adopted by these authors was used in the present thesis. van Strien and Bazelier (2007) reported Cronbach's alpha levels of 0.76 (pressure to eat) and 0.60 (restriction), maintaining the restriction subscale despite this falling below the accepted level of reliability (Cortina, 1993; Field, 2005). Therefore, in the present thesis the Cronbach's alpha levels for pressure to eat and restriction were considered acceptable (except in the instance of Chapter 9, where the reliability for restriction was 0.28 and this was therefore excluded from analyses).

In Chapter 9, the Cronbach's alpha for social phobia, as measured by the Spence Children's Anxiety Scale (Spence, 1997; section 2.5.3.1) was below the accepted level, with a value of 0.44. Analyses in Chapter 9 excluded this subscale. In all Chapters using the negative mood scale of the Children's Depression Inventory (Kovacs, 1992; section 2.5.3.2) alpha levels were below the accepted level (α levels ranging from 0.52 to 0.67). However, as suggested by Cortina (1993), alpha levels are sensitive to the number of items in a scale. The negative mood subscale of the Children's Depression Inventory (Kovacs, 1992; section 2.5.3.2) contains only 3 items. The negative mood scale was included in the analyses throughout the thesis, but results using this scale were interpreted with caution.

2.5.1 Eating behaviours - self-reported by child

Eating Patten Inventory for Children (EPIC; Schact, Richter-Appelt, Schulte-Markwort, Hebebrand & Schimmelmann, 2006).

To assess children's self-reported eating behaviours, children completed three subscales of the EPIC (totalling 20 items). These subscales included: dietary restraint (e.g., "To keep my weight, I often eat less than I would actually like to"; 8 items); external eating (e.g., "When I see someone eat, I also get hungry"; 5 items); and emotional eating (e.g., "Eating helps me when I am disappointed"; 4 items). Children responded on a four point scale ranging from 'not at all' (1) to 'totally' (4). Higher scores on each subscale were indicative of higher levels of each of these eating behaviours. The EPIC is designed for use in both clinical and non-clinical preadolescent children and has been shown to have adequate factor structure (Schact et al., 2006) and good validity with preadolescents (Farrow et al., 2011; Schact et al., 2006). The EPIC and details of its scoring are presented in Appendix H.

2.5.2 Parental feeding practices - as perceived by children

Kids' Child Feeding Questionnaire (KCFQ; Carper et al., 2000).

To measure children's perceptions of the feeding practices used by their parents in relation to food and mealtimes, the KCFQ subscales of pressure to eat (e.g., "When you say "I'm not hungry" at dinnertime, do your parents say "You need to eat anyway"?"; 8 items) and restriction (e.g., "Do your parents ever say things like "You've had enough to eat now, you need to stop"?"; 5 items) were used. The KCFQ is an age-appropriately worded child version of the Child Feeding Questionnaire (CFQ; Birch et al., 2001). The CFQ is frequently used in research with parents and the KCFQ measures similar constructs to the CFQ. The KCFQ is the only known measure of children's perceptions of parental feeding practices. The authors of the KCFQ

suggest that questions be administered twice, measuring each parent's behaviours separately (e.g., "Does your mommy ever let you have snacks?" and "Does your daddy ever let you have snacks?"). In the present study, however, these were combined and questions were asked once by replacing "mommy/daddy" with "parents" in order to minimise child fatigue in the young age sample, and to replicate the use of the measure by van Strien and Bazelier (2007) with a similar preadolescent sample. To allow comparisons to be made with van Strien and Bazelier's (2007) findings with a Dutch sample, the factor structure of the KCFQ adopted by these authors was likewise used in the current thesis ('pressure' consisted of the items 1, 2, 3, 5, 6, 7, 8 and 15; restriction consisted of the items 10, 11, 12, 14 and 16. Items 8, 10, 11, 12, 14 and 16 were reverse coded). The KCFQ has a three point response scale; 'no', 'sometimes' and 'yes' and higher scores suggest greater levels of parental controlling feeding practices, as perceived by the child. Full details of the scoring, and the measure, can be found in Appendix I.

2.5.3 Child symptoms of anxiety and depression

2.5.3.1 Anxiety

Spence Children's Anxiety Scale (SCAS; Spence, 1997).

The SCAS is a self-report measure of children's anxiety symptoms, developed using the DSM IV (American Psychiatric Association, 2000) categories of anxiety. Two of the six subscales were used, totalling 12 items: social phobia (e.g., "I worry what other people think of me"; 6 items) and generalised anxiety disorder/overanxious disorder (e.g., "I worry about things"; 6 items). The selection of these two subscales was made due to the well-established links between social phobia, generalised anxiety and symptoms of eating disorders (e.g., Levinson & Rodebaugh, 2012; Swinbourne, Hunt, Abbott, Russell, St Clare & Touyz, 2012), as well as in an attempt to keep the questionnaire pack brief for the young respondents. The SCAS is rated on a four point

scale, from 'never' to 'always', with scores summed to provide subscale totals. Higher scores signify greater levels of anxiety. The SCAS has been evidenced to be a valid and reliable measure of child anxiety (Spence, 1998) and has been used with children aged 7-17 years, with good levels of internal consistency (Muris, Schmidt & Merckelbach, 2000). The SCAS and its scoring are in Appendix J.

2.5.3.2 Depression

Children's Depression Inventory: Short Version (CDI:S; Kovacs, 1992).

The CDI:S measures self-reported depressive symptoms and is suitable for completion by children aged 7-17 years. The CDI:S has three subscales and an overall depression scale. The full scale has 10 items and this was used in the experimental aspects of this thesis (Chapter 9) to provide an overall measure of depression. Only the negative mood scale (three items, e.g., "I am sad once in a while") was used in the non-experimental chapters of the thesis (Chapters 3, 4, 5 & 6) due to time constraints associated with questionnaire completion. Responses to the CDI:S questions are made on a three point scale, with the child being required to select one statement per question that best describes their mood over the previous two weeks (e.g., "I am sad once in a while"/ "I am sad many times"/ "I am sad all the time"). For children aged 7-8 with reading difficulties, it is recommended that the questions from the CDI:S be read aloud (Kovacs, 1992) and so the CDI:S was read out by the researcher / class teacher for any classes containing children with reading difficulties. Responses to the CDI:S are summed, with higher scores indicating greater levels of depressive symptoms (see Appendix K for the measure and scoring details). The CDI:S has previously been shown to have sound levels of internal consistency (Kovacs, 2003).

2.5.4 Friendship groups

To establish friendship groups, children were asked to “write down the full names of your best friends in your class. That is, the people you usually spend time with at school and enjoy being with”. This statement was adapted from previous work examining friendship group influences on children's eating (Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999). A software package, UCINET VI (Borgatti, Everett & Freeman, 2002), was subsequently used to generate friendship groups. In order to be in a friendship group, an individual had to have been reciprocally chosen by the majority of individuals in that group (Paxton et al., 1999; Hutchinson & Rapee, 2007). Individuals were only able to be part of one friendship group, to maintain independence of groups for analyses. Outputs of friendship groups obtained from the software package were checked manually and modified if the software allocated children to more than one friendship group (in which case, they were placed in the group that they had the strongest links with). Previous research has excluded dyads (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999) as they have been shown to differ to larger groups in their levels of intimacy and conformity (e.g., Ennett & Bauman, 1994; Hare, 1981). However, in the samples recruited for the research presented in this thesis, no dyad friendship groups were found.

2.5.5 Height and weight measurements

For the experimental research (Chapters 7, 8 and 9), parents were asked to consent to their child being weighed and measured as part of the experimental consent form (Appendix F). All children also provided verbal assent to be weighed and measured by the researcher. Following the experimental procedure, children were asked to remove their shoes and their weight was measured using Salter electronic scales, to the nearest 0.1kg. Height measurements were taken using a Leicester Height Measure, to

the nearest 0.5cm. Heights and weights were converted into age and gender adjusted BMI z scores (Child Growth Foundation, 1996).

2.5.6 Demographics

In all studies reported in this thesis, children were asked to provide their gender and date of birth.

2.5.7 Experimental data coding

For the feasibility and experimental chapters of the thesis (Chapters 7, 8 & 9), children's food intake was calculated in kilocalories (kcal) by multiplying the weighed amount of each food consumed by the kcal per 100g (as detailed on each snack food's nutritional label). To examine variation in food intake, variance *within* groups was compared to variance *between* groups. This was achieved using two calculations: a) the standard deviation of intake of each snack food, and total intake (in kcal) for the whole sample (*between* groups standard deviation); and b) the standard deviation of intake of each snack food, and total intake (in kcal) for each group of friends/ peers and calculating the mean of these standard deviation values (*within* groups standard deviation). These two standard deviation scores were then compared to assess differences in snack food intake variation.

2.6 General data analysis strategy

2.6.1 Normality of data

Histograms, skew and kurtosis examined normality for the non-experimental chapters of the thesis (Chapters 3, 4, 5 & 6) and indicated that almost all subscales were normally distributed in the and consequently parametric tests were used in analyses in these Chapters. Subscales in the experimental chapters (Chapters 7, 8 & 9) were

primarily non-normally distributed and therefore permitted the use of non-parametric statistics only.

2.6.2 Hypothesis testing

As some of the thesis was based on exploratory hypotheses, two-tailed and tests were utilised throughout the thesis.

2.6.3 Statistical analyses

The research aims for each Chapter were based on previous literature or previous findings of thesis Chapters and the p -value for significance was set at $<.05$. All statistical analyses were conducted using PASW Statistics 20 software.

2.6.3.1 Tests of difference

In Chapters 3, 4, 5, 6, independent samples t-tests were used to examine gender differences in reports of eating behaviours. In Chapters 3 and 4, independent samples t- tests examined gender differences in reports of anxiety and depression. In Chapters 4 and 6, gender differences in perceived parental feeding practices were tested using independent samples t- tests tests. Further independent samples t- tests performed in Chapter 5 and 6 were to establish whether there were any differences between children who took part in both parts of the research (T1 and T2) and those who dropped out after T1.

Paired samples t-tests were used to examine continuity of eating behaviours over time (Chapter 5) and continuity of perceived parental feeding practices over time (Chapter 6).

In Chapter 7, Mann Whitney U-tests were used to examine gender differences between boys' and girls' intake of food and variation of intake across conditions

(friends and peers) and for individual snack foods. In Chapters 8 and 9, Mann Whitney U-tests were used to examine gender differences between boys' and girls' intake of each snack food and their overall intake. In Chapter 9, Mann Whitney U-tests examined gender differences for perceptions of parental feeding practices, and children's reports of anxiety and depression.

In Chapter 7, Wilcoxon signed rank tests were used to examine differences in intake and variation of intake when in the presence of friends versus peers. In Chapter 8, Wilcoxon signed rank tests were conducted to examine differences in individual and total snack food intake and variation in food intake, for boys and girls.

2.6.3.2 Tests of association/correlation

In Chapters 3, 4, 5 and 6, Pearson's correlations were used to examine relationships between children's age and reports of eating behaviours, and perceptions of parental controlling feeding practices (Chapter 4).

In Chapter 4, one-tailed partial correlations (controlling for gender and age) were conducted to examine the associations between preadolescents' anxiety and depression symptoms with their eating behaviours and their perceptions of controlling parental feeding practices. In Chapter 5, one-tailed partial correlations (controlling for age and/or gender) were used to explore the relationships between preadolescents' eating behaviours at T1 and their eating behaviours at T2; their *friends'* eating behaviours at T2; and their anxiety and depression at T2. In Chapter 6, one-tailed partial correlations (controlling for age and gender) were conducted between the T1 and T2 variables (perceptions of parental controlling feeding practices, eating behaviours, anxiety and depression).

Pearson's correlations were used to examine the stability of eating behaviours over time (Chapter 5) and the stability of perceived parental feeding practices over time (Chapter 6).

In Chapters 7 and 8, Spearman's correlations were used to screen for associations between initial hunger ratings and children's subsequent intake of food. Further Spearman's correlations were used to identify significant relationships between child age and food intake, as well as associations between BMI z-scores and intake of each snack food and overall intake. In Chapter 9, Spearman's correlations explored relationships between child age and perceptions of parental controlling feeding practices, self-reported eating behaviours, anxiety and depression. In Chapter 9, partial Pearson's correlations (controlling for gender) identified the relationships between preadolescents' eating behaviours in the presence of friends and peers (assessed objectively) and their self-reported eating behaviours, and reports of general anxiety and depression. Also in Chapter 9, partial correlations (controlling for gender and age) were used to identify associations between eating behaviours when in the presence of friends and peers and reports of their parental controlling feeding practices.

2.6.3.3 Regression analyses

In Chapter 3, multiple linear regressions (enter method) were computed to identify the significant predictors of children's eating behaviours, controlling for gender and age.

In Chapters 4 and 6, mediation analyses (Baron & Kenny, 1986) were used to explore anxiety and depression as mediators of the relationships between perceptions of parental feeding practices and reports of eating behaviours.

In Chapter 5, moderated regression analyses were used to explore if any variables of interest (friends' eating/ anxiety/ depression) moderated the relationship between T1 and T2 eating behaviours (Baron & Kenny, 1986). In Chapter 6, moderated regression analyses were used to explore if perceptions of controlling feeding practices moderated the relationship between eating behaviours at T1 and T2. Simple slope analyses were used to further explore any significant moderations.

Chapter 3:

Preadolescents' eating behaviours: The roles of friendship group eating, and individual anxiety and depression

This Chapter has been submitted for publication in a special issue of *Appetite*, focusing on social influence, as:

Houldcroft, L., Haycraft, E., & Farrow, C. (under review). Social and individual influences on eating in preadolescents: The role of friends' eating behaviours and individual anxiety and depression.

The content of Chapter 3 is the largely same as in the submitted paper, but the formatting and presentation has been altered so that it remains consistent with the rest of the thesis.

Abstract

Friends are important role models for the formation of social norms and behaviour comparisons, particularly in children. This study examined the similarities between children's own eating behaviours with the eating behaviours of those in their friendship group. It also evaluated whether symptoms of anxiety and depression were related to eating behaviours in this age group. Three hundred and forty three children (mean age 8.75 years) completed questionnaires measuring their dietary restraint, emotional eating and external eating, as well as measures of their general and social anxiety, and symptoms of depression. Children also provided details about their friendship groups. Preadolescents' dietary restraint was positively predicted by their friendship groups' dietary restraint, and their individual levels of social and general anxiety. Emotional and external eating behaviours were predicted by preadolescents' levels of general anxiety. Younger children were significantly more likely to report higher levels of emotional and external eating than older children, and boys were more likely to report more external eating behaviours than girls. These results suggest that greater dieting behaviours in preadolescents are related to their friends' reports of greater dieting behaviours. In contrast, greater levels of eating governed by emotions, and eating in response to external hunger cues, are related to greater symptoms of anxiety in preadolescent children. Such findings underline the importance of friends' social influences on dieting behaviours in this age group and highlight the value of targeting healthy eating and eating disorder prevention interventions at preadolescents.

Preadolescents' eating behaviours: The roles of friendship group eating, and individual anxiety and depression

3.1 Introduction

Feeding problems and under-eating are common in childhood (e.g., Manikam & Perman, 2000) with research suggesting that eating and dieting concerns established in childhood are associated with the development of disordered eating in later childhood and adulthood (e.g., Kotler, Cohen, Davies, Pine & Walsh, 2001; Marchi & Cohen, 1990; Neumark-Sztainer, Wall, Larson, Eisenberg & Loth, 2011). In girls, eating concerns and dieting behaviours have been evidenced from as young as 5 years of age (Ricciardelli & McCabe, 2001). Worldwide the prevalence of childhood obesity is increasing dramatically and, similarly to under-eating, the eating behaviours of overweight and obese children are likely to endure into adulthood (Guo, Wu, Chumlea & Roche, 2002; World Health Organisation, 2014). Given this alarming evidence it is crucial to understand the factors that contribute to problematic eating behaviours and attitudes in childhood, prior to these behaviours becoming well established and persisting into later life (Watkins & Lask, 2002).

Developmental research suggests that concerns about body image, weight-loss and dieting behaviours commonly emerge during middle-to-late childhood, or preadolescence (Ricciardelli, McCabe, Holt & Finemore, 2003; Schur, Sanders & Steiner, 2000; Stice, Agras & Hammer, 1999). Preadolescence is the period between childhood and adolescence that precedes puberty. It commences at different ages for each individual child, although is thought to occur "somewhere between eight-and-a-half and ten" years of age (Sullivan, 1953, p.245). Maladaptive under-eating behaviours manifesting during this period may lead to delays in puberty, stunted growth and physical development, and may have detrimental effects on cognitive

functioning (National Institute for Health and Care Excellence, 2004). A wealth of research exploring the predictors of eating in this age group has evidenced the role of parents, specifically through the home feeding environments they maintain, and their use of feeding practices with their children (see Faith, Scanlon, Birch, Francis & Sherry, 2004 and Wardle & Carnell, 2007, for reviews). However, recent research has also suggested a link between children's eating behaviours and the eating of their friend and peer networks (see Houldcroft, Haycraft & Farrow, 2014, for a review).

School-aged children spend a substantial amount of time in the company of peers and friends and it has long been established that these individuals are a key source of influence on children's developing attitudes and behaviours (Hartup, 1984; Sullivan, 1953). Peers and friends have been shown to play an important role in influencing children's developing attitudes and behaviours across a variety of domains (for example, risk-taking behaviours; Hoffman, Sussman, Unger & Valente, 2006; Musher-Eizenman, Holub & Arnett, 2003), gradually becoming more influential as children grow older (Rubin, Bukowski & Parker, 2006) and spend more unsupervised time in the company of friends (Gifford-Smith & Brownell, 2003). Friendship groups are said to be found in children aged 8 and over, with children at this age likely to have formed a close group of friends with a secure structure (Foot, Chapman & Smith, 1980). Despite the important preadolescent period, there remains a dearth of research examining the importance of peer and friend networks in explaining eating behaviours during this time.

The normative model of eating (Herman, Roth & Polivy, 2003) posits that adult eating behaviours are heavily influenced by social comparisons and social approval from other individuals. Since children spend a vast amount of time with their friends, this suggests that friends may play a large role in the eating behaviours displayed by children during the impressionable preadolescent time period. Experimental research

in this field has highlighted the importance of peers and friends as role models for children's eating by examining children's eating behaviours when in the presence of these individuals (e.g., Romero, Epstein & Salvy, 2009; Salvy, Howard, Read & Mele, 2009; Salvy, Romero, Paluch, & Epstein, 2007; Salvy, Vartanian, Coelho, Jarrin, & Pliner, 2008). Non-experimental research, on the other hand, has focussed on attempting to expose the role of friendship networks in predicting children's eating attitudes and behaviours. Such work has reported associations between children's eating behaviours and their perceptions of the influence that their friends have on their eating behaviours (e.g., Cullen et al., 2001; Oliver & Thelen, 1996; Wind et al., 2011). More specifically, both Cullen et al. (2001) and Oliver and Thelen (1996) found that preadolescent children's perceptions of how their friends' eating behaviours influenced their own eating were associated with children's own self-reported eating behaviours. Similarly, Wind et al. (2011) found that children's fruit and vegetable consumption was positively related to their perceptions of receiving food modelling behaviours from their friends. Although findings such as this point at friends and peers as potentially influential figures for children's eating behaviours, the results are limited as they rely on perceptions of the influences of peers, which may not be wholly accurate.

A small number of studies have explored whether children and their friends share similarities in their eating attitudes and behaviours. Using social network analysis (see Scott & Carrington, 2011), whereby children report the names of the other children in their friendship group, such research can examine any similarities in the attitudes and behaviours of members of friendship groups or cliques. Paxton and colleagues (1999) used social network analysis to show that adolescent girls' individual eating behaviours and use of eating and weight loss behaviours were predicted by their friendship groups' use of these behaviours. Similarly, Hutchinson and Rapee (2007) found that adolescent girls shared similar levels of self-reported dieting, weight loss behaviours, and binge eating behaviours to girls in their friendship group. They further found that

girls' individual dieting and weight loss behaviours were predicted by their friends' levels of the same behaviours. To date, however, limited research has explored the similarities in friendship group eating behaviours in both boys and girls during the important period of preadolescence. In a study using preadolescents (with a mean age of 10.5 years), Farrow and colleagues (2011) found that children's reports of dieting-related eating behaviours were similar to their friends' reports of dieting behaviours, and to their friends' eating in response to external cues (external eating). Findings such as these suggest that the eating behaviours of a child's friendship group may have important implications for their own eating behaviours; however more research is needed with younger samples of children.

Research has documented the associations between problematic eating behaviours and symptoms of anxiety and depression, as work with clinical groups suggests that these symptoms often co-occur in both adults (e.g., Mischoulon et al., 2011; Pallister & Waller, 2008; Swinbourne & Touyz, 2007) and adolescents/children (e.g., Santos, Richards & Bleckley, 2006; Stice, Burton & Shaw, 2004; Touchette et al., 2011). Two previous studies have considered anxiety or depression alongside friendship group eating behaviours in relation to children's own eating behaviours. Hutchinson and Rapee (2007) found that adolescent girls' own levels of depression (and self-esteem) predicted their levels of restrained eating, as did their friends' eating behaviours. In preadolescent boys and girls, Farrow and colleagues (2011) reported that individuals with high or moderate levels of anxiety were more likely to report similar problematic eating behaviours to their friends. To date, however, no research has considered the role of anxiety *and* depression together with friends' eating behaviours, in predicting preadolescents' eating behaviours.

Although some research has explored how friendship groups influence children's eating behaviours, the present study aimed to examine this in a younger sample of

children than previous work has considered, specifically, children entering preadolescence. The present study aimed to examine the relationships between preadolescents' reports of their own eating behaviours and those reported by their friendship group. A further aim was to examine the role of preadolescents' reports of anxiety and depression symptomology in this relationship. Based on previous research with older samples (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999), it was anticipated that friends' reports of under-eating behaviours (dietary restraint) would be positively related to preadolescents' own reported under-eating behaviours. It was further hypothesised that children's anxiety and depression levels would be positively related to general eating behaviours, as evidenced in previous work (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007).

3.2 Method

3.2.1 Participants

Three hundred and fifty-six children were recruited via primary schools within the United Kingdom. As some children ($n= 13$) did not form a part of the friendship groups identified (as described below), the final sample reported here consists of 343 children, with boys and girls similarly represented (boys $n= 179$, girls $n= 164$ girls). The children ranged in age from 7.25 to 10.25 years of age ($M= 8.75$ years, $SD= 0.57$), with 93% describing themselves as White British, 6% as Black/Black British, 6% as Asian/Asian British, 2% as Mixed Race, and 3% as 'Other'.

3.2.2 Procedure and measures

Primary schools from Staffordshire, Derbyshire, Nottinghamshire and Leicestershire were contacted by letter and invited to participate in a study investigating the influences of friendship groups on children's eating attitudes (see Appendix A).

Schools' participation was confirmed by follow-up telephone calls, with eight schools agreeing to participate in the research.

Participating schools sent home letters to parents of children in classes within the target age range (8 to 10 years), informing them about the study, and allowing them to opt out their child from participating (Appendix B). The study was conducted as part of a class lesson. At the beginning of the lesson the study was described to each class of children and they provided verbal assent to complete questionnaire packs. Children were asked to complete the questionnaire pack on their own, and in silence, and to ask for help if they did not understand any questions. Alternative activities were provided for children who did not wish to participate or did whose parents had opted them out ($n= 5$). The research was approved by Loughborough University Ethics Approvals (Human Participants) Sub-Committee.

Participants completed a series of questions about their background, including their date of birth, gender and ethnicity. Participants also completed a series of questionnaire measures, as detailed below.

3.2.2.1 Eating Patten Inventory for Children (EPIC; Schact, Richter-Appelt, Schulte-Markwort, Hebebrand & Schimmelmann, 2006).

To assess their self-reported eating behaviours, children completed three subscales of the EPIC (totalling 20 items; Appendix H). These subscales included: dietary restraint (e.g., "To keep my weight, I often eat less than I would actually like to"); external eating (e.g., "When I see someone eat, I also get hungry"); and emotional eating (e.g., "Eating helps me when I am disappointed"). Children responded on a four point scale ranging from 'not at all' to 'totally'. Higher scores on each subscale were indicative of higher levels of psychological dimensions of eating. The EPIC is designed for use in both clinical and non-clinical preadolescent children and has been shown to have

adequate factor structure (Schact et al., 2006) and good validity with preadolescents (Farrow et al., 2011; Schact et al., 2006). In the present sample, the internal reliability coefficients (Cronbach's α) scores for dietary restraint (0.85), external eating (0.78) and emotional eating (0.75) all demonstrated good levels of internal consistency.

3.2.2.2 Spence Children's Anxiety Scale (SCAS; Spence, 1997).

The SCAS is a self-report measure of children's anxiety symptoms (Appendix J). Two of the six subscales were used, totalling 12 items: social phobia (e.g., "I worry what other people think of me") and generalised anxiety disorder/overanxious disorder (e.g., "I worry about things"). The SCAS is rated on a four point scale, from 'never' to 'always', with scores summed to provide subscale totals. Higher scores signify greater levels of anxiety. The SCAS has been evidenced to be a valid and reliable measure of child anxiety (Spence, 1998) and has been used with children aged 7-17 years, with good levels of internal consistency (Muris, Schmidt & Merckelbach, 2000). Alpha levels for the present sample were 0.71 for social phobia and 0.77 for generalised anxiety, suggesting good levels of internal consistency.

3.2.2.3 Children's Depression Inventory: Short Version (CDI:S; Kovacs, 1992).

The CDI:S measures self-reported depressive symptoms in children aged 7-17 years, with the negative mood scale (three items, e.g., "I am sad once in a while") used in the present study (Appendix K). Responses are made on a three point scale of statements and the child must select one statement per question that best describes their mood over the previous two weeks (e.g., "I am sad once in a while"/ "I am sad many times"/ "I am sad all the time"). Responses are summed, with higher scores indicating greater levels of depressive symptoms. The CDI:S has previously been shown to have sound levels of internal consistency (Kovacs, 2003), however, as the internal reliability for the current study was fairly low at 0.52, results using this measure were interpreted with caution.

3.2.2.4 Friendship cliques

To establish friendship groups, each participant was asked to “write down the full names of your best friends in your class. That is, the people you usually spend time with at school and enjoy being with”. This statement was adapted from previous work by Paxton et al. (1999), Hutchinson and Rapee (2007) and Farrow et al. (2011). A software package, UCINET VI (Borgatti, Everett & Freeman, 2002), was subsequently used to generate friendship groups. In order to be in a friendship group, an individual had to have been reciprocally chosen by the majority of individuals in that group. Individuals were only able to be part of one friendship group, to maintain independence of groups for analyses. Outputs of friendship groups obtained from the software package were checked manually and modified if the software allocated children to more than one friendship group (in which case, they were placed in the group that they had the strongest links with). Previous research has excluded dyads (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999) as they have been shown to differ to larger groups in their levels of intimacy and conformity (e.g., Ennett & Bauman, 1994; Hare, 1981). In the present sample, however, no dyad friendship groups were found. In total, 74 friendship groups were established, ranging in size from three to eight members.

3.2.3 Statistical analyses

To consider the similarities between friendship group members' eating behaviours and children's own individual eating behaviours, firstly mean friendship group eating behaviour scores were calculated for each of the three subscales (dietary restraint, emotional eating and external eating). For each individual child, their friendship group's mean score was calculated from the mean of the scores of all of the other members in their group (excluding themselves). This allowed for comparisons to be

made between children's individual eating behaviours and their friends' eating behaviours.

Histograms, skew and kurtosis data for each subscale indicated that the sample did not deviate substantially from normality and consequently parametric tests were used in analyses. The large sample size fulfilled the requirements of power (at 0.80) necessary to detect a medium effect at $p < .05$ using correlations ($n = 85$) and regressions ($n = 97$, when using 6 independent predictors), as suggested by Cohen (1992).

Independent samples t-tests were used to examine gender differences in reports of eating behaviours, and preliminary two-tailed Pearson correlations were used to examine relationships between age and reports of eating behaviours.

To identify the significant predictors of children's individual eating behaviours (dietary restraint, emotional eating, external eating), a series of multiple linear regressions (enter method) were computed. Gender and age were controlled for in Step 1 of all regressions. In Step 2 of the regression models, the following independent predictor variables were entered: corresponding friendship group eating behaviour (e.g., friends' dietary restraint levels when predicting individual children's dietary restraint; friends' emotional eating levels when predicting individual children's emotional eating; friends' external eating when predicting individual children's external eating); children's individual symptoms of anxiety (general and social); and children's individual negative mood.

Statistical analyses were performed using PASW Statistics 20. All tests were two-tailed and the p -value was set at $< .05$.

3.3 Results

3.3.1 Descriptive statistics

Table 3.1 displays the mean, standard deviation (*SD*) and test of difference (*t*) scores for children's individual eating behaviours, anxiety and depression symptoms by gender.

Table 3.1: Descriptive statistics (means, standard deviations) and test of gender difference scores (*t*) for individual eating behaviours, anxiety and depression subscales for boys and for girls

	Mean (<i>SD</i>) Boys (<i>n</i> = 179)	Mean (<i>SD</i>) Girls (<i>n</i> = 164)	Independent t test (<i>t</i>)	Actual <i>p</i> value
Eating Pattern Inventory for Children Questionnaire (EPIC)				
Dietary restraint	2.03 (.77)	2.04 (.80)	-0.21	.833
External eating	2.46 (.85)	2.18 (.72)	3.23	.001***
Emotional eating	1.93 (.83)	1.76 (.74)	1.99	.047*
Spence Children's Anxiety Scale (SCAS)				
Social anxiety	6.64 (4.22)	7.71 (4.21)	-2.34	.020*
General anxiety	6.82 (4.21)	8.42 (4.27)	-3.49	.001***
Children's Depression Inventory: Short (CDI:S)				
Negative mood	0.90 (1.23)	1.15 (1.45)	-1.71	.088

* $p < .05$; ** $p < .01$; *** $p < .001$, two tailed

Mean scores for the eating behaviours measured by the EPIC (dietary restraint, external eating and emotional eating) were slightly higher than published studies using the same measures with a similar age range of children (Farrow et al., 2011; Schact et al., 2006). Likewise, mean levels of children's anxiety (SCAS) were slightly higher than those reported in previous published studies (Farrow et al., 2011; Spence, 1998), however they were still considered as 'low'. A potential explanation for the marginally higher mean scores could be that the mean age of children in the present sample were

slightly lower than previous studies (Farrow et al., 2011), as Spence (1998) reports higher symptoms of anxiety in younger children (8 year old children compared to 9-10 year olds). Mean scores for children's levels of depression (negative mood) were comparable to normative mean CDI:S scores reported by Kovacs (2003) for children of a similar age.

Independent t tests (Table 3.1) showed significant differences between boys and girls for four of the six variables of interest. Specifically, boys reported greater levels of external and emotional eating compared to girls, with the result for external eating supporting previous research with children of a comparable age (van Strien & Bazelier, 2007), while girls reported higher symptoms of general and social anxiety compared to boys, similarly to previous findings (e.g., Bender, Reinholdt-Dunne, Esbjørn & Pons, 2012; Orgilés, Méndez, Espada et al., 2012). Two-tailed Pearson's correlations indicated that child age was negatively associated with external eating ($r = -.18$, $p = .001$), emotional eating ($r = -.18$, $p = .001$) and depression symptomology ($r = -.23$, $p = .001$). Subsequent analyses therefore controlled for gender and age.

Pearson's correlations showed significant relationships between children's self-reported external and emotional eating behaviours ($r = .508$, $p = .001$). External eating behaviours were not correlated with dietary restraint behaviours ($r = -.041$, $p = .452$), and similarly emotional eating behaviours were not correlated with reports of dietary restraint ($r = .073$, $p = .175$).

3.3.2 Predictors of eating behaviours

In order to test the hypotheses that friends' dieting behaviours would be predictors of children's own reports of dieting behaviours, and that children's anxiety and depression levels would also positively predict eating behaviours, three multiple regressions were run.

3.3.2.1 Predictors of preadolescent dietary restraint

Multiple regression (enter method) using gender and age in Step 1, and friends' levels of dietary restraint, individual symptoms of social anxiety, general anxiety and depression in Step 2, produced a significant model: $F(6, 342) = 12.71, p = .001$, accounting for 17.3% of the variance in dietary restraint (adjusted $R^2 = .173$). Table 3.2 shows the contributions of the predictor variables entered into the model.

Table 3.2: Multiple regression analyses to predict children's individual levels of dietary restraint

Variable	β	SE	t	p value
Gender [#]	-.101	.079	-1.274	.204
Age	-.013	.071	-.185	.853
Friends' dietary restraint	.177	.088	2.017	.045*
Social anxiety	.045	.012	3.587	.001***
General anxiety	.030	.013	2.289	.023*
Depression	.053	.033	1.586	.114

* $p < .05$; ** $p < .01$; *** $p < .001$, two tailed

[#] gender coded 1 for boys; 2 for girls

Friends' levels of dietary restraint, and individual levels of social and general anxiety symptoms significantly predicted children's individual dietary restraint. Social anxiety was the predictor accounting for the most variance. All significant predictors were positive, such that greater levels of each predicted greater levels of dietary restraint behaviours. Gender and age did not significantly predict dietary restraint.

3.3.2.2 Predictors of preadolescents' external eating

Multiple regression (enter method) using gender and age in Step 1, and friends' levels of external eating, individual symptoms of social anxiety, general anxiety and depression in Step 2, produced a significant model: $F(6, 342) = 6.188, p = .001$, that

accounted for 8.5% of the variance in external eating (adjusted $R^2 = .085$). Table 3.3 illustrates the contributions of the model's predictor variables.

Table 3.3: Multiple regression analyses to predict children's individual levels of external eating

Variable	β	SE	t	p value
Gender [#]	-.354	.089	-3.974	.001***
Age	-.236	.077	-3.070	.002**
Friends' external eating	-.029	.101	-.283	.777
Social anxiety	.001	.013	.106	.916
General anxiety	.039	.014	2.699	.007*
Depression	-.011	.036	-.295	.768

* $p < .05$; ** $p < .01$; *** $p < .001$, two tailed

[#] gender was coded 1 for boys; 2 for girls

Gender, age and children's symptoms of general anxiety significantly predicted children's individual external eating. Gender was the predictor accounting for the most variance, suggesting that being male was the strongest predictor of engaging in external eating. Being younger and reporting greater symptoms of general anxiety also significantly predicted greater external eating. There were no other significant predictors of external eating.

3.3.2.3 Predictors of preadolescents' emotional eating

The final multiple regression (enter method) used gender and age in step 1, and in step 2, friends' levels of emotional eating, individual symptoms of social anxiety, general anxiety, and depression, to predict children's individual levels of emotional eating. A significant model was found: $F(6, 342) = 7.237$, $p = .001$, accounting for 10.0% of the variance in emotional eating (adjusted $R^2 = .100$). Table 3.4 illustrates the contributions of the model predictor variables.

Table 3.4: Multiple regression analyses to predict children's individual levels of emotional eating

Variable	B	SE	t	p value
Gender [#]	-.270	.086	-3.151	.002**
Age	-.223	.075	-2.987	.003**
Friends' emotional eating	-.025	.098	-.254	.799
Social anxiety	.003	.013	.224	.823
General anxiety	.047	.014	3.368	.001***
Depression	.008	.035	.233	.816

* $p < .05$; ** $p < .01$; *** $p < .001$, two tailed

[#]gender was coded 1 for boys; 2 for girls

As with external eating, gender, age and symptoms of general anxiety significantly predicted children's levels of emotional eating. General anxiety was the highest predictor of emotional eating, suggesting that higher levels of general anxiety predicted higher levels of emotional eating. The predictive value of gender and age suggested that being male and being younger predicted greater reports of emotional eating behaviours. No other factors were identified as significant predictors of emotional eating.

3.4 Discussion

The present study sought to expand the understanding of the child and friend variables that predict eating behaviours in preadolescent children, specifically by examining the eating behaviours of children's friendship groups, and children's individual levels of anxiety and depression. The hypothesis that friends' under-eating behaviours would be predictors of children's own under-eating behaviours was supported by the results of the study. The anticipated results that children's reports of greater anxiety and depression would predict higher self-reported levels of problematic eating behaviours were also partially supported.

Friendship groups' reports of dietary restraint were significant predictors of preadolescents' dietary restraint. Conversely, emotional and external eating were not predicted by friendship group reports of such behaviours. The finding that external (eating governed by external cues) and emotional (eating governed by emotions) eating were not predicted by friends' levels of these behaviours, but dietary restraint was, is consistent with previous research in adolescents and older preadolescents where similarities have been found in individual and friendship group scores for dieting behaviour (Eisenberg & Neumark-Sztainer, 2010; Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton, 1999). Emotional and external eating behaviours in the present sample were highly related and it is plausible that in the younger preadolescent sample reported on in this study, emotional and external eating behaviours are influenced more by other factors, for example those within the family, and that friends have less influence on these eating behaviours in children of this age. Younger children are more exposed to parental feeding strategies in the home environment than are older preadolescents and adolescents who may spend more time eating away from the home environment.

Dietary restraint was most strongly predicted by preadolescents' levels of social anxiety, such that more socially anxious preadolescents reported higher levels of dietary restraint. High levels of general anxiety also predicted greater levels of dietary restraint, external and emotional eating. These results share similarities with those of Hutchinson and Rapee (2007) for adolescent girls, and also the findings of Farrow and colleagues (2011), who reported that general anxiety moderated the relationship between children's individual eating and that of their friends. Interestingly, social anxiety only predicted dietary restraint, which was also the only eating behaviour predicted by friends' reports of this behaviour. This suggests that dietary restraint may be an eating behaviour that is more susceptible to social influences in general, when compared to external and emotional eating, which may be linked to affective factors

such as anxiety. It is also plausible that the physiological experience associated with social anxiety (e.g., anxiety is often described as the feeling of butterflies in the stomach; Zigmond & Snaith, 1983) may give children the misconception of having stomach ache, which may result in them restricting their dietary intake. However, it is further plausible that the assessment of social anxiety chosen actually tapped into *trait* levels of anxiety; an individual's predisposed response to react to situations of anxiety consistently based on traits related to their personality (Endler & Kocovski, 2001). Therefore, the result that dietary restraint was associated with heightened social anxiety could be attributed to the anxiety measure identifying children at a greater predisposed level of sensitivity to inhibitory social messages from their friends as their behaviour is more governed by trait anxiety levels. Interestingly, dietary restraint was not predicted by levels depression in this preadolescent sample. The low reliability level of the depression measure with the current sample could imply that the measure chosen was too complex for the children in this study, as they were at the lower age range of the measure's age scope (Kovacs, 1992).

Preadolescents' emotional and external eating behaviours were both predicted by gender and age; specifically, these eating behaviours were higher for male and for younger children. Furthermore, gender differences in individual levels of eating behaviours indicated that boys reported higher levels of external eating compared to girls. Previous experimental research has shown that boys are more susceptible to external cues for eating than girls (e.g., Anschutz, Engels & van Strien, 2009). This is noteworthy given that some previous research has excluded males (Hutchinson & Rapee, 2007; Paxton, 1999). However, in order to elucidate this finding, longitudinal studies, similar in design to Eisenberg and Neumark-Sztainer's (2010) study, exploring gender differences in eating behaviours of preadolescents over time would be beneficial. This would also establish the contribution of friendship groups over time by

ascertaining, in particular, whether friends' dietary restraint predicts individual dietary restraint behaviours longitudinally.

Despite identifying significant predictors of preadolescent children's eating behaviours, the regression models explained relatively modest amounts of the variance in children's eating behaviours, highlighting the potential role of other contributing factors that future research should consider, such as the use of parental feeding practices and other individual factors, such as temperament and genetics. The present study is further limited by its cross-sectional nature as the results cannot ascertain whether children's eating behaviours are influenced by those of their friends, or if children form friendships with children who share similar eating behaviours. The self-reporting of friendship groups may have been more complex for the younger children as friendships can be less stable at younger ages (Newcomb & Bagwell, 1995) and therefore it is possible that children may have 'fallen out' with a friend on the day of the study and thus not reciprocally selected each other as friends, which may have impacted on the friendship groups formed by the social network analysis techniques employed. Furthermore, friendship group sizes differed from 3 to 8, meaning that the mean values in smaller groups may be less reliable than for larger groups. A mean value for a group of 3 children would be more easily influenced by an extreme value than a mean for a group of 8 children would. This is an important limitation, however one which is difficult to overcome if children were to be grouped in their natural friendship groups, as per the aim of this study.

Despite these limitations, the current study is the first to examine whether the eating behaviours of friends and children's own levels of anxiety and depression predict eating in a young preadolescent sample of boys and girls. To date, research in this area has focussed on children older than those reported in the current study (Farrow et al., 2011; Hutchinson & Rapee, 2007), despite evidence showing body image, weight

and dieting concerns in younger children (Ricciardelli et al., 2003; Schur et al., 2000; Stice et al., 1999). Consistent with previous research, the results add to the literature that finds links between problematic eating behaviours and anxiety in childhood (Farrow et al., 2011; Hutchinson & Rapee, 2007). Furthermore, the present study expands on the literature that finds links between children's individual eating behaviours and those of their friends (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999), illustrating that friends' eating behaviours can significantly predict preadolescent children's dietary restraint behaviours. This is particularly important given the criticality of the childhood and pre-adolescent periods for the development of eating and dieting concerns (e.g., Koff & Rierdan, 1991). Unlike parental behaviours in relation to child eating, the behaviours of friends are less easy to modify. If friends are agents of change in childhood, school health interventions aimed at improving children's eating attitudes and behaviours, taking into account the impact of friendship groups as influential figures, are essential, although more research is needed to appreciate the other variables that may be implicated in this interaction.

Chapter 4

The previous Chapter reported on the significance of friends' eating behaviours and children's individual levels of anxiety and depression in explaining maladaptive eating in preadolescent children. Specifically, Chapter 3 found that preadolescent children's reports of dietary restraint behaviours were significantly predicted by their friends' reports of such behaviours, as well as preadolescents' own reported levels of general and social anxiety. Preadolescents' reports of emotional and external eating behaviours were not found to be predicted by their friends' eating behaviours but were significantly predicted by their individual levels of general anxiety. For emotional and external eating in particular, although significant predictors were established, they were low in predictive value, suggesting that other factors may contribute to explaining these maladaptive eating behaviours in a preadolescent sample. The primary aim of Chapter 4, therefore, was to explore other factors that may predict preadolescent children's maladaptive eating behaviours, specifically parents' feeding practices. Given the links established in Chapter 3 between child anxiety and maladaptive eating, Chapter 4 also aimed to explore the potential role of child anxiety, as well as depression, as mediators of the relationship between parental feeding practices and maladaptive eating behaviours in preadolescent children.

Chapter 4:

Preadolescents' perceptions of parental controlling feeding practices and reports of anxiety, depression, and maladaptive eating behaviours

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The content of Chapter 4 is the largely same as in the published paper, but the formatting and presentation has been altered so that it remains consistent with the rest of the thesis.

Abstract

Previous research suggests that parental controlling feeding practices are associated with children's over-eating and under-eating behaviours. However, there is limited research addressing the link between children's symptoms of anxiety and depression and their reports of eating behaviours, despite knowledge that these psychopathologies often co-exist. The current study aimed to identify the relationships between preadolescents' perceptions of their parents' feeding practices with reports of their own anxiety, depression and eating behaviours. Three hundred and fifty six children (mean age 8.75 years) completed questionnaires measuring their dietary restraint, emotional eating and external eating, as well as their perceptions of their parents' use of pressure to eat and restriction of food. Children also completed measures of general anxiety, social anxiety and depression symptomology. Results indicated that preadolescents' eating behaviours were associated with their perceptions of the controlling feeding practices their parents used with them. Preadolescents' dietary restraint, emotional eating and external eating behaviours were positively associated with their reports of general and social anxiety, and their dietary restraint and emotional eating associated with their depression symptomology. In addition, perceptions of parental pressure to eat were positively related to preadolescents' anxiety levels. Child anxiety (general and social) was found to mediate the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours (dietary restraint, emotional eating and external eating). The results suggest that greater anxiety in preadolescents may explain why children who perceive greater pressure to eat by their parents are more likely to exhibit maladaptive eating behaviours.

Preadolescents' perceptions of parental controlling feeding practices and reports of anxiety, depression, and maladaptive eating behaviours

4.1 Introduction

There are multiple people who influence children's food intake; however, two key groups of individuals are peers and parents (e.g., Houldcroft, Haycraft & Farrow, 2014; Salvy, de la Haye, Bowker & Hermans, 2012; Scaglioni, Salvioni & Galimberti, 2008; see also Chapter 1). Parents and caregivers are, in particular, responsible for shaping children's eating attitudes and behaviours through the feeding environments they provide (including the food choices they make for their children and the foods they select and model eating) and the feeding practices they employ with their children (e.g., Faith, Scanlon, Birch, Francis, & Sherry, 2004; Wardle & Carnell, 2007). It has been well established that parents/caregivers have a substantial role in creating the eating environments of younger children who have less autonomy over their own eating (see Patrick & Nicklas, 2005, for a review), yet these key individuals remain primarily responsible for food choices, portion sizes and general mealtime environments throughout childhood and adolescence (e.g., Fulkerson, Neumark-Sztainer & Story, 2006; Savage, Fisher & Birch, 2007; Walsh & Nelson, 2010).

Parents' reports of their use of controlling feeding practices with their children in eating situations are well researched (see Scaglioni, Salvioni & Galimberti, 2008, for a review), particularly since high levels of control over young children's feeding have been shown to be counterproductive (e.g., Faith et al., 2004; Farrow & Blissett, 2008). Excessive parental control in the feeding domain has been shown to be associated with children's inability to respond appropriately to internal hunger and satiety signals as children learn to associate the process of eating with external, parental cues (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch, 2000). One example of a commonly

used controlling feeding practice is restriction of food, whereby parents overtly or covertly restrict, or limit, the type of food or amount of food that their child eats (Birch et al., 2001). Parental use of restriction has been linked with an increase in children's intake of food and general over-eating (Birch, Fisher & Davison, 2003), and is further evidenced to be related to increased child weight in pre-school aged children (Birch & Fisher, 2000), although other studies have failed to evidence this link (e.g., Matheson, Robinson, Varady & Killen, 2006). In contrast, pressuring a child to eat has been related to their reduced intake of pressured food/s, and less weight gain (e.g., Galloway, Fiorito, Francis & Birch, 2006; Wardle & Carnell, 2007). One study has suggested that the effects of pressure to eat may be longstanding, with adults reporting a continued dislike and an enduring lack of willingness to eat food/s they retrospectively recall being pressured to eat as a child (Batsell, Brown, Anfield & Paschall, 2002). In adolescents, perceptions of parents' use of greater levels of controlling feeding practices (pressure to eat and restriction) have been linked to higher levels of problematic eating (Haycraft, Goodwin & Meyer, 2014).

Despite research documenting parents' use of controlling feeding practices and their relationship to young children's eating behaviours and adolescent eating behaviours, to date there remains a gap in research between these two stages, notably during preadolescence. The period of preadolescence is of particular importance since research suggests that body, weight, and dieting concerns begin around this age (e.g., Ricciardelli, McCabe, Holt & Finemore, 2003; Schur, Sanders & Steiner, 2000; Stice, Agras & Hammer, 1999). Preadolescence is also a time period characterised by increasing independence and autonomy. Children begin to have more control over decisions about food choices and food environments, and parents' control over feeding may change to reflect this during preadolescence. However, parents remain the primary providers of food until a child reaches adolescence (Savage et al., 2007), yet much of the previous research in this domain focuses on parental feeding practices

with younger children (e.g., Birch & Fisher, 2000; Rodgers et al., 2013; Scaglioni et al., 2008). Furthermore, the published literature is largely based on parents' self-reported use of controlling feeding practices with their children, which may differ from children's perceptions of such practices. In a study using adolescents, perceptions of greater controlling parental feeding practices were linked to more unhealthy adolescent eating behaviours (Haycraft et al., 2014).

To date, only one previous study has examined preadolescents' perceptions of their parents' controlling feeding practices, finding that perceptions of greater levels of parental pressure to eat were associated with greater reports of emotional and external eating in boys (but not girls) in a Dutch, preadolescent sample (van Strien & Bazelier, 2007). However, for both boys and girls, perceptions of parental restriction were found to be negatively related to their emotional and external eating, although positively correlated with their restrained eating behaviours (van Strien & Bazelier, 2007). Given the importance of these findings in highlighting that the association between controlling parental feeding practices and child obesogenic and under-eating behaviours may continue into preadolescence, a replication of such results in a UK sample of preadolescents is warranted.

In addition to the research that links controlling parental feeding practices to over- and under-eating in children, evidence also suggests an association between controlling parenting styles and children's symptoms of anxiety and depression (e.g., Bögels & van Melick, 2004; Feng, Shaw, & Silk, 2008; Hudson & Rapee, 2001; LeMoyne & Buchanan, 2011). Thirlwall and Creswell (2010) reported that the children of mothers who engaged in more controlling parenting behaviours were more anxious. In their experimental study, the authors additionally found that children's levels of trait anxiety moderated the relationship between mothers' controlling parenting and children's negative predictions about their performance on a task. Specifically, they found that

when mothers engaged in higher levels of controlling parenting behaviours, children with heightened levels of trait anxiety made greater negative predictions about their performance (Thirlwall & Creswell, 2010). Similarly to anxiety, evidence has suggested potential links between controlling parenting and childhood depression (e.g., Rapee, 1997), although a review of the literature by McLeod, Weisz and Wood (2007) suggested that the evidence of an association between these two factors is limited. It is plausible that, as suggested by Hudson and Rapee (2001) and Rapee (2001), parents' excessive protection and control over their children may result in a child's perception of the world as threatening, as well as reinforcing child doubt and encouraging a reliance on their parents. This may produce a heightened susceptibility to experiencing symptoms of anxiety and depression in the children of controlling parents.

The associations between symptoms of anxiety, depression and disordered eating behaviours have been well-documented, as clinically the symptomology of these disorders often co-occur in both adults (e.g., Mischoulon et al., 2011; Pallister & Waller, 2008; Swinbourne & Touyz, 2007) and adolescents/children (e.g., Stice, Burton & Shaw, 2004; Touchette et al., 2011). Indeed, the results of Chapter 3 supported this relationship, indicating that preadolescents' reports of maladaptive eating behaviours were predicted by their reported levels of anxiety. Given the previously discussed relationships between controlling parental feeding practices and children's maladaptive eating behaviours, and the relationships between controlling parenting and children's anxiety and depression symptomology, it is plausible that anxiety and depression may mediate the relationship between parental controlling feeding practices and children's maladaptive eating behaviours. Mediation analyses examine how two variables (the independent variable and the dependent variable) are related through an intervening/mediating variable (the mediator), and are in contrast to moderation analyses (which examines whether the size or magnitude of an effect of the independent variable on

the dependent variable depends on, or interacts with, a third variable (the moderator) the independent variable affects the dependent variable) (Baron & Kenny, 1986). Mediation analyses examining anxiety and depression as potential mediators of the relationship between parental controlling feeding practices and children's maladaptive eating behaviours were deemed suitable in this instance given the relationships previously reported. If evidenced, an understanding of this relationship would be beneficial to inform future feeding and eating interventions aimed at parents and children, by highlighting the importance of parental controlling feeding practices potentially influencing children's levels of anxiety and/or depression, which in turn may influence children's eating behaviours.

The current study aimed to replicate van Strien and Bazelier's (2007) Dutch study by using a UK sample of preadolescent children to examine the relationships between perceptions of parental controlling feeding practices and preadolescents' reports of their own maladaptive eating behaviours. It was hypothesised that greater perceptions of parental controlling feeding practices would be associated with higher levels of children's self-reported maladaptive eating behaviours. Based on the results of Chapter 3, the present study also aimed to examine the relationship between preadolescents' reports of maladaptive eating behaviours and their reported levels of anxiety and depression symptomology, with a positive association between the two hypothesised. To expand on previous research in the parenting domain (which has focused largely on parental reports) the current study further aimed to examine the potential relationship between preadolescents' perceptions of controlling parental feeding practices and their reports of anxiety and depression symptomology. It was anticipated that greater perceptions of parental controlling feeding practices would be associated with higher levels of self-reported anxiety and depression symptoms. The final aim was to draw together the results by examining preadolescents' reports of anxiety and depression as potential mediators of the association between

preadolescents' perceptions of parental feeding practices and their reported maladaptive eating behaviours.

4.2 Method

4.2.1 Participants

Three-hundred and fifty six children participated in the study, with a roughly equal spread of boys and girls (boys $n = 184$, girls $n = 172$). The age of the children ranged from 7.25 to 10.25 years ($M = 8.75$, $SD = 0.57$). The majority (93%) of children described themselves as White British. Children were recruited from primary schools from the Midlands counties of Staffordshire, Derbyshire, Nottinghamshire and Leicestershire.

4.2.2 Procedure and measures

Schools ($N = 8$) agreed to participate in a study exploring the factors associated with preadolescent children's eating behaviours. As outlined in Chapter 3, parents of children in the classes which covered the target preadolescent age range were sent a letter detailing the nature of the study and giving them the option to opt-out their child from participating (Appendix B).

All children participating in the research completed a series of questionnaires that included measures of their eating attitudes and behaviours, the feeding practices that they perceived their parents used with them, their levels of anxiety and depression, and demographic information (age, gender). Questionnaire measures are detailed below.

4.2.2.1 Eating Pattern Inventory for Children (EPIC; Schact, Richter-Appelt, Schulte-Markwort, Hebebrand & Schimmelmann, 2006).

To assess self-reported eating behaviours, children completed the dietary restraint, external eating and emotional eating subscales of the EPIC (Appendix H). Further details on this measure can be found in Section 2.5.1. In the present sample Cronbach's alphas were 0.85 (dietary restraint); 0.78 (external eating); and 0.75 (emotional eating).

4.2.2.2 Kids' Child Feeding Questionnaire (KCFQ; Carper, Fisher & Birch, 2000).

To measure children's perceptions of the feeding practices used by their parents when feeding them, the KCFQ subscales pressure to eat (e.g., "When you say "I'm not hungry" at dinnertime, do your parents say "You need to eat anyway"?") and restriction (e.g., "Do your parents ever say things like "You've had enough to eat now, you need to stop"?") were used. The authors of the KCFQ suggest that questions be administered twice, measuring each parent's behaviours separately (e.g., "Does your mommy ever let you have snacks?" and "Does your daddy ever let you have snacks?"). In the present study, however, these were combined and questions were asked once by replacing "mommy/daddy" with "parents" in order to minimise child fatigue in the young age sample, and to replicate the use of the measure by van Strien and Bazelier (2007) with a similar preadolescent sample. To allow comparisons to be made with van Strien and Bazelier's (2007) findings, the factor structure of the KCFQ adopted by these authors was likewise used in the current study (see Section 2.5.2 and Appendix I for details). The KCFQ has a three point response scale; 'no', 'sometimes' and 'yes' and higher scores suggest greater levels of parental controlling feeding practices, as perceived by the child. In the present sample Cronbach's alphas were 0.68 (pressure to eat) and 0.60 (restriction), suggesting moderate levels of

internal reliability, although comparable to those reported by van Strien and Bazelier (2007) (pressure to eat 0.76; restriction 0.60).

4.2.2.3 Spence Children's Anxiety Scale (SCAS; Spence, 1997).

The SCAS is a self-report measure of children's anxiety symptoms. The social phobia (e.g., "I feel scared when I have to take a test") and generalised anxiety disorder/overanxious disorder (e.g., "I worry about things") subscales were used here, totalling 12 items. Further details on the SCAS can be found in Sections 2.5.3.1 and Appendix J. Alpha levels for the present sample were 0.71 for social phobia and 0.77 for generalised anxiety, suggesting sound levels of internal consistency.

4.2.2.4 Children's Depression Inventory: Short Version (CDI:S; Kovacs, 1992).

The CDI:S is a self-report measure assessing symptoms of depression in children aged 7-17 years. In the present study, only the negative mood scale (three items, e.g., "I am sad once in a while") was used, as outlined in Section 2.5.3.2 (see also Appendix K). The alpha level for negative mood for the present sample was 0.52 and so results using this measure were interpreted with caution.

4.2.3 Statistical analyses

Histograms, skew and kurtosis data for each subscale indicated that the sample did not deviate substantially from normality and consequently parametric tests were used in analyses. The large sample size fulfilled Cohen's (1992) suggested requirements of power (at 0.80) necessary to detect a medium effect at $p < .05$ using correlations ($n = 85$) and mediated regressions ($n = 67$, when using 2 independent predictors).

Independent samples t- tests identified gender differences for boys' and girls' self-reported levels of external and emotional eating, as well as their reports of general and social anxiety (see Table 4.1).

Similar to the findings of van Strien and Bazelier (2007; who found that perceptions of pressure to eat were negatively correlated with child age for 7-9 year old boys), child age was negatively associated with perceptions of pressure to eat in the current sample ($r = -.093$, $p = .044$). However, unlike van Strien and Bazelier (2007; who found that perceptions of restriction were negatively correlated with child age for 7-9 year old girls) child age was not significantly correlated with perceptions of restriction ($r = -.034$, $p = .268$). Further Pearson's correlations indicated that child age was negatively associated with reports of eating behaviours, specifically: external eating ($r = -.170$, $p = .001$) and emotional eating ($r = -.169$, $p = .001$). Subsequent analyses therefore controlled for gender and age.

To replicate van Strien and Bazelier's (2007) findings in a UK sample and identify the relationships between preadolescents' perceptions of parental controlling feeding practices (pressure and restriction) and reports of eating behaviours (dietary restraint, emotional eating and external eating), two-tailed partial correlations (controlling for gender and age) were conducted. Further two-tailed partial correlations (controlling for gender and age) were used to examine the associations between preadolescents' reports of under- and over- eating behaviours and their reports of anxiety (general and social) and depression (negative mood). Finally, two-tailed partial correlations (controlling for gender and age) between perceptions of controlling parental feeding practices and preadolescents' reports of anxiety and depression were calculated.

To explore anxiety and depression as potential mediators of the relationships between perceptions of parental feeding practices and reports of eating behaviours, mediation analysis (Baron & Kenny, 1986) was used. When perceived parental feeding practices, anxiety and depression, and eating behaviours were significantly related in the initial correlations, these variables were subsequently investigated by mediation

analyses using a series of linear regressions. The four stages for testing mediation are: 1) the independent variable must significantly predict the dependent variable; 2) the independent variable must predict the mediator; 3) the mediator must predict the dependent variable when controlling for the independent variable. If these steps are met, the fourth step then examines whether the effect of the independent variable on the dependent variable is less after controlling for the mediator. Steps 3 and 4 are run in the same equation. If the independent variable no longer affects the dependent variable after controlling for the mediator, complete mediation has occurred (Baron & Kenny, 1986). If the effect of the independent variable on the dependent variable *reduces in size* after controlling for the mediator, partial mediation may have occurred, and calculations using a Sobel test can confirm this (Preacher & Leonardelli, 2013).

Statistical analyses were performed using PASW Statistics 20. All tests were two-tailed and the p -value was set at $<.05$.

4.3 Results

4.3.1 Descriptive statistics

Table 4.1 displays the mean, standard deviation (*SD*) and test of difference (*t*) scores for children's individual eating behaviours, perceived parental feeding practices, anxiety and depression symptoms by gender.

Table 4.1: Descriptive statistics (means, standard deviations) and tests of difference scores (t) for children's reported eating behaviours, perceived parental feeding practices, and reports of anxiety and depression by gender

	Mean (SD) Boys (n= 184)	Mean (SD) Girls (n= 172)	Independent t test (t)	Actual <i>p</i> value
Eating Pattern Inventory for Children Questionnaire (EPIC)				
Dietary restraint	2.01 (.76)	2.05 (.79)	-.45	.652
External eating	2.44 (.86)	2.17 (.72)	3.14	.002**
Emotional eating	1.92 (.82)	1.75 (.74)	2.02	.044*
Kids Child Feeding Questionnaire (KCFQ)				
Restriction	0.88 (.45)	0.86 (.41)	.29	.769
Pressure to eat	1.01 (.41)	0.95 (.45)	1.20	.231
Spence Children's Anxiety Scale (SCAS)				
General anxiety	6.82 (4.19)	8.42 (4.28)	-3.2	.001***
Social phobia	6.62 (4.20)	7.67 (4.17)	-2.29	.023*
Children's Depression Inventory: Short (CDI:S)				
Negative mood	.89 (1.22)	1.17 (1.45)	-1.61	.108

* $p < .05$; ** $p < .01$; *** $p < .001$, two tailed

Preadolescents' mean eating behaviour scores were generally similar to published studies using the EPIC with a similar age range of children (Farrow et al., 2011; Schacht et al., 2006). Average scores on the KCFQ were comparable with the results found with the original KCFQ (Carper et al., 2000). Mean levels of self-reported anxiety (SCAS) were slightly higher than previous studies using this measure (Farrow et al., 2011; Spence, 1998), possibly due to the lower mean age of the children in the present study. Mean scores for children's levels of depression (negative mood) were broadly comparable with normative mean CDI:S scores reported by Kovacs (2003) for children of a similar age.

Independent samples t-tests (Table 4.1) showed significant gender differences for two of the eating behaviours and for preadolescents' reports of anxiety; specifically, boys reported significantly greater levels of external and emotional eating compared with

girls. No gender differences were evident for reports of dietary restraint behaviours. Girls reported higher symptoms of general and social anxiety compared with boys. No significant gender differences were found for perceptions of parental feeding practices or negative mood.

4.3.2 Correlation analyses

To examine the hypothesised relationships between preadolescents' reports of their own eating behaviours with their perceptions of parental controlling feeding practices and with their reported levels of anxiety or depression symptomology, a series of two-tailed partial correlations were calculated, controlling for gender and age (Table 4.2).

Table 4.2: Partial correlation coefficients (controlling for age and gender) between children's reports of eating behaviours with perceptions of parental feeding practices and with reports of anxiety and depression

	Eating Pattern Inventory for Children (EPIC)		
	Dietary Restraint (<i>p</i> value)	External Eating (<i>p</i> value)	Emotional Eating (<i>p</i> value)
Kids Child Feeding Questionnaire (KCFQ)			
Restriction	-.02 (.696)	-.21 (.000)***	-.27 (.000)***
Pressure to eat	.14 (.013)*	.10 (.078)	.06 (.245)
Spence Children's Anxiety Scale (SCAS)			
General anxiety	.38 (.000)***	.19 (.001)**	.28 (.000)***
Social anxiety	.38 (.000)***	.15 (.007)*	.22 (.000)***
Children's Depression Inventory (CDI:S):			
Negative mood	.27 (.000)***	.09 (.105)	.14 (.010)**

p*<.05; ** *p*<.01, **p*<.001, two tailed

4.3.2.1 Correlates of dietary restraint

Preadolescents' reports of dietary restraint were positively associated with their perceptions of parental pressure to eat, as well as their levels of general anxiety and social phobia, and negative mood.

4.3.2.2 Correlates of external eating

Reports of external eating were positively associated with preadolescents' their levels of general anxiety and social anxiety. External eating was negatively associated with perceptions of parental restriction.

4.3.2.3 Correlates of emotional eating

Emotional eating was positively associated with perceptions of parental pressure to eat, and reports of general anxiety, social phobia, and negative mood. Emotional eating was negatively associated with preadolescents' perceptions of parental restriction.

4.2.3.4 Correlates of parental controlling feeding, anxiety and depression

To examine the hypothesised relationships between preadolescents' perceptions of parental controlling feeding practices and their reports of anxiety and depression, further two-tailed partial correlations were calculated, controlling for gender and age (Table 4.3).

Table 4.3: Partial correlation coefficients (controlling for age and gender) between children's perceptions of parental feeding practices and reports of anxiety and depression

	Controlling feeding practices	
	KCFQ	KCFQ
	Restriction (<i>p value</i>)	Pressure to eat (<i>p value</i>)
General anxiety	-.06 (.258)	.18 (.000)***
Social phobia	.03 (.586)	.20 (.000)***
Negative mood	-.06 (.258)	.05 (.360)

* $p < .05$; ** $p < .01$, *** $p < .001$, two tailed

Preadolescents' perceptions of greater parental pressure to eat were significantly positively associated with higher levels of general anxiety and social phobia. Perceptions of parental restriction were not found to significantly correlate with preadolescents' reports of anxiety and negative mood.

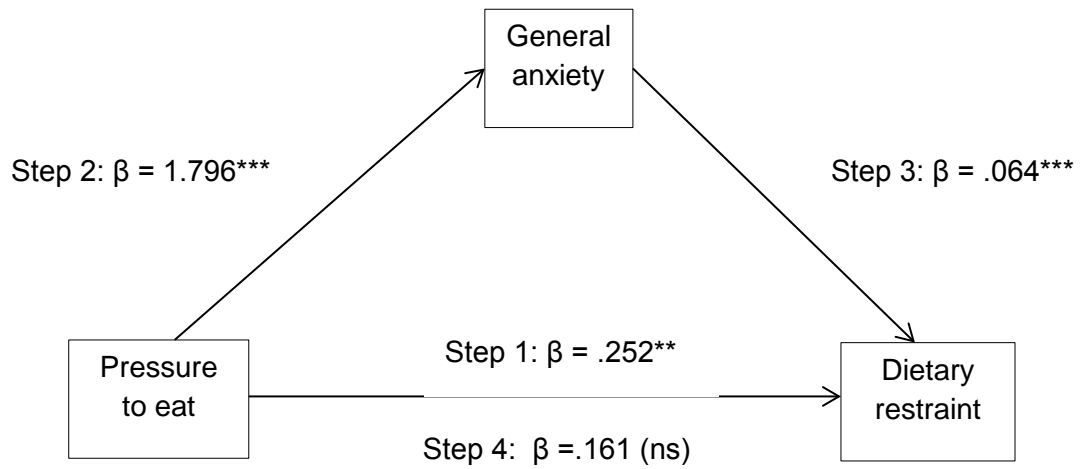
4.3.3 Mediation analyses

To satisfy the final aim of the study and draw together the results of the correlations, mediation analyses (Baron & Kenny, 1986) were used to examine whether preadolescents' reports of anxiety mediated the relationship between perceptions of parental feeding practices and reported eating behaviours. The partial correlations indicated that only perceived parental pressure to eat was significantly associated with preadolescents' reported symptoms of social and general anxiety. Thus, mediation analyses were used to test whether preadolescents' reports of anxiety (social and general) mediated the relationship between perceptions of pressure to eat from parents and self-reported eating behaviours (dietary restraint, emotional eating and

external eating). Depression was not considered as a potential mediator, based on the non-significant correlation results (see Table 4.3).

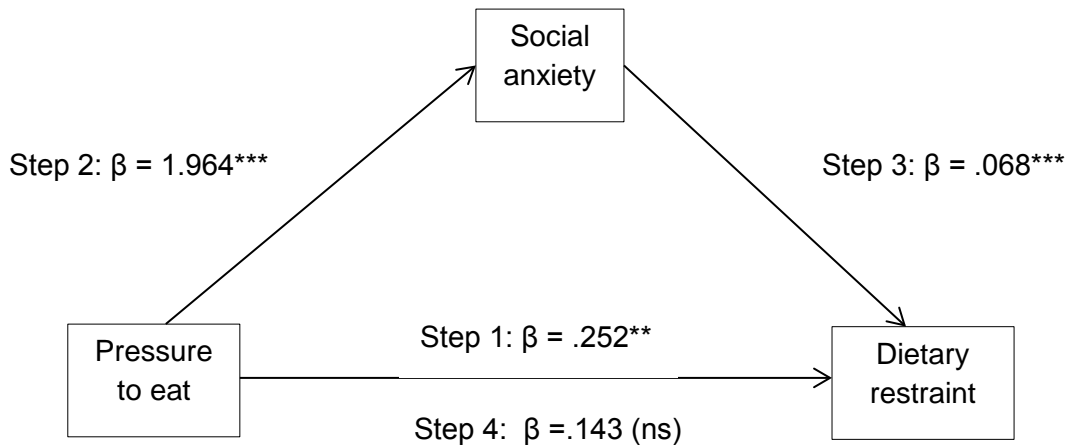
4.3.3.1 Anxiety as a mediator of the relationship between perceptions of pressure to eat and reports of dietary restraint

Preadolescents' reports of general and social anxiety fully mediated the relationship between perceived parental pressure to eat and children's reports of dietary restraint. This was tested via the following stages. First, preadolescents' perceptions of parental pressure to eat (IV) significantly predicted their reports of dietary restraint (DV) ($\beta = .252, p = .009$). Next, perceptions of pressure to eat significantly predicted preadolescents' reports of general anxiety ($\beta = 1.796, p = .001$) and social anxiety ($\beta = 1.964, p = .000$) (mediators). General anxiety significantly predicted dietary restraint ($\beta = .064, p = .000$), and social anxiety also significantly predicted dietary restraint ($\beta = .068, p = .000$). In the final stage of the mediation model, perceptions of pressure to eat failed to continue to be a significant predictor of dietary restraint when general anxiety was added to the regression ($\beta = .161, p = .085$), and separately, when social anxiety was added to the regression ($\beta = .143, p = .125$) (Figures 4.1 & 4.2).



* $p < .05$; ** $p < .01$, *** $p < .001$, (ns) $p > .05$

Figure 4.1: General anxiety fully mediated the relationship between preadolescents' perceptions of parental pressure to eat and reports of dietary restraint.



* $p < .05$; ** $p < .01$, *** $p < .001$, (ns) $p > .05$

Figure 4.2: Social anxiety fully mediated the relationship between preadolescents' perceptions of parental pressure to eat and reports of dietary restraint.

4.3.3.2 Anxiety as a partial mediator of the relationship between perceptions of pressure to eat and reports of external eating

Preadolescents' reports of general and social anxiety partially mediated the relationship between perceived parental pressure to eat and children's reports of external eating. Perceptions of parental pressure to eat (IV) significantly predicted preadolescents' reports of external eating (DV) ($\beta = .256, p = .01$). Next, perceptions of pressure to eat significantly predicted preadolescents' reports of general anxiety ($\beta = 1.796, p = .001$) and social anxiety ($\beta = .068, p < .000$) (mediators). General anxiety predicted external eating ($\beta = .034, p = .001$), and social anxiety also predicted external eating ($\beta = .024, p = .019$). Finally, perceptions of pressure continued to be a significant predictor of external eating when general anxiety ($\beta = .031, p = .003$) was added to the regression, and separately, when social anxiety was added to the regression ($\beta = .020, p = .054$), indicating that full mediation had not occurred, but suggesting a potential partial mediation. Sobel test (Preacher & Leonardelli, 2013; Sobel, 1982) confirmed that general anxiety (Sobel test: $p < .001$) and social anxiety (Sobel test: $p < .001$) significantly partially mediated the relationship between parental pressure to eat and external eating (Figures 4.3 & 4.4).

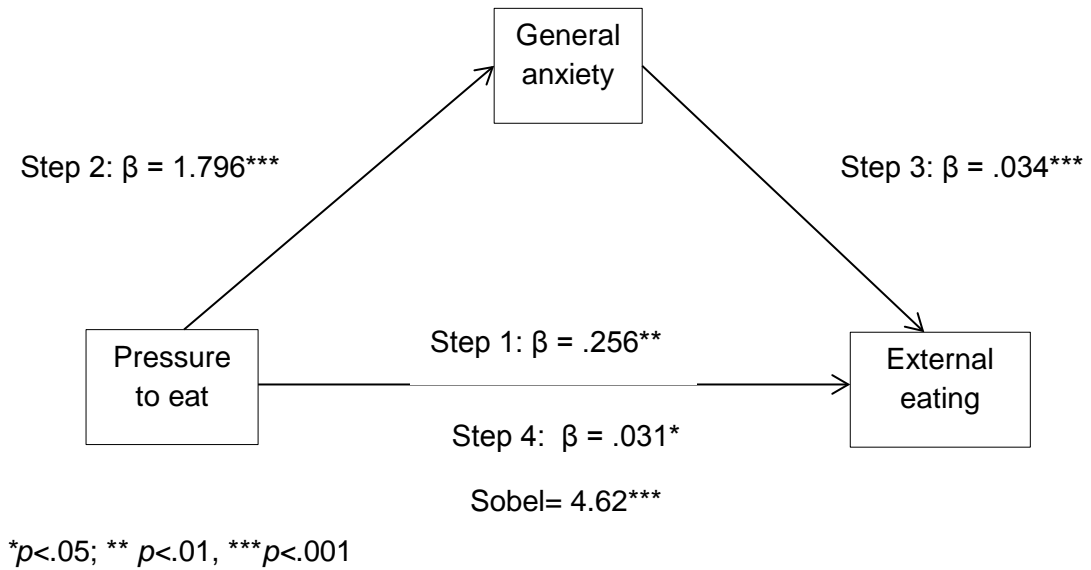


Figure 4.3: General anxiety partially mediated the relationship between preadolescents' perceptions of parental pressure to eat and reports of external eating.

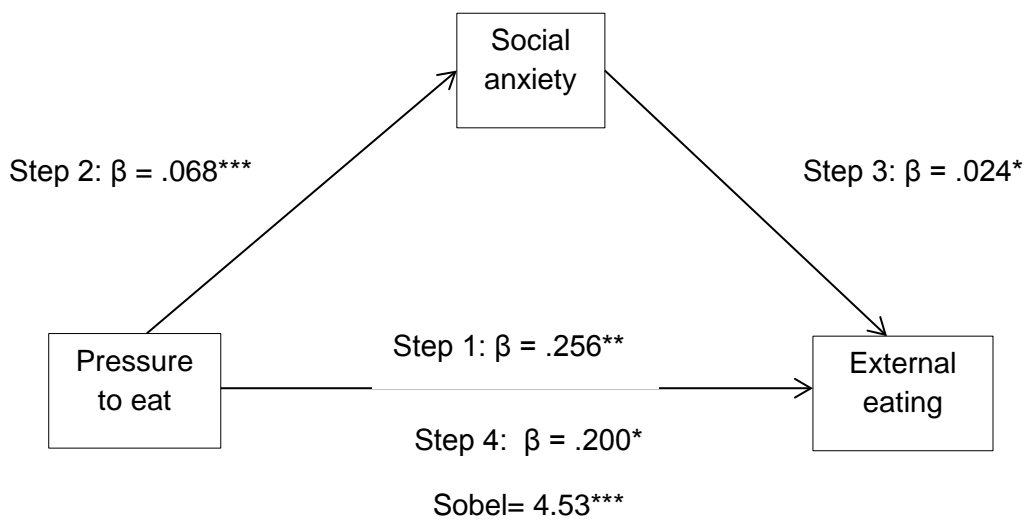
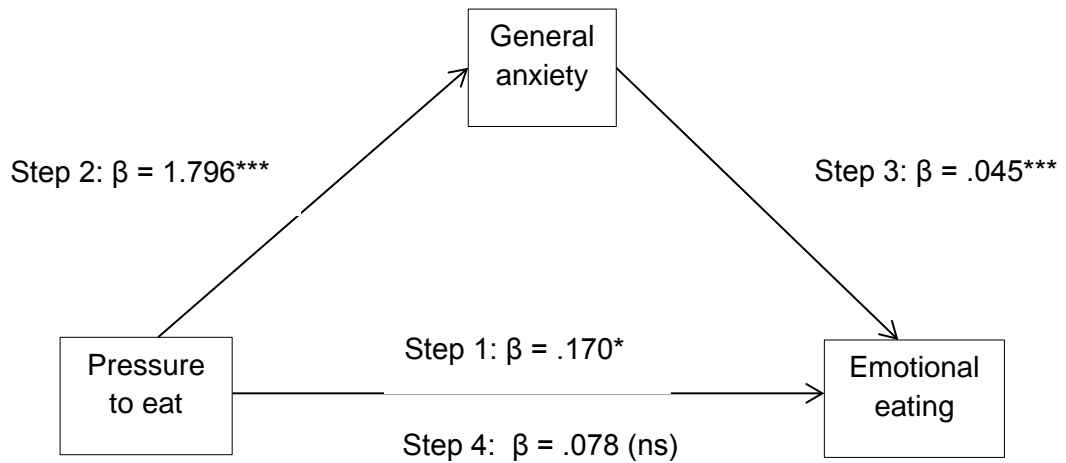


Figure 4.4: Social anxiety partially mediated the relationship between preadolescents' perceptions of parental pressure to eat and reports of external eating.

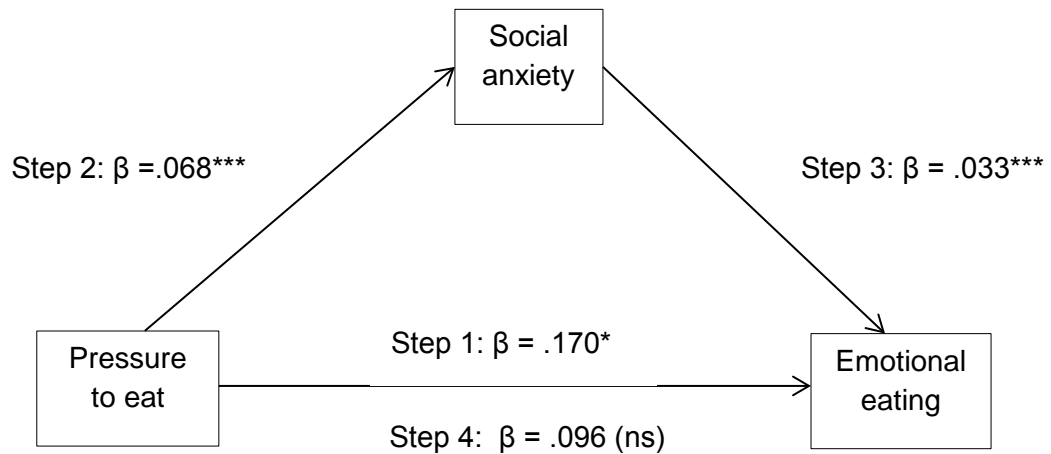
4.3.3.3 Anxiety as a mediator of the relationship between perceptions of pressure to eat and reports of emotional eating

Preadolescents' reports of general and social anxiety fully mediated the relationship between perceived parental pressure to eat and children's reports of emotional eating. Perceptions of parental pressure to eat (IV) significantly predicted preadolescents' reports of emotional eating (DV) ($\beta = .170, p = .042$). Next, preadolescents' perceptions of pressure to eat significantly predicted their reports of general anxiety ($\beta = 1.796, p = .001$) and social anxiety ($\beta = .068, p < .000$) (mediators). General anxiety predicted emotional eating ($\beta = .045, p = .000$), and social anxiety predicted emotional eating ($\beta = .033, p = .001$). Finally, perceptions of pressure to eat failed to continue to be a significant predictor of emotional eating when general anxiety was added to the regression ($\beta = .078, p = .426$), and separately, when social anxiety was added to the regression ($\beta = .096, p = .338$) (Figures 4.5 & 4.6).



* $p < .05$; ** $p < .01$, *** $p < .001$, (ns) $p > .05$

Figure 4.5: General anxiety fully mediated the relationship between preadolescents' perceptions of parental pressure to eat and reports of emotional eating.



* $p < .05$; ** $p < .01$, *** $p < .001$, (ns) $p > .05$

Figure 4.6: Social anxiety fully mediated the relationship between preadolescents' perceptions of parental pressure to eat and reports of emotional eating.

4.4 Discussion

The primary aim of the current study was to replicate the findings of van Strien and Bazelier's (2007) study with a UK sample of preadolescent children. In support of the hypothesised relationships, greater perceptions of parental pressure to eat were associated with higher reports of dietary restraint in preadolescents. However, preadolescents' reports of higher levels of external and emotional eating were associated with lower perceptions of parental restriction over their eating. The second aim of the study was to examine the relationship between preadolescents' reports of under- and over-eating behaviours and their reported levels of anxiety and depression symptomology. All three eating behaviours (dietary restraint, emotional eating and external eating) were associated with preadolescents' levels of general and social anxiety, and dietary restraint and emotional eating were correlated with depression symptomology.

The hypothesised relationships between preadolescents' perceptions of controlling parental feeding practices and their reports of anxiety and depression symptomology were partially supported as perceptions of pressure to eat were related to preadolescents' reports of general and social anxiety. Finally, the exploratory hypothesis, that preadolescents' reports of anxiety and depression would mediate the relationship between preadolescents' perceptions of parental feeding practices and their reported eating behaviours, was partially supported as preadolescent anxiety (general and social) was found to fully mediate the relationships between perceptions of parental pressure to eat and reports of dietary restraint and emotional eating behaviours. Preadolescents' general and social anxiety partially mediated the relationship between perceptions of parental pressure to eat and reports of external eating behaviours.

Boys in the current sample reported significantly greater levels of external and emotional eating compared with girls, similar to previous findings using children of a comparable age (van Strien & Bazelier, 2007). No gender differences were evident for reports of dietary restraint behaviours. No significant gender differences were found for perceptions of parental feeding practices, in line with van Strien and Bazelier's (2007) results with Dutch preadolescents. Girls reported higher symptoms of general and social anxiety compared with boys, which is again comparable with previous findings within this age group (e.g., Bender et al., 2012; Orgilés et al., 2012).

The finding that greater perceptions of parental pressure to eat were associated with higher reports of dietary restraint in preadolescent children confirms the findings of van Strien and Bazelier (2007). The links between dietary restraint and perceptions of pressure to eat support previous research with younger children which has found that greater parental pressure to eat is associated with children's reduced intake of food (e.g., Galloway et al., 2006; Wardle & Carnell, 2007). Pressure to eat is thought to disrupt children's ability to respond to internal cues of hunger and satiety (Carper et al., 2000) and can have long-lasting implications on food intake (Batsell et al., 2002).

The finding that preadolescents' reported dietary restraint behaviours were associated only with their perceptions of parental pressure to eat (and not parental restriction) lends support to the results and conclusions of Chapter 3 of this thesis. Chapter 3 found that preadolescents' friendship groups' reports of dietary restraint were significant predictors of preadolescents' *own* dietary restraint, and concluded that dietary restraint behaviours in preadolescence may be linked to friends' reports of such behaviours, whereas emotional and external eating behaviours may be influenced more by *parental* factors. The results of the present chapter confirm and extend these previous findings. Similarly to van Strien and Bazelier (2007), the present study found that lower perceptions of parental restriction were associated with *higher* reports of

emotional and external eating in preadolescents. This implies that children who perceive lower levels of restriction over their eating engage in more obesogenic eating behaviours, which is contrary to findings with younger children (e.g., Birch et al., 2003; Fisher & Birch, 1999), but supports the findings of van Strien and colleagues (2009) in a preadolescent population. This suggests that a moderate perceived level of parental restriction may facilitate the prevention of over-eating in this age group. Importantly, parental restriction over children's eating may be a covert behaviour that is not always detectable by the child. For example, parents may restrict their child's intake of specific foods by avoiding bringing them into the house, or avoiding taking their child to specific restaurants; behaviours not necessarily perceivable by their child (Ogden, Reynolds & Smith, 2006). Parental pressure to eat, on the other hand, is a more overt behaviour, which is likely to be better perceived and detected by a child, for example, verbally instructing a child to eat more of a food (Ogden et al., 2006). It is possible that children's perceptions of restriction, therefore, may not be entirely accurate, since the use of this feeding practice may be less obvious to the child, and future research is required to explore children's perceptions of controlling parental feeding practices in more detail.

The links between disordered eating behaviours with anxiety and depression are well-established in the clinical literature (e.g., Blinder, Cumella & Sanathara, 2006; Pallister & Waller, 2008; Santos, Richards & Bleckley, 2006), and the results of the present study provide support for these associations in a community sample of preadolescents. Higher self-reported eating behaviours (dietary restraint, emotional eating and external eating) were related to higher reported symptoms of anxiety (general and social) and higher self-reports of dietary restraint and emotional eating were related to depression (negative mood). In particular, the results highlighted a medium to large relationship between dietary restraint behaviours and anxiety symptomology. Clinically, anxiety symptoms have been shown to pre-date eating

disorder symptoms (e.g., Bulik, Sullivan, Carter & Joyce, 1996; Godart, Flament, Lecrubier & Jeammet, 2000). This is noteworthy given that the results of the current study found greater perceptions of parental pressure to eat were related to higher reports of general and social anxiety, however, no significant relationships were found between perceptions of restriction and reports of anxiety or depression symptomology.

Building on the findings of Thirlwall and Cresswell (2010), whose moderation analyses found that the children of controlling mothers exhibited more anxiety symptomology, it is plausible that parents who pressure their child to eat may (unintentionally) ignite anxiety in their children as the child comes to rely on external cues regarding what and when to eat. Thirlwall and Cresswell (2010) further found that when mothers engaged in higher levels of controlling parenting, children with heightened levels of trait anxiety made greater negative predictions about their performance on a task. In relation to the current findings, this may suggest that parents who exert higher levels of pressure to eat on children with heightened anxiety levels may in turn nurture dieting behaviours in their children. Since early reports of dietary restraint behaviours have been identified as prospective risk factors for the development and maintenance of binge eating and bulimia nervosa (e.g., Neumark-Sztainer, Wall, Guo, Story, Haines & Eisenberg, 2006; Stice & Agras, 1998), further research is recommended to build on these findings.

However, it is important to note that measure of anxiety used in the present study may have tapped into *trait* anxiety, thus identifying children who are sensitive to inhibitory messages from their parents because their behaviour is more governed by trait anxiety levels, rather than parents triggering *state* anxiety levels. This is an important distinction, and one which future research should address using a measure sensitive to examining state and trait anxiety, as this may reveal differences in anxiety types in relation to perceptions of pressure to eat and under-eating behaviours in this age group.

The current study is the first to explore anxiety and depression as potential mediators of the relationship between perceptions of parental feeding practices and self-reported eating behaviours in preadolescents. The results extend previous findings (e.g., van Strien & Bazelier, 2007) by highlighting that preadolescent anxiety (general and social) fully mediated the relationship between perceptions of parental pressure to eat and reports of dietary restraint and emotional eating behaviours, and anxiety (general and social) partially mediated the relationship between perceptions of pressure to eat and reports of external eating. Such results suggest that greater levels of anxiety in preadolescents who perceive their parents to apply greater levels of pressure to eat may contribute to greater reports of over- and under-eating behaviours in these individuals. This supports the literature that reports links between controlling parenting practices and children's symptoms of anxiety and depression (e.g., Bögels & van Melick, 2004; Feng et al., 2008; Hudson & Rapee, 2001; LeMoyné & Buchanan, 2011) and the theory that excessive parental control can heighten a child's reliance on their parents, resulting in a greater vulnerability to experiencing anxiety problems (Hudson & Rapee, 2001; Rapee, 2001). Preadolescents exposed to greater parental pressure to eat may have a heightened susceptibility to anxiety since repeated exposure to pressure to eat may encourage children's reliance on parents for hunger and satiety cues. This in turn could manifest in maladaptive eating behaviours, such as emotional eating, dietary restraint and external eating, potentially as the child attempts to take back control of their eating.

The finding that social anxiety mediated the relationship between perceptions of parental pressure to eat and the over-eating behaviours, emotional eating and external eating, is of interest. Children with higher levels of social anxiety may have a tendency to overemphasise worries related to the social environment and, as such, may be more susceptible to social and non-dietary cues for hunger, such as emotional and environmental cues for eating. For those children who exhibit higher levels of anxiety

in social situations, their experience of pressure to eat at home may make them more likely to respond to cues for eating in social situations by over-eating. For example, if a child, who is pressured to eat at home and also exhibits social anxiety, is feeling lonely or bored, they may over-eat in social situations as a response to their emotions (emotional eating). Similarly, a child who perceives pressure to eat at home and who also exhibits social anxiety may be likely to respond to external cues for hunger (external eating) when their parents are not present and they are exposed to food in social settings. Although these results are exploratory and other explanations are plausible, these mediational results are of great importance and highlight the possible detrimental influence of parental pressure to eat in relation to children's anxiety and eating behaviours in this age group.

It would be of interest for future research to ascertain how children's levels of anxiety link to their parents' general style of parenting. It would further be beneficial to examine parents' own levels of anxiety in this relationship. Parents who are more anxious themselves have been found to be more likely to exhibit controlling feeding practices with their children (e.g., Farrow & Blissett, 2005; Haycraft & Blissett, 2008, 2012), especially if they have anxieties relating to eating and/or mealtimes. As anxiety, like eating behaviours, can be modelled by parents (Fisak & Grills-Taquechel, 2007), children may be more anxious as a consequence of their parents' anxiety, and this is something future research should consider.

Contrary to our hypotheses, depression symptomology was not found to be significantly related to perceptions of parents' feeding practices or to mediate the relationship between perceptions of parental feeding practices and self-reported eating behaviours, which supports a review which suggested only weak links between controlling parenting and childhood depression (McLeod et al., 2007). However, as mentioned in Chapter 3, the reliability level of the measure used for depression was

low with the current sample, and despite the measure being suitable for children aged 7-17 years, the low reliability may suggest that this measure may have been too complex for some of the younger children. Use of a depression measure that is more sensitive and specific to younger children may have produced different results and it would be advantageous for future research to consider this, although to our knowledge there are no alternative, succinct measures of depression suitable for this age group.

A further noteworthy limitation was that schools that took part in the research were self-selecting. It is plausible that the head teachers/schools that agreed to participate in the current study had a greater interest in healthy eating/childhood well-being than the general UK school population and, as such, children within these schools may have been exposed to more healthy eating projects or initiatives. Furthermore, despite the large sample size, the cross-sectional design and use of statistical mediation based on the selected theoretical model means that causation cannot be concluded as other causal pathways may be possible. The cross-sectional nature of the research also limits the ability to observe whether the findings persist over time. Longitudinal research would be beneficial to replicate whether these findings remain stable, particularly the mediational results, to establish the longer term contribution of parental feeding practices and preadolescents' anxiety symptoms to children's eating behaviours.

Future research would benefit from collecting parental data regarding their use of controlling feeding practices with their children as well as data relating to their general parenting style, and their own eating behaviours. Since the current study analysed *child perceptions* of parental controlling feeding practices, which may not be wholly accurate as some behaviours may not be detectable by the child (e.g., covert control), it would be of interest to match these to parental reports of such behaviours and to examine the degree of correspondence between child and parent reports. It is

plausible that children who report higher levels of anxiety or depression may perceive their parents as more controlling over their eating behaviours, as well as more controlling in their general parenting style. Further, it is possible that there may be links found between preadolescents' reports of dietary restraint, emotional eating and external eating behaviours and their parents' reports of these eating behaviours, as parents model eating behaviours to their children (e.g., Palfreyman, Haycraft & Meyer, 2012; Scaglioni et al., 2008). Parents' own eating behaviours and levels of anxiety are likely to influence the way they control their children's eating experiences. The direction in which these processes occur is important for future research to examine. Parents may pressure their children to eat as a response to perceptions that their children are exhibiting dietary restraint behaviours (e.g., Francis, Hofer & Birch, 2001). Given the current focus in the Western world on both under- and over-eating in childhood, parents' anxieties over their child's diet and weight may be the precursor to their use of controlling feeding practices. More research is needed to dissect these relationships.

Research has suggested that parental control is not usually isolated to the feeding environment, but instead typically reflects a wider style of parenting (see Collins, Duncanson & Burrows, 2014, for a review). For example, an authoritarian parenting style is characterised by high demand and control over their child, and this type of parenting style has been linked with excessive levels of pressure and restriction over their child in the feeding domain (e.g., Hughes, Power, Fisher, Mueller & Nicklas, 2005). Parenting styles have further been linked to anxiety and depression symptomology in adolescents (e.g., Wolfradt, Hempel & Miles, 2003). It is likely that pressure to eat may also be a characteristic of a more general controlling parenting style. The results of the present study may be linked more generally to parenting styles as a whole and future research should consider how general parenting styles and practices may interact with children's symptoms of anxiety and depression and

their eating behaviours. There are clearly some fascinating avenues for future research in this area.

Despite the limitations discussed, this is the first study to examine the relationships between eating behaviours, perceptions of parental feeding practices and symptoms of anxiety and depression in a UK sample of preadolescents. Given the importance of the preadolescent period of development in relation to the onset of body, weight, and dieting concerns (e.g., Ricciardelli et al., 2003; Schur et al., 2000; Stice et al., 1999), and the dearth of research with this age group, the present results make an important addition to the field. The results support and extend previous literature with a younger age group by demonstrating evidence of the links between eating behaviours and perceived parental feeding practices, and between perceived parental feeding practices and anxiety symptomology, in preadolescent children. The novel findings of this study may begin to explain why the children of parents who use greater levels of pressure in feeding situations are more likely to report maladaptive eating behaviours, by suggesting that parental pressure may trigger anxiety in children, which in turn leads to maladaptive eating behaviours. Most importantly, the results highlight the possible negative implications of preadolescents' perceptions of their parents' pressure to eat and, whether this parental feeding practice is unintentional or not, it is potentially linked to the development or maintenance of anxiety problems in this age group. This study suggests that children may be using food to deal with symptoms of anxiety and depression, and this finding is something that needs disseminating to anyone working with children in this age group, such as health professionals and teachers, especially since parenting behaviours have the potential to be modified. However, more research is needed before causal relationships may be concluded.

Chapter 5

Chapter 3 explored the variables associated with preadolescent eating behaviours cross-sectionally; specifically, friends' eating behaviours and preadolescents' anxiety and depression symptomology. Chapter 3 reported that preadolescents' own reports of dietary restraint behaviours were significantly predicted by their friends' reports of such behaviours, as well as their own levels of anxiety (general and social).

Preadolescents' emotional and external eating behaviours were not related to friends' reports of these behaviours, but were significantly predicted by preadolescents' levels of general anxiety. The aim of the present chapter was to extend the findings of Chapter 3 by examining the same factors longitudinally. To satisfy this, Chapter 5 analysed baseline data (T1) and data collected 12 months later (T2) from the same sample of preadolescents. Chapter 5 initially aimed to examine the stability and continuity of eating behaviours over 12 months in a preadolescent sample. The second aim of Chapter 5 was to explore the role of friends' eating behaviours, in particular dietary restraint behaviours, in predicting eating behaviours longitudinally. Finally, Chapter 5 aimed to explore the role of anxiety and depression in predicting preadolescent eating behaviours longitudinally.

Chapter 5:

**Exploring preadolescent eating longitudinally:
Stability, continuity, and the moderating role of friends'
eating behaviours.**

Abstract

Preadolescence is an important time period for the development of problematic eating behaviours, yet there is a lack research examining the continuity and stability of eating behaviours during this time period, as well as limited research exploring the variables linked to problematic eating behaviours in this age group over time. The aims of this longitudinal study were three-fold. First, to examine the continuity and stability of preadolescents' eating behaviours over a 12 month period using data from two time points (T1 and T2). Second, to explore if friends' reports of under-eating behaviours moderated the relationship between individuals' reports of these behaviours at T1 and T2. Third, to explore if anxiety and depression moderated the relationship between preadolescents' eating behaviours at T1 and T2. Two hundred and eighty eight preadolescents (mean age 9.71 at T2) provided details about their friendship groups and completed questionnaires at two time points, 12 months apart. Questionnaires measured their dietary restraint, emotional eating and external eating, as well their general and social anxiety, and symptoms of depression. Preadolescents' eating behaviours remained stable over the 12 month period. Continuity of eating behaviours was not found, with dietary restraint, emotional eating and external eating behaviours *decreasing* over time. Friends' reports of under-eating behaviours (dietary restraint) moderated the relationship between preadolescents' self-reported under-eating at T1 and T2. General anxiety moderated the relationship between over-eating behaviours (external and emotional eating) at T1 and T2. The findings suggest that greater levels of friends' dieting behaviours and individual levels of anxiety can influence the development of dysfunctional eating behaviours over time within a preadolescent population.

**Exploring preadolescent eating longitudinally:
Stability, continuity, and the moderating role of friends' eating
behaviours.**

5.1 Introduction

Preadolescence is an important period of transition and growth (Sullivan, 1953), and a time period linked to the emergence of weight-loss and dieting behaviours (e.g., Ricciardelli, McCabe, Holt & Finemore, 2003; Schur, Sanders & Steiner, 2000; Stice, Agras & Hammer, 1999). Problematic eating behaviours developing during this milestone period of children's development can have negative physical and cognitive long-term effects (e.g., National Institute for Health and Care Excellence, 2004). Despite this, research into the predictors of problematic eating behaviours in this age group is limited.

Children of school-age spend much time with their friends and peers, with the amount of unsupervised time spent with these individuals increasing as children get older (Gifford-Smith & Brownell, 2003; Rubin, Bukowski & Parker, 2006). Foot, Chapman and Smith (1980) reported that, from approximately 8 years of age, preadolescent children can be part of friendship groups with secure structures, and so it follows that research has suggested links between the eating behaviours of children and their friends (see Chapter 1 and also Houldcroft, Haycraft & Farrow, 2014, for a review).

Research for this thesis (Chapter 3) found that preadolescent children's under-eating behaviours (specifically dietary restraint) were positively predicted by their friendship groups' reports of under-eating, or dietary restraint behaviours, as well as their levels of anxiety (general and social). Such results were not mirrored for over-eating behaviours (specifically emotional and external eating behaviours) in relation to

friends' reports of these behaviours, however external and emotional eating behaviours at T1 were predicted by preadolescents' reports of general anxiety. While finding associations between friends' restrained eating behaviours with an individual's restrained eating, and between anxiety with both under- and over- eating behaviours in this age group, is important, these results were based on cross-sectional research, which is limited in terms of establishing causality or identifying whether this association persists over time.

A further area of interest in this under-researched age group is the continuity and stability of eating behaviours. Continuity and stability are two distinct concepts that developmentalists have used to explore the development of behaviours over time. Continuity of a behaviour refers to the consistency in the mean level of a behaviour, e.g., eating behaviours, over time. A continuous eating behaviour is one where the mean levels of the eating behaviour are the same at one time point as a second, later time point. A discontinuous behaviour is one where the mean level of the eating behaviour changes over time. Stability refers to the consistency in ranks of behaviour over time. For example, a stable eating behaviour would be one that some children report at high levels at one point in time and again at a later time point, and other children report low levels of at both time points. An unstable behaviour occurs when rank order is not maintained (Cote & Bornstein, 2003; Farrow & Blissett, 2012).

Dietary restraint behaviours have been shown to have good continuity in girls aged between 5 and 9 years of age (Shunk & Birch, 2004). However, mean levels of emotional under- and over-eating have been shown to change significantly over time in children aged from 4-11 years (Ashcroft, Semmler, Carnell, van Jaarsveld & Wardle, 2008), with emotional under-eating decreasing, and emotional over-eating increasing. On the other hand, Ashcroft and colleagues (2008) found that consistency in the rank order of emotional eating behaviours was maintained over time in 4-11 year olds,

suggesting good stability. To date, there has been no research that has looked at the continuity and stability of a range of eating behaviours specifically across a preadolescent time period, despite this being a time of major biological, sexual, physical, social and emotional change (Susman & Dorn, 2009). An understanding of the continuity and stability of eating behaviours during this time period may help to explain the development of maladaptive eating behaviours in preadolescence.

The first aim of the present study was therefore to examine the continuity and stability of preadolescent over- and under-eating eating behaviours over a 12 month period. It was anticipated, based on previous research by Shunk and Birch (2004) that dietary restraint behaviours would be continuous; however emotional over-eating behaviours would lack continuity (based on the results of Ashcroft et al., 2008). A similar result was expected for external eating in the present study as this was a measure of over-eating, likewise to emotional over-eating. In line with the results of Ashcroft and colleagues (2008) who found that a range of eating behaviours, including emotional eating, were stable over time, stability in eating behaviours in the present sample were expected.

The subsequent aims were to extend previous cross-sectional findings (Chapter 3) and explore whether friends' reports of under-eating behaviours, as well as individual levels of anxiety moderated the relationships between preadolescents' eating behaviours at T1 and T2. Moderation examines the stability of behaviours over time at different levels of a separate variable, or moderator. It was hypothesised, based on the findings from Chapter 3, that friends' dieting behaviours would moderate the relationship between preadolescents' own dieting behaviours at baseline and 12 months later. Such a relationship was not hypothesised to exist for emotional and external eating, because friends' reports of these behaviours were not shown to be significantly related to individual eating (Chapter 3). It was further hypothesised that anxiety (general

anxiety and social phobia) would moderate the relationship between dietary restraint behaviours at T1 and T2, and that general anxiety levels would moderate the relationships between over-eating behaviours (emotional and external eating) at T1 and T2.

5.2 Method

5.2.1 Participants

Three hundred and forty-three children from eight UK primary schools took part in this study at baseline (T1) and 288 children (84%) from six schools remained in the study at the 12 month follow-up (T2). It is the final sample of 288 children who are reported on in this Chapter. The reasons for schools discontinuing participation were due to a change in Head Teacher and competing time commitments. Not all individual participants were present at school on the follow-up data collection days, so some individuals from baseline did not take part in the follow-up despite their school continuing to participate in the research.

The T2 sample consisted of a relatively similar number of boys and girls (boys $n= 151$, girls $n= 137$ girls). At T1 the participants ranged in age from 7.25 to 10.25 years ($M= 8.75$ years, $SD= 0.57$), and at T2 follow-up, from 8.25 to 11.25 years ($M= 9.71$ years, $SD= 0.62$). Most (94%) of the final sample reported their ethnicity as White British.

5.2.2 Procedure and measures

The baseline and longitudinal aspects of this research were approved by the Loughborough University Ethics Approvals (Human Participants) Sub-Committee. Primary schools from Staffordshire, Derbyshire, Nottinghamshire and Leicestershire that had participated in this research at T1 (Chapters 3 & 4) were contacted by letter

and invited to participate in the follow-up research (see Appendix C). Six of the eight T1 schools remained in the study at follow-up.

As was done at baseline, schools sent home letters to parents of children in the relevant aged classes informing them about the study, and allowing them to opt out their child from participation (see Appendix D).

The study was conducted as part of a class lesson, with the researcher describing the study to each class before the children took part. Children provided assent to participate. Children were asked to complete the questionnaire pack individually, and in silence, and to ask for help if required. An alternative activity was provided for any child who did not consent to take part, or whose parents had expressed for them not to participate (n= 0).

Children completed the questionnaire measures outlined below. Children completed the same measures at T1, and 1 year later at T2 (see Sections 2.5. and 3.2.2 for a full description of each measure).

5.2.2.1 Eating Patten Inventory for Children (EPIC; Schact, Richter-Appelt, Schulte-Markwort, Hebebrand & Schimmelmann, 2006).

The EPIC was used to measure children's self-reported eating behaviours, specifically dietary restraint, external eating and emotional eating. The internal reliability coefficients (Cronbach's α) scores for sample at T2 were: dietary restraint α 0.88; external eating α 0.82; and emotional eating α 0.79; all demonstrating good levels of internal consistency. The EPIC and details of its scoring are presented in Appendix H.

5.2.2.2 Spence Children's Anxiety Scale (SCAS; Spence, 1997).

Two subscales of the SCAS were used to measure children's social anxiety and generalised anxiety symptoms. Cronbach's alpha levels for the present sample were satisfactory at 0.73 for social phobia and 0.82 for generalised anxiety. The SCAS and details of its scoring are presented in Appendix J.

5.2.2.3 Children's Depression Inventory: Short Version (CDI:S; Kovacs, 1992).

One subscale of the CDI:S, the negative mood scale, was used to measure children's levels of depressive symptoms (Appendix K). The Cronbach's alpha level for the present sample was 0.67, slightly lower than the accepted minimum level of reliability (Pallant, 2007), but higher than at baseline (T1 α 0.52).

5.2.2.4 Friendship groups

As previously described in Sections 2.5.4 and 3.2.2.4, each child was asked at baseline to "write down the full names of your best friends in your class. That is, the people you usually spend time with at school and enjoy being with" (Farrow, Haycraft & Meyer, 2011; Hutchinson & Rapee, 2007; Paxton, Schutz, Wertheim & Muir, 1999). This allowed T1 friendship groups to be established (see Sections 2.5.4 and 3.2.2.4 for full details of how friendship groups were produced and checked). At T1 there were 74 friendship groups with three to eight members each. Analyses for this chapter are based on T1 friendship groups as the focus for this study was the impact that friends have over time. Friendship groups were typically stable over time, with less than 8% of children reporting a change in group over time.

5.2.3 Statistical analyses

Histograms, skew and kurtosis data for each subscale indicated that the sample did not deviate substantially from normality and parametric tests were used in all analyses. The sample size of 288 exceeded the requirements to detect a medium effect at $p < .05$

with a power of 0.80 when using correlations ($n= 85$), tests of difference ($n= 64$) and moderated regression ($n= 177$).

Independent samples t-tests identified gender differences for boys' and girls' self-reported levels of external and emotional eating, as well as their reports of general and social anxiety (see Table 5.1).

To establish whether there were any differences between children who took part in both parts of the research and those who dropped out after T1 ($n= 55$), independent t-tests were conducted. The tests confirmed that there were no significant differences between children who remained in the study at T2 compared to those who did not in terms of their age or their self-reported eating behaviours ($p> .05$).

Independent t-tests were used to examine gender differences in eating behaviours, and two-tailed Pearson's correlations were run to examine relationships between child age and reports of eating behaviours.

Next, to examine continuity of eating behaviours over time, mean difference scores were calculated between T1 and T2. Paired samples t-tests were conducted to assess continuity. Positive mean scores indicated an average increase in the eating behaviour over the 12 months, whereas a negative mean score indicated an average decrease. To examine the stability of eating behaviours over time, two-tailed Pearson's correlations were calculated. Again, positive correlations indicated stability in eating behaviours.

To consider the similarities between friendship group members' eating behaviours and children's own individual eating behaviours, mean friendship group eating behaviours at T2 were calculated (see Section 3.2.3 for a detailed description of this).

Next, two-tailed Pearson's correlations were used to explore the relationships between preadolescents' eating behaviours at T1 with their *own* eating behaviours at T2 and their *friends'* eating behaviours at T2. Partial correlations (controlling for age and/or gender) were run when associations between these variables and eating behaviours had been previously established. Further Pearson's two-tailed correlations were used to explore the relationships between preadolescents' eating behaviours at T1 with their anxiety and depression levels at T2. Again, partial correlations (controlling for age and/or gender) were run when associations between these variables and eating behaviours had been previously established.

Based on the findings of Chapter 3, moderated regression analyses (Baron & Kenny, 1986) were used to explore: (1) if friends' dietary restraint behaviours moderated the relationship between preadolescents' own reports of dietary restraint at T1 and T2; (2) if general anxiety or social anxiety moderated the relationship between reports of dietary restraint at T1 and T2; (3) if general anxiety moderated the relationship between reports of external eating at T1 and T2; and (4) if general anxiety moderated the relationship between emotional eating at T1 and T2. The hypothesised moderations were tested by calculating the main and interaction effects of the moderator in predicting preadolescents' eating behaviours at T2. Simple slope analyses were used to explore significant moderators.

Statistical analyses were performed using PASW Statistics 20. All tests were two-tailed due to the exploratory nature of the research. A p -value of $<.05$ was accepted as significant.

5.3 Results

5.3.1 Descriptive statistics

Table 5.1 displays the mean, standard deviation (*SD*), and test of difference scores for girls' and boys' individual eating behaviours at T1 and T2.

Table 5.1: Descriptive statistics (means, standard deviations) and tests of difference scores (*t*) for eating behaviours for boys and girls at T1 and T2

	Mean (<i>SD</i>) Boys (<i>n</i> = 151)	Mean (<i>SD</i>) Girls (<i>n</i> = 137)	Independent t test (<i>t</i>)	<i>p</i> value
Dietary restraint T1	2.11 (.79)	2.15 (.77)	-.41	.685
Dietary restraint T2	1.91 (.73)	1.91 (.79)	.04	.970
External eating T1	2.39 (.89)	2.16 (.74)	2.31	.022*
External eating T2	2.07 (.81)	1.89 (.72)	1.89	.060
Emotional eating T1	1.85 (.77)	1.80 (.73)	.51	.607
Emotional eating T2	1.60 (.73)	1.60 (.69)	.01	.992

**p*<.05, two tailed; T1: time point 1; T2: time point 2

Mean scores for the EPIC eating behaviours at T2 were comparable to those reported by the authors of the EPIC with children of a similar age (Schact et al., 2006), and similar to previous research using the measure with a preadolescent sample (Farrow et al., 2011). Independent *t*- tests of difference showed significant gender differences for external eating at T1 with boys reporting greater levels of external eating compared to girls. This mirrors the results presented in Chapter 3 and supports previous findings with children of a comparable age range (van Strien & Bazelier, 2007).

Table 5.2 displays the mean, standard deviation (*SD*), and test of difference scores (*t*) for girls' and boys' individual anxiety and depression levels at T1 and T2.

Table 5.2: Descriptive statistics (means and standard deviations) and tests of difference scores (*t*) for anxiety and depression for boys and girls at T1 and T2

	Mean (<i>SD</i>) Boys (<i>n</i> = 151)	Mean (<i>SD</i>) Girls (<i>n</i> = 137)	Independent t tests (<i>t</i>)	<i>p</i> value
Spence Children's Anxiety Scale (SCAS):				
General anxiety T1	6.76 (4.39)	8.68 (4.48)	-3.46	.001***
General anxiety T2	6.93 (4.32)	8.69 (4.46)	-3.17	.002**
Social phobia T1	6.44 (4.34)	7.65 (4.18)	-2.27	.024*
Social phobia T2	6.77 (4.18)	8.53 (4.03)	-3.39	.001***
Children's Depression Inventory Short Form (CDI:S):				
Negative mood T1	1.02 (1.26)	1.24 (1.49)	-1.23	.220
Negative mood T2	0.77 (1.20)	1.05 (1.48)	-1.66	.097

p*<.05; *p*<.01; ****p*<.001, two tailed; T1: time point 1; T2: time point 2

Mean levels of children's anxiety were higher than previous research using the SCAS in a preadolescent sample (Farrow et al., 2011; Spence, 1998), but were still classed as 'low' levels overall. Mean scores for children's levels of depression (negative mood) were comparable to normative mean scores with children of a similar age (Kovacs, 2003). Girls reported significantly higher levels of general and social anxiety at both time points in comparison to boys, corresponding with previous research comparing both genders (e.g., Bender, Reinholdt-Dunne, Esbjørn & Pons, 2012; Orgilés, Méndez, Espada et al., 2012).

Two-tailed Pearson's correlations indicated that child age was negatively associated with external eating at T1 ($r = -.20, p = .001$) and T2 ($r = -.19, p = .003$), and with emotional eating at T1 ($r = -.25, p = .000$) and T2 ($r = -.25, p = .000$), and depression at

T1 ($r = -.23$, $p = .000$). Subsequent analyses using these variables therefore controlled for age.

5.3.2 Continuity of eating behaviours over 12 months

To examine the continuity of children's reports of eating behaviours over time, mean change scores for variables between the two time points (T1 and T2) were calculated, followed by paired samples t- tests (Table 5.3).

Table 5.3: Descriptive statistics and paired sample t-tests (t) for children's reports of eating behaviours between T1 and T2

Variable	T1 Mean (SD)	T2 Mean (SD)	Mean change (SD)	Paired sample t- tests (t)	p value
Dietary restraint	2.16 (.78)	1.90 (.78)	-.27 (.85)	-4.74	.000***
Emotional eating	1.83 (.74)	1.62 (.75)	-.20 (.74)	-4.05	.000***
External eating	2.31 (.74)	2.02 (.83)	-.29 (.74)	-5.77	.000***

*** $p < .001$, two tailed; T1: time point 1; T2: time point 2

As shown in Table 5.3, eating behaviours between T1 and T2 failed to display continuity. Dietary restraint, emotional eating and external eating all significantly *decreased* between the two time points.

5.3.3 Stability of eating behaviours over 12 months

To examine the stability of children's reports of eating behaviours over time, a series of Pearson's correlations were calculated (Table 5.4).

Table 5.4: Correlation coefficients between children's reports of eating behaviours at time point 1 (T1) and time point 2 (T2)

Variable	<i>R</i> s	<i>p</i> value
Dietary restraint	.39	.000***
Emotional eating	.49	.000***
External eating	.58	.000***

*** $p < .001$; two tailed

As shown in Table 5.4, all variables were significantly positively correlated with the same behaviour subsequently over time, suggesting good stability in eating behaviours in this age of school children.

5.3.4 Correlation analyses

To examine the hypothesised relationships between T1 and T2 variables, a series of two-tailed Pearson's or partial (where applicable) correlations were calculated (Tables 5.5 & 5.6).

5.3.4.1 Correlates of T1 and T2 eating behaviours (own and friends')

Two-tailed Pearson's correlations were calculated for dietary restraint behaviours at T1 and T2. Two-tailed partial correlations were calculated for external eating (controlling for gender and age) and emotional eating (controlling for age) at T1 and T2. The results are presented in Table 5.5.

Table 5.5: Correlation coefficients between preadolescents' reports of their eating behaviours at T1 with their own, and their friends', eating behaviours at T2

		Time point 2 (T2)					
		Dietary Restraint (<i>p</i> value)	External Eating [#] (<i>p</i> value)	Emotional Eating [#] (<i>p</i> value)	Friends' Dietary Restraint (<i>p</i> value)	Friends' External Eating (<i>p</i> value)	Friends' Emotional Eating (<i>p</i> value)
Time point 1 (T1)							
Dietary restraint	.39 (.000) ^{***}				.33 (.000) ^{***}		
External eating ^{#†}		.56 (.000) ^{**}				.06 (.390)	
Emotional eating [#]			.43 (.000) ^{***}				-.06 (.425)

** $p < .01$, *** $p < .001$, two tailed; # age controlled for; † gender controlled for

Preadolescents' reports of dietary restraint behaviours at T1 were positively associated with their dietary restraint at T2, and their friends' reports of dieting behaviours at this time. External eating behaviours reported at T1 were associated with external eating at T2, but not with friends' reports of this behaviour at T2. Similarly, emotional eating behaviours at T1 were associated with emotional eating at T2, but not with friends' reports of emotional eating at T2.

5.3.4.2 Correlates of T1 and T2 eating behaviours, anxiety and depression

Two-tailed partial correlations were conducted between T1 eating behaviours and T2 anxiety (controlling for gender) and depression (controlling for age) (Table 5.6).

Table 5.6: Pearson's correlation coefficients between preadolescents' reports of eating behaviours at T1 and their anxiety and depression levels at T2

	Time point 2 (T2)		
	General anxiety [†] (<i>p value</i>)	Social anxiety [†] (<i>p value</i>)	Depression negative mood [#] (<i>p value</i>)
Time point 1 (T1)			
Dietary restraint	.10 (.143)	.16 (.013)*	.10 (.120)
External eating [†]	.18 (.006)*	.04 (.558)	.01 (.885)
Emotional eating	.17 (.010)**	.11 (.114)	.07 (.334)

* $p < .05$, ** $p < .01$, two tailed; # age controlled for; [†]gender controlled for

Preadolescents' reports of dietary restraint behaviours at T1 were positively associated with their social anxiety at T2. External eating behaviours reported at T1 were related to general anxiety reported at T2. Emotional eating behaviours at T1 were associated with general anxiety at T2.

5.3.5 Moderation analyses

Moderated regression analyses (Baron & Kenny, 1986) were used to examine under what conditions of a moderating variable preadolescents' eating behaviours were stable over time. Moderated regressions were performed where Chapter 3 had found correlations between eating behaviours and friends' eating behaviours and individual levels of anxiety symptomology. Specifically, moderated regressions were used to explore if friends' reports of under-eating behaviours moderated the relationship between individuals' reports of these behaviours at T1 and T2, and if anxiety moderated the relationship between preadolescents' under- and over-eating at T1 and T2. Simple slope analyses were used to further investigate any significant moderations. Simple slopes for the regression of T1 eating behaviour on T2 eating behaviour were computed at 3 levels of the moderator: low (-1 SD below the mean), moderate (mean) and high (+1 SD above the mean).

5.3.5.1 Dietary restraint behaviours

5.3.5.1.1. The moderating role of friends' dietary restraint on the relationship between T1 and T2 dietary restraint behaviours

The interaction between dietary restraint at T1 and friends' dieting behaviours at T2 was a significant predictor of dietary restraint behaviours at T2 ($\beta= 6.273$, $SE= .115$, $p<=000$). The interaction between individual dietary restraint and friend's dietary restraint was significant when the moderator was high, moderate or low. The relationship was stronger when friends' dietary restraint behaviours were high ($\beta= 11.851$, $SE= .016$, $p= .000$) than when they were moderate ($\beta= 6.115$, $SE= .011$, $p= .000$) or low ($\beta= .378$, $SE= .017$, $p= .011$). Figure 5.1 shows the simple slopes plots for the interaction.



Figure 5.1: Simple regression slopes for the moderating role of friends' dietary restraint on the relationship between time point 1 (Mean age= 8.75) and time point 2 (Mean age= 9.71) dietary restraint behaviours

5.3.5.1.2 The moderating role of general anxiety on the relationship between T1 and T2 dietary restraint

The interaction between dietary restraint behaviours at T1 and general anxiety at T2 was not a significant predictor of dietary restraint behaviours at T2 ($\beta= 0.04$, $SE= .013$, $p=.943$).

5.3.5.1.3 The moderating role of social anxiety on the relationship between T1 and T2 dietary restraint

The interaction between dietary restraint behaviours at T1 and social anxiety at T2 was not a significant predictor of dietary restraint behaviours at T2 ($\beta = 0.08$, $SE = .013$, $p = .540$).

5.3.5.2 External eating behaviours

5.3.5.2.1. The moderating role of general anxiety on the relationship between T1 and T2 external eating behaviours

The interaction between external eating behaviours at T1 and general anxiety at T2 was a significant predictor of external eating behaviours at T2 ($\beta = 6.285$, $SE = .125$, $p = .000$). The interaction between external eating and general anxiety was significant when the moderator was high, moderate or low. The relationship was stronger when general anxiety levels were high ($\beta = 12.760$, $SE = .018$, $p < .000$) than when they were moderate ($\beta = 6.840$, $SE = .012$, $p = .000$) or low ($\beta = .919$, $SE = .018$, $p = .000$). Figure 5.2 shows the simple slopes plots for the interaction.

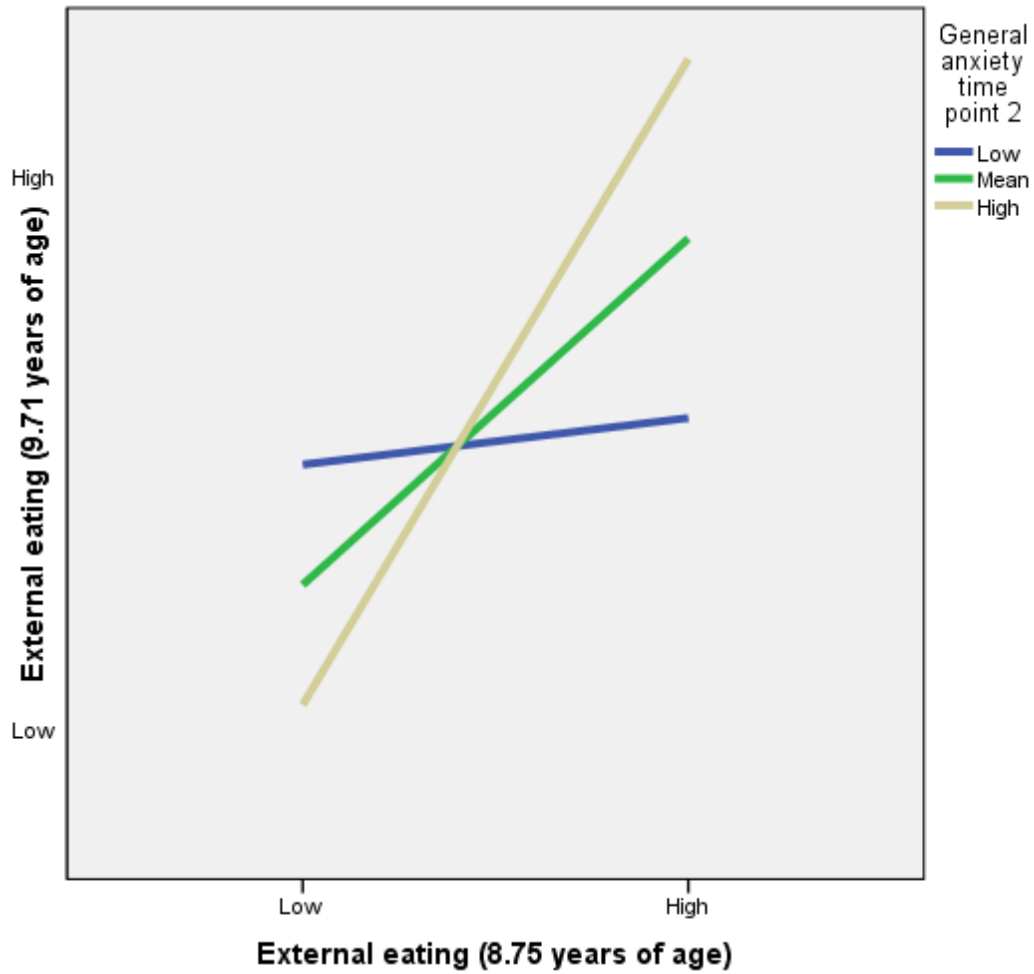


Figure 5.2: Simple regression slopes for the moderating role of general anxiety on the relationship between time point 1 (Mean age= 8.75) and time point 2 (Mean age= 9.71) external eating behaviours

5.3.5.3 Emotional eating behaviours

5.3.5.3.1 The moderating role of general anxiety on the relationship between T1 and T2 emotional eating behaviours

The interaction between emotional eating behaviours at T1 and general anxiety at T2 was a significant predictor of emotional eating behaviours at T2 ($\beta= 6.037$, $SE= .104$, $p= .000$). The interaction between emotional eating and general anxiety was significant when the moderator was high, moderate or low. The relationship was stronger when general anxiety levels were high ($\beta= 12.932$, $SE= .017$, $p= .000$) than when they were moderate ($\beta= 6.889$, $SE= .011$, $p= .000$) or low ($\beta= .846$, $SE= .014$, $p= .000$). Figure 5.3 shows the simple slopes plots for the interaction.

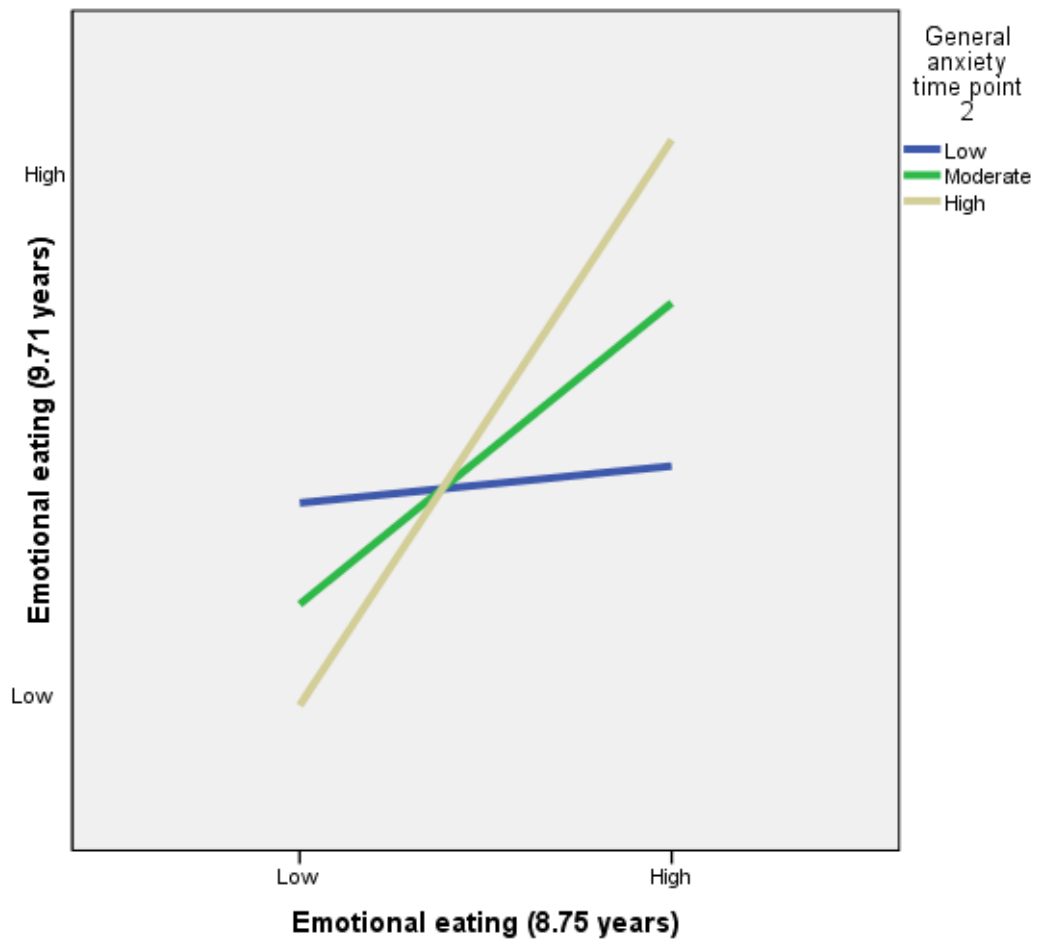


Figure 5.3: Simple regression slopes for the moderating role of general anxiety on the relationship between time point 1 (Mean age= 8.75) and time point 2 (Mean age= 9.71) emotional eating behaviours

5.4 Discussion

The present study sought to explore under- and over-eating behaviours in preadolescent children longitudinally, specifically by examining the continuity and stability of eating behaviours over 12 months, and the potential moderating role of friends' eating behaviours and anxiety in contributing to the relationship between eating behaviours at baseline (T1) and 12 months later (T2).

Based on previous research it was hypothesised that there would be continuity in reports of dietary restraint behaviours, but emotional and external eating would lack continuity, in this preadolescent age group. It was further predicted that eating behaviours would be stable over time. While it was found that eating behaviours remained stable over the 12 month period, continuity of all three eating behaviours was not found. Dietary restraint, emotional eating and external eating behaviours all showed a decrease over time in the present sample. Previous research has found that self-reported dietary restraint behaviours have good continuity in girls aged 5-9 (Shunk & Birch, 2004). However, the present study used slightly older children and also included boys, which may explain some of the differences in results. Ashcroft et al. (2008) found that emotional eating behaviours lacked continuity in children aged 4-11 (Ashcroft et al., 2008), with emotional under-eating showing a small decrease over time, and emotional over-eating showing a moderate increase over time. The present study measured emotional *over-eating* and the results therefore differed from previous research (Ashcroft et al., 2008). However, Ashcroft and colleagues (2008) used the Children's Eating Behaviour Questionnaire, a *parental* report of their child's emotional eating, whereas a *child* self-report of emotional eating (the Eating Pattern Inventory Questionnaire; Schact et al., 2006) was used in the present study, which could explain the discrepancies in the results for emotional eating.

Chapter 3 of this thesis reported that preadolescent children's under-eating behaviours (dietary restraint) were positively predicted by their friendship groups' reports of dietary restraint behaviours. It was therefore hypothesised that, for the present longitudinal study, friends' dieting behaviours would moderate the relationship between preadolescents' own dieting behaviours at baseline and 12 months later. The results of the present study supported this hypothesis by showing that friends' dietary restraint behaviours at T2 moderated the relationship between preadolescents' dietary restraint behaviours at T1 and T2, with the relationship strongest when friends' dieting behaviours were high. Such results provide longitudinal support for the role friends in the stability of preadolescents' under-eating behaviours over time, supporting and extending the results of Chapter 3 and previous cross-sectional work showing links between preadolescents' and adolescents' eating behaviours and those of their friends (e.g., Hutchinson & Rapee, 2007; Farrow et al., 2011; Paxton et al., 1999). It may be that friends foster dieting behaviours in each other, or it is also plausible that children with higher levels of restrained eating choose friends with similar attitudes and behaviours towards eating. Further research is needed to examine this in more detail. However this is an important finding and one that has implications for anyone working with groups of children in the preadolescent age range in relation to preventing the onset of eating disorder symptomology.

A further finding reported in Chapter 3 was that preadolescents' under-eating behaviours (dietary restraint) were positively predicted by their levels of anxiety (general and social) and over-eating behaviours were predicted by general anxiety levels. The present study examined these relationships longitudinally. General anxiety moderated the relationship between T1 and T2 over-eating behaviours (external and emotional eating), but not under-eating behaviours (dietary restraint). Social anxiety failed to moderate the relationship between T1 and T2 dietary restraint. The findings of these moderations suggest that preadolescents' under- and over-

eating behaviours at baseline predict these behaviours 12 months later, thus persisting over time. Specifically for preadolescents reporting higher levels of anxiety, their baseline under- and over- eating behaviours are highly correlated with these behaviours twelve months later.

This study has extended previous research by employing a longitudinal design to explore preadolescents' eating behaviours. It is noteworthy that the study collected data only once at each time point. It would be beneficial for future research to collect data from multiple time points to examine any changes in children's reports of eating behaviours, anxiety and depression levels. Furthermore, the results reported in this Chapter are based on T2 variables as moderators and prospective friends' eating behaviours. T1 variables were examined as moderators but no significant results were found. This suggests that there might be a shift occurring between T1 and T2 in terms of eating behaviours and anxiety and depression symptoms. Collecting data at more time intervals across the twelve months would yield greater quality data, and this is something future research should consider.

The current study is the first to examine whether the eating behaviours of friends and children's own levels of anxiety and depression influence the stability of under- and over- eating behaviours longitudinally in a preadolescent sample of boys and girls. The results point at the importance of friends in the reports of dieting behaviours longitudinally, and the importance of anxiety in over-eating behaviours in preadolescents. Such findings are likely to be beneficial for the development of school-based initiatives aiming to promote healthier eating behaviours in preadolescents.

Chapter 6

Chapter 4 explored variables associated with preadolescent eating behaviours cross-sectionally; specifically, perceived parental feeding practices and preadolescents' anxiety and depression symptomology. Chapter 4 reported that preadolescents' eating behaviours were associated with their perceptions of the controlling feeding practices (pressure to eat and restriction) their parents used with them. Dietary restraint, emotional eating and external eating behaviours reported by preadolescents were also positively associated with their reports of general and social anxiety, and depression symptomology. Furthermore, perceptions of parental pressure to eat were positively related to preadolescents' anxiety levels. Preadolescents' levels of general and social anxiety mediated the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours (dietary restraint, emotional eating and external eating).

The aim of the present chapter was to extend the findings of Chapter 4 longitudinally by analysing baseline data (T1; Chapter 4) and data collected 12 months later (T2) from the same sample of preadolescents. Chapter 6 aimed to examine the stability and continuity of perceived parental feeding practices (pressure to eat and restriction) over 12 months in a preadolescent sample. This Chapter also aimed to replicate the mediation relationships reported in Chapter 4 with an older sample of preadolescents. Finally, Chapter 6 sought to explore the role of perceived parental feeding practices in predicting preadolescent eating behaviours over time.

Chapter 6:

**Exploring preadolescent eating longitudinally:
Stability, continuity, and the moderating role of
perceived parental feeding practices.**

Abstract

The links between children's eating behaviours and parental feeding practices are well-researched in younger children, but there is a lack of research examining these variables in a preadolescent age group, particularly longitudinally. The study had three main aims. First, to examine the continuity and stability of preadolescent reports of their parents' controlling feeding practices (pressure to eat and restriction) over a 12 month period. Second, to explore if anxiety (general and social) mediated the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours in a sample of preadolescents. Third, to explore if perceptions of parental feeding practices moderated the relationship between preadolescents' eating behaviours at T1 and T2. Two hundred and fifty four preadolescents (mean age 9.73 at T2) completed questionnaires assessing their eating behaviours, their perceptions of parental feeding practices and their symptoms of anxiety and depression at two time points, 12 months apart (T1 and T2). Preadolescents' perceptions of their parental feeding practices remained stable. Perceptions of restriction and pressure to eat were continuous. Anxiety did not mediate the relationship between preadolescents' eating behaviours at T1 and T2. Perceptions of parental pressure to eat and restriction significantly moderated the relationships between eating behaviours at T1 and T2. The findings from this study suggest that in a preadolescent population, perceptions of parental pressure to eat and restriction of food may exacerbate the development of problematic eating behaviours.

**Exploring preadolescent eating longitudinally:
Stability, continuity and the moderating role of perceived parental feeding
practices.**

6.1 Introduction

It is widely accepted that parents are responsible for the feeding environments that children experience, through the foods they select and their modelling of eating behaviours (e.g., Faith, Scanlon, Birch, Francis, & Sherry, 2004; Wardle & Carnell, 2007). Younger children in particular are more susceptible to parental influences on their eating as they lack the autonomy to fully control their food choices and eating environment (e.g., Patrick & Nicklas, 2005), with parents remaining the key determinants of food choices, portion sizes, and mealtime environments until a child reaches adolescence (e.g., Fulkerson, Neumark-Sztainer & Story, 2006; Savage, Fisher & Birch, 2007; Walsh & Nelson, 2010).

There is a well-established body of research concerning the impact of controlling parental feeding practices on young children (see Scaglioni, Salvioni & Galimberti, 2008, for a review). In particular, the feeding practices *pressure to eat* and *restriction of food* (Birch, Fisher, Grimm-Thomas, Markey, Sawyer & Johnson, 2011) have been extensively studied, since greater parental use of such behaviours has been suggested to be counterproductive to healthy child eating behaviour (e.g., Faith et al., 2004; Farrow & Blissett, 2008) and has been linked with the inability to recognise internal cues for hunger and satiety (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch, 2000). Parental pressure to eat and restriction can take different forms. Pressure to eat typically refers to a parent pressuring their child to eat more food, typically occurring at mealtimes (Birch et al., 2001). Pressure to eat can take the format of encouraging the intake of foods in general (e.g., Birch et al., 2001; Galloway, Fiorito,

Francis & Birch, 2006); encouraging the intake of healthy foods (e.g., fruit and vegetables; Galloway, Fiorito, Lee & Birch, 2005; Ventura & Birch, 2008); or encouraging the intake of novel foods (e.g., Blissett, Bennett, Donohoe, Rogers & Higgs, 2012). Restriction on the other hand, is a practice where parents intentionally restrict, or limit, the type of food or amount of food that their child eats, typically at mealtimes or in relation to snacking (Birch et al., 2001). The terms *pressure* and *restriction* were coined by Birch and colleagues (2001) when developing the Child Feeding Questionnaire (CFQ), a parental self-report measure of attitudes and practices in relation to child feeding. The CFQ measures pressure of food intake generally, and restriction encompasses general restriction at mealtimes and snacking (Birch et al., 2001). The children's version of this questionnaire, the Kids Child Feeding Questionnaire (KCFQ; Carper, Fisher & Birch, 2000) similarly measures the constructs in this way.

Previous research in the parent-child feeding domain has often focussed on parental self-reported use of controlling feeding practices with their young children (e.g., Scaglioni et al., 2008). It is possible that parental reports and child perceptions may differ, and some research has also examined this. Carper and colleagues (2000) compared mothers' self-reported controlling feeding practices with child perceptions of their mothers' use of feeding practices in girls aged 5 years and reported positive associations in reports of pressure to eat, but not restriction. A more recent study, using a preadolescent age group, found that in children aged 10.45 years reports of perceived parental pressure and restriction were correlated with their parents' reports of such behaviours, however such results were not mirrored for younger children in the sample (M= 8.21 years) (Pulley, Galloway, Webb & Payne, 2014). However, importantly, in younger girls, perceptions of their mothers' use of pressure to eat have been linked to dietary restraint and emotional eating behaviours (Carper et al., 2000). Similarly, in an adolescent population, perceptions of greater controlling parental

feeding practices have been shown to be associated with more unhealthy eating behaviours (Haycraft et al., 2014). Although research suggests possible mixed results in terms of parent and child similarities in reports of controlling feeding practices (e.g., Carper et al., 2000; Pulley et al., 2014), the associations between child perceptions of controlling parental feeding practices and child obesogenic and under-eating behaviours (e.g., Carper et al., 2000; Haycraft et al., 2014) are important and warrant further investigation, particularly during the preadolescent period, where research is limited. Given that research with adolescents suggests that perceptions of greater controlling parental feeding practices (pressure to eat and restriction) predict higher levels of disordered eating (Haycraft, Goodwin & Meyer, 2014), it is important that research consider this in the somewhat under-researched preadolescent period.

A further area that remains under-researched in the preadolescent age group is the continuity and stability of their perceptions of controlling parental feeding practices (see Section 5.1 for a discussion of continuity and stability). In younger children, the use of controlling feeding practices reported by parents has been shown to be stable (Faith, Scanlon, Birch, Francis, & Sherry, 2004; Farrow & Blissett, 2012). In relation to continuity, parents report using less pressure to eat and restriction with their children between 7 and 10 years of age (Webber, Cooke, Hill & Wardle, 2010). However, to date, there has been no research that has looked at the continuity and stability of parental feeding practices across a preadolescent time period, or from the perspective of the child rather than the parent.

Research presented in Chapter 4 found that preadolescents' eating behaviours were associated with their perceptions of their parents' use of controlling feeding practices, specifically pressure to eat and restriction. Preadolescents' eating behaviours were further associated with their own reports of general and social anxiety, and depression symptoms. Chapter 4 also found that perceptions of parental pressure to eat were

positively related to preadolescents' anxiety levels, and that anxiety (general and social) fully mediated the relationship between perceptions of parental pressure to eat and preadolescents' dietary restraint and emotional eating behaviours, and partially mediated the relationship between perceptions of parental pressure to eat and external eating. The present Chapter sought to examine whether these mediational relationships were evident in preadolescents at an older age than those reported in Chapter 4.

The first aim of the present study was to examine the continuity and stability of preadolescent reports of their parents' controlling feeding practices (pressure to eat and restriction) over a 12 month period. It was anticipated, based on previous research conducted with parents (Webber et al., 2010), that preadolescents' reports of their parents' use of controlling feeding practices would be discontinuous, decreasing over time as children assert more autonomy over eating as they age. It was further anticipated, based on research with younger children (e.g., Faith et al., 2004; Farrow & Blissett, 2012) that perceptions of parental controlling feeding practices would be stable over a 12 month period. The second aim was to replicate the previous cross-sectional findings of Chapter 4 by exploring whether the mediation models reported in Chapter 4 could be replicated in the older sample of preadolescent children. It was hypothesised that anxiety (general and social) would mediate the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours in this older preadolescent sample.

Finally, Chapter 6 sought to extend the results of Chapter 4 by exploring whether perceptions of parental feeding practices moderated the relationship between preadolescents' eating behaviours at T1 and T2. Moderated regression analyses the stability of behaviours over time at different levels of a third variable, or moderator. It was hypothesised, based on the findings from Chapter 4, that perceptions of parental

pressure to eat would moderate the relationship between preadolescents' reports of dieting behaviours at baselines and 12 months later. Such a relationship was not hypothesised to exist for emotional and external eating, because perceptions of pressure were not shown to be significantly related to the over-eating behaviours (Chapter 4). It was further hypothesised that perceptions of restriction would moderate the relationship between the over-eating behaviours, external and emotional eating, at T1 and T2. Specifically, preadolescents who reported greater perceptions of pressure to eat or restriction would report greater stability in the corresponding maladaptive eating behaviours over time.

6.2 Method

6.2.1 Participants

At baseline (T1), 343 children from eight UK primary schools took part in this study. At 12 month follow-up (T2), six schools and 254 of the original sample (71%) remained in the study. The two schools cited a change in Head Teacher and conflicting time commitments as their reasons for not participating in the follow-up. Some individuals from T1 were absent on the day of T2 collection or failed to complete the full questionnaire measures. However, no children actively opted out, or were opted out of the research by their parents, at T2. The data reported in this chapter concern the 254 children who provided data at both time points.

The final sample consisted of a roughly equal number of boys and girls (boys $n= 132$, girls $n= 122$ girls). At T1 the participants ranged in age from 7.25 to 10.25 years ($M= 8.75$ years, $SD= 0.57$), and at T2 from 8.25 to 11.25 years ($M= 9.73$ years, $SD= 0.62$). The majority (94%) of the final T2 sample reported their ethnicity as White British.

6.2.2 Procedure and measures

A letter (Appendix C) was sent to the eight primary schools that participated at T1 and, of these, six remained in the study at T2. The research was approved by Loughborough University Ethics Approvals (Human Participants) Sub-Committee.

Participating schools sent letters to parents of children in the relevant aged classes explaining the T2 study, and allowing them to opt out their child from participating (see Appendix D).

As outlined in Section 5.2.2, the study was conducted as part of a class lesson and children assented to participate. They completed a questionnaire pack which consisted of the measures outlined below. Children completed the same measures at T1 and at T2 (see Sections 2.5.1 and 3.2.2 for a full description of each measure).

6.2.2.1 Eating Patten Inventory for Children (EPI-C; Schact, Richter-Appelt, Schulte-Markwort, Hebebrand & Schimmelmann, 2006).

Three subscales of the EPIC were used to measure preadolescents' self-reported eating behaviours: dietary restraint, external eating and emotional eating (Appendix H). The internal reliability coefficients (Cronbach's α) at T2 were: dietary restraint α 0.88; external eating α 0.82; and emotional eating α 0.79; all demonstrating very good levels of internal consistency.

6.2.2.2 Kids' Child Feeding Questionnaire (KCFQ; Carper et al., 2000).

The KCFQ measured preadolescents' perceptions of the feeding practices used by their parents; specifically, pressure to eat (of all foods in general) and restriction (at mealtimes and of snack food intake) (Appendix I). The factor structure reported in Section 2.5.2 was again used with the present sample. Cronbach's α scores for the

sample at T2 were: pressure to eat α 0.56; restriction α 0.62, suggesting adequate levels of internal reliability.

6.2.2.3 Spence Children's Anxiety Scale (SCAS; Spence, 1997).

The social phobia and generalised anxiety subscales of the SCAS were used in the present study, with good Cronbach's alpha levels: social phobia α 0.73; generalised anxiety α 0.82 (see Appendix J for more details of the SCAS).

6.2.2.4 Children's Depression Inventory: Short Version (CDI:S; Kovacs, 1992).

The negative mood subscale of the CDI:S was used in the present sample. The Cronbach's alpha level was reasonable at α 0.67. The CDI:S and details of its scoring are presented in Appendix K.

6.2.3 Statistical analyses

Histograms, skew and kurtosis data for each subscale indicated that the sample did not deviate substantially from normality and parametric tests were used in all analyses. The sample size of 254 exceeded the requirements to detect a medium effect at $p < .05$ with a power of 0.80 when using correlations ($n = 85$), tests of difference ($n = 64$) and moderated regression ($n = 177$).

Independent samples t-tests were used to examine gender differences in eating behaviours and perceptions of parental feeding practices, and two-tailed Pearson's correlations were used to examine relationships between age and reports of eating behaviours. As in Chapter 5 (Section 5.2.3) there were no significant differences between children who remained in the study at T2 compared to those who did not in terms of age or eating behaviours ($p > .05$).

To examine the continuity of perceived parental feeding practices over time, mean difference scores were calculated between T1 and T2 reports of these behaviours. Paired samples t- tests were conducted to calculate continuity. Positive mean scores indicated an average increase in perception of the feeding practice over 12 months, whereas a negative mean score indicated an average decrease. To examine the stability of perceived parental feeding practices over time, two-tailed Pearson's correlations were calculated. Again, positive correlations indicated stability in eating behaviours.

To replicate the findings of Chapter 4, two-tailed correlations were run to explore relationships between perceptions of controlling feeding practices at T1 with anxiety and depression and eating behaviours at T2. Further two-tailed correlations were used to examine associations between eating behaviours and perceptions of controlling feeding practices at T2, with anxiety and depression at T2. Where age or gender were significantly associated with eating behaviours or perceptions of controlling feeding practices, partial correlations were used controlling for these. Finally, to explore whether anxiety at T2 mediated the relationship between perceptions of pressure to eat and reports of eating behaviours at T2, as in Chapter 4, mediation analysis (Baron & Kenny, 1986) was planned.

Building on the findings of Chapter 5, moderated regression analyses (Baron & Kenny, 1986) were used to explore whether perceived parental feeding practices (pressure to eat and restriction) moderated the relationship between preadolescents' own reports of eating behaviours at T1 and T2. Moderation analyses were tested by calculating the main and interaction effects of perceived parental feeding practices at T2 in predicting preadolescents' reported eating behaviours at T2. Simple slope analyses were used to explore any significant moderations.

All tests were two-tailed due to the exploratory nature of the hypotheses and the p -value was set at $<.05$.

6.3 Results

6.3.1 Descriptive statistics

Table 6.1 displays the mean, standard deviation (SD), and test of difference scores for preadolescents' individual eating behaviours by gender at baseline (T1) and follow-up (T2).

Table 6.1: Descriptive statistics (means, standard deviations) and tests of difference scores (t) for eating behaviours for boys and girls

	Mean (SD) Boys ($n= 132$)	Mean (SD) Girls ($n= 122$)	Independent t test (t)	p value
Dietary restraint T1	2.15 (.80)	2.16 (.75)	-.08	.939
Dietary restraint T2	1.91 (.73)	1.91 (.79)	.04	.970
External eating T1	2.36 (.89)	2.19 (.78)	1.59	.114
External eating T2	2.07 (.81)	1.89 (.72)	1.89	.060
Emotional eating T1	1.83 (.76)	1.79 (.73)	.39	.695
Emotional eating T2	1.59 (.73)	1.60 (.70)	.01	.992

two tailed; T1: time point 1; T2: time point 2

Mean scores for the EPIC eating behaviours at T2 were comparable to previous research with children of this age range (e.g., Farrow, Haycraft & Meyer, 2011; Schact et al., 2006). Independent t -tests of difference showed no gender differences in reports of eating behaviours for boys and girls, differing to previous results presented in this thesis (Chapter 3) and previous research with preadolescents (van Strien & Bazelier, 2007) which has found that boys report greater levels of external eating.

Table 6.2 displays the mean, standard deviation (*SD*) and test of difference scores (*t*) for preadolescents' perceptions of their parents' feeding practices by gender at T1 and T2.

Table 6.2: Descriptive statistics (means, standard deviations) and tests of difference scores (*t*) for perceived parental feeding practices for boys and girls

	Mean (<i>SD</i>) Boys (<i>n</i> = 132)	Mean (<i>SD</i>) Girls (<i>n</i> = 122)	Independent samples <i>t</i> test (<i>t</i>)	<i>p</i> value
Perceived pressure to eat T1	0.98 (.41)	0.96 (.44)	-.91	.361
Perceived pressure to eat T2	0.90 (.37)	0.95 (.35)	.25	.806
Perceived restriction T1	0.90 (.48)	0.85 (.41)	1.32	.188
Perceived restriction T2	0.90 (.43)	0.84 (.39)	.83	.408

two tailed; T1: time point 1; T2: time point 2

Mean scores for the KCFQ were comparable to the results reported with the original questionnaire (Carper et al., 2000). Independent samples *t*-tests of difference (Table 6.2) showed no significant differences between boys' and girls' perceptions of parental feeding practices at T1 and T2. Subsequent analyses using perceptions of parental feeding practices therefore did not control for gender.

Two-tailed Pearson's correlations indicated that child age was negatively associated with: external eating at T1 ($r = -.22, p = .001$) and T2 ($r = -.20, p = .003$); emotional eating at T1 ($r = -.30, p = .000$) and T2 ($r = -.25, p = .000$); and perceptions of pressure to eat at T2 ($r = -.13, p = .050$). Subsequent analyses using these variables therefore controlled for age, where applicable.

6.3.2 Stability of perceived parental feeding practices between T1 and T2

To examine the stability of children's perceptions of their parents' feeding practices over time, a series of two-tailed Pearson's correlations were calculated (Table 6.3).

Table 6.3: Correlation coefficients between children's perceptions of their parents' feeding practices at T1 and T2

Variable	<i>R</i> s	<i>p</i> value
Perception of pressure to eat	.49	.000***
Perception of restriction	.37	.000***

*** $p < .001$; two tailed

As Table 6.3 shows, both perceptions of pressure to eat and perceptions of restriction were significantly correlated over time, suggesting good stability in perceptions of parental feeding practices in children of this age.

6.3.3 Continuity of perceived parental feeding practices over 12 months

To examine the continuity of children's perceptions of their parents' use of controlling feeding practices over time, mean change scores for variables between T1 and T2 were firstly calculated, followed by paired samples t-tests (Table 6.4).

Table 6.4: Descriptive statistics and paired samples t-test (t) results for children's perceptions of their parents' feeding practices between T1 and T2

Variable	T1 Mean (SD)	T2 Mean (SD)	Mean change (SD)	Paired samples t test (t)	<i>p</i> value
Perceived pressure to eat	0.96 (.42)	0.92 (.92)	-.05 (.40)	-1.71	.088
Perceived restriction	0.88 (.88)	0.87 (.87)	-.00 (.49)	-.03	.975

two tailed; T1: time point 1; T2: time point 2

Table 6.4 shows that perceptions of parental restriction and pressure to eat were continuous between T1 and T2.

6.3.4 Examining the correlates of preadolescents' eating over time

To examine the hypothesised relationships between preadolescents' reports of their own eating behaviours (T1 and T2) with their perceptions of parental controlling

feeding practices (T2) and with their reported levels of anxiety or depression symptomology (T2), a series of two-tailed partial correlations were calculated, controlling for age where applicable (Table 6.5).

Table 6.5: Correlation coefficients (controlling for age where stated) between children's reports of eating behaviours (T1 and T2) with perceptions of parental feeding practices (T2) and reports of anxiety and depression (T2)

	T1 (N = 343)			T2 (N = 254)		
	Eating Pattern Inventory for Children (EPIC)			Eating Pattern Inventory for Children (EPIC)		
	Dietary Restraint (<i>p value</i>)	External Eating [#] (<i>p value</i>)	Emotional Eating [#] (<i>p value</i>)	Dietary Restraint (<i>p value</i>)	External Eating [#] (<i>p value</i>)	Emotional Eating [#] (<i>p value</i>)
T2						
Kids Child Feeding Questionnaire (KCFQ):						
Perceived restriction	.56 (.394)	-.12 (.078)	-.16 (.017)*	.01 (.814)	-.18 (.010)**	-.25 (.000)***
Perceived pressure [#]	-.10 (.893)	.16 (.018)*	.14 (.037)*	.01 (.851)	.24 (.000)***	.11 (.112)
Spence Children's Anxiety Scale (SCAS):						
General anxiety	.10 (.127)	.14 (.035)*	.15 (.029)*	.24 (.000)***	.24 (.000)***	.32 (.000)***
Social anxiety	.17 (.009)**	.01 (.921)	.10 (.144)	.31 (.000)***	.19 (.004)**	.20 (.003)**
Children's Depression Inventory (CDI:S):						
Negative mood	.11 (.094)	-.00 (.990)	.07 (.295)	.05 (.403)	.05 (.466)	.11 (.103)

* $p < .05$; ** $p < .01$, *** $p < .001$, two tailed # age controlled for

6.3.4.1 Correlates of dietary restraint at T1 and T2

Preadolescents' reports of dietary restraint at T1 and at T2 were positively associated with their levels of social anxiety at T2. Dietary restraint at T2 was positively associated with general anxiety at T2. Preadolescents' reports of dietary restraint at

T1 and T2 were not significantly associated with their perceived parental feeding practices or negative mood at T2.

6.3.4.2 Correlates of external eating at T1 and T2

Preadolescents' reports of external eating at T1 were positively associated with their levels of general anxiety and perceptions of parental pressure to eat at T2. External eating reported at T2 was positively associated with three of the T2 variables: perceptions of pressure, general anxiety, and social anxiety. Reports of external eating at T2 were negatively associated with perceptions of restriction at T2.

6.3.4.3 Correlates of emotional eating at T1 and T2

Preadolescents' reports of emotional eating at T1 were positively associated with their T1 levels of general anxiety and perceptions of pressure to eat, and negatively associated with perceptions of restriction. Emotional eating reported T2 was positively associated with T2 general anxiety and social anxiety, and negatively associated with perceptions of restriction.

To replicate the results of Chapter 4, the relationships between preadolescents' perceptions of parental controlling feeding practices at T2 and their reports of anxiety and depression at T2 were explored using two-tailed correlations (Table 6.6).

Table 6.6: Correlation coefficients between children's perceptions of parental feeding practices and reports of anxiety and depression at time point 2 (T2)

	T2	
	Perceived feeding practices	
	KCFQ	KCFQ
	Restriction	Pressure to eat
	(<i>p value</i>)	(<i>p value</i>)
T2		
General anxiety	-.05 (.381)	.09 (.164)
Social anxiety	-.06 (.307)	.11 (.082)
Negative mood	-.06 (.369)	-.02 (.691)

two tailed

Preadolescents' perceptions of greater parental pressure to eat were not significantly associated with levels of general and social anxiety, or depression, contrary to the results of Chapter 4 which used a younger preadolescent sample. Perceptions of parental restriction were not significantly correlated with preadolescents' reports of anxiety and depression, mirroring Chapter 4's results.

6.3.5 Mediation analyses

To replicate the results of Chapter 4 using an older sample of preadolescents, mediation analyses (Baron & Kenny, 1986) to examine whether reports of anxiety (general and social) at T2 mediated the relationships between perceptions of pressure to eat at T2 and preadolescents' self-reported eating behaviours at T2, were planned. However, as shown in Table 6.6, there were no significant relationships found between perceptions of pressure to eat (independent variable) and anxiety levels (mediators) at

T2 so mediation analyses were not performed. The results from Chapter 4 (i.e. that anxiety levels (general and social) mediated the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours) were not replicated with older preadolescents.

6.3.6 Moderation analyses

Moderated regression analyses (Baron & Kenny, 1986) were used to examine under what conditions of a moderating variable preadolescents' eating behaviours were stable over time. Moderated regressions were performed where Chapter 4 had found correlations between eating behaviours and perceptions of parental controlling feeding practices. Specifically, moderated regressions were used to explore if perceptions of pressure to eat moderated the relationship between preadolescents' reports of dietary restraint behaviours at T1 and T2; and if perceptions of restriction moderated the relationship between preadolescents' over-eating at T1 and T2. Simple slope analyses were used to further investigate any significant moderations. Simple slopes for the regression of T1 eating behaviour on T2 eating behaviour were computed at 3 levels of the moderator: low (-1 SD below the mean), moderate (mean) and high (+1 SD above the mean).

6.3.6.1 The moderating role of perceived pressure to eat (T2) on the relationship between T1 and T2 dietary restraint behaviours

The interaction between dietary restraint behaviours (T1) and perceptions of parental pressure to eat at T2 was a significant predictor of dietary restraint behaviours at T2 ($\beta= 6.282$, $SE= .112$, $p= .000$). The interaction between dietary restraint and perceptions of pressure to eat was significant when the moderator was high, moderate or low. The relationship was stronger when perceived levels of parental pressure were high ($\beta= 12.158$, $SE= .016$, $p= .000$) than when they were moderate ($\beta= 6.760$, $SE=$

.011, $p = .000$) or low ($\beta = 1.363$, $SE = .015$, $p = .000$). Figure 6.1 shows the simple slopes plots for the interaction.

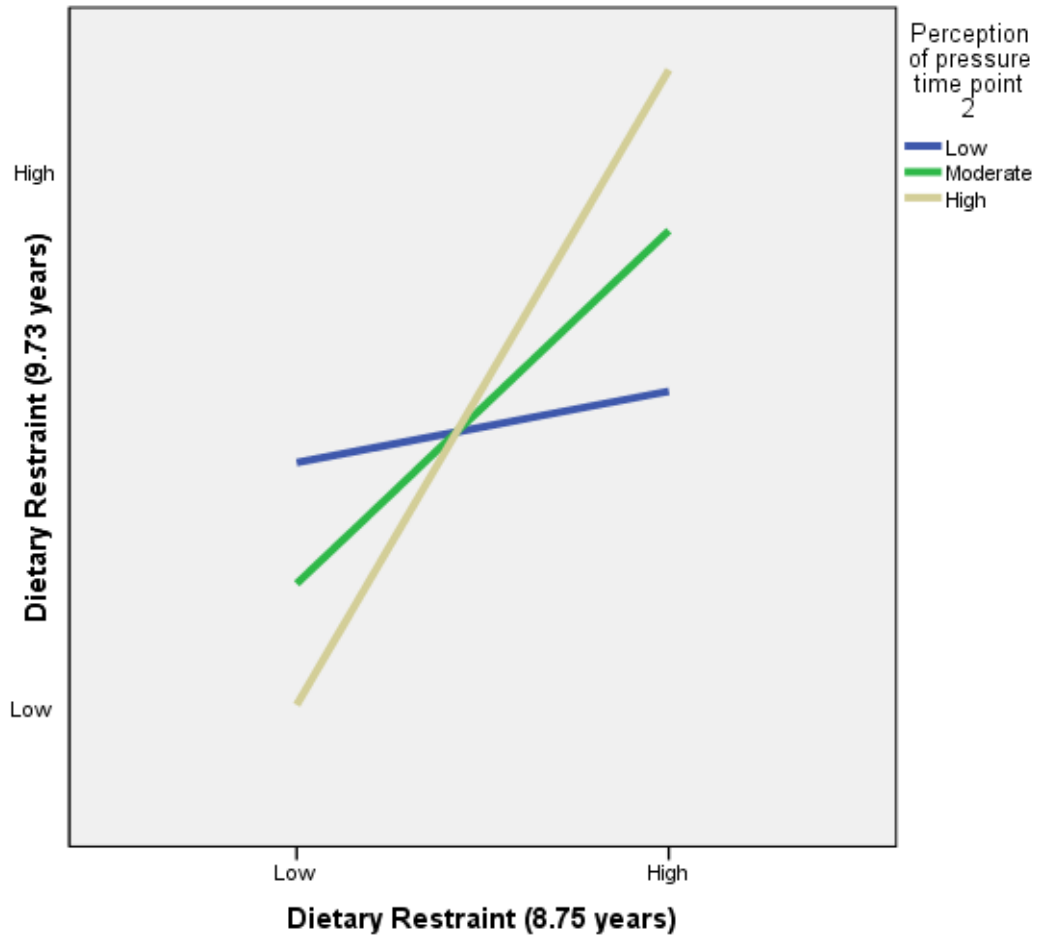


Figure 6.1: Simple regression slopes for the moderating role of perceptions of parental pressure to eat (time point 2) on the relationship between time point 1 (Mean age= 8.75 years) and time point 2 (Mean age= 9.73 years) dietary restraint behaviours

6.3.6.2 *The moderating role of perceived restriction (T2) on the relationship between T1 and T2 over-eating behaviours*

The interaction between external eating behaviours (T1) and perceptions of parental restriction at T2 failed to significantly predict external eating behaviours at T2 ($\beta = -.056$, $SE = .104$, $p = .591$).

The interaction between emotional eating behaviours (T1) and perceptions of parental restriction (T2) was a significant predictor of emotional eating behaviours (T2) ($\beta = 6.323$, $SE = .109$, $p = .000$). The interaction between emotional eating and perceptions of restriction was significant when the moderator was high and moderate. The relationship was stronger when perceived levels of restriction were high ($\beta = 13.086$, $SE = .015$, $p = .000$) than when they were moderate ($\beta = 7.107$, $SE = .010$, $p = .000$). When perceived levels of restriction were low, the relationship between emotional eating at T1 and T2 was not significant ($\beta = 0.13$, $SE = .010$, $p = .065$). Figure 6.2 shows the simple slopes plots for the interaction.

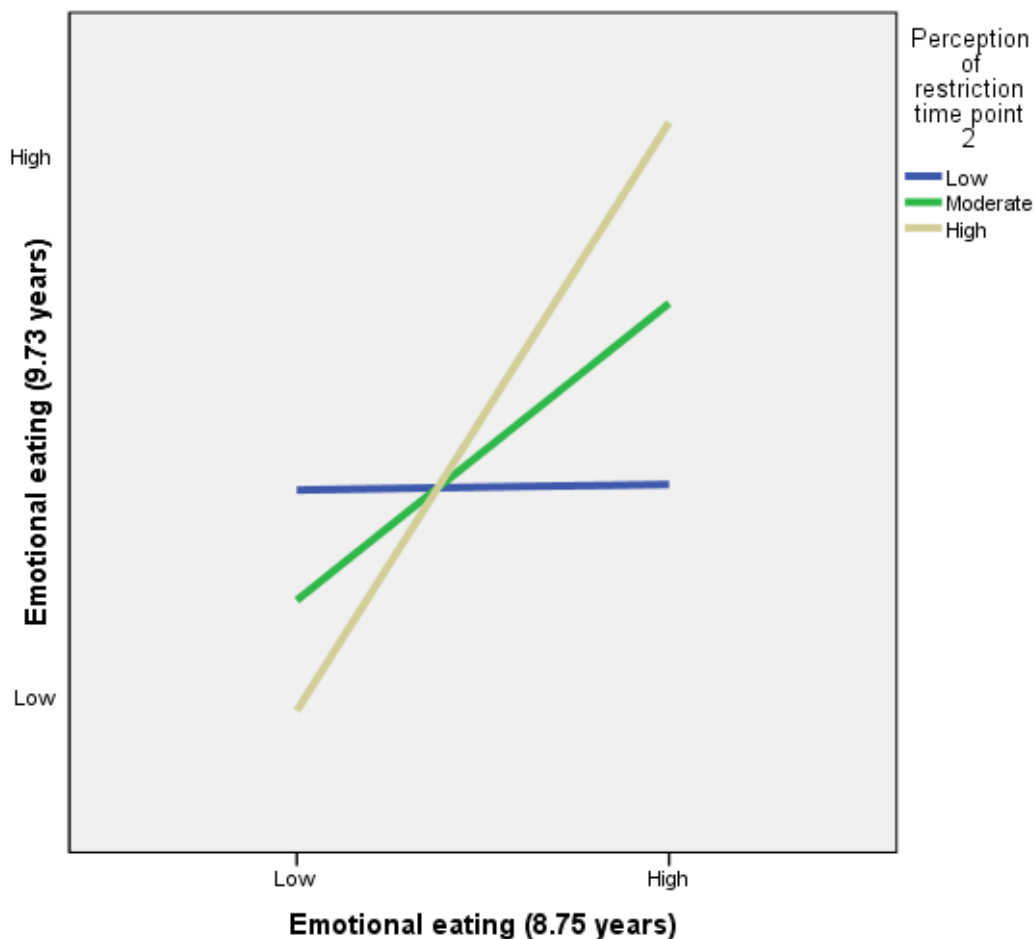


Figure 6.2: Simple regression slopes for the moderating role of perceptions of parental restriction (time point 2) on the relationship between time point 1 (Mean age= 8.75 years) and time point 2 (Mean age= 9.73 years) emotional eating behaviours

6.4 Discussion

The first aim of the current study was to examine the continuity and stability of preadolescents' perceptions of their parents' controlling feeding practices, namely pressure to eat and restriction, over a 12 month period. Contrary to the hypothesised findings, perceptions of parental pressure to eat and restriction were continuous over time. As anticipated, perceptions of pressure to eat and restriction remained stable over time. The second aim of this Chapter was to replicate the mediation model from Chapter 4 when the preadolescent children reported on in Chapter 4 were older. Contrary to the findings of Chapter 4, when the children were older, anxiety did not mediate the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours in this older preadolescent sample. The final aim, to explore if perceptions of parental feeding practices moderated the relationship between preadolescents' eating behaviours at T1 and T2, produced mixed results. Preadolescents' perceptions of pressure to eat at T2 moderated the relationship between dietary restraint behaviours at T1 and T2; and perceptions of restriction at T2 moderated the relationship between emotional eating at T1 and T2. However, perceptions of restriction at T2 did not moderate the relationship between external eating at T1 and T2.

The finding that perceptions of pressure to eat and restriction were continuous and stable over time is in contrast to previous research conducted with parents, who have reported using less pressure to eat and restriction with children aged 7 to 10 years of age, compared to when their children were younger (Webber et al., 2010). Although children become more autonomous over their own eating with age and may rely less on parental influences on their intake (e.g., Savage et al., 2007), the preadolescent sample reported on here (with a mean age of 9.73 years) did not perceived a reduction in their parents use of controlling feeding practices. The present study was based on

child perceptions rather than parental reports of controlling feeding practices with their children, which could explain the differences in the results found. As suggested in Chapter 4, such results are limited by the use of child perceptions of their parents' behaviours, in particular for restriction, as restriction of a child's food is often a covert behaviour that may be unobservable by the child (Ogden, Reynolds & Smith, 2006).

The links between disordered eating behaviours and anxiety, as well as controlling parenting and child anxiety, are well-established in the literature (e.g., Blinder, Cumella & Sanathara, 2006; Pallister & Waller, 2008; Santos, Richards & Bleckley, 2006) and, along with the results of Chapter 4, were suggestive of a probable mediation model, with anxiety being expected to mediate the relationship between pressure to eat and child eating behaviours. However, this result was not replicated in the present Chapter with this slightly older sample of preadolescents. These findings may be explained by the stability and continuity in pressure to eat reported over time, and the decreases in under- and over-eating behaviours observed between T1 and T2. Preadolescence is a period of great transition and change for children (Susman & Dorn, 2009) and their reports of eating behaviours and perceptions of parental feeding practices may have been affected by this.

Perceptions of pressure to eat at T2 were found to moderate the relationship between dietary restraint at T1 and T2. This relationship was evident for high, moderate and low levels of pressure to eat, although strongest for higher perceived levels of pressure to eat, and weakest for lower perceived levels of parental pressure to eat. This suggests that when parental pressure to eat is high, dietary restraint behaviours in preadolescents show greater consistency over time. This finding could suggest that parents may use pressure to eat with their children who exhibit dietary restraint behaviours in an attempt to increase their dietary intake, but this could be counterproductive. Furthermore, although a weaker relationship was found for

preadolescents reporting lower levels of parental pressure to eat, even lower levels of pressure to eat were associated with preadolescents' continuing dietary restraint behaviours. This links to research with younger children which finds links between pressuring a child to eat and reduced intake of pressured food, and less weight gain (e.g., Galloway et al., 2006; Wardle & Carnell, 2007).

Preadolescents' perceptions of parental restriction at T2 significantly moderated the relationship between emotional eating at T1 and T2. The relationship between emotional eating at T1 and T2 was significant for children who reported high and moderate levels of restriction, but for children perceiving lower levels of restriction T1 emotional eating did not predict T2 emotional eating. This suggests that parents of children who emotionally eat, and who use low levels of restriction over their food, can potentially reduce their child's emotional eating. In contrast, the findings suggest that parents of children who emotionally over-eat, who apply a high or moderate level of restriction over their child's eating behaviour actually see this behaviour maintained over time. Previous literature suggests that parents may pressure their child to eat more in an attempt to increase the intake of children displaying dietary restraint behaviours (e.g., Francis, Hofer & Birch, 2001). In contrast, parents may restrict the intake of a child they believe to be exhibiting over-eating behaviours, such as emotional over-eating (e.g., Birch & Fisher, 2000). These parental strategies may be counterproductive and instead serve to maintain consistency in these maladaptive eating behaviours over time (e.g., Fisher & Birch, 2002).

This Chapter extends previous research by employing a longitudinal design to explore preadolescents' eating behaviours, perceptions of parental controlling feeding practices, and child anxiety levels. A limitation of the present study is the reliance on preadolescents' perceptions of their parents' feeding practices, which may not be wholly accurate, particularly for restriction which suffered from a low reliability at T2.

Restriction can be conducted more covertly (e.g., by not keeping a particular food in the house) than pressure to eat, and so may not always be detectable to children (Ogden et al., 2006). Future research would benefit from collecting data from parents and linking this to children's reports of controlling feeding practices. It would also be of interest to examine if children are better able to perceive controlling feeding practices accurately as they become older. A further limitation, as noted in Chapter 5, is that the results reported in this Chapter use T2 variables as moderators. T1 variables were examined as moderators but no significant results were found. Again, these results suggest a possible shift occurring between T1 and T2 in terms of eating behaviours and symptoms of anxiety and depression, which in itself is an interesting finding; one which lends support to the notion that the period around adolescence is a time of significant change (Susman & Dorn, 2009).

Despite the limitations, the present study is the first to explore whether parental controlling feeding practices and levels of anxiety predict eating behaviours longitudinally in a preadolescent sample of boys and girls. No research to date has considered the continuity, stability and moderating role of parental feeding practices across a preadolescent time period, particularly from the perspective of the child. Therefore the present findings add to the existing literature by suggesting that parental pressure to eat may have adverse effects on the development of dietary restraint behaviours, and parental restriction may have negative effects on the development of emotional eating behaviours, in preadolescent children. These results require dissemination to health professionals working with parents and children of this age, to educate them about the use of pressure and restriction with their preadolescent children in eating situations.

Chapter 7

The previous chapters of this thesis (Chapters 3-6) have presented cross-sectional and longitudinal data exploring the variables associated with preadolescent eating behaviours; specifically, friends' reports of eating behaviours, perceived parental feeding practices, and, anxiety and depression symptoms. Chapter 3 reported that preadolescents' dietary restraint behaviours were positively predicted by their friends' reports of dietary restraint. Furthermore, Chapter 5 reported that, longitudinally, friends' reports of dietary restraint behaviours moderated the relationships between preadolescents' eating at baseline and twelve months later. However, while the previous findings usefully extend the knowledgebase relating to the factors that can impact on children's eating behaviours, they are based on children's reports, which might be subjective in nature. Limited research has considered the effects of friendship groups on children's eating behaviours *objectively*, using an experimental design. The aim of the following Chapters, therefore, was to extend the previous findings by conducting a feasibility study (Chapter 7), followed by a full experimental study (Chapters 8 & 9), to objectively examine the influence of friends and peers on preadolescents' food intake using an experimental design.

Chapter 7:

The influence of friends and peers on children's eating: A feasibility study

The findings of this chapter formed part of an oral presentation delivered at the British Feeding & Drinking Group Annual Conference, Holywell Park, Loughborough, 5th April 2013:

Houldcroft, L., Farrow, C. & Haycraft, E. (2013). *The influence of friends and peers on children's food intake: An experimental study.*

Abstract

Previous experimental research has suggested that children's eating behaviours are influenced differentially by their friends and their peers. However, the majority of previous work has been conducted in laboratory settings and has examined the effect of individuals and not groups. The predominant aim was to conduct a feasibility study to examine objectively how groups of peers and friends may differentially influence preadolescent children's eating behaviours in a real-life school setting. Immediately after their school lunch break, 26 preadolescents (mean age= 8.82 years) were offered access to snack foods while playing a game with a group of friends or, on another occasion, a group of familiar peers. All children participated in both conditions of the research (order counterbalanced). Trends in the data suggested possible gender differences in children's snack food intake, with the intake of boys higher when eating in the presence of friends, compared to girls' intake being higher when eating in the presence of peers. Further trends suggested that there was more similarity in snack food intake within groups (friends or peers) than between groups of children in this preadolescent age range. The results of this feasibility study may have been affected by the initial amounts of food provided to the children, as several children requested more food, or ate all of the food initially provided. Trends in the data also require further examination. Future research should address these issues by offering larger portion sizes initially, and using a larger sample size to detect significant differences in the results

The influence of friends and peers on children's eating: A feasibility study

7.1 Introduction

School-aged children spend a substantial amount of time interacting with other children, in particular their friends and their classmates, or peers (Rubin, Bukowski & Parker, 2006; Sullivan, 1953). Recent work has suggested that friends and peers influence children's eating attitudes and behaviours (see Chapter 1 and Houldcroft, Haycraft & Farrow, 2014, for a review), but it remains unclear how the influences of friends may differ from the influences of peers. Friends and peers may have different relationships and interactions with children and may potentially exert different influences and have differing effects on their behaviour.

Bandura's (1977) social learning theory posits that an individual's behaviour is learned from observing the behaviour of others, then modelling and imitating this behaviour. Behaviours reinforced or rewarded are repeated, whereas behaviours discouraged or punished cease (Bandura, 1977). Individuals are most likely to model the behaviours of other individuals who they perceive to be similar to them and with whom they associate most regularly, as repeated exposure to a behaviour allows it to be learned thoroughly (Bandura, 1977). When applied to eating behaviours, social learning theory suggests that the individuals we spend a lot of time interacting with around food and eating are potential modellers of our food choice and consumption levels. Since children spend a significant amount of time with their friends and peers in relation to food and eating (e.g., during school break and lunch times, after school, at weekends), peers and friends are influential modellers of children's food choices and intake (e.g., Birch, 1980; Duncker, 1938; Hendy & Raudenbush, 2000; Salvy, Coelho, Kieffer, &

Epstein, 2007a; Salvy, Howard, Read & Mele, 2009; Salvy, Romero, Paluch, & Epstein, 2007b).

A diary study by de Castro (1994) examined the social facilitation of food intake produced by co-eating individuals, and established that being in the presence of family and friends increased food intake. The study, in which adults completed a food diary detailing all food consumed and the environment in which it was consumed (including the individuals present and their relationship to the individual), reported that when eating with others, meals were larger and lasted longer, compared to when eating alone. Furthermore, this effect was larger when eating meals with family and friends, rather than with unknown individuals, suggesting that the presence of family and friends has a greater impact on socially facilitating food intake, compared to eating with unfamiliar others. More recently, after reviewing the literature on the social facilitation of eating, modelling and impression management, Herman, Roth and Polivy's (2003) normative model of eating proposed that eating is directed by norms specific to the social situation, notably the eating behaviours of others present, and how important their social approval is deemed to be.

Experimental research conducted in the United States by Salvy and colleagues has sought to understand how peers and friends may influence children's eating behaviours. Across a series of studies, the research team have demonstrated how the familiarity of the co-eater (friend/unfamiliar peer/sibling/stranger) can affect children's food intake (e.g., Salvy et al., 2007b; Salvy, Kieffer, & Epstein, 2008a; Salvy et al., 2009).

In a study that examined the snack food intake of preadolescent girls when in the presence of an age-matched peer, Salvy et al. (2007a) found that girls' intake of food significantly predicted their partners' intake. In another study, 10-12 year old boys and

girls played games with a while having free access to nutrient dense (healthy) and energy dense (unhealthy) snacks with an unfamiliar peer and, on a separate occasion, alone (the order they took part in conditions was counterbalanced) (Salvy 2008a). Children's intake of nutrient dense snacks was found to be predicted by their peers' intake of these snacks. Results such as these highlight the importance of the presence of peers in relation to children's food intake in social situations.

More recent work by Salvy and colleagues has addressed the contribution that friends make to children's food intake. Children aged 9-15 years played and ate with a same-gender friend, or played and ate with an unfamiliar same-gender peer, whilst having access to healthy and unhealthy snack foods (Salvy et al., 2009). The results showed that children who ate with a friend consumed more than those eating with an unfamiliar peer and that matching of food intake was greater when eating with friends than with unfamiliar peers. This finding contrasted with earlier work, which had reported that children's intake was predicted by the intake of unfamiliar eating partners (e.g., Salvy et al., 2007a; Salvy et al., 2008a). In a study comparing young children's (aged 5-7 years) consumption during lunch in the presence of their mother, or a friend, Salvy, Elmo, Nitecki, Kluczynski and Roemmich (2011) found that children's consumption of unhealthy snacks was lower when in the presence of their mother, compared to with a friend (although this was not the case for the adolescent sample in the same study). Taken together, these results suggests that the individuals present in children's eating environments influence their food intake, and the influence they have is somewhat explained by their relationship, or familiarity, to the individual.

There has been one study to date that has addressed the influence of *groups* of individuals on children's food intake. Six to 10 year old healthy weight and overweight children were given unlimited access to pizza (following a preload) and were tested alone and in a group with three unfamiliar peers of the same gender (no more than two

years different in age) (Salvy et al., 2007a). When eating alone, overweight children consumed more than when in the presence of a group of unfamiliar peers, whereas healthy-weight children consumed more when in a group with peers than when alone. This suggests that the social context children find themselves in affects their food intake differently (as does their weight); however research has yet to compare how groups of friends and groups of peers may differently influence children's eating. The focus of previous research has been on friends or *unfamiliar* peers, yet being in an eating situation with unfamiliar peers is unusual for young children, who predominantly socialise with their friends and class peers. Furthermore, limited research has considered the effects of friendship groups on children's eating behaviours *objectively*, using an experimental design.

Previous research has predominantly been conducted in the US, in a laboratory setting, by Salvy and colleagues. The current feasibility study therefore sought to test a real-life setting to improve the ecological validity when working with children and aimed to replicate the results of Salvy and colleagues in a UK sample. Furthermore, the feasibility study also aimed to include *groups* of children, which only one study to date has considered (Salvy et al., 2007a) to objectively explore the potentially different effects of groups of friends versus groups of peers on children's eating. Since children often work in groups and often eat together in groups, this was deemed to be a more naturalistic situation for children than a laboratory-based experiment. The overall aim of this study was to test the feasibility of this proposed methodology. A further aim was to explore differences in snack food intake when in the presence of friends, compared to peers. It was hypothesised that preadolescent children's intake of food would show a trend of being higher when eating in the presence of a group of friends, compared to when eating with a group of familiar peers. It was also predicted that variation in food intake would differ *between* and *within* groups of friends and peers.

7.2 Method

7.2.1 Participants

Twenty six children (boys $n= 15$, girls $n= 11$) aged 8.37 to 9.21 years ($M= 8.82$, $SD=0.26$) took part in this feasibility study. Children reported their ethnicity as White British (88%; $n= 23$), Black British (4%; $n= 1$) or mixed (8%, $n= 2$). Age and gender adjusted BMI z scores, calculated from objective height and weight measurements, ranged from -1.80 to 3.22 ($M= 1.03$, $SD= 1.08$), suggesting that the weight of the children in the sample was slightly above average for their age and gender (Child Growth Foundation, 1996).

7.2.2 Procedure and measures

A Local Education Authority primary school who had participated in the previous studies reported on in this thesis (Chapters 3-6) was approached to participate in a study exploring the influences of friends and peers on preadolescent children's food intake. Parents of children in a year 4 class who were in the target age range (8-9 years of age) were sent a letter outlining the nature of the study and were asked to provide consent for their child to participate (see Appendix F), as well as details of any food allergies their child may have. Three parents did not provide consent for their child to take part (11.5% of the school class). The research was approved by Loughborough University Ethics Approvals (Human Participants) Sub-Committee.

Prior to the experimental aspects of the research, each child was asked to: "write down the full names of your best friends in your class. That is, the people you usually spend time with at school and enjoy being with"; a statement adapted from previous work by Paxton, Schutz, Wertheim and Muir (1999), Hutchinson and Rapee (2007) and Farrow, Haycraft and Meyer (2011) and used in previous Chapters reported in this thesis (Chapters 3 & 5). Children's *friendship* groups were then constructed manually and

cross-checked with the class teacher to ensure children were placed in the correct groups with their friends. Children's *peer* groups were created by mixing children's friendship groups. Six groups of friends (three friendship groups consisting of five members; two friendship groups consisting of four members; and one friendship group consisting of three members) participated in the feasibility study. For the peer aspect of the study, four peer groups consisted of four members and two peer groups consisted of five members.

The design of the feasibility study was a within-subjects design where the social context was manipulated (friends versus peers). Children were grouped with their natural friendship groups or with a group of familiar peers. Each child took part in both aspects of the experiment, once in a group with friends and once in a group with familiar peers, with the order they participated in counterbalanced. Sessions took place over a three-week period.

Immediately following their school lunch break, children were asked to go in groups with the researcher to a separate classroom where they were to play a game.

Children were seated around a table which had an age-appropriate game of snakes and ladders set up in the middle. As all children had just eaten lunch, they were initially asked to complete a visual rating scale (Appendix G) assessing their hunger levels. They were told by the researcher to think about how full their tummy was with food (in case any children had difficulty interpreting the term 'hungry').

Children were then given their own standardised plate of food containing two nutrient-dense and two energy-dense snacks, comprising: six pieces of chopped apple, eight carrot sticks, four chocolate chip cookies, and 25g of ready salted crisps. Children were told they could eat as much or as little as they wanted and if they would like any

more food to ask the researcher and pre-weighed bowls of all snack foods were visible to the children ($n=6$ children asked for more food when in friendship groups; $n=10$ children asked for more food when in peer groups). Children were told to eat only the food on their own plate and not to share plates. A cup of water was provided to all children and refilled if requested. Children played the game and ate the snacks, while the researcher sat at a separate table, interacting with the children only if they asked her a direct question.

After 20 minutes, all snack foods were removed from the table. Consumption rates were calculated after the study had ended by weighing the remaining foods. Following the experimental session, children were weighed and measured with their shoes removed. Figure 7.1 details the flow of the experimental procedure.

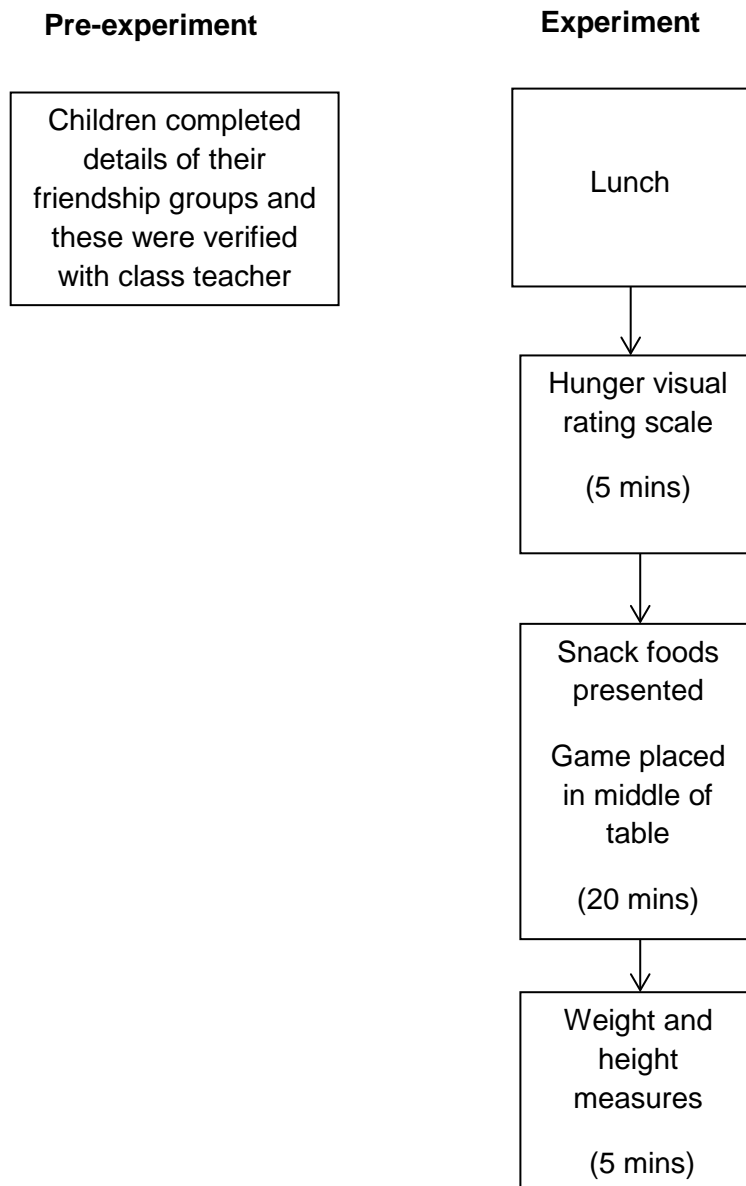


Figure 7.1 Flowchart detailing the experimental procedure.

7.2.3 Analysis of Results

As the predominant aims of Chapter 7 were to explore the feasibility of an experimental study designed to examine the influences of friends and peers on preadolescent children's eating, a priori power analyses were not conducted as no significance testing was planned as part of the analyses of results.

To examine the feasibility of the study to examine the influence of friends and peers on preadolescent children's eating experimentally, the methods used were firstly evaluated. This included an evaluation of the design and procedure and any issues identified were subject to change prior to the study being conducted in full (as reported in Chapters 8 and 9).

In addition to evaluating the feasibility of the study design, this study also looked at possible trends in the data for children's food intake when in the presence of friends and peers. To look at trends in children's food intake, their intake of each snack food (under each condition) was calculated in kilocalories (kcal). This was completed by multiplying the weighed amount of the food consumed by the kcal per 100g (as reported on each snack food's nutritional label). To examine variation in food intake under each condition (friendship group/peers), variance *within* groups was compared to variance *between* groups. This was achieved by a) calculating the standard deviation of intake of each snack food, and total intake (in kcal) for the whole sample (*between* groups standard deviation); and b) calculating the standard deviation of intake of each snack food, and total intake (in kcal) for each group of friends/ peers and calculating the mean of these standard deviation values (*within* groups standard deviation). These two standard deviation scores were then compared to assess potential differences in snack food intake variation.

7.3 Results

7.3.1 Sample characteristics

A summary of the sample characteristics (BMI z-score, age and gender) are shown in Table 7.1.

Table 7.1: Descriptive statistics (means and standard deviations) of the sample (age and BMI z-score)

	Male (n= 15)	Female (n= 11)
Age (years)	8.89 (.27)	8.73 (.29)
BMI z-score	.85 (.70)	1.28 (1.46)

There was a roughly equal number of boys and girls who were of similar age, but girls' average BMI z-score was slightly higher than boys'.

7.3.2 Feasibility study results

The primary aim of this Chapter was to test the feasibility of the study methods for examining the influence of friends and peers on preadolescent children's eating experimentally. The overall design and procedure worked well in practice, although the amount of children who asked for extra portions of the snack foods ($n=6$ when eating with friends; $n=10$ when eating with peers) suggests that the initial amounts of snack foods provided (six pieces of chopped apple, eight carrot sticks, four chocolate chip cookies, and 25g of crisps) were too small. Furthermore, some children ate all of the snack foods, particularly the energy dense (unhealthy snacks), yet did not ask for more food. This would have affected the results obtained for variation in intake since, for example, if the majority of children in a group ate all of the crisps on their plate, and did not ask for more, the variation within the group would be low. To improve this

design for a future experimental study, larger amounts of food should be offered initially. This would also reduce any possible visual effects of a small portion size on consumption levels since the amount of food presented on a plate has been shown to influence consumption norms and intake expectations (e.g., Wansink, Painter & North, 2005). Offering larger amounts of food initially, and reducing the need for children to ask the researcher for larger portions may also reduce the possible impact of children's temperament, as shyer or more socially anxious children may be less likely to feel confident to ask a stranger for more snacks in front of their friends or peers. Evidence suggests that people eat less when in the presence of others who they believe are observing or evaluating them, compared to when eating alone (e.g., Roth, Herman, Polivy & Pliner, 2001), and it is possible that the children believed that the researcher was observing or evaluating their intake of food, which may have prevented them from asking for extra food.

7.3.3 Results: Intake of food

7.3.3.1 Trends in food intake

Table 7.2 shows overall intake, and boys' and girls' intake of snack foods (carrots, apples, crisps, cookies) across conditions (friends and peers).

Table 7.2: Descriptive statistics (means and standard deviations) for snack food intake overall, and for boys and girls separately (kcal)

	Mean (SD) Overall sample (n=26)	Mean (SD) Boys (n=15)	Mean (SD) Girls (n=11)
Eating with friends			
Intake of carrots	19.81 (15.04)	26.86 (10.73)	10.19 (15.10)
Intake of apples	20.78 (13.26)	23.06 (15.64)	17.68 (8.89)
Intake of cookies	186.51 (87.22)	197.09 (73.48)	173.04 (105.22)
Intake of crisps	109.55 (32.33)	109.26 (39.00)	109.95 (22.11)
Overall intake	329.48 (104.09)	343.13 (107.47)	310.87 (101.29)
Eating with peers			
Intake of carrots	13.40 (15.14)	18.58 (14.81)	6.33 (13.08)
Intake of apples	23.05 (13.56)	26.56 (14.49)	18.27 (11.07)
Intake of cookies	179.33 (100.99)	167.50 (109.54)	194.39 (91.82)
Intake of crisps	111.79 (47.60)	114.29 (56.28)	108.38 (34.75)
Overall intake	324.69 (111.29)	315.77 (118.51)	327.37 (104.97)

The data for the overall sample suggested limited differences between food intake across conditions (eating in the presence of friends/ peers). In terms of gender, the data suggested a trend for boys to generally consume more than girls for all snack foods (although their intake of crisps when with friends was slightly lower than girls' intake). The data suggested that boys' overall intake of kilocalories was higher when eating in the presence of friends, compared to peers. For girls, overall intake was higher when eating in the presence of peers, compared to friends.

7.3.3.2 Variation in food intake across conditions

Within and between groups standard deviations were used to explore potential differences in the sample for intake of food across conditions (friends and peers) for each snack food and overall snack food intake (Table 7.3).

Table 7.3: Variation (standard deviation scores) for food intake (kcal) between and within groups (friends/ peers) for the overall sample

	Between- group Friends	Within- group Friends	Between- group Peers	Within- group Peers
Overall sample (n=26)				
Intake of carrots	15.04	10.44	15.14	14.14
Intake of apples	13.27	9.89	13.56	12.07
Intake of cookies	87.22	71.78	100.99	67.75
Intake of crisps	32.33	25.36	47.60	35.31
Total intake	104.09	85.91	110.94	101.24

Variance in snack food intake *between* groups of friends was larger than *within* groups of friends for all snack foods. Similar trends were seen for peers, specifically that variance in snack food intake *between* groups of peers was larger than *within* groups of peers. This suggests that there was more similarity in snack food intake for children within the same groups compared to children more generally of the same demographic background.

7.4 Discussion

The primary aim of this study was to test the feasibility of the study methodology employed. Although the design of the study worked well in practice, and provided a real-life setting to examine children's intake of food when in the presence of friends or peers, there were some limitations noted. The main issue highlighted by this feasibility study was that the initial amount of snack foods offered to the children was likely to be too small. Many children ate all of the snack foods, especially the energy-dense snacks of cookies and crisps, implying that the initial amount provided was too little. Research has suggested that visual cues relative to portion sizes can influence intake in adults (e.g., Wansink et al., 2005) and children (e.g., Fisher, Rolls & Birch, 2003). Furthermore, despite being instructed that they could ask for more food at any time,

not all children who consumed all snacks did this. The social effects of a child having to ask an unfamiliar researcher for more food may have prevented some children from asking for more snacks. Therefore, to rectify this issue in future research, larger initial portion sizes should be offered to all children, and the ability to access more snack foods should be emphasised more by the researcher.

It was predicted that preadolescents' intake of food would be higher when eating in the presence of a group of friends, compared to a group of peers. Trends in the data suggested that there were minimal differences between food intake when children ate in the presence of their friends, compared to their peers. When split by gender, a trend was observed for boys to generally consume more than girls for all snack foods (although their intake of crisps when with friends was slightly lower than girls' intake). Interestingly, boys' overall intake of kilocalories was higher when eating in the presence of friends, compared to peers, whereas the opposite was observed for girls. The trend for boys is similar to previous work using paired individuals which found that children who ate with a friend consumed more than those eating with an unfamiliar peer (Salvy et al., 2009). However, it must be noted that this study was underpowered to examine gender differences in intake due to the small sample size. Future research should recruit a larger sample to allow for comparisons to be made across genders. Furthermore, the trends seen in this feasibility study are difficult to compare to the one previous study that has used groups of children in this context. Salvy et al. (2007a) found that overweight children consumed more than when in the presence of a group of unfamiliar peers, whereas healthy-weight children consumed more when in a group than when alone. To enable comparisons with such previous research, future research in this thesis therefore aimed to explore child weight in relation to intake in the presence of friends and peers.

The present study further predicted that variation in food intake would differ *between* and *within* groups of friends and peers, as previous research pairing children with a peer has reported matching of intake among partners (e.g., Salvy et al., 2008a; Salvy et al., 2009). The results showed that variance in snack food intake *between* groups was higher than *within* groups, for both friends and peers. This suggests that there was less variation in intake when children ate in groups, compared to the variation of intake across different groups of preadolescent children. However, as previously mentioned, the results reported in this feasibility study may have been affected by the initial amounts of food provided to the children. Since many children ate all of the snack foods on their plate and did not ask for more food, this would have elevated the intake results found, and made it less likely that differences were found across conditions. Future research should seek to replicate these results with larger amounts of food and a sample size large enough to detect if there are significant differences in *between* and *within* group variation of snack food intake. Further to this, it is possible that some children in the groups may have eaten very large or very small amounts and their consumption levels may have affected the group variation scores. However, as the present study was exploratory in nature, no outliers were removed from the sample.

Despite the limitations of this feasibility study, obtaining a deeper understanding of the differences that peers and friends may have on children's eating behaviours is important as it may help to inform school and health interventions developed to improve children's food intake and choice in social situations. Future research with larger samples should take account of children's weight, and also increase the amount of snack foods initially offered to allow for greater variability in children's consumption and to eliminate any social effects which may have prevented children from asking for more food.

Chapter 8

The previous Chapter detailed a feasibility study which aimed to test an experimental design, in an attempt to examine the potentially differential effect of friends and peers on preadolescents' snack food intake. Based on the conclusions drawn from the feasibility study and the suggested directions for future research, the research design was modified. Specifically, changes were made to increase the initial amount of snack foods offered to children. Chapter 8 reports on a study that was conducted using the modified design and a larger sample of children, which aimed to examine the effect of friends and peers on preadolescents' food intake and variation in intake experimentally.

Chapter 8:

The influence of friends and peers on children's eating:

An experimental study

Abstract

Experimental research suggests that the presence of friends and peers may have differential effects on children's eating behaviours, and points towards child weight and gender as potential contributing factors. However, limited research has considered the effects of groups of friends and peers on children's eating behaviours. The aim of this study was to objectively examine the influence of friends and familiar peers on children's intake of snack food experimentally. A further aim was to examine gender differences and BMI associations in relation to snack food intake and variation of snack food intake when eating in the presence of friends and peers. Forty-eight preadolescents (mean age= 9.22 years) were offered snack foods while playing a game with their friends or, separately, with their peers. Each child took part in both conditions of the experiment, the order of which was counterbalanced. Children were weighed and measured following experiment participation. Several gender differences in intake in the presence of friends and peers were found. Snack food intake was more similar within groups (for both friends and peers), suggesting that children generally consumed amounts more similar to the group they were in, when compared to the rest of the sample's intake of snack foods. Girls' BMI z-scores (but not boys') were associated with their intake of several foods, typically in the presence of friends, suggesting that friends and peers may have different effects on snack food intake for girls of this age.

The influence of friends and peers on children's eating:

An experimental study

8.1 Introduction

Friends and peers are known to influence children's eating attitudes and behaviours (Houldcroft, Haycraft & Farrow, 2014; see also Chapter 1) since children spend a considerable amount of time in the presence of friends and peers, particularly through school-based interactions. Social learning theory (Bandura, 1977) suggests that eating behaviours are modelled by individuals we interact with and it follows that friends and peers are important modellers of behaviour for school-aged children. The normative model of eating (Herman, Roth & Polivy, 2003) proposes that eating behaviours are influenced by the eating behaviours of others present and the importance of their social approval. The presence of friends and peers has been shown to influence food intake in several experimental studies (e.g., Salvy, Coelho, Kieffer & Epstein, 2007a; Salvy, Kieffer & Epstein, 2008a; Salvy, Howard, Read & Mele, 2009; see also Chapter 7 Section 7.1).

A further factor that has been evidenced to be associated with friend and peer influences on children's food intake experimentally is child weight. A series of studies using unfamiliar peers have shown that the weight status of the target child, and their co-eaters or partners, can predict children's food intake. Salvy, Romero, Paluch and Epstein (2007b) matched preadolescent girls (8-12 years) with a similar-aged unfamiliar peer and offered cookies as snacks. The results indicated that girls' intake of cookies predicted their partner's intake of cookies. Furthermore, intake was predicted by both the weight status of the girl and their partner, with overweight girls eating with overweight partners eating more than overweight girls paired with a healthy-weight partner. Overweight pairs ate more than healthy-weight pairings and

healthy-overweight pairings. In a separate study, Salvy and colleagues (2008a) compared the snack food intake (both healthy and unhealthy) of overweight and lean 10-12 year old preadolescents, when eating alone compared to when paired with an unfamiliar peer in weight-discordant (overweight child paired with lean child) and weight-concordant dyads (lean paired with lean child / overweight paired with overweight child). They found that overweight children ate more snack foods (both healthy and unhealthy) when alone compared to lean children, who consumed more snacks (healthy and unhealthy) when in pairs. Furthermore, children's intake of healthy snacks was predicted by their partner's intake of healthy snacks. However, the weight of peers did not predict their partner's consumption of either healthy or unhealthy snack foods. A separate study, examining eating in the absence of hunger in children aged 7-9 years who ate in groups in a classroom, found positive associations between eating in the absence of hunger with weight in boys, with a trend for the same results in girls (Hill et al., 2008). Taken together, these results suggest that peer influence, the weight status of the eater (and in one study, co-eaters) and gender can account for food intake and eating in the absence of hunger.

One study that addressed weight and the influence of friends *and* peers (rather than simply peers) allowed overweight and non-overweight children (9-15 years) access to healthy and unhealthy snack foods while playing with a same-gender friend, or unfamiliar same-gender peer (Salvy et al., 2009). Children who ate with a friend consumed more than those eating with an unfamiliar peer. Overweight children who ate with an overweight partner, who was either a friend or unfamiliar peer, consumed more food than overweight children eating with healthy weight or lower weight partners. In contrast to earlier work, which found high matching of intake in unfamiliar dyads, Salvy et al. (2009) found that among friend pairs, matching of food intake was greater than between unfamiliar peer pairs.

Although previous research points at the importance of peers and friends as potential influencers on children's food intake, it has predominantly used pairs of children. In eating environments in school time, and outside of school when children eat with friends at parties / social gatherings, children are likely to be in settings where there are multiple children present, or groups of children. Despite this, only one study to date has considered the influence of *groups* of children on children's food intake. Salvy et al. (2007a) offered children (aged 6-10) unlimited access to pizza while alone or, on a separate occasion (order counterbalanced), in a group with three unfamiliar peers of the same gender. Weight status was also measured. Overweight children consumed more pizza when alone than when in the presence of the group of peers. Conversely, healthy-weight children consumed more pizza when in a group than when alone. These findings, along with the findings discussed above, imply that the social context (the individuals present during eating interactions) influences food intake in children, and this is further influenced according to the child's weight (and the weight of their co-eaters, e.g., Salvy et al., 2009).

Previous experimental research has also failed to compare how *groups* of friends and *groups* of peers may differently influence children's eating. This is an important oversight given that children who eat with other children generally do so in the presence of more than one other child. Furthermore, previous research utilising peers has focussed on *unfamiliar* peers (e.g., Salvy et al., 2007a; Salvy et al., 2008a; Salvy et al., 2009), rather than familiar peers. Children are more likely to find themselves in an eating situation with familiar peers, for example classmates or teammates (see Section 1.5.1 for a discussion of the distinction between friends and peers), than unfamiliar peers. This is an important distinction because peers who are familiar to a child are suggested to facilitate children's responses in a social situation, whereas unfamiliar peers are thought to stimulate inhibition and wariness (Lewis, Young,

Brooks, & Michelson, 1975). Research should therefore consider how the role of *groups* of friends and familiar peers influences children's eating behaviours.

The aim of the present study was to objectively examine the influence of friends and familiar peers on children's intake of food, experimentally. It was hypothesised, based on the normative model of eating (Herman et al., 2003) and previous experimental work (Salvy et al., 2009), that children would consume more snack foods when in the presence of friends, compared to familiar peers, and there would be gender differences in these results, with boys eating more than girls (as found in Chapter 7). It was also hypothesised that variation in food intake would be greater between groups than within groups, across both conditions (friends/ peers) (based on the results of Salvy et al., 2009). Based on the results of Salvy et al. (2007b; 2008a) and Hill and colleagues (2008), it was further hypothesised that the BMI z-score of the target child would be positively related to intake when eating in the presence of friends or peers.

8.2 Method

8.2.1 Participants

Forty eight children (boys $n= 23$, girls $n= 25$) aged 8.67 to 9.75 years ($M= 9.22$, $SD= 0.28$) participated in the study. The majority of children reported their ethnicity as White British (85.4%; $n= 41$), Asian (8.3%; $n= 4$) or mixed (6.3%, $n= 3$). BMI z scores ranged from -2.15 to 3.09 ($M= 0.39$, $SD= 1.10$), suggesting that the weight status of the children in the sample was average for their age and gender (Child Growth Foundation, 1996).

8.2.2 Procedure and measures

A Local Education Authority school who had participated in the feasibility study of this thesis (Chapter 7) was again approached to participate in the present study (see

Appendix E). The children who took part in this study were different to those who participated in the feasibility study (Chapter 7). Parents of children in the target age range classes (8-9 years of age) were sent a letter outlining the nature of the study and were asked to provide consent for their child to participate, for their child to be weighed and measured, and asked to provide details of any food allergies their child may have (see Appendix F). One child participating was reported as having a nut allergy by their parent and so was not given one of the snack foods (cookies). Three parents did not provide consent for their child to take part in the experimental study (5.6% of the eligible participants). The research was approved by Loughborough University Ethics Approvals (Human Participants) Sub-Committee.

As detailed in Section 7.2.2, children completed a list of their best friends in their class prior to participating in the study. Children's friendship groups were manually assigned by the researcher using these data and cross-checked with the class teacher. Peer groups were created by mixing children's friendship groupings. Eight friendship groups consisting of five members, and two friendship groups consisting of four members participated. For the peer aspect of the experimental studies, again, eight peer groups consisted of five members, and two peer groups consisted of four members. Children participated in both aspects of the research, once with their friends, and once with their peers, with the order of participation counterbalanced. Experimental sessions took place over a six week period (three weeks per school class).

As outlined in Section 7.2.2, children completed the experimental sessions immediately after lunch, in a separate classroom. All children completed a visual rating scale (see Appendix G) assessing their hunger levels prior to the experiment. They were presented with a game of snakes and ladders and provided with their own standardised plate of food containing two nutrient-dense and two energy-dense snacks: a whole chopped apple, twelve carrot sticks, six chocolate chip cookies, and

50g of ready salted crisps (an increase from the feasibility study, Chapter 7, Section 7.2.2, where children were offered six pieces of chopped apple, eight carrot sticks, four chocolate chip cookies, and 25g of ready salted crisps). Children were instructed to eat as much or as little as they wanted from their own plates only, and to ask the researcher if they would like any more food. Pre-weighed bowls of all snack foods were visible to the children but no children asked for more food. A cup of water was provided to all children and refilled on request. During the experiment the researcher sat at a separate table, visible to the children, but interacted with the children only if asked a direct question.

All snack foods were removed from the children after 20 minutes and consumption was calculated after the study had finished by weighing the snack foods that remained on each child's plate. Following participation in both experimental sessions (friends and peers), children were weighed and measured with their shoes removed (see Figure 7.1 for a flowchart of the full experimental procedure).

8.2.3 Statistical analyses

Shapiro-Wilk calculations of the distribution of snack food intake and variation of snack food intake suggested that the majority of data deviated substantially from normality and thus non-parametric tests were used in all analyses. The sample size of 48 was lower than the requirements to detect a medium effect at $p < 0.05$ with a power of 0.80 when using correlations ($n = 85$), tests of difference ($n = 64$). The results presented are discussed with reference to this lack of power.

As detailed in Section 7.2.3, intake of each snack food was calculated in kilocalories (kcal) by multiplying the weighed amount of each food consumed by the kcal per 100g (as detailed on each snack food's nutritional label). Again, as detailed previously (Section 7.2.3), to examine variation in food intake under each condition (friendship

group/peers), variance *within* groups and variance *between* groups was calculated. This involved two calculations: a) calculating the standard deviation of intake of each snack food, and total intake (in kcals) for the whole sample (*between* groups standard deviation); and b) calculating the standard deviation of intake of each snack food, and total intake (in kcals) for each group of friends/ peers and calculating the mean of these standard deviation values (*within* groups standard deviation). Comparison of these standard deviation scores allowed examination of differences in snack food intake variation.

Two-tailed Spearman's correlations were used to examine if there were any relationships between children's initial hunger rating (as assessed by the visual rating scale; Appendix G) and their overall intake of snack foods during both conditions of the experiment (friends and peers). There were no significant relationships found between children's reported levels of hunger pre-experiment and their overall intake in the presence of friends or peers, therefore initial hunger levels were not controlled for in subsequent analyses. Next, two-tailed Spearman's correlations failed to identify any significant relationships between child age and overall food intake and variation in intake across each condition, so age was not included in any further analyses.

Two-tailed Mann Whitney U-tests were used to examine gender differences between boys' and girls' total intake (kcals) of each snack food (carrots, apples, crisps, cookies) and overall intake (kcals) for each condition (friends and peers). As gender differences were observed (see Table 8.2), two-tailed Wilcoxon Signed Ranks tests were subsequently used to compare differences in individual and total snack food intake (kcals) for each condition, for boys and girls separately. Two-tailed Wilcoxon Signed Ranks tests were again used to examine differences in variation of intake across conditions (friends and peers). Finally, to examine associations between

children's BMI z-scores and intake of each of the four snack foods and overall intake in the presence of friends and peers, two-tailed Spearman's correlations were conducted.

Statistical analyses were performed using PASW Statistics 20. All tests were two-tailed and a p -value of $<.05$ was accepted as significant.

8.3 Results

8.3.1 Sample characteristics

A summary of the sample characteristics (BMI z-score, age and gender) are shown in Table 8.1.

Table 8.1: Descriptive statistics (means and standard deviations) of the sample (gender, age and BMI Z-score)

	Male (n= 23)	Female (n= 25)
Age (years)	9.27 (.28)	9.18 (.29)
BMI z-score	.62 (.96)	.19 (1.19)

There was a roughly equal number of boys and girls. Boys and girls were similar in ages. Mean BMI z-scores suggested that both boys and girls had average BMIs for their age and gender (Child Growth Foundation, 1996).

8.3.2 Intake of food when in the presence of friends and peers

Two-tailed Mann Whitney U tests (Table 8.2) were conducted to examine any gender differences between boys' and girls' intake of food (kcal) across conditions (friends and peers) and snack foods (carrots, apples, crisps, cookies, total intake).

Table 8.2: Descriptive statistics (means and standard deviations) and tests of difference scores (z) for snack food intake (kcal) for boys and girls

	Mean (SD) Boys (n= 23)	Mean (SD) Girls (n= 25)	Mann Whitney U (z)	p value
Friends				
Intake of carrots	13.43 (15.30)	19.90 (16.90)	-1.71	.088
Intake of apples	25.13 (15.19)	20.17 (16.17)	-1.31	.190
Intake of cookies	226.40 (91.53)	136.36 (107.37)	-2.68	.007*
Intake of crisps	164.68 (82.52)	109.44 (52.73)	-2.32	.020*
Total snack intake	429.65 (133.37)	282.69 (124.19)	-3.35	.001**
Peers				
Intake of carrots	11.74 (14.06)	13.35 (15.07)	-.72	.469
Intake of apples	22.65 (14.81)	23.46 (15.24)	-.37	.710
Intake of cookies	213.33 (83.60)	157.77 (123.29)	-1.40	.160
Intake of crisps	153.39 (86.84)	123.09 (50.35)	-1.16	.248
Total snack intake	401.11 (149.83)	311.37 (128.92)	-2.20	.028*

* $p < .05$; ** $p < .01$, two tailed

There were significant differences for boys' and girls' intake of cookies, crisps and total intake when eating in the presence of friends; specifically, boys' intake of cookies, crisps and total intake was higher, compared to the intake of girls when eating in the presence of friends. There were also significant differences for boys' and girls' total intake when eating in the presence of peers; again, boys' total intake was higher, compared to the intake of girls, when eating in the presence of peers.

Two-tailed Wilcoxon signed rank tests were next used to compare differences in individual and total snack food intake (kcal) across conditions, for boys and girls (Table 8.3).

Table 8.3: Descriptive statistics (means and standard deviations) and tests of difference scores (z) for snack food intake (kcal) across conditions for boys and girls

	Mean (SD) Friends	Mean (SD) Peers	Wilcoxon signed rank (z)	p value
Boys (n= 23)				
Intake of carrots	13.43 (15.30)	11.74 (14.06)	-1.40	.163
Intake of apples	25.13 (15.19)	22.65 (14.81)	-1.39	.164
Intake of cookies	226.40 (91.53)	213.33 (83.60)	-.73	.465
Intake of crisps	164.68 (82.52)	153.39 (86.84)	-.64	.523
Total snack intake	429.65 (133.37)	401.11 (149.83)	-1.31	.191
Girls (n= 25)				
Intake of carrots	19.90 (16.90)	13.35 (15.07)	-1.89	.059
Intake of apples	20.17 (16.17)	23.46 (15.24)	-.85	.394
Intake of cookies	136.36 (107.37)	157.77 (123.29)	-.34	.732
Intake of crisps	109.44 (52.73)	123.09 (50.35)	-1.65	.098
Total snack intake	282.69 (124.19)	311.37 (128.92)	-1.01	.313

two tailed

For girls, the difference in intake of carrots when in the presence of friends, compared to peers, was approaching significance ($p=.059$), suggesting that girls consumed significantly more carrots when in the presence of friends, compared to peers. There were no significant differences for any other snack foods, or for total snack food intake when in the presence of friends, compared to peers, for boys or for girls.

8.3.3 Variation in food intake across conditions

Within and between groups standard deviations were calculated and two-tailed Wilcoxon signed rank tests (Table 8.4) were used to explore differences between variation of snack food intake (kcal) between and within groups, across conditions (friends and peers).

Table 8.4: Variation (standard deviation scores) for food intake (kcal) between and within groups (friends/ peers) for the overall sample and tests of difference (z)

	Between- group Friends	Within- group Friends	Wilcoxon signed rank (z)	p value	Between- group Peers	Within- group Peers	Wilcoxon signed rank (z)	p value
Intake of carrots	16.32	14.32	-1.26	.207	14.46	12.45	-2.29	.022*
Intake of apples	15.74	13.87	-2.80	.005**	14.88	13.20	-2.03	.042*
Intake of cookies	108.81	91.84	-3.42	.001**	108.31	107.44	-3.80	.704
Intake of crisps	73.38	67.31	-1.37	.172	71.12	65.44	-1.30	.192
Total intake	147.33	121.62	-3.68	.000***	145.08	148.19	-.02	.984

* $p < .05$; ** $p < .01$; *** $p < .001$, two tailed

There were significant differences in food intake variation *between* and *within* groups for several snack foods. Specifically, variance in snack food intake *between* groups of friends was larger than *within* groups of friends for apples, cookies, and overall intake. Variance in snack food intake *between* groups of peers was larger than *within* groups of peers for carrots and apples. This suggests that there was more similarity in snack food intake of these snacks for children *within* the same groups compared to children more *generally* of the same sample.

8.3.4 BMI z-score relationships with intake

One-tailed Spearman's correlations, conducted separately for boys and girls, indicated that boys' BMI z-score was not significantly associated with the total or individual intake of any snack foods. For girls, however, BMI z-score was significantly negatively associated with their intake of carrots when in the presence of friends ($r = -.45$, $p = .025$). Girls' BMI z-score was significantly positively related to their intake of cookies when in the presence of friends ($r = .42$, $p < .042$), as well as their total intake of snack foods when in the presence of friends ($r = .44$, $p = .026$) and peers ($r = .43$, $p = .031$).

8.4 Discussion

The aim of the present study was to objectively examine the influence of friends and familiar peers on children's intake of snack food experimentally. The hypothesis that children would consume more snack foods when in the presence of friends, compared to familiar peers, and there would be gender differences in these results, with boys eating more than girls, was partially supported. There were significant gender differences in intake with boys' intake of cookies being higher than girls' intake of these snacks, when eating in the presence of friends. Boys ate more snack foods overall, across conditions, compared with girls. However, the only difference in intake across conditions was the finding that girls ate more carrots in the presence of friends, compared to peers, although this was only approaching statistical significance.

The normative model of eating (Herman et al., 2003) suggests that eating behaviours are influenced by the eating behaviours of other individuals present during the interaction and how important their social approval is to the target individual. Previous experimental work using friends and peers reports that children eating with a friend consume more than children eating with an unfamiliar peer, suggesting that the social approval warranted from friends may be more important than social approval from unfamiliar peers. The present study was the first to utilise *familiar* peers in direct comparison to friends, as it has been suggested that peers who are familiar to a child facilitate children's responses in a social situation, whereas unfamiliar peers rouse inhibition and wariness (Lewis et al., 1975). The finding (approaching statistical significance) that girls ate more carrots in the presence of friends, compared to peers is of interest as it suggests that girls of this age group may desire greater social approval from friends, compared to peers, when consuming healthy snacks such as carrots, supporting the suggestions of the normative model of eating. However the results were not mirrored for girls' intake of the second healthy snack food, apples, and

the reason for this is not wholly clear. Replication with a larger sample size would help to unpack these results.

The anticipated result that variation of snack food intake would be greater *between* groups than *within* groups, across both conditions (friends/ peers) was also partially supported, with variance *between* groups greater than *within* groups for the intake of apples, cookies and overall, when eating with friends; and the intake of carrots and apples when eating with peers. This suggests that there was more similarity in the snack food intake of these children *within* their group, than *between* the whole sample of preadolescents of a similar age and demographic background. This implies that the groups children find themselves in in a social eating situation may influence their intake since there was less variability within the group than for children as a whole sample. The finding that there were greater within-group, than between-group, similarities in healthy snack (carrots and apples) intake when in the presence of peers may suggest that the social approval demands from peers differs from that of friends, in children of this age (Herman et al., 2003). Children of a preadolescent age may desire greater social approval from their peers and this may influence similarities in the intake of healthier foods in their company.

The further hypothesised finding, that BMI z-scores would be positively related to intake when eating in the presence of friends or peers, was also somewhat supported, but for girls only. For girls, a lower BMI z-score was associated with a greater intake of carrots when eating with friends. Furthermore, girls' BMI z-scores were related to their intake of cookies when eating with friends, and total snack food intake when with friends and peers. Girls with lower BMI z-scores ate fewer cookies in the presence of friends, and ate less overall when in the presence of friends and peers. Conversely girls with higher BMI z-scores ate more kilocalories from cookies in the presence of friends, and ate more kilocalories overall when in the presence of friends and peers.

Girls with lower BMI z-scores may wish to present themselves as eating less overall, and avoiding unhealthy snack foods (cookies) when in the presence of their friends, to maintain an image of healthy eating in front of their friends (Paxton et al., 1999; Salvy et al., 2011). On the other hand, girls with higher BMI z-scores may be less susceptible to social approval demands on their eating, and may feel comfortable eating larger amounts in the presence of their friends and peers. In research with adolescent girls, it is suggested that they practice impression management, attempting to present themselves as healthy eaters in front of other same-gender friends (e.g., Paxton, Schutz, Wertheim & Muir, 1999; Salvy, Elmo, Nitecki, Kluczynski & Roemmich, 2011). It is possible that these effects are also evident in preadolescent girls and this may be related to their weight, as the present results suggest. Such associations between weight and intake is something that future research should address in more detail, before girls reach adolescence and clinical eating behaviours become more prevalent (e.g., Thomas, Ricciardelli, & Williams, 2000; Wood, Becker, & Thompson, 1996).

The present study is somewhat limited by a lack of power to detect significant results. While the sample recruited for this study was larger than in Chapter 7's feasibility study, it was still not as large as Cohen (1992) suggests is required to detect large effect sizes with the p -value set at $<.05$ ($N > 64$), and splitting the sample by gender further reduced the size of each sub-sample and so it is likely that the current study lacked adequate power. Future research should, therefore, recruit larger sample sizes to ensure sufficient power to detect significant results. Furthermore, the gender differences in the results may be somewhat attributable to the formation of friendship and peer groups. The friendship groups constructed in the current study were predominantly gender-specific (*all boys or all girls*), however the peer groups were mixed gender. This could have contributed to the gender differences observed in the results, although as this study used *groups* of children, it is difficult to attribute these results to being related to one specific factor. Future research using gender-specific

peer groups may yield different results, although would be difficult to organise if the focus was, like the present study, *familiar* peers, since children's class sizes in the UK are generally limited to a maximum of 30 mixed gender children. A further noteworthy limitation was the decision to retain any outliers in intake data. It is possible that some children may have eaten irregularly large or small amounts and their consumption levels may have affected the group variation scores. However, in order to retain full groups for the analyses to ensure that the eating behaviours of the *whole* group were considered, no outliers were removed from the sample.

Despite these limitations, the current study is the first to objectively examine the influence of *groups* of friends and *familiar* peers on children's intake of food, experimentally. To date, research in this area has focussed on *unfamiliar* peers and *dyads* (e.g., Salvy et al., 2007b; Salvy et al., 2008b; Salvy et al., 2009), rather than familiar peers and groups (one study that has included groups used unfamiliar peers; Salvy et al., 2007a), despite children of this age spending much time in groups with their peers and friends. Consistent with previous research, the results add to the literature that finds possible associations with child weight and snack food intake in the presence of friends and peers. The present study highlights potential gender differences in food intake for girls, which is of particular importance given the criticality of the preadolescent period for the development of eating and dieting concerns, and the greater incidence of eating problems in adolescent girls, compared to boys (e.g., Neumark-Sztainer, Wall, Larson, Eisenberg & Loth, 2011). The results have implications for people who work with school-aged preadolescent children, suggesting the importance of considering friends and peer groups as influential figures for the development of eating behaviours, particularly for girls.

Chapter 9

The previous Chapters of this thesis have sought to understand the factors that influence eating behaviours in preadolescent children; specifically, the roles of friends' eating behaviours, perceptions of parental feeding practices, preadolescents' levels of anxiety and depression, and BMI. The findings from the preceding Chapters have shown links between children's dieting behaviours and their friends' reports of dieting behaviours, and links between individuals' dieting behaviours and levels of anxiety and depression (Chapters 3 & 5). Positive relationships between over-eating behaviours (external and emotional eating) and levels of anxiety have also been found (Chapters 3 & 5). Results have also highlighted associations between preadolescents' eating behaviours and their perceptions of the controlling feeding practices their parents use with them (parental pressure to eat and restriction of food), as well as links between perceptions of controlling feeding practices and children's anxiety and depression levels (Chapters 4 & 6).

The experimental Chapters of this thesis (Chapters 7 & 8) implemented an objective measure of child eating behaviour and found gender differences in children's snack food consumption when eating in the presence of friends or peers. For girls, their BMI z-score was related to their food intake when eating in the presence of friends or peers.

The aim of Chapter 9 was to bring together the results of the previous Chapters (3-8) to explore the relationships between preadolescents' food intake when in the presence of friends and peers, and their perceptions of the feeding practices their parents use with them, and their self-reported eating behaviours, BMI, and symptoms of anxiety and depression.

Chapter 9

Preadolescents' eating behaviours in the presence of friends and peers: Exploring relationships with self-reported eating behaviours, BMI, perceived parental feeding practices, anxiety and depression

Abstract

Developmental and social theories suggest that friends and peers are important role models for preadolescents' developing attitudes and behaviours. Previous research suggests links between children's self-reported and objective eating behaviours when in the presence of friends and peers, but research has yet to examine the predictors of objectively assessed eating behaviours in preadolescents. The aim of this study was to examine the relationships between preadolescents' snack food intake when in the presence of friends and peers and their reports of: their own under- and over-eating behaviours; the controlling feeding practices their parents use with them (pressure to eat and restriction); anxiety and depression symptomology; and their BMI. A further aim was to establish the best predictors of preadolescents' snack food intake when in the presence of friends and peers. A total of 48 preadolescents with a mean age of 9.22 years participated in an experimental study where they played a game and had access to snack foods in the presence of friends on one occasion, and in the presence of peers on a separate occasion (the order of which was counterbalanced). Children were also weighed and measured. Preadolescents' snack food intake in the presence of their friends was related to their perceptions of parental pressure to eat, whereas their intake in the presence of their peers was associated with perceptions of parental pressure to eat and BMI. The results are discussed in relation to the potential implications of perceived parental pressure to eat on children's intake of food.

**Preadolescents' eating behaviours in the presence of friends and peers:
Exploring relationships with self-reported eating behaviours, BMI,
perceived parental feeding practices, anxiety and depression**

9.1 Introduction

The emergence of body image, weight-loss and dieting behaviours is common during middle-to-late childhood, or preadolescence (Ricciardelli, McCabe, Holt & Finemore, 2003; Schur, Sanders & Steiner, 2000; Stice, Agras & Hammer, 1999). It is also during this time period that children's social networks are becoming more secure, with stability in friendship groups reported to increase in children aged 8 and over (Foot, Chapman & Smith, 1980). Previous research and research for this thesis (Chapters 3 & 5) has demonstrated links between preadolescents' and adolescents' self-reported eating behaviours and the eating behaviours reported by their friends, in particular dieting behaviours (e.g., Farrow, Haycraft & Meyer, 2011; Hutchinson & Rapee, 2007; Paxton, Schutz, Wertheim & Muir, 1999). Bandura's (1977) social learning theory underpins such research, suggesting that eating behaviours are modelled by individuals we interact with regularly, particularly friends and peers for school-aged children.

Previous experimental research and research for this thesis (Chapters 7 & 8) has found differences between children's intake of food when in the presence of friends and similar-aged peers (e.g., Salvy, Howard, Read & Mele, 2009). The normative model of eating (Herman, Roth & Polivy, 2003) proposes that an individual's eating behaviours are influenced by the eating behaviours of others present and the importance of their social approval, implying that the social approval demands of friends may influence children's intake of food in their presence. Previous non-experimental research and research for this thesis (Chapters 3 & 5) have reported

links between children's self-reported eating behaviours and the eating behaviours of their friends, in particular dieting behaviours. It is likely that children's self-reported eating behaviours may be linked to their actual eating behaviours when eating in the presence of friends and peers, but no research to date has examined this.

Parents' use of controlling feeding practices with their children is another factor that has been shown to be related to children's eating behaviours. For example, excessive control over younger children's eating has been suggested to disrupt children's natural ability to respond to internal hunger and satiety cues, as children learn to associate eating with parental cues (e.g., Birch & Fisher, 2000; Carper, Fisher & Birch, 2000). However, there is limited research relating to parents' controlling feeding practices with older children, or preadolescents, despite parents remaining predominantly responsible for general food-related choices and environments throughout childhood and adolescence (e.g., Fulkerson, Neumark-Sztainer & Story, 2006; Savage, Fisher & Birch, 2007; Walsh & Nelson, 2010). Research for this thesis (Chapters 4 & 6) found that preadolescents' eating behaviours were associated with their perceptions of the controlling feeding practices their parents used with them, namely pressure to eat and restriction. The research also found that perceptions of parental pressure to eat and restriction moderated the relationships between preadolescents' eating behaviours reported over twelve months. These findings suggest that perceptions of controlling feeding practices can encourage the development of problematic eating behaviours in preadolescent children.

Chapter 4 of this thesis also reported links between preadolescents' perceptions of controlling feeding practices and their self-reported anxiety and depression levels. This is understandable, since over-controlling behaviours by parents may enforce doubt in their child by encouraging a reliance on their parents (e.g., Rapee, 1997; Thirlwall & Creswell, 2010). Furthermore, Chapters 3 and 4 reported links between

preadolescents' self-reported eating behaviours and their levels of anxiety and depression, which supports clinical evidence that these disorders co-occur in children and adolescents (e.g., Stice, Burton & Shaw, 2004; Touchette et al., 2011).

Taken together, the research discussed above illustrates relationships between preadolescents' eating behaviours and their friends' reported eating behaviours, the controlling feeding practices their parents utilise with them, and their levels of anxiety and depression. However, research has yet to examine the predictors of *objectively assessed* eating behaviours (e.g., food intake) in preadolescents, in particular when in the presence of friends and peers, despite the importance of friends during this time period. Furthermore, the results of Chapter 8 highlighted an association between BMI and gender and preadolescents' eating behaviours in the presence of friends and peers. Therefore, the present study aimed to examine the relationships between preadolescents' snack food intake when in the presence of friends and peers (assessed objectively) and their self-reports of: their own under- and over-eating behaviours (dietary restraint, emotional eating and external eating); their reports of the controlling feeding practices their parents use with them (pressure to eat and restriction); their reports of anxiety and depression symptomology; and their BMI. It was hypothesised that self-reported eating behaviours, perceptions of controlling parental feeding practices, reports of anxiety and depression symptomology, and BMI would be positively associated with preadolescents' intake when in the presence of friends and peers.

9.2 Method

9.2.1 Participants

The participants in this study have been reported on in Section 8.2.1. In total, 48 children participated (boys $n= 23$, girls $n= 25$) with a mean age of 9.22 years (SD= 0.28, range 8.67 to 9.75). Children reported their ethnicity as White British (85.4%; $n= 41$), Asian (8.3%; $n= 4$) or mixed (6.3%, $n= 3$). Their mean BMI z score was 0.39 (SD= 1.10, range -2.15 to 3.09), suggesting a mean average weight for their gender and age (Child Growth Foundation, 1996).

9.2.2 Procedure and measures

The procedure for the experimental aspects of this study has been reported in Section 8.2.2. The research was approved by Loughborough University Ethics Approvals (Human Participants) Sub-Committee.

Following completion of the experimental aspects of this research (see Figure 7.1 for a flowchart of the full experimental procedure), children completed a series of questionnaire measures, as detailed below (a full description of each measure can be found in Section 2.5.1). The questionnaires were completed as part of a class lesson, with the researcher present. Children were asked to complete the questionnaire pack individually, and in silence, and to ask the researcher for help if required.

9.2.2.1 Eating Patten Inventory for Children (EPI-C; Schact, Richter-Appelt, Schulte-Markwort, Hebebrand & Schimmelmann, 2006).

Three subscales of the EPIC (dietary restraint, external eating and emotional eating) were used in the present study (Appendix H). Cronbach's α for the current sample

were: dietary restraint α 0.82; external eating α 0.74; and emotional eating α 0.78, suggesting very good levels of internal consistency.

9.2.2.2 Kids' Child Feeding Questionnaire (KCFQ; Carper, Fisher & Birch, 2000).

Both subscales of the KCFQ (pressure to eat and restriction) were used to measure preadolescents' perceptions of the feeding practices used by their parents (Appendix I). The factor structure reported in Section 2.5.2 was again utilised. Cronbach's α for the current sample were: pressure to eat α 0.58; restriction α 0.28. Given the low reliability level for the restriction subscale, it was therefore not used in any analyses.

9.2.2.3 Spence Children's Anxiety Scale (SCAS; Spence, 1997).

Two subscales of the SCAS were used (social anxiety and generalised anxiety; Appendix J). Cronbach's α 's for the current sample were: social anxiety α 0.44; generalised anxiety α 0.72. As the internal reliability for social anxiety was low, it was not included in any analyses.

9.2.2.4 Children's Depression Inventory: Short Version (CDI:S; Kovacs, 1992).

The full CDI:S was used to provide an overall measure of children's levels of depressive symptoms. Cronbach's α for the sample was α 0.79 (see Appendix K for details of the CDI:S and scoring).

9.2.3 Statistical analyses

Shapiro-Wilk calculations of all questionnaire subscales and distribution of snack food intake suggested that the majority of data deviated substantially from normality and thus non-parametric tests were used in all analyses.

The sample size of 48 was lower than the requirements to detect a medium effect at $p < 0.05$ with a power of 0.80 when using correlations ($n = 85$) and tests of difference ($n = 64$). The results presented are discussed with reference to this lack of power.

Full details of calculations relating to children's intake of snack foods are reported in Section 7.2.3.

Mann Whitney U-tests found no gender differences for boys' and girls' self-reported levels of eating behaviours, perceptions of parental feeding practices, and reports of anxiety and depression (Table 9.1). As reported in Chapter 8 (Table 8.2), gender differences for boys' and girls' intake of food were found. Subsequent analyses involving children's food intake therefore controlled for gender. Two tailed Spearman's correlations indicated that child age was not associated with any questionnaire subscales or to food intake (see Section 8.2.3).

To identify the relationships between preadolescents' intake of snack food in the presence of friends and peers (assessed objectively) and their reports of their own under- and over-eating behaviours (dietary restraint, emotional eating and external eating), two-tailed partial correlations (controlling for gender) were conducted. Next, two-tailed partial correlations (controlling for gender) were used to examine the associations between preadolescents' intake of snack foods when in the presence of friends and peers and their reports of their parents' use of the pressure to eat (restriction was not considered due to the very low alpha level reported in Section 9.2.2.2). Further two-tailed partial correlations (controlling for gender) between preadolescents' intake of snack foods when in the presence of friends and peers and preadolescents' reports of anxiety and depression were calculated. Finally, two-tailed partial correlations (controlling for gender), between preadolescents' snack food intake when in the presence of friends and peers and BMI z-scores were conducted.

Statistical analyses were performed using PASW Statistics 20. All tests were two-tailed and a p -value of $<.05$ was accepted as significant.

9.3 Results

9.3.1 Descriptive statistics

Table 9.1 displays the means and standard deviations for children's self-reported eating behaviours, perceived parental feeding practices, and levels of anxiety and depression. The descriptive statistics (means, standard deviations and tests of difference for gender) for BMI z-scores and food intake are presented in Chapter 8 (see Tables 8.1, 8.2 and 8.3).

Table 9.1: Descriptive statistics (means and standard deviations and ranges) and tests of difference scores (z) for children's reported eating behaviours, perceived parental feeding practices, and reports of anxiety and depression

	Mean (SD) Boys (n= 23)	Mean (SD) Girls (n=25)	Mann Whitney U (z)	p value
Eating Pattern Inventory Questionnaire for Children (EPIC)				
Dietary restraint	2.15 (.72)	1.84 (.57)	-1.43	.154
External eating	2.38 (.73)	2.12 (.70)	-1.27	.202
Emotional eating	2.08 (.86)	1.89 (.73)	-.57	.576
Kids Child Feeding Questionnaire (KCFQ)				
Pressure to eat	.68 (.42)	.68 (.32)	-.11	.909
Spence Children's Anxiety Scale (SCAS)				
General anxiety	6.70 (3.18)	6.52 (3.96)	-.44	.663
Children's Depression Inventory (CDI)				
Depression	4.26 (3.63)	3.08 (3.05)	-1.17	.240

two tailed

Preadolescents' mean eating behaviour scores were generally similar to published studies using the EPIC with a similar age range of children (Farrow et al., 2011; Schact

et al., 2006). Average scores for pressure to eat on the KCFQ were comparable to the results found by the authors (Carper et al., 2000). Mean levels of self-reported anxiety (SCAS) were similar to previous studies using this measure (Farrow et al., 2011; Spence, 1998). Mean scores for children's levels of depression were comparable to normative mean CDI:S scores for children of this age (Kovacs, 2003). Mann-Whitney U tests of difference (Table 9.1) showed no significant gender differences for any of the self-report variables.

9.3.2 Correlation analyses

9.3.2.1 Intake of food in the presence of friends and peers

To examine the hypothesised relationships between preadolescents' overall snack food intake in the presence of friends and peers (assessed objectively) and their: reports of their own eating behaviours; perceptions of their parents' pressure to eat; anxiety and depression; and BMI z-score, one-tailed partial correlations (controlling for gender) were conducted (Table 9.2).

Table 9.2: Partial correlation coefficients (controlling for gender) between children's overall intake of snack foods (kcal) when in the presence of friends and peers with: self-reported of eating behaviours; perceptions of parental pressure to eat; self-reported anxiety and depression; and BMI z-score

	Overall intake of food	
	Presence of friends (<i>p</i> value)	Presence of peers (<i>p</i> value)
Eating Pattern Inventory Questionnaire for Children (EPIC)		
Dietary restraint	.07 (.65)	.04 (.79)
External eating	-.08 (.57)	-.08 (.57)
Emotional eating	-.02 (.87)	.17 (.25)
Kids Child Feeding Questionnaire (KCFQ)		
Pressure to eat	-.30 (.04)*	-.37 (.01)**
Spence Children's Anxiety Scale (SCAS)		
General anxiety	.10 (.52)	-.18 (.22)
Children's Depression Inventory (CDI)		
Depression	.14 (.33)	.02 (.87)
BMI z-score	.19 (.21)	.29 (.05)*

* $p < .05$; ** $p < .01$, two tailed

Perceptions of pressure to eat were negatively associated with preadolescents' overall intake of snack food in the presence of both friends and peers. Preadolescents' BMI z-scores were positively associated with their intake of food in the presence of peers. No relationships were found between intake of food and preadolescents' self-reported eating behaviours, anxiety, or depression.

9.4 Discussion

The present study sought to examine the variables associated with preadolescents' intake of snack foods in the presence of friends and peers, specifically by exploring self-reported eating behaviours, perceived parental feeding practices, anxiety and depression, and BMI. No relationships were found between overall intake of food

when in the presence of friends or peers, and preadolescents' self-reported eating behaviours. Previous research has suggested that friends share similarities in dieting behaviours (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999), a finding also reported in Chapter 3. It was therefore anticipated that relationships would be found between self-reported eating behaviours, particularly dietary restraint, and overall intake of food when in the presence of friends, but this was not evidenced in the present sample. Similarly, the anticipated relationships between preadolescents' anxiety and depression and their food intake when in the presence of friends or peers were not supported. Chapters 3 and 4 of this thesis found links between anxiety and self-reported eating behaviours, and clinical links between eating behaviours and symptoms of anxiety are well established (e.g., Stice et al., 2004; Touchette et al., 2011). Social anxiety, as measured in previous Chapters of this thesis (3, 4, 5 & 6) was not used in the present Chapter due to the low alpha level. The reasons for this are unclear and it has been reliable in other studies reported within this thesis. It is possible that relationships may have been found between social anxiety and preadolescents' intake of snack foods if the reliability of this subscale had been greater and it had not been excluded from the analyses.

In the present study, perceptions of pressure to eat were associated with preadolescents' overall intake of snack food in the presence of both friends and peers. Specifically, preadolescents with higher perceptions of parental pressure to eat at home had a lower intake of snack foods in the presence of friends *and* peers. These associations are similar to relationships reported with younger children, whereby children who experience greater pressure to eat have a reduced intake of food (e.g., Galloway, Fiorito, Francis & Birch, 2006). This could suggest that when eating with their friends and peers, and in the absence of their parents, children who perceive greater parental pressure to eat at home may be unsure how to eat in an unusual social situation as they have no parental cues for eating, and thus alter their intake

according to the social situation. The interpretation is purely speculative and future research is needed to explore this fascinating area in more depth, particularly given that in adolescents, perceptions of pressure have been linked to disordered eating attitudes and behaviours (Haycraft, Goodwin & Meyer, 2014). Future research would benefit from exploring the eating behaviours of preadolescents in the presence of friends, compared to family, given the links found with perceptions of pressure to eat, to explore whether children who perceive greater perceptions of pressure to eat at home exhibit different eating behaviours in the presence of their friends, compared to in their home environment.

As found in Chapter 8, preadolescents' BMI z-scores were positively associated with intake of food in the presence of peers, suggesting that children with higher BMI z-scores consume more when eating in the presence of peers, compared to children with lower BMI z-scores. These findings are similar to those of Salvy and colleagues (e.g., Salvy, Romero, Paluch & Epstein, 2007b; Salvy, Kieffer & Epstein, 2008a) who found that overweight children consume more than healthy weight children when eating in the presence of an unfamiliar peer. This result is interesting since in the present study links were only found between BMI z-scores and eating in the presence of *familiar peers*, not friends. Taken together with previous research (e.g., Salvy et al., 2007b, 2008a) these findings suggest that the social cues from peers may differ to those from friends in eating situations (e.g., Herman et al., 2003). Future research should explore this in greater detail with a larger sample size of children with more diverse BMI z-scores.

It is noteworthy that the present study did not consider preadolescents' perceptions of parental restriction over their eating as the alpha level for the subscale was too low. The reasons for this are unclear and it has been reliable in other studies reported within this thesis (e.g., Chapters 4 & 6). However, as suggested in Chapter 8,

restriction is a covert practice that may not be fully perceivable by the child (e.g., Ogden, Reynolds & Smith, 2006) which may contribute to the low reliability of the subscale. Similarly to Chapter 8, this study is limited by low power to detect significant results (Cohen, 1992). Future research should attempt to recruit larger sample sizes to ensure sufficient power.

The present study is the first to examine the variables associated with preadolescents' intake of snack foods in the presence of friends and peers, specifically by exploring self-reported eating behaviours, perceived parental feeding practices, anxiety and depression, and BMI. The results tie together the previous Chapters of this thesis and add to the literature that finds relationships between parental controlling feeding practices and children's eating behaviours. The findings related to perceptions of parental pressure to eat are of much interest and require replication and extension, particularly given the implications suggested. Parents' behaviours are potentially modifiable and further evidence of the potentially negative implications of parental pressure to eat would inform interventions to educate parents about the unfavourable effects of this behaviour.

Chapter 10:

General discussion

General Discussion

10.1 Introduction to the general discussion

The final Chapter of this thesis provides an overview and discussion of the results of the preceding Chapters (3-9). The original aims of the thesis, as stated in Chapter 1 (Section 1.9), will firstly be summarised, followed by presentation of the results found in relation to these aims and a discussion of these findings. The methodological strengths and weaknesses of the thesis will then be discussed, and suggestions for future work presented. This Chapter ends with an overview of the conclusions that can be drawn from the work reported on in this thesis.

10.2 Aims of the thesis

The fundamental aim of this thesis was to examine peer and friend influences on children's eating behaviours, with a specific focus on children in a preadolescent age range, as this is an age range somewhat neglected by previous research.

Preadolescence is a time period characterised by great biological, sexual, physical, social and emotional changes (Susman & Dorn, 2009) and is suggested to be of key importance to the development of body image concerns, strategies of body change and problematic eating behaviours (Ricciardelli, McCabe, Holt & Finemore, 2003).

The thesis therefore aimed to specifically explore the relationships between preadolescents' self-reported eating behaviours and the eating behaviours reported by their friendship group, their perceptions of the controlling feeding practices used by their parents, and their anxiety and depression symptomology, both cross-sectionally and longitudinally. The thesis also aimed to examine the stability and continuity of eating behaviours, and perceived parental feeding practices over 12 months in preadolescents. Third, the thesis aimed to conduct an experimental study to explore the effect of friends versus peers on preadolescents' snack food intake, and finally

aimed to explore the links between snack food intake with preadolescents' self-reported eating behaviours, BMI, perceived parental feeding practices, anxiety and depression.

10.3 Summary of results

10.3.1 Pathways tested and relationships found

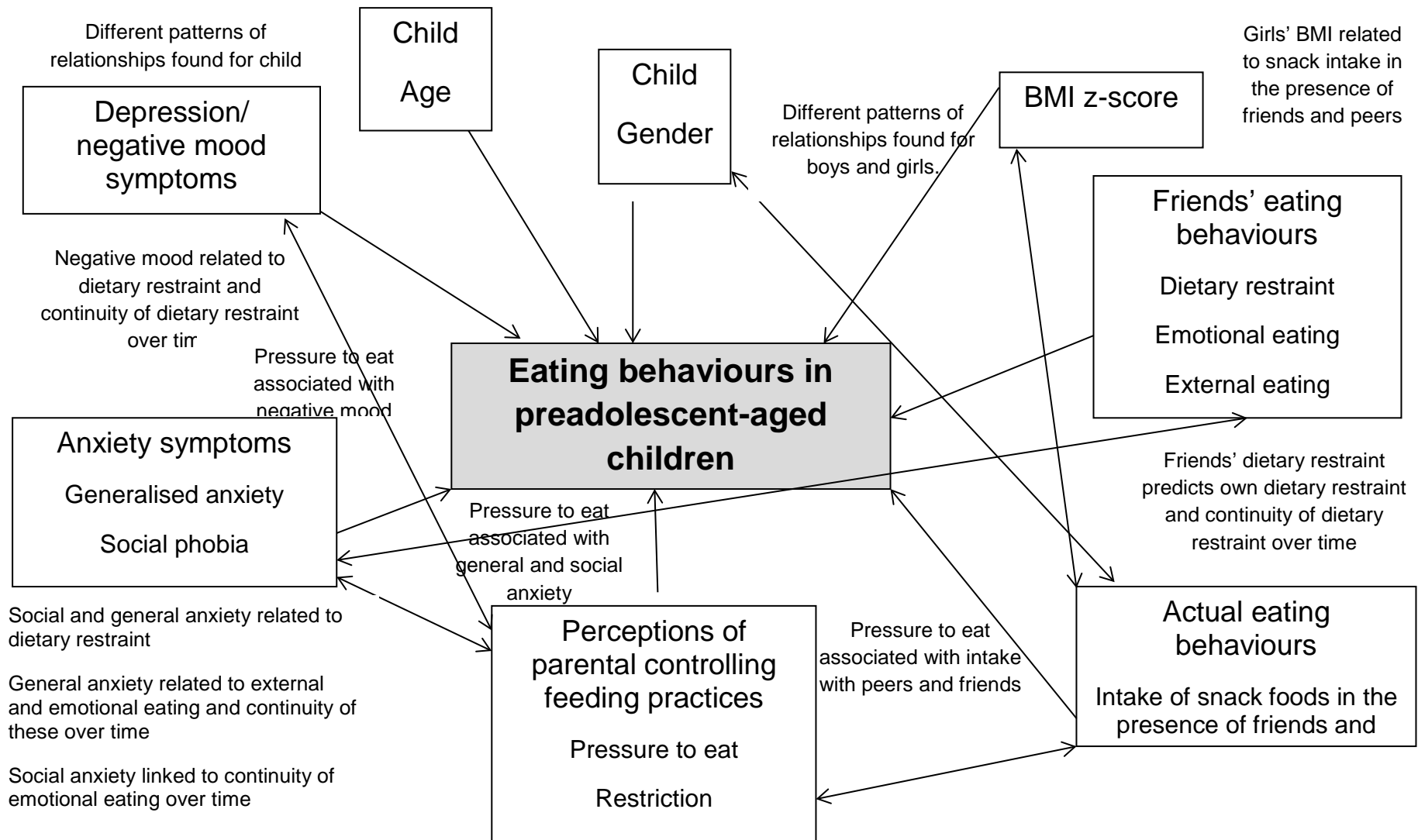
The significant relationships found within the studies reported on in this thesis are summarised in Figure 10.1 and are discussed in more detail in Section 10.3.2.

10.3.2 Summary of chapter findings

The main findings from each Chapter are presented and discussed below.

10.3.2.1 Chapter 3: Preadolescents' eating behaviours: The roles of friendship group eating, and individual anxiety and depression

Previous research has suggested that children's friendship groups influence their eating attitudes and behaviours (e.g., Farrow, Haycraft & Meyer, 2011; Hutchinson & Rapee, 2007; Paxton, Schutz, Wertheim, & Muir, 1999). The links between maladaptive eating behaviours in children and symptoms of anxiety and depression are well documented (e.g., Stice, Burton & Shaw, 2004; Touchette et al., 2011), and research has also highlighted associations between anxiety, depression and friendship group eating behaviours in predicting children's own eating behaviours (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007). However, previous research has failed to explore the role of anxiety *and* depression together with friends' eating behaviours, in predicting eating behaviours in a preadolescent-aged sample of children (see Section 3.1). Chapter 3 sought to examine the relationships between preadolescents' reports of their own eating behaviours and those reported by their friendship group, with their anxiety and depression symptomology.



Pressure to eat associated with dietary restraint, external and emotional eating. Restriction associated with emotional and external eating. Pressure linked to continuity in dietary restraint over time. Restriction linked to continuity in emotional and external eating over time.

Figure 10.1: Model to show the associations found between eating behaviours in preadolescents with the series of child and parent factors tested within this thesis.

The results of Chapter 3 support previous research that has found links between children's and their friends' under-eating behaviours (e.g., Eisenberg & Neumark-Sztainer, 2010; Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton, 1999) as friendship groups' reports of dietary restraint were found to predict preadolescents' own reports of dietary restraint behaviours. Furthermore, higher levels of dietary restraint behaviours were predicted by higher levels of preadolescents' levels of social and general anxiety (most strongly predicted by social anxiety). These results mirror the findings of Hutchinson and Rapee (2007) with adolescent girls, and somewhat support the findings of Farrow and colleagues (2011) whereby general anxiety moderated the relationship between preadolescent children's individual eating and their friends' eating behaviours (Farrow et al., 2011). Dietary restraint behaviours were not predicted by levels of depression in this preadolescent sample, contrary to similar research with adolescent girls (Hutchinson & Rapee, 2007). The results suggest potential links between dietary restraint and general social influences, since dietary restraint was related to friends' dieting behaviours as well as social anxiety. However, as noted in Chapter 3, it is possible that the anxiety scale selected for use lacked a degree of sensitivity when used in non-clinical populations. The measure may indeed have been tapping into *trait* anxiety, highlighting children who, by their very personality, are more sensitive to experiencing anxiety.

Emotional and external eating behaviours were *not* significantly predicted by friends' reports of these behaviours in Chapter 3, suggesting that these eating behaviours may be associated with factors other than friendship group eating behaviours (e.g., familial influences). Emotional and external eating behaviours by their nature are less evidently observed in other people, when compared to dietary restraint behaviours, which can be more obviously observed in other individuals, such as friends. Emotional and external eating behaviours were found to be predicted by levels of general anxiety, with preadolescents who reported higher levels of general anxiety also reporting

greater levels of external and emotional eating. Emotional and external eating behaviours were further predicted by gender and age, with boys and younger children reporting greater emotional and external eating, a finding similar to previous research (e.g., Anschutz, Engels & van Strien, 2009). This highlights a potential oversight in previous research with preadolescents that has excluded males (e.g., Hutchinson & Rapee, 2007; Paxton et al., 1999) and indicates the value of including males in research examining eating behaviours in preadolescents.

In summary, Chapter 3 found that the dieting behaviours of friends, as well as children's own levels of anxiety, predict eating behaviours in a young preadolescent sample of boys and girls. Given the importance of the preadolescent period in relation to the development of dieting and eating concerns (e.g., Koff & Rierdan, 1991), these results suggest that school health interventions promoting healthy eating attitudes and behaviours in this age group should take into account the influence friends may have on dieting-related behaviours. However, it should be noted that dietary restraint is not an entirely negative behaviour. Some level of dietary restraint can actually be protective against over-eating and potential obesity (e.g., Hays, Bathalon, McCrory, Roubenoff, Lipman & Roberts, 2002). Therefore a degree of dietary control can be viewed as a positive way to manage weight and this too should be considered in any health interventions promoting healthy eating and weight behaviour skills to children.

10.3.2.2 Chapter 4: Preadolescents' perceptions of parental controlling feeding practices and reports of anxiety, depression, and maladaptive eating behaviours

Previous research has evidenced links between controlling parental feeding practices, namely restriction and pressure to eat, and children and adolescents' eating behaviours, (Birch, Fisher & Davison, 2003; Birch, Fisher, Grimm-Thomas, Markey, Sawyer & Johnson, 2001; Haycraft, Goodwin & Meyer, 2014). However, only one previous study has explored parental feeding practices from the perspective of the

child in preadolescent children and this was conducted in the Netherlands (van Strien & Bazelier, 2007). Chapter 4 therefore sought to examine the relationships between preadolescents' reports of their own eating behaviours and their perceptions of the controlling feeding practices their parents used with them at home (replicating van Strien & Bazelier's Dutch study but with a UK sample), as well as their anxiety and depression symptomology (building on the findings from Chapter 3).

The results of Chapter 4 support the results of van Strien and Bazelier (2007), finding that preadolescents who perceived greater levels of parental pressure to eat also reported higher levels of maladaptive eating behaviours (dietary restraint, external eating and emotional eating). The relationship found between dietary restraint and perceptions of pressure to eat supports previous research with younger children (e.g., Galloway, Fiorito, Francis & Birch, 2006; Wardle & Carnell, 2007) and the suggestion that pressure to eat may disrupt children's ability to respond to internal cues of hunger and satiety (Carper, Fisher & Birch, 2000) and may be linked to the later development of disordered eating behaviours (Carper et al., 2000; Marchi & Cohen, 1990).

Perceptions of restriction were not significantly associated with reports of dietary restraint. This lends support to the suggestions made in relation to the findings of Chapter 3, specifically that dietary restraint behaviours in preadolescence may be linked to friends' reports of such behaviours, whereas emotional and external eating behaviours may be influenced more by parental factors.

Similarly to van Strien and Bazelier (2007), Chapter 4 found that lower perceptions of parental restriction were associated with *higher* reports of emotional eating in preadolescents. However, these results conflict with the findings of research with younger children which suggest that *higher* levels of restriction are associated with children's engagement in greater obesogenic eating behaviours (e.g., Birch et al., 2003; Fisher & Birch, 1999). In preadolescent children, therefore, this suggests that a

moderate perceived level of parental restriction may prevent emotional over-eating. Indeed, parental control over children's feeding does not always result in negative outcomes. Research has shown that moderate levels of parental control can actually reduce weight in overweight children and improve their eating behaviour and food choice (e.g., Brown & Ogden, 2004; Wardle, Sanderson, Guthrie, Rapoport & Plomin, 2002). Furthermore, Ogden, Reynolds and Smith (2006) suggested that covert control (control not detectable by the child) is related to a lower intake of unhealthy snacks, whereas overt control (control detectable by the child) is associated with a higher intake of healthy snacks, in children with a mean age of 7.4 years. The results of Chapter 4, and previous research, thus suggest that a degree of parental control over child eating may not produce the detrimental outcomes in preadolescents that research with younger children has implied.

Chapter 4 found that preadolescents' under- and over-eating behaviours were associated with their levels of general and social anxiety, and depression symptomology, with a medium to large relationship found between dietary restraint behaviours and anxiety symptomology, the same as the findings of Chapter 3 (using the same sample of children). Furthermore, greater perceptions of parental pressure to eat were related to higher reports of general and social anxiety; however, no significant relationships were found between perceptions of restriction and reports of anxiety and depression symptomology (this could be linked to the earlier point that restriction may not be fully detectable by children). Such findings link with previous research in the domain of controlling parenting (e.g., Thirlwall & Cresswell, 2010) and potentially suggest that parents who pressure their child to eat may unintentionally provoke symptoms of anxiety/depression in their child as the child comes to rely on external cues regarding what and when to eat. This response to external cues for eating could, in turn, nurture dieting behaviours in children who become concerned about their eating or weight.

The novel findings from Chapter 4, that preadolescent anxiety (general and social) fully mediated the relationship between perceptions of parental pressure to eat and reports of dietary restraint and emotional eating behaviours, and anxiety (general and social) partially mediated the relationship between perceptions of pressure to eat and reports of external eating, are of interest. However, depression symptomology was not found to mediate this relationship. The results for anxiety support the established links between controlling parenting and children's anxiety symptomology (e.g., Bögels & van Melick, 2004; Feng et al., 2008; Hudson & Rapee, 2001; LeMoyné & Buchanan, 2011; Rapee, 2001). The results suggest that greater levels of anxiety in preadolescents who perceive their parents to apply higher levels of pressure to eat may contribute to greater reports of over- and under- eating behaviours in these individuals.

Preadolescents' exposed to more parental pressure to eat may have a heightened susceptibility to anxiety since repeated exposure to pressure may encourage children's reliance on their parents to guide their behaviours in eating, and other, situations.

Preadolescents with higher levels of social anxiety may have a heightened susceptibility to worries related to the social environment and, as such, may be more susceptible to social and non-dietary cues for hunger, such as emotional and environmental cues for eating. This could foster problematic eating behaviours as the preadolescent attempts to regain control of their eating from their parents. Again however, as noted in Chapter 3, the measure used throughout this thesis to examine anxiety levels in preadolescents, although designed for non-clinical populations, may have lacked a degree of sensitivity in distinguishing between state and trait anxiety levels. It may be that the anxiety measure utilised in this thesis highlighted children who are more susceptible to controlling messages from their parents because their behaviour is more governed by trait anxiety levels.

In summary, Chapter 4 provided support for the relationships between eating behaviours and perceived parental feeding practices, and between perceived parental feeding practices and anxiety symptomology, in preadolescent children, replicating the findings of van Strien and Bazelier (2007) in a UK sample. The mediation results from Chapter 4 highlight the potentially detrimental influence that parental pressure to eat may have in relation to preadolescents' levels of anxiety and eating behaviours and further suggest that children may be using food to deal with symptoms of anxiety. Parenting behaviours have the potential to be modified through health interventions, and these findings require disseminating to professionals working with parents and children in this age group.

10.3.2.3 Chapter 5: Exploring preadolescent eating longitudinally: Stability, continuity, and the moderating role of friends' eating behaviours

Previous research, as well as the results of Chapter 3 of this thesis, has suggested links between children's eating behaviours and the eating behaviours of their friends (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999), and their anxiety and depression symptomology (e.g., Stice et al., 2004; Touchette et al., 2011). However, previous work is limited to cross-sectional designs. Furthermore, research exploring the continuity and stability of eating behaviours in children has generally overlooked the preadolescent period (e.g., Ashcroft, Semmler, Carnell, van Jaarsveld & Wardle, 2008; Shunk & Birch, 2004). Chapter 5 therefore sought to extend the results of Chapter 3 by exploring if friends' reports of under-eating behaviours moderated the relationship between individuals' reports of these behaviours at time point one (T1) and time point two (T2). Chapter 5 further aimed to extend Chapter 3 by exploring if anxiety and depression moderated the relationship between preadolescents' eating behaviours at T1 and T2. Finally, Chapter 5 aimed to examine the continuity and stability of preadolescents' eating behaviours over a 12 month period (T1 to T2).

Chapter 5 found that friends' dietary restraint behaviours at T2 moderated the relationship between preadolescents' dietary restraint behaviours at T1 and T2, with the relationship strongest when friends' dieting behaviours were high. Such results support and extend the previous cross-sectional results of Chapter 3 (which found that dieting behaviours were positively predicted by friendship groups' reports of dieting behaviours), and support the findings of cross-sectional studies reporting links between eating behaviours and friends' eating behaviours in preadolescents and adolescents (e.g., Farrow et al., 2011; Hutchinson & Rapee, 2007; Paxton et al., 1999). It is plausible that friends of this age nurture dieting behaviours in each other, while it is also likely that preadolescents choose friends with similar attitudes and beliefs to their own (e.g., Hartup, 1984; Sullivan, 1953), which may include dieting behaviours. As previously mentioned, dietary restraint is not wholly negative and a degree of control over one's diet can be seen as a positive weight management tool (e.g., Hays et al., 2002) and thus the learning of this skill may actually serve to protect children from over-eating and possible obesity.

A further finding of Chapter 5 was that general anxiety moderated the relationship between T1 and T2 over-eating behaviours (external and emotional eating), but not under-eating behaviours (dietary restraint). Finally, social anxiety was found to moderate the relationship between T1 and T2 emotional eating. These findings suggest that preadolescents' under- and over-eating behaviours predict these behaviours 12 months later, thus persisting over time, and consistency in these relationships is strongest for children with high levels of anxiety or depression, indicating that these children are the most likely to continue to develop maladaptive eating strategies.

Chapter 5 found that there was stability of eating behaviours in preadolescents over

the 12 month period, but continuity of eating behaviours was not found. Decreases were found in all three studied eating behaviours (dietary restraint, emotional eating and external eating behaviours) over time. Although previous research with girls aged 5-9 has found good continuity of dietary restraint (Shunk & Birch, 2004), the present study used slightly older children and also included boys, which may explain some of the difference in results. Previous research has also shown a lack of continuity in emotional over-eating in children aged 4-11 years (Ashcroft et al., 2008), supported by the results of Chapter 5.

In summary, Chapter 5 provided longitudinal support for the role friends and levels of depression in preadolescents' continuity of dieting behaviours over time, and for the role of anxiety levels in the continuity of over-eating behaviours (emotional and external eating) over time. Chapter 5 further added to the dearth of literature examining continuity and stability of eating behaviours in preadolescents over time. These results have implications for those working with children of a preadolescent age, particularly in school environments where children regularly interact with their friends.

10.3.2.4 Chapter 6: Exploring preadolescent eating longitudinally: Stability, continuity, and the moderating role of perceived parental feeding practices

Previous cross-sectional research, and the results of Chapter 4, have suggested links between children's eating behaviours and the controlling feeding practices their parents utilise with them, particularly pressure to eat and restriction with food (e.g. Birch et al., 2001; Birch et al., 2003; Galloway et al., 2006; Wardle & Carnell, 2007). As evidenced in Chapters 3, 4 and 5, relationships between under- and over-eating behaviours and anxiety and depression symptomology have also been found in preadolescents. However, there is a dearth of longitudinal research exploring these variables over time. Furthermore, research exploring the continuity and stability of parental controlling feeding practices in preadolescents is limited to parental reports

(e.g., Faith et al., 2004; Farrow & Blissett, 2012; Webber, Cooke, Hill & Wardle, 2010). The aims of Chapter 6, therefore, were to extend the results of Chapter 4 by exploring the role of perceived parental feeding practices in predicting preadolescent eating behaviours over time. Chapter 6 further sought to replicate the mediation relationships reported in Chapter 4 with an older sample of preadolescents. Finally, Chapter 6 aimed to examine the continuity and stability of preadolescents' perceptions of their parents' feeding practices over a 12 month period.

Chapter 6 found that preadolescents' perceptions of pressure to eat at T2 moderated the relationship between dietary restraint behaviours at T1 and T2, suggesting a positive relationship between dieting behaviours between T1 and T2. This relationship was evident for high, moderate and low levels of pressure to eat, although strongest for higher perceived levels of pressure to eat, and weakest for lower perceived levels of parental pressure to eat. This suggests that when parental pressure to eat is high, dietary restraint behaviours in preadolescents show greater consistency over time. It may be that parents are using pressure to eat with their children who exhibit dietary restraint behaviours in an attempt to increase their dietary intake (e.g., Francis, Hofer & Birch, 2001).

Chapter 6 further found that preadolescents' perceptions of restriction at T2 moderated the relationship between emotional eating at T1 and T2; suggesting a positive relationship between emotional eating behaviours over time. This relationship was evident only for high and moderate levels of perceived restriction. This implies that parents of children who emotionally eat, and who use low levels of restriction over their food, can potentially reduce their child's emotional eating. In contrast, the findings suggest that parents of children who emotionally over-eat, who apply a high or moderate level of restriction over their child's eating behaviour actually see this behaviour maintained over time. These moderation results suggest the potentially

detrimental impact of high levels of parental controlling feeding practices with their children. We cannot be sure of the reasons motivating parental pressure to eat or restriction, but if we assume that many parents use these behaviours to modify child food intake, then it actually appears that these behaviours are counterproductive and instead serve to maintain consistency in these maladaptive eating behaviours over time. These results concur with previous literature relating to the counterproductive nature of pressure to eat and restriction in younger children (e.g., Birch, Fisher & Davison, 2003; Galloway et al., 2006; Wardle & Carnell, 2007), but extend them to consider the child's perspective of the feeding practices their parents use. However, the results for emotional eating and perceptions of restriction suggest that parental control may not be wholly negative, and support previous research that instead suggests that some control may produce beneficial outcomes (e.g., Brown & Ogden, 2004; Ogden et al., 2006; Wardle et al., 2002).

Chapter 6 also aimed to replicate the mediation model found in Chapter 4, with an older sample of preadolescents. However, anxiety (general and social) was not found to mediate the relationship between perceptions of parental pressure to eat and preadolescents' eating behaviours in Chapter 6. It is plausible that the unanticipated decreases in under- and over-eating behaviours reported by preadolescents between T1 and T2 may explain the failure to replicate this model at T2.

Perceptions of parental pressure to eat and perceptions of restriction were found to be continuous over time. Similarly, both pressure to eat and restriction remained stable over time. These findings contrast previous research (Webber et al., 2010). It is plausible that preadolescents' perceptions of parental restriction may not be wholly accurate given that restriction can be conducted more covertly (e.g., by not keeping a particular food in the house) and so may not always be detectable to children (Ogden et al., 2006). Preadolescents may therefore not be fully able to perceive restriction by

their parents to the degree that they are able to perceive pressure to eat, a far more overt behaviour, and this may contribute to the differences.

In summary, Chapter 6 extends previous research by employing a longitudinal design to explore preadolescents' eating behaviours, perceptions of parental controlling feeding practices, and child anxiety levels, and further adds to the literature on continuity and stability of parental controlling feeding practices in preadolescents. The moderation results are of particular importance since they are the first to suggest that parental pressure to eat may have adverse effects on dietary restraint behaviours, and parental restriction may have negative effects on emotional eating behaviours, in preadolescent children. These controlling strategies may be unintentionally employed by parents perceiving their child to be under- or over-eating, and these findings therefore require dissemination to health professionals working with parents and children of this age.

10.3.2.5 Chapter 7: The influence of friends and peers on children's eating: A feasibility study

The previous Chapters of the thesis were concerned with self-reported eating behaviours in preadolescents. The aim of Chapter 7 was to explore the relationships reported in Chapters 3 and 5 experimentally, whilst also exploring the role of peers in children's eating behaviours. Experimental research, largely conducted in the United States, has suggested that the presence of peers and friends can influence children's intake of food (e.g., Salvy, Howard, Read & Mele, 2009; Salvy, Kieffer, & Epstein, 2008a; Salvy, Romero, Paluch & Epstein, 2007b). However, previous research has yet to consider how *friendship groups*, in direct comparison to *peer groups*, influence food intake in preadolescent children, despite these two types of groups being a natural occurrence for school aged children. The overall aim of Chapter 7, therefore, was to test the feasibility of an experimental method designed to objectively measure

the effects of friendship groups and peer groups on children's intake of snack foods. Chapter 7 further aimed to explore potential differences in intake when in the presence of friends versus peers, and explore variation in intake when eating in the presence of friends versus peers.

The results of the feasibility study highlighted a key area of the methodology that could be improved; namely, the quantity of snack foods offered to children during the experiment. As over 30% of the children overall asked for extra portions of snack foods, this suggested that the initial amount of snack foods offered was too small. In addition, some children ate the entire snack foods offered yet did not ask the researcher for more. This may suggest that some children had the potential to eat more, but may have been uncomfortable about speaking up in front of their friends or peers.

Trends in the data suggested gender differences in children's snack food intake, with the intake of boys higher when eating in the presence of friends, and girls' intake higher when eating in the presence of peers. Further trends suggested that there was more similarity in snack food intake within groups (friends or peers) than between groups of children.

In summary, Chapter 7 tested a feasibility study to explore preadolescents' eating behaviours when eating in the presence of friends compared with peers. The feasibility study highlighted a main area of improvement for future studies (e.g., increased quantity of snack foods initially offered).

10.3.2.6 Chapter 8: *The influence of friends and peers on children's eating: An experimental study*

Chapter 8 sought to improve and extend the feasibility study reported in Chapter 7 by performing a full experimental study to examine the influence of friends, compared with peers, on snack food intake and variation in intake in preadolescent children. The specific modifications made from Chapter 7 were increasing the initial amount of snack foods offered to children, and considering child BMI alongside objective measures of eating.

The results presented in Chapter 8 found significant gender differences in snack food intake with boys' intake of unhealthy snack foods (cookies and crisps) higher than girls' intake of these snacks, when eating in the presence of friends. Boys ate more snack foods overall, across conditions, compared with girls. However, for girls, the only difference in intake across conditions was that girls ate more carrots in the presence of friends, compared to peers, although this result was only approaching statistical significance. These results link to Herman and colleagues' (2003) normative model of eating which suggests that eating behaviours are influenced by the eating behaviours of other individuals present during the interaction and by how important their social approval is to the target individual. The finding that girls ate more carrots in the presence of friends, compared to peers is interesting. This suggests that girls may desire greater social approval from friends, compared to peers, when consuming healthy snacks such as carrots. The implications of this finding are that friends may have a positive impact on the healthy eating behaviours of preadolescent girls. However, the same results were not found for girls' intake of a second healthy snack, apples.

Chapter 8 further found differences in food intake variation *between* and *within* groups for several snack foods. Variance in snack food intake *between* groups of friends was

larger than *within* groups of friends for apples, cookies, and overall intake. Variance in snack food intake *between* groups of peers was larger than *within* groups of peers for carrots and apples. This suggests that there was more similarity in snack food intake of these snacks for children *within* the same groups compared to children more *generally* of the same sample. This implies that preadolescent children may eat more similarly to the group when in a grouped social eating environment.

Chapter 8 also found results pertinent to BMI. For girls, a lower BMI z-score was associated with a greater intake of carrots when eating with friends. Furthermore, girls with lower BMI z-scores ate fewer cookies in the presence of friends, and ate less snack foods overall when in the presence of friends and peers. It is plausible that girls of a preadolescent age may be more susceptible to the demands of their weight status on their food intake in public environments. Girls with lower BMI z-scores may wish to present themselves as eating less overall, and avoiding unhealthy snack foods (cookies), when in the presence of their friends. Such a finding is potentially important because in girls, eating concerns and dieting behaviours have been evidenced from as young as 5 years of age (Ricciardelli & McCabe, 2001) and girls, compared to boys, are more likely to present with a clinical eating disorder in adolescence (Field et al., 2008). These results add weight to the notion that the influence of friends on the objective eating behaviours of girls of a preadolescent age is substantial and the implications of these in terms of the later development of clinical eating disorders is something that warrants further research.

In summary, Chapter 8 provided an objective study of the influence of *groups* of friends and *familiar* peers on children's intake of food, experimentally. The results add to the literature that finds differences in snack food intake when children are in the presence of friends and peers, as well as associations between intake and child weight. The study further highlights gender differences in food intake in the presence

of friends and peers, specifically for girls, suggesting that girls may have heightened susceptibilities to friend and peer influences on their eating. This has implications for anyone working closely with girls of this age, before the typical age of onset of maladaptive eating problems and clinical eating disorders.

10.3.2.7 Chapter 9: Preadolescents' eating behaviours in the presence of friends and peers: Exploring relationships with self-reported eating behaviours, BMI, perceived parental feeding practices, anxiety and depression

To build upon the findings of Chapter 8 and to bring together the findings from the previous Chapters of this thesis (3-6), Chapter 9 aimed to explore the relationships between preadolescents' food intake when in the presence of friends and peers, and their perceptions of the feeding practices their parents use with them, and their self-reported eating behaviours, symptoms of anxiety and depression, BMI and gender.

Chapter 9 found no significant relationships between overall intake of food and preadolescents' self-reported eating behaviours. This is an interesting finding as it was anticipated that self-reported eating behaviours would be positively associated with objective measures of eating. It may be that dietary restraint, emotional eating and external eating do not influence preadolescents' intake of food when in the presence of friends or peers, or, more plausibly, it may be that these self-reported eating behaviours do not inform how preadolescents eat in an eating in the absence of hunger experimental situation of when offered snack foods with their friends and peers. Dietary restraint may be a more private behaviour that preadolescents may not exhibit in experimental eating situations. Similarly, external and emotional eating may also be a response to specific external or emotional factors not present during the experiment (and may, as found in Chapters 4 and 6, be linked to parental controlling feeding practices), and this could explain why no relationships were found between self-reported eating behaviours and overall intake of food experimentally.

Chapter 9 further found that preadolescents' perceptions of pressure to eat were negatively associated with their overall intake of snack foods in both the presence of friends and peers. These findings support the cross-sectional and longitudinal findings reported in Chapters 4 and 6, by suggesting that the more parental pressure to eat preadolescents perceive, the lower their intake of food in the presence of peers (or the less they eat in the absence of hunger since children completed the experiment straight after lunch and reported how full they were). These results also suggest that boys eat more in the presence of peers, as expected from the results of Chapters 7 and 8.

In summary, Chapter 9 brought together the variables measured across the entire thesis, namely; self-reported eating behaviours, perceptions of parental feeding practices, BMI, and symptoms of anxiety and depression, to explore relationships with objective assessment of overall snack food intake in the presence of friends, compared with peers. Overall, the results underline the importance of perceived pressure to eat in predicting the eating behaviours of preadolescent children in the presence of peers, as well as social anxiety and gender.

10.4 Methodological strengths and limitations

The research presented in this thesis has a number of strengths. The fundamental strength of the thesis is the consideration of the preadolescent time period in terms of friends' and peers' influences on eating behaviours during this time. There is a dearth of research using children of this age group, despite it being well-established that this is a key time period for the development of body image concerns, strategies of body change and problematic eating behaviours (e.g., Ricciardelli et al., 2003), and further, that problematic eating behaviours presenting during this time are related to the onset and development of clinical eating disorders in adolescence and adulthood (e.g.,

Combs, Pearson, Zapolski & Smith, 2013; Kotler et al., 2001). The findings reported in this thesis have added to the research literature in this age group. Of further merit is the inclusion of both boys and girls in all aspects of the research. Previous research in the area of child feeding has often failed to consider boys, despite the rising occurrence of eating problems reported in males (e.g., Strother, Lemberg, Stanford & Turberville, 2012). Although findings in the later Chapters were pertinent to females, the results from earlier Chapters in this thesis indicated higher problematic eating behaviours for boys, highlighting the need for boys to be considered in research in this area.

A further strength of the thesis is the methodologies used. While the data reported on in Chapters 3 and 4 are cross-sectional, which limits the ability to make causal inferences, they provided the baseline data for the longitudinal study reported on in Chapters 5 and 6. This allowed for variables to be studied over time, rather than being limited by cross-sectional data as much previous research is, and further allowed for the novel findings of the moderation and mediational results to be identified (Chapters 4, 5, 6). The sample sizes for the cross-sectional work were high and as a consequence these studies were well powered. A high retention rate was also maintained at the longitudinal follow-up. The experimental studies conducted, although limited by sample size, allowed a broader understanding of the influences of groups of friends and peers on preadolescent children's intake of food. They assessed children's eating behaviours objectively and also obtained objective height and weight data. The majority of previous research of an experimental design had been conducted in the United States by the same research group, therefore the experimental research reported in this thesis adds results from UK-based community sample of preadolescents.

A final strength of the thesis worth note is the use of data relating to parental feeding practices from the perspective of the child. The majority of previous research is limited by parental report, with their younger children (for reviews, see Faith, Scanlon, Birch, Francis, & Sherry, 2004; Scaglioni et al., 2008). Studying parental feeding practices from the perspective of the preadolescent adds a new scope to the previous research range and avoids the biases that may be associated with parental reports.

Despite the many strengths of the research reported on in this thesis, there are also a number of limitations. Although mentioned as a strength, the use of a preadolescent sample is also a weakness of the present thesis as 'preadolescence' was not objectively measured. There were no direct measures taken to ensure that children had begun, or were approaching puberty, since initial inclusion of these measures was met with great criticism from schools approached to participate in the research of this thesis. It was therefore felt that removal of these measures was the most appropriate action to take, but the consequence of this is that, given the mean age of the sample (>8.5 years; Sullivan, 1953) some children in the sample may have begun puberty, and others may not have. This may have influenced the results found since puberty is associated with huge biological, sexual, physical, social and emotional changes (Susman & Dorn, 2009). The timing of puberty, in particular if it occurs at an earlier age, is associated with increased susceptibility to heightened levels of depression and anxiety symptomology (e.g., Hamilton, Hamlat, Strange, Abramson & Alloy, 2014; Weingarden & Renshaw, 2012) and the earlier onset of problematic eating behaviours (Jacobi, Hayward, de Zwaan, Kraemer & Agras, 2004). This is an important limitation to the results and one which future research could easily overcome by using an objective measure of puberty.

Methodologically, the research for this thesis relied heavily on children's self-reported behaviours, cross-sectionally. Although all the measures used were appropriate for

the age of the children studied, there is always a potential for bias when using self-report data. The use of cross-sectional data is also a limitation for several of the Chapters of the thesis (3, 4, 9) since the self-reporting of children in these Chapters represents only a snap-shot of their eating behaviours, perceptions of parental feeding practices and anxiety and depression symptomology, which could be different dependent on when they completed these measures. This limits the generalisability of the results provided in such Chapters and also makes it impossible to infer causality based on these data alone. Furthermore, the self-reporting of friendship groups may have been subject to inaccuracies. In younger children, friendships are less stable (Newcomb & Bagwell, 1995) and therefore it is possible that children may have 'fallen out' with a friend on the day they completed the details of their friendship group and thus not reciprocally selected each other as friends, which may have impacted on the friendship groups formed by the social network analysis techniques employed. Ensuring that children were reciprocally identified as friends by the majority of other children their friendship groups was intended to counteract issues such as this.

In relation to the measures chosen, there was low reliability of the depression measure when used in Chapters 3 and 4, as only the negative mood subscale was used. In Chapter 9 the full measure was used and the reliability level improved considerably. Use of the full depression measure throughout the thesis might have improved the reliability of the measure. In addition to this, the low Cronbach's alpha values obtained for restriction for Chapters 4, 6 and 9 suggested that children in these studies might not have been fully able to perceive the practice of parental restriction over their eating, which may have been reflected in their reports of this behaviour. It is plausible that parental restriction is a more covert behaviour compared to pressure to eat, which is more overt and detectable by a child (Ogden, Reynolds & Smith, 2006), and that this may influence preadolescents' interpretation of restriction. Furthermore, as children grow older, they gain more autonomy over their eating and may spend less time eating

with their parents, which may make the measures of perceived parental feeding practices less robust with child increasing child age. The novel findings in relation to parental restriction to eat (specifically that this moderated the relationships between emotional eating behaviours over time) must therefore be interpreted with some caution since it is unclear whether children of a preadolescent age are appropriately able to perceive parental restriction over their food intake.

The anxiety measure chosen may have lacked a degree of sensitivity when used in non-clinical populations, as discussed in Chapter's 3 and 4. Despite the anxiety measure utilised throughout the thesis being developed for a non-clinical population of children, it may have tapped into *trait* anxiety, which is distinct from *state* anxiety, and could have implications for the interpretation of the results in this thesis. A measure of trait anxiety would identify children who are sensitive to inhibitory messages from their friends and parents, whose behaviour is more governed by trait anxiety levels. Future research should look to address this important distinction in more detail and may yield results differing to those reported here.

In the experimental Chapters of the thesis (Chapters 7,8 & 9), food intake was measured in relation to 'eating in the absence of hunger' as children participated in the snack food intake experiment immediately following lunch and completed a visual rating scale to measure satiety levels prior to the experiment. This method was chosen based on previous experimental work with groups by Salvy and colleagues (2007a), who similarly examined eating in the absence of hunger in groups of children. However, a limitation of using this method, as opposed to examining eating in a general mealtime setting, was that such results are limited in terms of generalisability since they do not examine children's general mealtime eating behaviours, but rather their eating behaviours when eating snack foods in the absence of hunger. It is of note that Chapter 9 found no significant relationships between overall intake of food and

preadolescents' self-reported eating behaviours, as anticipated. This may be because these self-reported eating behaviours do not inform how preadolescents eat in an eating in the absence of hunger paradigm. Future work building on from this thesis would aim to examine eating behaviours (food intake) in general mealtime settings when eating in the presence of friends and, separately, peers to compare this to the findings from the research presented in regards to eating in the absence of hunger in the presence of friends and peers.

Schools participating in all aspects of the research were self-selecting, as with all research using children of this age. It is possible that the schools that agreed to participate in the research were more interested in promoting healthy eating behaviours in their pupils than the general population of UK schools. Furthermore, there were limited schools from low socio-economic areas that participated in the research, and the samples overall were predominately White British children. This is a common problem in research and future research following from the studies presented in this thesis should seek to recruit more varied samples.

10.5 Future directions

The research conducted for this thesis has highlighted several areas for future research. First, future research using a preadolescent age group should attempt to measure preadolescence objectively, using a reliable measure of puberty. Research suggests links between pubertal-onset and maladaptive eating behaviours, as well as anxiety and depression (e.g., Mendle, Turkheimer & Emery, 2007; Zehr, Culbert, Sisk & Klump, 2007) and this is something future research should consider. Furthermore, the links between eating behaviours (both self-reported and experimentally) and gender found in the present thesis demand further research. Several Chapters in this thesis found differences between girls and boys and eating behaviours and this should be explored in more depth.

This research has highlighted several links between children's eating behaviours and their perceptions of the controlling feeding practices utilised by their parents that warrant further investigation. Future research should aim to explore children's perceptions of controlling parental feeding practices in more detail to ascertain whether parental restriction is fully perceivable by children. This could be achieved by matching child perceptions and parental reports of controlling feeding practices. Furthermore, the thesis research suggests that parents' use of controlling feeding practices with their children may be related to a more general parenting style, and may be related to parents' perceptions that their child is exhibiting under- or over-eating behaviours. In addition, children's levels of anxiety may link to their parents' general style of parenting, as relationships between parental controlling feeding practices and child anxiety were evidenced in this thesis. It may be that children who report higher levels of anxiety or depression may perceive their parents as more controlling over their eating behaviours, as well as more controlling in their general parenting style. This research has clearly highlighted many future avenues for research relating to parents' levels of control and children's eating behaviours and symptoms of anxiety and depression.

To build on the experimental findings reported in this thesis, future experimental studies addressing friend and peer influences on eating should use a larger sample size to ensure adequate power to detect significant results. Furthermore, the implications of comparing *single*-gender friendship groups to *mixed*-gender peer groups, as discussed in Section 8.4, suggest that future research should attempt to maintain consistency in genders across groups. Finally, it must be acknowledged that the scope of this thesis warranted the exploration of a limited number of variables in relation to children's eating behaviours. There are undoubtedly other factors, not reported on in this thesis, that are relevant to eating behaviours in children, for

example, genetics, child temperament and self-esteem. To gain a fuller understanding of eating behaviours in preadolescents, consideration of all these factors would be necessary.

10.6 Conclusions

In conclusion, the findings from this thesis highlight the potential of friends' eating behaviours, parental feeding practices, anxiety, depression, gender and BMI to influence eating behaviours in preadolescent-aged children. The results of the studies presented in this thesis are of particular importance given the criticality of the childhood and pre-adolescent periods for the development of eating and dieting concerns (e.g., Koff & Rierdan, 1991; Kotler et al., 2001; Combs et al., 2013). The finding that friends' eating behaviours predict preadolescent children's dieting behaviours has important implications for schools and those working with children. The links between problematic eating and anxiety in preadolescents is also important since, clinically, anxiety symptoms have been shown to pre-date eating disorder symptoms (e.g., Bulik, Sullivan, Carter & Joyce, 1996; Godart, Flament, Lecrubier & Jeammet, 2000). The potential negative impact that parental pressure to eat and restriction has on eating behaviours in preadolescents is also of importance. Furthermore, pressure to eat was found to be potentially linked to the development or maintenance of symptoms of anxiety and depression in this age of children. Regardless of parents' intentions when using controlling feeding practices with their children, the negative implications on children's eating and symptoms of anxiety and depression requires dissemination, particularly given that parental behaviours have the potential to be modified. The research in this thesis has made an important contribution to extending our understanding of the variables associated with eating behaviours in preadolescent-aged children, and future research building on the findings reported here is required.

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Appendix A- Example letter to schools time point one

School of Sport, Exercise & Health Sciences

Loughborough University
Loughborough
Leicestershire
LE11 3TU
[Date]

Dear [Head Teacher's Name],

In the School of Sport, Exercise and Health Sciences at Loughborough University we are setting up a study to explore children's attitudes to eating and body image and how similar they are to those of their friends and we are inviting your school to take part. If you are interested, taking part in this study would simply involve children aged 8-9 years (Year 4) being invited to complete a questionnaire pack (taking around 20 minutes to complete) during a lesson such as PSHE. If you would be happy for this research to be conducted within your school, we would be more than willing to facilitate a classroom discussion about healthy eating and/or body image following completion of the questionnaire pack.

Previous work has suggested that the social networks children maintain in school are likely to influence their attitudes and behaviours but little is known about the impact of friends on children's eating attitudes and body image. The proposed study is one of the first of its kind in the UK and hopes to increase our understanding of how children's attitudes to eating and body image are influenced by their friends during the important pre-adolescent years (ages 8-11 years). The study will use questionnaires suitable for children that ask questions about friendship groups, health, body image, eating behaviours, teasing, self-esteem and emotions.

The researcher can be present while the questionnaires are completed or, if you would prefer, the questionnaires can be dropped-off and completed in class at a time suited to you/the Year 4 teacher(s) and then collected at a later date. All the information children provide on the questionnaires will be kept strictly confidential and only the researchers will have access to the data. 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. This study is part of an ongoing research project that aims to track children's attitudes over time, and so we would ideally like the children to complete the same questionnaires again when they are in school years 5 and 6, to see if there are any changes in their answers to the questionnaires and to understand why this might be.

We believe that the findings of this study will improve our understanding of children's attitudes towards eating and body image. This will hopefully be useful for schools by informing you of the best ways of promoting healthy eating and positive body image in young children. Any assistance you could give with this research would be very gratefully appreciated. We would, of course, send you details about the findings of the study, which you may wish to use to develop policies within your school.

We hope that you will agree to take part in this study. I will contact you by phone in the next few weeks to discuss this further with you, but if you wish to contact me in the meantime, or if you have any questions, then please do not hesitate to contact me (Laura) using the contact details below.

With very best wishes,

Laura Houldcroft
PhD Research Student
l.a.houldcroft@lboro.ac.uk; 01509 228473
Supervisors: Dr Claire Farrow (c.v.farrow@lboro.ac.uk); Dr Emma Haycraft
(e.haycraft@lboro.ac.uk)

Appendix B- Example letter to parents time point one

[School's address]

[Date]

Dear Parent / Guardian,

Researchers from Loughborough University would like our Year [4] pupils to take part in a research study on the topic of eating in children. They would like pupils to complete a questionnaire which includes questions on health, eating behaviours, how they get on with others and how they feel about themselves. In particular, the researchers are interested in exploring the links between children's attitudes to eating and how similar these are to those of their friends. The study is part of a large study of children this age, using schools from across the UK.

Year 4 pupils will be invited to complete a short questionnaire as part of a class activity. Before the pupils complete the questionnaire they will be told what they need to do, will be made aware of their right not to take part and their right to stop taking part at any time. They will also be given the opportunity to complete a different task if they do not want to take part. All pupils will be informed that everything they write on the questionnaire will be kept strictly confidential.

After completing the questionnaire, they will be collected in to be sent back to the University and a classroom workshop about healthy eating will follow. Once the study is completed, the researchers have offered to send the school a report, summarising the findings of the research, which it is hoped will help to inform our school's healthy eating and emotional well-being policies and practices. It is of course possible that this research could encourage discussion between parents and children about healthy eating habits (as well as discussion between teachers and pupils, between pupils and between teachers) and this is something which we welcome.

In order to make this process as easy as possible, please **only return** the slip below if you **do not** want your child to take part in the research study. It is expected that the pupils will complete the questionnaires and workshop session at some point during the week beginning [date xx/xx/xx].

Yours faithfully,

Head teacher

I **do not** give permission for my child class.....
to take part in the study on eating.

Print nameSigned Date

**Appendix C- Example letter to schools time point two
(including lay summary of findings from time point
one)**

School of Sport, Exercise & Health Sciences

Loughborough University
Loughborough
Leicestershire
LE11 3TU
[Date}

Dear [Head Teacher's Name],

My name is Laura Houldcroft and you may remember that last year your Year [3/4] children took part in a research study for Loughborough University, exploring children's attitudes to eating and how similar they are to their friends. The first stage of this research is complete and enclosed is a summary of the preliminary findings from the research, which your school and many others participated in during the last year.

As the initial findings have been so interesting, we would like to examine how children's attitudes may change over time and how the influence of their friends may change with age. We are currently contacting all the schools that took part in the first stage of the research to ask if they would kindly participate in the research again, one year later (for your school, this is DATE). The second stage of the research involves the same children (now likely to be in Year 5) completing the same questionnaires, so we can try to track changes in children's answers and understand whether age may be important to children's eating habits.

The questionnaires are identical to last time and take around 15-20 minutes to complete. If you would be happy to take part in this second part of the research, I would be happy to come into your school at a time that suits you, to hand out the questionnaires, followed by an interactive workshop with the class, looking at healthy eating and friendship, if this is something you think that the children would find beneficial and interesting. Alternatively, if you would prefer me to send you the questionnaires for completion in class time with the teacher, I would also be happy to do this.

I hope that you are interested in taking part in the second stage of the study, and I will contact you by phone in the next few days to discuss this further with you. If you wish to contact me in the meantime, or if you have any questions, then please do not hesitate to contact me using the contact details below.

With very best wishes,

Laura Houldcroft
PhD Research Student
l.a.houldcroft@lboro.ac.uk
01509 228151
Laura Houldcroft

Supervisors: Dr Claire Farrow (c.v.farrow@lboro.ac.uk); Dr Emma Haycraft (e.haycraft@lboro.ac.uk)

Findings from 'children's eating and their friends'
research
2011-2012



Children aged 7-9 years, from a range of primary schools across the UK took part in the research. The main findings of the research are detailed below:

- Boys and girls differed in some of their eating behaviours. Girls reported watching what they ate more than boys did. Boys reported more eating in response to their emotions, such as eating more when they were sad, compared to girls.
- For both boys and girls there were strong similarities between children's eating habits and the eating of those in their friendship group. This could suggest that children in friendship groups may influence each others' eating, or, it may be that children who have similar eating habits are more likely to be friends.
- For both boys and girls, children's emotions were linked to their eating habits, with children who had higher levels of anxiousness and sadness reporting less healthy eating practices.

What happens next?

Following on from the findings so far, we are very interested to understand whether children's eating habits and the influence of their friends change over time. We are inviting all the schools who took part in the initial phase of the research to take part in a follow-up study. The study involves the same children completing the same questionnaires one year after they first completed them. From this, we are hoping to be able to examine how children's eating may change with age, and whether friends are more, or less, influential as children grow older. We will contact your school in the near future to see if you are happy to take part in this follow-up study.

We hope that these findings are useful and if you would like any more details, please do not hesitate to contact us. With many thanks for your schools' help with this important research,

Laura

Laura Houldcroft (PhD Research Student)
School of Sport, Exercise & Health Sciences, Loughborough University
l.a.houldcroft@lboro.ac.uk 01509 228817
Supervisors: Dr Claire Farrow (c.v.farrow@lboro.ac.uk) & Dr Emma Haycraft
(e.haycraft@lboro.ac.uk)

Appendix D- Example letter to parents time point two

[School's address]

[Date]

Dear Parent / Guardian,

You may remember that your child took part in a research study for Loughborough University last year, looking at children's eating habits and how similar they are to their friends. The study was part of a large study of children aged 8-9 years and schools from across the UK took part. Twelve months later, the researchers would now like the children to complete the same study, in order to look at how their eating habits and the influence of their friends changes with age.

The researchers would like our Year [4/5] pupils to complete a questionnaire which includes questions on health, eating behaviours and how they feel about themselves. Children will be invited to complete the short questionnaire as part of a class activity.

Before the pupils complete the questionnaire they will be told what they need to do, will be made aware of their right not to take part and their right to stop taking part at any time. They will also be given the opportunity to complete a different task if they do not want to take part. All pupils will be informed that everything they write on the questionnaire will be kept strictly confidential. After the children have completed the questionnaires they will be collected in by the researcher and taken back to the University.

Once the study is completed, the researchers have offered to send the school a report, summarising the findings of the research, which it is hoped will help to inform our school's healthy eating and emotional well-being policies and practices. It is of course possible that this research could encourage discussion between parents and children about healthy eating habits (as well as discussion between teachers and pupils, between pupils and between teachers) and this is something which we welcome.

In order to make this process as easy as possible, please **only return** the slip below if you **do not** want your child to take part in the research study.

Yours faithfully,

Headteacher

.....
I **do not** give permission for my child class.....
to take part in the study on healthy eating.

Print nameSigned Date

**Appendix E- Example letter to school experimental
studies**

School of Sport, Exercise & Health Sciences
Loughborough University
Loughborough
Leicestershire
LE11 3TU
[Date]

Dear [Head Teacher's Name],

You may remember that your school kindly took part in some research about how similar young children's eating is to their friends. We have now completed the first stage of this research and following on from the results we would like to complete some further research which aims to increase knowledge of how other children influence how much, and what foods children eat. The results of the study will be particularly useful to schools as it will help to inform you of the best ways of promoting healthy eating in young children.

The study involves children aged 8-9 years (Year 4) taking part in an activity where they play with a group of their class friends (up to 5 children) while they are offered a range of snack foods (cookies, crisps, carrots and apples). Children will complete the study in groups after lunch, in a separate room to their classroom. Each child will also be asked to play with a group of children from the same school class, that are not from their immediate friendship group, again while being offered snack foods for 20 minutes. The study aims to find out whether there are differences in what, and how much, children eat when with their friendship groups, compared to with other children. Following the activity, if they are happy to do so, and with their parents' consent, children will be weighed and measured. Children will also complete a short questionnaire following the study (taking around 15 minutes to complete).

All the information children provide on the questionnaires, as well as the information about their food consumption, and their height and weight data, will be kept strictly confidential and only the researchers will have access to the data. 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. This study is part of an ongoing research project that aims to examine the influences children have on each others' eating.

Any assistance you could give with this research would be very gratefully appreciated. We would, of course, send you details about the findings of the study, which you may wish to use to develop policies within your school.

We do hope that this study is of interest to you and you would like to participate. If you have any questions, then please do not hesitate to contact me (Laura) using the contact details below.

Thank you for your time. With very best wishes,

Laura Houldcroft
PhD Research Student
School of Sport, Exercise & Health Sciences, Loughborough University
l.a.houldcroft@lboro.ac.uk
01509 228817

Supervised by: Dr Claire Farrow (c.v.farrow@lboro.ac.uk; 01509 228487)
Dr Emma Haycraft (e.haycraft@lboro.ac.uk; 01509 228160)

Appendix F: Example letter to parents, information sheet and consent form for experimental studies

[School's address]

[Date]

Dear Parent / Guardian,

Researchers from Loughborough University would like our Year 4 pupils to take part in a research study on the topic of eating in children. The research aims to increase what we know about children's eating outside of the home environment by looking at how other children influence how much, and what foods children chose to eat.

The study involves children in Year 4 taking part in an activity where they play with a group of their class friends (up to 5 children) while they are offered a range of snack foods (cookies, crisps, carrots and apples). Children will complete the study in groups after lunch time. Each child will also be asked to play with a group of children from the same school class that are not from their immediate friendship group, again while being offered snack foods for 20 minutes. The study aims to find out whether there are differences in what, and how much, children eat when with their friendship groups, compared to with other children. Following the activity, if they are happy to do so, and with your consent, children will be weighed and measured. Children will also complete a short questionnaire after the study.

All the information children provide on the questionnaires, as well as the information about their food consumption, and their height and weight data, will be kept strictly confidential and only the researchers will have access to the data. The data will be analysed and written up as a group so no individual child can be identified and no-one will know who participated in the study. The work is part of an on-going research project studying the influences children have on each other's eating.

Please find enclosed an information sheet containing more details about the study from the researchers, as well as a consent form for you to sign. Please complete the consent form (and information about any food allergies) and send it back to school as soon as possible. It is expected that the children will complete the study during the next few weeks.

[Head teacher name]

**The Influence of Peers and Friends on Children's Eating
Information Sheet**

Laura Houldcroft, Dr. Claire Farrow and Dr. Emma Haycraft
Loughborough University Centre for Research into Eating Disorders (LUCRED)
School of Sport, Exercise and Health Sciences, Loughborough University, UK

Dear Parent / Guardian,

At Loughborough University we are currently running a research study on the topic of children's eating and we have asked your child's school to take part in the study. The research is about the influence that friends and peers have on children's eating habits. Please take the time to read the following information about the study.

What is the study about?

The study is about increasing knowledge on children's eating outside of the home environment by looking at how other children influence how much, and what foods children eat. By doing this study we hope to increase understanding about the way children influence each other's eating. The results of the study will be particularly useful to schools as it will help to inform them of the best ways of promoting healthy eating in young children.

Immediately following the school lunch time, your child will be invited to play with a group of their class friends (up to 5 children) while being offered a range of snack foods (cookies, crisps, carrots and apples), for 20 minutes. Your child will also be asked to play with a group of children from the same school class, that are not from their immediate friendship group, again while being offered snack foods for 20 minutes. The study aims to find out whether there are differences in what foods children choose, and how much they consume when eating with their friendship group, compared to with other children. Following the activity, if they are happy to do so, and with your consent, children will be individually weighed and measured.

At a separate time, children will complete questionnaires about their eating behaviours, how they get on with others and how they feel about themselves.

Who is taking part?

- Approximately 50 children aged 8-9 years (Year 4) from primary schools across the UK.

What will my child have to do?

- Each play and eat session should last approximately 20 minutes and your child will take part in 2 sessions following the school lunch break.
- The questionnaire will take around 15 minutes to complete, as part of a normal classroom lesson.
- If you are happy for your child to take part in the study, you are asked to sign the consent form and return it to the school.

What happens to the information?

All the information your child provides will be anonymous and confidential. Information about children's food consumption, their height and weight data, and their answers to the questionnaires will be kept separately, so details cannot be traced back to each individual child. Only the researchers will have access to the anonymous questionnaires, which will be stored in a locked cabinet at Loughborough University and destroyed after five years. A report of the study may be submitted for publication, but individual children will not be identifiable. A summary report of the study may be

provided to the school, to help to inform them of the best ways of promoting healthy eating in young children.

Does my child have to participate?

Your child is under no obligation to take part in this study and you have the right to withdraw the information they provide at any time. If you wish to withdraw your child from the study please contact Laura Houldcroft.

What if my child finds part of the study distressing?

It is possible that some of the questions on the questionnaire may raise issues that your child wishes to discuss further. If you have concerns please contact one of the following:

- Your school nurse or G.P.
- Parentline Plus: free national helpline for parents and step-parents – Tel: 0808 800 2222
- BEAT (formerly the Eating Disorders Association) - Tel: 0845 634 1414

What if I have more questions or do not understand something?

Further information can be obtained from: Laura Houldcroft, School of Sport, Exercise and Health Sciences, Loughborough University, Leicestershire, LE11 3TU. Email: L.A.Houldcroft@lboro.ac.uk

What if I am not happy with how this research was conducted?

Please contact the secretary of the Ethical Advisory Committee at Loughborough University: Mrs Zoë Stockdale; 01509 222423; Z.C.Stockdale@lboro.ac.uk. The University's policy relating to Research Misconduct and Whistle Blowing is available online at [http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

CONSENT FORM

Important – Please ensure that you have read the attached information sheet. Your child will be presented with the snack foods listed in the information sheet and allowed to consume as much of these as they like during the duration of the study. Furthermore, some of the questions contained in the questionnaire are of a sensitive nature. While the questionnaire should not cause your child any distress, if your child does find any of the issues raised by the research upsetting please call one of the telephone numbers provided on the information sheet.

- 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 understand that my child is under no obligation to take part in the study.
- I understand that I have the right to withdraw my child's data from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing my child from this study.
- I understand that all the information my child provides will be treated in strict confidence and will be kept anonymous and confidential to the researchers.
- I **agree** for my child to participate in this study

Signed:.....

Your name:.....

Date:.....

Child's name:

Child's class:

If you agree to your child taking part, please list any food allergies or intolerances that your child has

.....
.....
.....
.....

**Appendix G: Hunger visual rating scale for
experimental studies**

Put a cross 'X' on the line below to show how hungry you are right now.

1. How hungry are you right now?



Tummy totally empty



Tummy totally full

Name _____

**Appendix H- Eating Patten Inventory for Children
(EPIC; Schact, Richter-Appelt, Schulte-Markwort,
Hebebrand & Schimmelmann, 2006) and scoring details**

Eating Pattern Inventory for Children Questionnaire

The questions below ask about your eating. For each question, please circle the response option which is most accurate for you. Take your time to consider your answer and try to answer all of the questions.

	Not at all	A little	Mostly	Totally
1. When I see someone eat, I also get hungry	Not at all	A little	Mostly	Totally
2. I have already tried a couple of times to eat less	Not at all	A little	Mostly	Totally
3. My parents always want me to eat up everything that is on my plate	Not at all	A little	Mostly	Totally
4. When I am finished eating I worry about getting too fat	Not at all	A little	Mostly	Totally
5. Eating helps me when I am disappointed	Not at all	A little	Mostly	Totally
6. While eating, I am always afraid of putting on weight	Not at all	A little	Mostly	Totally
7. When I am afraid or worried I eat something	Not at all	A little	Mostly	Totally
8. When I am together with someone who eats a lot, I eat a lot, too	Not at all	A little	Mostly	Totally
9. At home, I am allowed to leave food I don't like on my plate	Not at all	A little	Mostly	Totally
10. I am very afraid of putting on weight	Not at all	A little	Mostly	Totally
11. I often think about food during the day	Not at all	A little	Mostly	Totally
12. I eat when I am unhappy	Not at all	A little	Mostly	Totally
13. It is always on my mind that I weigh too much	Not at all	A little	Mostly	Totally
14. To keep my weight, I often eat less than I would actually like to	Not at all	A little	Mostly	Totally
15. When I am lonely, I comfort myself with food	Not at all	A little	Mostly	Totally
16. At home, I must eat whatever is put on the table	Not at all	A little	Mostly	Totally
17. When I see food I get hungry right away, even if it is not mealtime yet	Not at all	A little	Mostly	Totally
18. I try to eat as little as possible so I don't put on any more weight	Not at all	A little	Mostly	Totally
19. I should try harder to lose weight	Not at all	A little	Mostly	Totally
20. I am often that hungry that I immediately have to eat something	Not at all	A little	Mostly	Totally

**Note that highlighted items (3, 9 and 16) relate to the 'Parental Pressure to Eat' subscale and were not used in the research reported in this thesis.*

Eating Pattern Inventory for Children: Scoring

Subscales: Dietary restraint (DR) = 8 items; External eating (Ex) = 5 items; Emotional eating (EE) = 4 items

Mean scores are calculated for each subscale.

	Not at all	A little	Mostly	Totally	Subscale
1. When I see someone eat, I also get hungry	1	2	3	4	EX
2. I have already tried a couple of times to eat less	1	2	3	4	DR
4. When I am finished eating I worry about getting too fat	1	2	3	4	DR
5. Eating helps me when I am disappointed	1	2	3	4	EE
6. While eating, I am always afraid of putting on weight	1	2	3	4	DR
7. When I am afraid or worried I eat something	1	2	3	4	EE
8. When I am together with someone who eats a lot, I eat a	1	2	3	4	EX
10. I am very afraid of putting on weight	1	2	3	4	DR
11. I often think about food during the day	1	2	3	4	EX
12. I eat when I am unhappy	1	2	3	4	EE
13. It is always on my mind that I weigh too much	1	2	3	4	DR
14. To keep my weight, I often eat less than I would actually like to	1	2	3	4	DR
15. When I am lonely, I comfort myself with food	1	2	3	4	EE
17. When I see food I get hungry right away, even if it is not	1	2	3	4	EX
18. I try to eat as little as possible so I don't put on any more weight	1	2	3	4	DR
19. I should try harder to lose weight	1	2	3	4	DR
20. I am often that hungry that I immediately have to eat something	1	2	3	4	EX

**Appendix I- Kids' Child Feeding Questionnaire (KCFQ;
Carper, Fisher & Birch, 2000)- subscales and factors
used in the present thesis, as suggested by van Strien
and Bazelier (2007)**

Kids Child Feeding Questionnaire, as used by van Strien & Bazelier (2007), questions asked in relation to 'parents' rather than 'mummy' and 'daddy' separately

The questions below ask about your eating at home. For each question, please circle the response option which is most accurate for you.

	No	Sometimes	Yes
1. When you say "I'm not hungry" at dinnertime, do your parents say "You need to eat anyway"?	No	Sometimes	Yes
2. Do your parents make you eat all the food on your plate?	No	Sometimes	Yes
3. If there is something your parents want you to eat, but you don't eat it, do they ever make you sit at the table until you eat it?	No	Sometimes	Yes
4. Do your parents get upset when you play with your food?	No	Sometimes	Yes
5. Do your parents ever say things like "I don't think you've had enough to eat, you need to eat more"?	No	Sometimes	Yes
6. If you tell your parents you're full and don't want to eat anymore, do they ever say "You need to eat more anyway"?	No	Sometimes	Yes
7. Do your parents say "If you don't eat all your food, you won't get dessert"?	No	Sometimes	Yes
8. Is it okay with your parents if you don't eat all of the food on your plate?	No	Sometimes	Yes
9. Do your parents ever say things like "You've had enough to eat now, you need to stop"?	No	Sometimes	Yes
10. Do your parents ever let you have snacks?	No	Sometimes	Yes
11. Do your parents buy sweets for you when you ask for them?	No	Sometimes	Yes
12. If you ask for a snack, do your parents let you have it?	No	Sometimes	Yes
13. If you're with your parents and you want something to eat, do they let you pick what you want to eat?	No	Sometimes	Yes
14. If you're with your parents and you want something to eat, do they let you pick how much you eat?	No	Sometimes	Yes
15. If you don't eat all of your dinner, are you allowed to have dessert?	No	Sometimes	Yes
16. Are you allowed to get your own snacks?	No	Sometimes	Yes

**Note that the highlighted (4,9,13), although they formed part of Carper et al.'s original KCFQ, were not used in the present thesis as van Strien and Bazelier (2007) omitted these items.*

Kids Child Feeding Questionnaire: Scoring structure as used by van Strien & Bazelier (2007)

Subscales: Pressure to eat (PE) = 8 items; Restriction (R) = 5 items

Note that Q8, Q10, Q11, Q12, Q14, Q16 are reverse coded.

Mean scores are calculated for each of the subscales.

	Scoring:	0	1	2	
	No	Sometimes	Yes	Subscale	
1. When you say "I'm not hungry" at dinnertime, do your parents say "You need to eat anyway"?	0	1	2	PE	
2. Do your parents make you eat all the food on your plate?	0	1	2	PE	
3. If there is something your parents want you to eat, but you don't eat it, do they ever make you sit at the table until you eat it?	0	1	2	PE	
4. Do your parents get upset when you play with your food?	0	1	2		
5. Do your parents ever say things like "I don't think you've had enough to eat, you need to eat more"?	0	1	2	PE	
6. If you tell your parents you're full and don't want to eat anymore, do they ever say "You need to eat more anyway"?	0	1	2	PE	
7. Do your parents say "If you don't eat all your food, you won't get dessert"?	0	1	2	PE	
8. Is it okay with your parents if you don't eat all of the food on your plate?	0	1	2	PE (r)	
9. Do your parents ever say things like "You've had enough to eat now, you need to stop"?	0	1	2		
10. Do your parents ever let you have snacks?	0	1	2	R (r)	
11. Do your parents buy sweets for you when you ask for them?	0	1	2	R (r)	
12. If you ask for a snack, do your parents let you have it?	0	1	2	R (r)	
13. If you're with your parents and you want something to eat, do they let you pick what you want to eat?	0	1	2		
14. If you're with your parents and you want something to eat, do they let you pick how much you eat?	0	1	2	R (r)	
15. If you don't eat all of your dinner, are you allowed to have dessert?	0	1	2	PE	
16. Are you allowed to get your own snacks?	0	1	2	R (r)	

**Note that the items highlighted that although formed part of the original KCFQ, were not used in the present thesis as van Strien & Bazelier (2007) omitted these items*

**Appendix J- Spence Children's Anxiety Scale (SCAS;
Spence, 1997) and scoring**

Spence Children's Anxiety Scale (generalised anxiety and social phobia subscales)

The questions below ask about times when you might feel scared or worried.

Please circle which answer is right for you.

1. I feel scared when I have to take a test.	Never	Sometimes	Often	Always
2. I feel afraid if I have to use public toilets or bathrooms.	Never	Sometimes	Often	Always
3. I feel afraid that I will make a fool of myself in front of people.	Never	Sometimes	Often	Always
4. I worry that I will do badly at my school work.	Never	Sometimes	Often	Always
5. I worry what other people think of me.	Never	Sometimes	Often	Always
6. I feel afraid if I have to talk in front of my class.	Never	Sometimes	Often	Always
7. I worry about things.	Never	Sometimes	Often	Always
8. When I have a problem, I get a funny feeling in my stomach.	Never	Sometimes	Often	Always
9. I feel afraid.	Never	Sometimes	Often	Always
10. When I have a problem, my heart beats really fast.	Never	Sometimes	Often	Always
11. I worry that something bad will happen to me.	Never	Sometimes	Often	Always
12. When I have a problem, I feel shaky.	Never	Sometimes	Often	Always

Spence Children's Anxiety Scale: Scoring structure for generalised anxiety and social phobia

Subscales: Generalised anxiety (GA) = 6 items; Social phobia (SP) = 6 items
Total scores are calculated for each of the subscales.

	Scoring				
	Never	Sometimes	Often	Always	Subscale
1. I feel scared when I have to take a test.	0	1	2	3	SO
2. I feel afraid if I have to use public toilets or bathrooms.	0	1	2	3	SO
3. I feel afraid that I will make a fool of myself in front of people.	0	1	2	3	SO
4. I worry that I will do badly at my school work.	0	1	2	3	SO
5. I worry what other people think of me.	0	1	2	3	SO
6. I feel afraid if I have to talk in front of my class.	0	1	2	3	SO
7. I worry about things.	0	1	2	3	GA
8. When I have a problem, I get a funny feeling in my stomach.	0	1	2	3	GA
9. I feel afraid.	0	1	2	3	GA
10. When I have a problem, my heart beats really fast.	0	1	2	3	GA
11. I worry that something bad will happen to me.	0	1	2	3	GA
12. When I have a problem, I feel shaky.	0	1	2	3	GA

**Appendix K- Children's Depression Inventory Short
Form (CDI:S; Kovacs, 1992) and scoring**

Children's Depression Inventory: Short Form - negative mood subscale and scoring

Below are some questions about your feelings over the last 2 weeks. Please tick one sentence that best describes you in each box.

Example:

I read books all the time	<input checked="" type="checkbox"/>
I read books once in a while	<input type="checkbox"/>
I never read books	<input type="checkbox"/>

1.	
I am sad once in a while	<input type="checkbox"/>
I am sad many times	<input type="checkbox"/>
I am sad all the time	<input type="checkbox"/>

2.	
Things bother me all the time	<input type="checkbox"/>
Things bother me many times	<input type="checkbox"/>
Things bother me once in a while	<input type="checkbox"/>

3.	
I feel like crying everyday	<input type="checkbox"/>
I feel like crying many days	<input type="checkbox"/>
I feel like crying once in a while	<input type="checkbox"/>

Scoring:

Subscales: negative mood = 3 items.
Calculate a total score (sum) for the subscale.

1.	
I am sad once in a while	0
I am sad many times	1
I am sad all the time	2

2.	
Things bother me all the time	2
Things bother me many times	1
Things bother me once in a while	0

3.	
I feel like crying everyday	2
I feel like crying many days	1
I feel like crying once in a while	0

Children's Depression Inventory: Short Form - full scale and scoring

Below are some questions about your feelings over the last 2 weeks.
Please tick one sentence that best describes you in each box.

Example:

I read books all the time	<input checked="" type="checkbox"/>
I read books once in a while	<input type="checkbox"/>
I never read books	<input type="checkbox"/>

1. I am sad once in a while <input type="checkbox"/> I am sad many times <input type="checkbox"/> I am sad all the time <input type="checkbox"/>	6. Things bother me all the time <input type="checkbox"/> Things bother me many times <input type="checkbox"/> Things bother me once in a while <input type="checkbox"/>
2. Nothing will ever work out for me <input type="checkbox"/> I am not sure if things will work out for me <input type="checkbox"/> Things will work out for me O.K. <input type="checkbox"/>	7. I look O.K. <input type="checkbox"/> There are some bad things about my looks <input type="checkbox"/> I look ugly <input type="checkbox"/>
3. I do most things O.K. <input type="checkbox"/> I do many things wrong <input type="checkbox"/> I do everything wrong <input type="checkbox"/>	8. I do not feel alone <input type="checkbox"/> I feel alone many times <input type="checkbox"/> I feel alone all the time <input type="checkbox"/>
4. I hate myself <input type="checkbox"/> I do not like myself <input type="checkbox"/> I like myself <input type="checkbox"/>	9. I have plenty of friends <input type="checkbox"/> I have some friends but I wish I had more <input type="checkbox"/> I do not have any friends <input type="checkbox"/>
5. I feel like crying everyday <input type="checkbox"/> I feel like crying many days <input type="checkbox"/> I feel like crying once in a while <input type="checkbox"/>	10. Nobody really loves me <input type="checkbox"/> I am not sure if anybody loves me <input type="checkbox"/> I am sure that somebody loves me <input type="checkbox"/>

Scoring:

Subscales: full scale = 10 items.

Calculate a total score (sum) for the full depression scale.

1. I am sad once in a while I am sad many times I am sad all the time	0 1 2	6. Things bother me all the time Things bother me many times Things bother me once in a while	2 1 0
2. Nothing will ever work out for me I am not sure if things will work out for me Things will work out for me O.K.	2 1 0	7. I look O.K. There are some bad things about my looks I look ugly	0 1 2
3. I do most things O.K. I do many things wrong I do everything wrong	0 1 2	8. I do not feel alone I feel alone many times I feel alone all the time	0 1 2
4. I hate myself I do not like myself I like myself	2 1 0	9. I have plenty of friends I have some friends but I wish I had more I do not have any friends	0 1 2
5. I feel like crying everyday I feel like crying many days I feel like crying once in a while	2 1 0	10. Nobody really loves me I am not sure if anybody loves me I am sure that somebody loves me	2 1 0