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SUMMARY

Parents have been identified as key influencers of the child weight-related environment (Kitzmann, Dalton II, & Buscemi, 2008), but the understanding of this relationship remains unclear. In addition, the relationship between parenting, child weight and psychosocial outcomes remains relatively unstudied. This thesis addresses gaps in the literature by clarifying the influence of parenting on child weight and weight-related outcomes, through investigating the measurement of parenting, along with processes by which parenting style may show associations with child weight-related outcomes.

The first study involved an analysis of the longitudinal relationship between parenting style (at child age 4-5 years) and child Body Mass Index (BMI; at age 6-7 years). The study attempted to clarify the conclusions of a previously published study, which were based upon a particular scale argued to be inappropriate for measuring parenting style. This investigation found that fathers’, and not mothers’, parenting influenced child weight, with paternal ‘warmth’ predicting increased child weight. This was a surprising finding, but was thought to relate to paternal permissiveness.

Three follow-up studies were conducted, utilizing a survey completed with children between the ages of 7 and 11 (n = 233), their mothers (n = 178) and fathers (n = 85).

The first investigation analysed two different measures of dimensions thought to comprise parenting style. The findings indicated that both mothers’ and fathers’ parenting was associated with child weight-related outcomes. Parental demandingness
was not found to be associated with parental control, and parental responsiveness showed associations with parental warmth, but associations with child outcomes were not found to be equivalent.

The second investigation focused on the relationship between child- and parent-reported parenting style, parental feeding and activity practices and child weight-related outcomes. Both parenting styles and specific practices were found to be uniquely associated with child weight-related outcomes, but were not found to interact in their associations. Child-reported parenting style was associated with child diet and activity-related attitudes, whereas parent-reported parenting style was not associated with child weight-related indices.

The final study investigated the relationship between parenting style and child weight-related psychological outcomes. Both child BMI and the parenting style dimension of responsiveness were associated with child psychological outcomes. Parenting was not found to moderate the association between child BMI and psychological outcomes.

Both parenting styles and specific practices appear to be important for child weight-related behaviours. Importantly, a responsive parenting style was also associated with healthy psychological outcomes and should be encouraged in interventions attempting to influence weight: focusing solely on parenting practices may be insufficient. Researchers investigating parenting style should ensure they examine the measures they intend to employ when considering the use of brief, proxy measures of complex constructs such as those that comprise parenting style. Finally, the child’s
perspective appears to be important for understanding parental influence on child outcomes, and should be included wherever feasible.
THESIS DECLARATION

I, Amanda Taylor, certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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_______________________________________________________________
Amanda Taylor
Signed: Date: 24/11/2011
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CHAPTER 1. INTRODUCTION AND LITERATURE REVIEW

Overview

At least 10% of children worldwide are overweight or obese according to statistics compiled by the International Obesity Task Force (Lobstein, Baur, & Uauy, 2004). In Australia, recent estimates suggest that the incidence of obesity in children has increased significantly over the past 20 years (Magarey, Daniels, & Boulton, 2001). The experience of overweight and obesity is associated with a myriad of negative consequences, both health and psychosocial, with the psychosocial consequences having been identified as the most widespread for obese children (Dietz, 1998). As the incidence of childhood overweight and obesity increases, so too does the incidence of these associated consequences. Attempts to mitigate this ‘epidemic’ through treatment have produced mixed results, with limited evidence for long term recovery following treatment in children who are obese (Kitzmann, et al., 2008). It is therefore important to investigate factors that may contribute to the development of overweight and obesity and its psychosocial consequences in children, in order to design effective targeted prevention and intervention programs.

Parents’ behaviour has long been accepted as a key influence on child outcomes (Costanzo & Woody, 1985). The relationship between parenting, child weight, and associated psychosocial outcomes has received recent attention in the literature, but studies have failed to establish a clear understanding of the nature of this relationship (Rhee, 2008). One explanation for these mixed findings in relation to parenting and child weight is that parenting does not influence child weight directly, but parental behaviour influences child behaviour which, in turn, influences weight status (Ventura
& Birch, 2008). Key child behaviours identified as risk factors for the development of obesity are dietary intake, physical activity and sedentary behaviours (Davison & Birch, 2001a). Although all three behaviours are widely acknowledged as influential, to date studies have failed to incorporate all three behaviours when testing the relationship between behaviours of parents and behaviours of children (e.g., Ventura & Birch, 2008). The present collection of studies is therefore proposed to clarify the relationship between parenting style, child weight-related behaviour and child weight. In addition, the association between these variables and psychosocial outcomes in Australian children are examined.

Defining overweight and obesity

Obesity in adults has been defined by the World Health Organisation (WHO) as a disease in which “excess body fat has accumulated to such an extent that health may be adversely affected” (World Health Organisation, 1999, p.6). In adults, overweight and obesity are classified using the measurement of Body Mass Index (BMI; weight kg/height m^2). According to the WHO, a BMI between 25kg/m^2 and 29kg/m^2 denotes overweight, and an adult is classified as obese when their BMI exceeds 30kg/m^2 (World Health Organisation, 1999). Although the determination of similar cut-points for overweight and obesity in children is more contentious, the accepted classification system is a weight for height value (as measured by BMI) that is of a particular deviation above BMI growth reference curves (World Health Organisation, 1999). Cut-points for overweight and obesity in children, broken down according to age and gender, have been established by the International Obesity Task Force (IOTF; Cole, Bellizzi, Flegal, & Dietz, 2000) and are now widely used in the literature on paediatric overweight and obesity. The basis for these estimates defines overweight as at or above the 85th
percentile and obesity as at or above the 95th percentile for age and gender. The IOTF estimates, which have been developed on the basis of samples from large population studies from developed countries around the world, have been described as conservative compared to other methods of estimation such as the other widely-used system, which uses the American Centre for Disease Control growth curves (Flegal, Ogden, Wei, Kuczynski, & Johnson, 2001). Nevertheless, the International Association for the Study of Obesity has identified these cut-points as appropriate for classification purposes in research (Lobstein, et al., 2004).

Prevalence of overweight/obesity

Much coverage has been given in both the lay media and the scientific literature to the current ‘obesity crisis’ or ‘obesity epidemic’ threatening the population in developed countries (Lissner, Sohlström, Sundblom, & Sjöberg, 2010). Indeed, studies conducted in the late 1990s and early 2000s reported that the prevalence rate of obesity has increased dramatically compared to increases in earlier decades (Lobstein, et al., 2004). This rise has resulted in a call for efforts to mitigate the increase. More recently, researchers have identified a plateauing of the prevalence of childhood obesity in developed countries such as Sweden and Australia (Booth, Dobbins, Okely, Denney-Wilson, & Hardy, 2007; Lissner, et al., 2010). Numerous reasons have been posited for this plateau including a temporary ‘lull’; the presence of a ‘saturation effect’ (i.e., all children at risk of becoming obese are now already obese); and, most optimistically, that intervention and prevention efforts are beginning to have an effect (Lissner, et al., 2010). The answer is unknown, but while there may be some degree of plateauing of the rate, it is still rising, and prevalence rates for children with overweight and obesity
remain high. Rates in Australia are among the highest in developed countries, with 5% obese and 20% overweight for children aged between 7 and 15 (Booth, et al., 2007).

The problem is also significant for reasons over and above prevalence at a young age. Obesity in childhood has also been shown to track through to adulthood, with a prospective study conducted in the USA indicating that among children who were obese between the ages of age 8 and 13, more than half were in the obese weight range at age 35 (Guo, Wu, Chumlea, & Roche, 2002). Of children who were obese at age 13 or older, the probability of adult obesity rose to 60%.

Australian evidence confirms the potential long-standing nature of obesity; a longitudinal Western Australian study of BMI reported that half of children who were obese when aged between 9 and 14 years were still obese 11 years later (Kelly, Sullivan, & Bartsch, 1984). In South Australia, a prospective study found that in a sample of 155 healthy children, 83% of those who were classified as overweight at age two were found to be overweight at age 20 (Magarey, Daniels, Boulton, & Cockington, 2003). These findings lend credence to the importance of intervening early to prevent overweight and obesity.

Physical and financial consequences of increased weight

Obesity in childhood has been associated with a range of poor health consequences including growth problems, liver complaints (e.g., fatty liver), diabetes, and hypertension (Dietz, 1998; Lobstein, et al., 2004). Increasing obesity prevalence has been correlated with an increase in prevalence of the metabolic syndrome in children, the symptoms of which include insulin resistance, high blood pressure, elevated blood lipids (triglycerides), decreased HDL (high-density lipoprotein, which is involved in the removal of cholesterol from arterial walls), and waist circumference.
greater than the 90th percentile (de Ferranti et al., 2004). The metabolic syndrome is also associated with increased risk of development of cardiovascular disorders and Type 2 diabetes (Biro & Wien, 2010).

In adults, obesity has been linked to a range of serious morbidities, including stroke, osteoarthritis, kidney and gall bladder disease, and respiratory problems (Australian Institute of Health and Welfare, 2010). A recent review found increased BMI in adults to be associated with risk for a range of cancers, including renal cancers in both sexes, colon cancer in men, and breast cancer in women (Renehan, Tyson, Egger, Heller, & Zwahlen, 2008). It is clear, therefore, that failing to intervene to prevent obesity in childhood could result in increasing prevalence of many health problems, with increased attendant costs for providing health solutions for those sufferers. The most recent estimate of the cost of obesity to the Australian economy, as a result of health burden and lost productivity was $8.23 billion in 2008, a rise from $3.8 billion in 2005 (Access Economics, 2008). Developing cost-effective, targeted prevention programs for obesity is important to help ease the health and economic burden it has created.

Influence of weight on psychosocial outcomes

The influence of overweight and obesity on physical health has been well documented, with clear links shown between adiposity (excess fat) and health problems including diabetes, hypertension, liver problems, sleep apnoea, metabolic problems, and orthopaedic complications (Caprio et al., 1995; Dietz, 1998). Psychosocial correlates of excess weight are less clearly defined. Studies have consistently shown that children who are obese are more likely to be stigmatised and negatively stereotyped by peers, caregivers, teachers, and health professionals than are their non-obese
counterparts (Puhl & Latner, 2007). Weight has also been shown to be one of the most common reasons for teasing among children (Cash, 1995), and overweight status has been found to predict subsequent victimisation by peers (Griffiths, Wolke, Page, & Horwood, 2006). Weight-related discrimination also persists to adulthood; overweight and obese adults are significantly more likely to experience discrimination based upon their weight in the workplace than their non-overweight peers (Roehling, Roehling, & Pichler, 2007).

Research into the psychological consequences of overweight has focused on well-being, self-image and self-worth variables (e.g., self-esteem, internalising/externalising behaviours, anxiety and depression, body dissatisfaction, and social functioning; Gibson et al., 2008). A number of studies have found that overweight and obese children and adolescents experience lower self-esteem (both global self-esteem and physical/body esteem), higher levels of internalising and externalising behaviour problems, higher incidence of anxiety and depression symptoms, poorer body image, and lower social functioning when compared to their non-overweight counterparts (Braet, Mervielde, & Vandereycken, 1997; Israel & Shapiro, 1985; Strauss, 2000). This finding is not, however, without debate with one study reporting no poorer psychosocial outcomes for overweight or obese children (Datar & Sturm, 2004), and another linking poorer psychosocial functioning with treatment-seeking samples of obese children but not community-based samples (Wardle & Cooke, 2005).

The reasons for these mixed findings have been studied, and potentially mediating variables have been posited as possible explanations for differences in psychosocial functioning among overweight/obese children. Weight and shape concern
is one such variable, and was shown to mediate the relationship between child weight and self esteem, appearance related self-esteem, body dissatisfaction, and depression (Allen, Byrne, Blair, & Davis, 2006; Erickson, Robinson, Farish Haydel, & Killen, 2000). Other suggestions include the presence or absence of weight-related teasing (Davison & Birch, 2001b; Kostanski & Gullone, 2007). Finally, child age has been posited as a mediator of the relationship between weight and psychosocial functioning; younger children have been suggested to experience fewer negative impacts compared to older children (French, Story, & Perry, 1995). Nevertheless, one study reported that body dissatisfaction is experienced by children as young as six years of age (Dohnt & Tiggemann, 2006b), highlighting the necessity of identifying the processes at play as early as possible.

Aetiology of obesity

Excess fat develops when energy intake is maintained at a consistently higher level than energy expenditure (Parsons, Powers, Logan, & Summerbell, 1999). The development and maintenance of obesity, however, is more complex, resulting from the interplay of genetic, behavioural and environmental factors (Procter, 2007). A recent study found evidence for a strong genetic component to the development of obesity, with up to 74% of the variance of both waist circumference and BMI attributable to the influence of genetics (Wardle, Carnell, Haworth, & Plomin, 2008). The authors argued that this does not mean that environmental influences are unimportant, rather, that genetics may explain some of the variance in differences in individual reactions to the environment (Wardle, et al., 2008). Procter’s (2007) review on the aetiology of obesity supports this view. She suggested that although some people may become obese in many environments, others may remain thin, even in an
'obesogenic' environment. For the vast majority of the population, however, it is the combination of both that ‘cause’ obesity: genes ‘load the gun’ and the environment ‘pulls the trigger’ (Procter, 2007).

Environmental influence on development of obesity

It has been widely documented that environmental conditions in developed countries such as Australia promote the development of obesity. According to the World Health Organisation has pointed out, food is widely available, and to obtain it does not require much energy expenditure (World Health Organisation, 1999). Population-wide, diets are becoming more energy-dense and less nutrient-rich. Lifestyles are also becoming more sedentary, with motorised transport and mechanised labour-saving devices moderating the energy expended on daily tasks (World Health Organisation, 1999). Procter’s (2007) review found that of diet and lifestyle factors, snacking, skipping meals, portion sizes, energy density of dietary intake, and high amounts of sedentary time were strong predictors of obesity in children (Procter, 2007). Davison and Birch (Davison & Birch, 2001a) have combined these variables in an Ecological Systems Theory for overweight (cf., Brofenbrenner, 1992). According to this model, development of overweight occurs within the context of multiple interacting systems (Davison & Birch, 2001a; See Figure 1). A number of environmental and genetic factors contribute to excess weight in children, including, in the family environment, a range of parental behaviours that are identified as important. The model also highlights key child risk behaviours linked to the development of overweight. These are participation in physical activity, sedentary behaviours and dietary intake (Davison & Birch, 2001a).
Figure 1. Ecological model of childhood obesity. Reprinted from Davison & Birch, 2001a, p.161. *Child risk behaviours associated with development of overweight and obesity are shown in capitalised lettering.

1 As a note to the reader, all figures, tables, and footnotes are numbered consecutively within each chapter of this thesis.
Role of the parents in childhood weight

There is substantial evidence to suggest that particular behaviours on the part of the child are influential in the development of obesity (Davison & Birch, 2001a). However, factors in the child’s environment that reinforce or inhibit behaviours related to excess energy intake and/or insufficient energy expenditure are less clearly defined. One area that has received a large amount of attention is the influence of parents in the development of obesity. This is because parents are uniquely placed to influence many aspects of the child environment, particularly those relevant to the development of childhood obesity. Parents are key gatekeepers of both the food and activity environments of young children (Kitzmann, et al., 2008). This is particularly the case for children in the pre-school and primary (elementary) school years (Birch, Zimmerman, & Hind, 1980; Blissett & Haycraft, 2008) because children of these ages are generally dependent upon their parents for food choices (Birch, et al., 1980) and access to physical activity. Parents encourage outside and active play and provide access and travel to organised sporting activities (Davison, Cutting, & Birch, 2003). As children move into adolescence they may exercise more autonomy in food and activity choices. Consequently, it is in the preadolescent years that parents can exert a strong influence on child weight-related outcomes.

Researchers have focussed on the influence of parenting practices on behaviours proposed to predispose children to weight problems in the future. These child behaviours include a preference for energy dense foods (Birch, Marlin, & Rotter, 1984; Newman & Taylor, 1992), eating in the absence of hunger (Birch & Fisher, 2000), ability to self-monitor and self-regulate energy intake (Johnson & Birch, 1994), and
percentage of energy intake taken from fat (Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). In addition, it has been suggested that more global aspects of parental behaviour, including general parenting style, may have a substantial impact on child outcomes including eating behaviours, physical activity, and sedentary behaviours (Rhee, 2008). This is because parenting style represents the context under which specific practices, including reinforcement schedules, are presented, thus influencing the likelihood that specific weight-related behaviours are practised by the child (Darling & Steinberg, 1993; Rhee, 2008).

**Parenting style**

Research in developmental psychology has explored the characteristics that differentiate parents from one another. Research into parenting in the 1950s and 60s concluded that parenting could be categorised into a circumplex pattern based on two dimensions – warmth/hostility and control/autonomy (Schaefer, 1959). These dimensions were derived from factor analysis of multidimensional assessments of parent child-rearing behaviour. Theoretical understanding of parenting at the time did not, however, show a strong relationship to these empirical findings. Parenting theory was based upon psychoanalytic theory (the basic tenet of which was that parents aim to inhibit aggressive impulses in children and induce identification with the parent), or behavioural learning theory (in which parents impacted child behaviour by rewarding desired behaviours and punishing inappropriate behaviours; Maccoby & Martin, 1983). Based upon results obtained from observational studies of parent-child dyads, Baumrind (Baumrind, 1971) developed a theoretical model that identified stable differences in
parenting style. This involved variations on two dimensions, *demandingness* and *responsiveness*. According to Baumrind:

*Demandingness* refers to the claims parents make on the child to become integrated into the family whole by their maturity demands, supervision, disciplinary efforts and willingness to confront the child who disobeys. *Responsiveness* refers to actions which intentionally foster individuality, self-regulation and self-assertion by being attuned, supportive and acquiescent to the child’s special needs and demands. (Baumrind, 1991b, p. 748)

Baumrind (Baumrind, 1971; Baumrind & Black, 1967), and subsequently Maccoby and Martin (1983), suggested that by dichotomising and combining two dimensions, four categories of parenting style could be defined (see Figure 2). Parents who were high on demandingness and responsiveness were described as *authoritative*; these parents have high expectations of their child, but also show sensitivity to their needs and are involved in the child’s life. High levels of demandingness and low levels of responsiveness were shown by parents described as having an *authoritarian* parenting style. Authoritarian parents place high expectations upon their child’s ability to exert self-control, but are minimally involved in their child’s life, showing little responsiveness to their needs. Parents with low levels of demandingness and high levels of responsiveness were described as having a *permissive* parenting style. These parents place minimal expectations on their child, but are highly involved and sensitive to their child’s needs. Finally, parents with low levels of both demandingness and responsiveness were termed *disengaged*. Disengaged parents do not place expectations upon their children in terms of self-control, achievement, or behaviour, and also show
minimal responsiveness to their child’s needs (Maccoby & Martin, 1983). Baumrind’s original conceptualisation consisted of three categories (authoritative, authoritarian, permissive). Maccoby and Martin (1983) added the ‘disengaged’ parenting style, after identification that the combination of low levels of demandingness and responsiveness created this fourth parenting style.

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<td>High responsiveness</td>
<td>Authoritative</td>
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<td>Low responsiveness</td>
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*Figure 2. Parenting styles (Maccoby & Martin, 1983)*

Children of authoritative parents have been shown to have higher levels of school engagement, higher academic performance, and higher levels of psychosocial development compared to children of non-authoritative parents (Boon, 2007). Authoritative parenting style has also been associated with decreased depressive symptoms and higher global self-esteem in children (Jackson, Pratt, Hunsberger, & Pancer, 2005; Radziszewska, Richardson, Dent, & Flay, 1996). Children of authoritarian parents have been shown to exhibit reasonable conformity to adult standards and show low levels of school misconduct, but have also been shown to have relatively lower levels of self-confidence, decreased social competence, lower self-esteem, increased internalised distress, and lower academic achievement when compared to children of authoritative or permissive parents (Lamborn, Mounts, Steinberg, & Dornbusch, 1991; Maccoby & Martin, 1983; Steinberg, Lamborn,
Parents who exhibit a permissive parenting style are associated with child outcomes of increased social competence and self esteem when compared to children of authoritarian or disengaged parents, but also poorer impulse control, more negative orientation to school, and increased school misconduct when compared to children of authoritative or authoritarian parents (Lamborn, et al., 1991; Maccoby & Martin, 1983; Steinberg, et al., 1994). Children of disengaged parents experience increased difficulties in a range of areas including competence, self-perception, misconduct, and psychological distress, when compared to other parenting styles, and particularly when compared to children of authoritative parents (Lamborn, et al., 1991; Maccoby & Martin, 1983; Steinberg, et al., 1994). In general, the best outcomes appear to result for children of authoritative parents, the worst outcomes for children of disengaged parents, with outcomes for children of authoritarian and permissive parents falling between these two extremes (Lamborn, et al., 1991; Steinberg, et al., 1994).

**Measurement of parenting style**

Baumrind’s conceptualisation of parenting style was derived from observation of mother-child dyads over extended periods (3-5 months; Baumrind & Black, 1967). Subsequent researchers have attempted to operationalise Baumrind’s taxonomy using brief observational checklists (Locke & Prinz, 2002). Compared to self-report, these methods provide an estimate of parenting that is not as susceptible to the influence of particular biases and social desirability (Morsbach & Prinz, 2006). Nevertheless, the experience of being observed may result in parents modifying the manner in which they interact with their child, resulting in unreliable and invalid measurement (Morsbach &
Prinz, 2006). This suggests that self-report measures, and other questionnaires, should not be rejected as potential measures of parenting, particularly when consideration is given to the ease, speed, and cost effectiveness of questionnaire-based data collection (Locke & Prinz, 2002).

Researchers have therefore focussed on ways in which parenting style can be reliably and validly assessed using self- or proxy- report measures. Baumrind developed a questionnaire measure of parental attitudes, consistent with her taxonomy. She reported that this self-report measure was not acceptable to parents who were ‘non-conformist’ (i.e., parents who encouraged independence and individualism in their children) or had either low or high levels of education (Baumrind, 1971). She noted that parents who had low levels of education found a long written measure to be tedious, and parents who were non-conformist or who had high education levels believed that this questionnaire measure could not reflect their unique outlook and position accurately (Baumrind, 1971). Baumrind’s measure was long (110 items), and its limited suitability (i.e., for use with “moderately educated, conforming parents without high intellectual ambitions” (Baumrind, 1971; p. 74) may have resulted in its lack of use in subsequent research.

More popular and more easily used measures were developed subsequently, and those that have been used in obesity-related research are summarised in Appendix A. These self-report measures varied in their theoretical orientation; a relatively small number produced Baumrind’s parenting style typology, and those that did (e.g., the Parent Authority Questionnaire, (Reitman, Rhode, Hupp, & Altobello, 2002); The Parenting Styles and Dimensions Questionnaire, (Robinson, Mandleco, Olsen, & Hart,
(1995) were limited to her original conceptualisation of three parenting styles: Authoritarian, Authoritative, and Permissive. These measures produce scores for each parenting style along a dimension (e.g., ‘authoritativeness’) rather than categorising parents into a typology based on dichotomisation of dimensions.

A number of measures utilised in the parenting style literature are based on slightly different conceptualisations of the dimensions that comprise parenting style. These include Nurturance and Restrictiveness (Child Rearing Practices Report; Block, 1965; Rickel & Biasatti, 1982), Laxness, Overreactivity, and Verbosity (Parenting Scale; Arney, Rogers, Baghurst, Sawyer, & Prior, 2008), and Expectations, Discipline, and Nurturing (Parent Behaviour Checklist; Fox, 1992). The constructs derived from these questionnaires are often used to approximate the dimensions demandingness and responsiveness and produce the four parenting styles in accordance with Baumrind’s characterisation. It is difficult to determine whether these researchers actively sought to develop a measure that reflected Baumrind’s conceptualisation of parenting, or whether their measures have been ‘fit’ to the parenting style typology in a post-hoc manner.

Regardless, the use of scales designed to measure different constructs for the purposes of measuring parenting style creates problems for validity of measurement. For example, the Child Rearing Practices Report, which has been used to estimate parenting style, consists of the scales of nurturance and restrictiveness. It is possible that the constructs of responsiveness and nurturance show considerable overlap, but demandingness appears to capture a different type of parenting to restrictiveness. Authoritative parenting, intended to describe a structured, but democratic style of parenting, and often thought to be the ‘optimal’ parenting style, is usually measured to
include high levels of demandingness. The substitution of the Restrictiveness subscale, which contains items like ‘I do not allow my child to question my decisions’ and ‘I believe that a child should be seen and not heard’; (Rickel & Biasatti, 1982), results in parents who may endorse these types of beliefs receiving categorisation as authoritative. This highlights the difficulties associated with using such scales for purposes other than that for which they were originally intended.

Recently, researchers in the area of parental influence have begun utilising data from large scale, population-based longitudinal studies, including the Avon Longitudinal Study of Parents and Children in the UK (Ness, 2004), Project EAT (Eating Amongst Teens) in the USA (e.g., Arcan et al., 2007), and the Longitudinal Study of Australian Children in Australia (Sanson et al., 2002). Datasets such as these provide an excellent opportunity for researchers to comprehensively test longitudinal relationships between parenting and child outcomes, with the ability to control for a range of potentially confounding variables, and produce findings that are largely generalisable to the wider population. These omnibus studies do, however, present difficulties in terms of construct measurement. In order to ensure comprehensiveness of the datasets, measurement of a large number of variables is required, thus participant burden quickly becomes a problem. As a result, the measures that comprise these datasets are often chosen on the basis of their ability to capture constructs using as few items as possible. Because most measures of parenting style consist of more than 10 items per dimension, they are generally deemed inappropriate for inclusion in large studies in which measurement of parenting style is a small and often non-central component. Consequently, many of these omnibus-type studies rely on brief, and even
single-item, measures of parenting style, often developed for the purposes of the study. Project EAT, for example, used two items assessing ‘caring’ and ‘communication’ as a proxy for ‘responsiveness’ and a single item measuring ‘strictness’ to measure demandingness (‘Compared to other mothers/fathers, how strict would you say your mother/father is?’; Berge, Wall, Loth, & Neumark-Sztainer, 2010). The use of brief scales to measure complex constructs can be problematic (Gardner, Cummings, Dunham, & Pierce, 1998), and using measures that were designed to measure different constructs to those thought to comprise parenting style may result in conclusions being drawn that may be questionable, or even invalid.

The need to compare brief scales of parenting style as used in large omnibus studies to more comprehensive measures of parenting style, which were designed to measure the constructs of ‘demandingness’ and ‘responsiveness’, is clear. One of the few parenting style measures designed for this purpose is the Authoritative Parenting Index (Jackson, Henriksen, & Foshee, 1998). This is a measure designed for child and adolescent report, and consists of sixteen items assessing the two parenting style dimensions of parental responsiveness and demandingness. The API has also been used successfully as a parent-report scale, with slight modifications to make items appropriate for parent rather than child report (Cullen et al., 2000). This measure has been used to show links between parenting style and a range of child outcomes, including child and adolescent health behaviours of physical activity (Schmitz et al., 2002), alcohol use and smoking (Jackson, et al., 1998), as well child wellbeing (Botello-Harbaum, Nansel, Haynie, Iannotti, & Simons-morton, 2008). This measure has appeal as an option for researchers who want to capture the constructs of
demandingness and responsiveness but for whom a lengthier, more comprehensive measure of parenting style is not feasible.

Parenting style and child weight

A number of studies have focussed on the relationship between parenting style and paediatric weight. These studies have returned mixed results, some finding clear associations between the two variables (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005; Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006) and some finding limited associations (Agras & Mascola, 2005; Blissett & Haycraft, 2008; Brann & Skinner, 2005; Wake, Nicholson, Hardy, & Smith, 2007). Rhee and colleagues (2006) studied Caucasian American children in their first grade of school and found that, compared to children of authoritative parents, children of authoritarian parents were at five times greater risk of overweight, while for children of uninvolved or permissive parents the comparative risk was two times that of the authoritative reference group, even after controlling for race and socioeconomic status. Cross-sectional associations have been found for permissive parenting and increased weight in children, (Hughes, et al., 2005; Olvera & Power, 2010), although these studies used Mexican-American and African-American samples, and in one instance, a conceptualisation of parenting styles based in the feeding (rather than general parenting) context (Hughes, et al., 2005). Taken together, however, results suggest that non-authoritative parenting may be associated with problematic weight in children.

Complicating factors limit the comparability and generalisability of the findings to date. Firstly, all studies operationalised parenting style differently. Secondly, the actual conceptualisation of parenting style differed; some used Baumrind’s (Baumrind,
original three categories of parenting style - authoritative, authoritarian and permissive - (Blissett & Haycraft, 2008; Brann & Skinner, 2005) whereas others included Maccoby and Martin’s (Maccoby & Martin, 1983) fourth parenting style, disengaged (Agras & Mascola, 2005; Hughes, et al., 2005; Rhee, et al., 2006; Wake, Nicholson, et al., 2007). The study by Rhee and colleagues employed an observational measure of parenting style (Rhee, et al., 2006), whereas all other studies relied on self-report measures. Most used objective measures of child BMI, although some relied on parental report of child weight only (e.g., Blissett & Haycraft, 2008), which may have also contribute to differences in findings. Additionally, the extent to which important covariates were included varied considerably between studies. Some studies included parent BMI (Brann & Skinner, 2005; Wake, Nicholson, et al., 2007), while others, including Rhee et al (2006), did not. Differences in the sample characteristics may also account for some of the differences observed in study findings. A number of studies employed cross-sectional samples of preschool children (Blissett & Haycraft, 2008; Wake, Nicholson, et al., 2007). Children at very young ages may not show sufficient autonomy in their dietary and physical activity choices to allow for parenting style to influence child weight (Blissett & Haycraft, 2008). Any or all of these abovementioned differences between studies may have contributed to the inconsistency in findings. It is clear, therefore, that no strong conclusions on the relationship between parenting style and child weight can be drawn from the studies that have been conducted to date.

Parenting and child weight-related behaviours

Another explanation for the mixed findings for parenting style and child weight is that a range of intervening variables may be moderating or mediating this
relationship. In particular, it has been suggested that parenting influences child behaviour rather than affecting child weight directly (Ventura & Birch, 2008).

The key challenge in establishing parenting influences on child weight appears to be in linking what parents do with weight-related child behaviour (i.e., child eating and activity). A number of researchers have taken up this challenge, investigating associations between parenting styles and weight-related behaviour outcomes including child and adolescent fruit and vegetable consumption (Lytle et al., 2003; Patrick, Nicklas, Hughes, & Morales, 2005; Vereecken, et al., 2009; Young, Fors, & Hayes, 2004), adolescent sweetened beverage consumption (Van Der Horst, Kremers, et al., 2007), and physical activity (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2010a; Jago et al., 2011). Although some evidence has emerged of an association between an authoritative parenting style and healthy dietary intake in adolescents (Lytle, et al., 2003; Patrick, et al., 2005), other studies have found no association between general parenting style and child diet outcomes (De Bourdeaudhuij et al., 2009; Vereecken, et al., 2009; Vereecken, Rovner, & Maes, 2010; Young, et al., 2004). It is possible that measurement of parenting style may be influencing these relationships; those studies reporting limited associations between parenting style and child diet have predominantly used parent-reported parenting style, whereas those finding associations have measured parenting style from the child’s perspective. One study that found no associations between parenting style and child dietary intake also conceptualised ‘parenting style’ using a different approach than that conceived of by Baumrind (i.e., Laxness, Overreactivity and Supportiveness; Vereecken, et al., 2010), thus these results may not be directly comparable.
Few studies have tested the association between parenting style and child activity (i.e., physical activity and sedentary behaviours). Two studies investigated associations between child-reported parenting style and objectively measured physical activity in young children in the UK and found permissive parenting style to be associated with increased physical activity in children (Hennessy, et al., 2010a; Jago, et al., 2011). This finding appears surprising, as permissiveness in parents has also been associated with increased child weight (Olvera & Power, 2010; Rhee, et al., 2006). Further investigation is needed of the generalisability of this finding across samples and cultures, and whether permissive parenting remains a predictor of healthy weight-related behaviours in children when both sides of the energy equation are investigated. It may be that permissive parenting is associated with both physical activity and increased child consumption of unhealthy food, potentially producing a net excess of energy and consequent increased risk for overweight. Another study involving young adolescent girls (11 to 15 years) found a relationship between authoritative parenting and increased physical activity and decreased sedentary behaviours (Schmitz, et al., 2002). No clear explanation exists for the differences between these findings, although different measures were used for parenting style, and the study by Schmitz and colleagues involved a slightly older sample. Clarification of the relationship between parenting style and child activity is therefore needed.

Parenting practices

Parenting practices refer to specific behaviours of parents intended to produce a particular outcome in children, and are generally tied to a domain of behaviour, such as academic learning, sleep, or diet (Costanzo & Woody, 1985). For example, some
studies have explored how parental feeding practices impact upon child diet and
weight. The most consistent associations in this area have been found for parenting
practices with food: specifically, pressure to eat and restriction of palatable foods.
Pressure to eat, referring to controlling practices that include telling the child to eat
everything on their plate, has been regularly associated with decreased consumption of
healthy foods or increased consumption of unhealthy foods (Patrick & Nicklas, 2005).
Restriction of palatable foods has produced some controversy in the literature, with
earlier findings suggesting associations between restriction and increased weight, as
well as increased intake of energy dense foods and eating in the absence of hunger in
children (Birch & Fisher, 2000; Birch, Fisher, & Davison, 2003; Faith et al., 2004).
More recent findings have suggested, however, that restriction may be associated with
decreased weight in children over the longer term, and that it is likely that problematic
eating behaviours (e.g., eating in the absence of hunger) are only induced when
palatable foods are available in the home, but access to them by children is restricted by
parents (Campbell et al., 2010).

A number of reviews have been conducted into the relationship between
parenting practices and child physical activity (child PA). The first comprehensive
systematic review of correlates of PA in children was conducted by Sallis and colleagues
in 2000 and focussed on a broad range of factors contributing to child physical activity.
This review determined that parental influence on PA was surprisingly limited, with
equivocal evidence for associations between parents’ own PA and child PA. Moreover,
practices such as encouragement of physical activity and provision of logistic support
were not found to be associated with children’s PA (Sallis & Saelens, 2000). Subsequent
reviews have supported this finding, with limited associations reported between parent
behaviour and child PA (Gustafson & Rhodes, 2006; Van Der Horst, Oenema, et al.,
2007). A recent review investigating parental associations with different types of child
PA found, however, that parental involvement (likened to modelling) was associated
with both overall PA and with leisure time PA in children aged between 6 and 11 years
(Edwardson & Gorely, 2010). As physical activity is an important component in
weight-related behaviour balance in children, further investigation for how parenting
may be associated with PA is warranted. In particular, broadening the investigation to
more complex relationships between parenting practices, parenting styles and child
physical activity behaviour is important.

Research into parental influence on child sedentary behaviour is limited and
predominantly focuses on child television viewing. A recent review of correlates of
screen viewing in young children (≤7 years) determined that parental modelling (family
television (TV) watching) and ‘family rules’ regarding screen time were associated with
child screen time (Hoyos Cillero & Jago, 2010). Parental monitoring of screen time had
also been studied, but the number of investigations is insufficient to draw conclusions
(Hoyos Cillero & Jago, 2010). A study conducted with 1926 families of children
between the ages of 4 and 12 in Australia found family rules regarding restriction of TV
hours were associated with reduced TV watching (Van Zutphen, Bell, Kremer, &
Swinburn, 2007). In contrast, another Australian study found associations between
parental restriction and child sedentary behaviour to be minimal (Timperio et al.,
2008). To date, research investigating influences on child sedentary behaviour appears
to focus more on environmental differences such as number of televisions or sedentary
behaviour equipment in the home, rather than on specific behavioural practices of parents (e.g., Salmon, Timperio, Telford, Carver, & Crawford, 2005; Timperio, et al., 2008; Van Sluijs, Page, Ommundsen, & Griffin, 2010). As with physical activity, therefore, there is broad scope for investigating parental influences on sedentary behaviour, and particularly for investigating more complex associations between parenting styles and specific practices.

*Measurement of parenting practices related to child feeding*

A recent review summarised the literature on feeding practices and child diet and weight outcomes in developed countries and found that, in 31 studies conducted on parental feeding practices, 16 different feeding measures had been used (Hurley, Cross, & Hughes, 2011). The major measures captured by this review have been summarised in Appendix B. Of these, some have been limited in terms of the age ranges they were suitable for (Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002; Baughcum et al., 2001), or only covered a single aspect of child feeding (Control; Ogden, Reynolds, & Smith, 2006). The most widely used measure was the Child Feeding Questionnaire (CFQ; Birch et al., 2001), developed for use with mothers of children between the ages of 5-11 years. It involves 3 scales of parental behaviour (restriction, pressure to eat and monitoring) and 4 scales measuring parental attitudes to weight and feeding (perceived child weight, perceived parent (own) weight, concern about child weight, and perceived responsibility over feeding).

It has since been acknowledged that parent practices in relation to child feeding comprise a wider range of behaviours than those covered in the CFQ, and that the emphasis on the use of the CFQ may have influenced the tendency for research to focus
on parental control over child eating with the consequent oversight of other, potentially influential, practices (Musher-Eizenman & Holub, 2007). Two measures have subsequently been developed, one of which purports to capture parenting ‘styles’ in relation to feeding and is based on observations of feeding practices under the framework of ‘demandingness’ and ‘responsiveness’ in African American and Hispanic parents in the USA (Hughes, et al., 2005). This measure has since been used with children and parents from a range of backgrounds and shown associations with child weight. The most notable association identified with this measure is that between permissive feeding styles and increased weight in children (Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008). Concerns have been raised, however, in regards to the blurring of the distinction between general parenting styles and feeding practices in this measure, with aspects of the questionnaire suggested to measure specific practices rather than general ‘styles’ (Blissett, 2011). Parental feeding styles have been regularly been confused with general parenting styles in the literature, leading to potential lack of clarity regarding which aspects of parenting style, feeding style, or specific parenting practices may be important for child weight-related outcomes.

The other instrument, the Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007), was designed to fulfil the need for a measure that captured a range of parent behaviours relevant to child feeding. This measure was developed for use with parents of young children and was informed by literature identifying aspects of child feeding that influence child diet, in order to add to items from pre-existing measures such as the CFQ. The CFPQ, which incorporates restriction, pressure to eat, and monitoring scales from the CFQ, was developed in the
USA for use with parents of young children (ages 2-9; Musher-Eizenman & Holub, 2007). Following confirmatory factor analysis of the data, 12 scales were retained (Musher-Eizenman & Holub, 2007). The factor scale labels that comprise the CFPQ are Monitoring, Emotional Regulation, Food as a Reward, Child Control, Modelling, Restriction for Weight, Restriction for Health, Teaching about Nutrition, Encouragement of Balance and Variety, Pressure to Eat, Maintenance of a Healthy Food Environment, and Involvement. The final model showed a good fit to the data ($\chi^2=(1061)=1580$, RMSEA=.057, CFI=.981), with adequate reliability (internal consistency) values, ranging between $\alpha=.6$ and $\alpha=.8$. A subsequent cross-cultural study of parental feeding practices in the USA and France revealed that higher child BMI was related to less teaching about nutrition, less encouragement of balance and variety, and more restriction (for both weight and health reasons) by mothers in both countries (Musher-Eizenman, de Lauzon-Guillain, Holub, Leporc, & Charles, 2009). The measure therefore appears to be appropriate for use in cultures outside the USA. The CFPQ has also recently been identified as an appealing measure for developing insights into the complex relationship between parenting and child diet-related outcomes by researchers who have previously utilised the CFQ (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2010b).

Measurement of parenting practices related to child activity

The availability of comprehensive, well-validated measures of parenting practices in the domains of physical activity and sedentary behaviour is limited. One of the most widely cited measures of parental physical activity (PA) practices was developed for use with parents of young girls (aged 9 years), and assesses a limited
range of parental behaviours. Factors consist of provision of logistical support for PA (e.g., enrolling child in organised sports) and modelling of PA (e.g., use own behaviour to encourage child PA; Davison, et al., 2003). Studies that do not use this measure tend to develop their own brief (e.g., single-item) measures of PA practices such as support for or modelling of PA, generally informed by previous measures and by existing literature (e.g., Jago, Fox, Page, Brockman, & Thompson, 2009; Lau, Lee, & Ransdell, 2007). Recently, Australian authors have developed a brief measure of specific parental behaviours that includes encouragement and praise for physical activity, modelling of physical activity, and support for engaging in physical activity (Timperio, et al., 2008). Although this measure has been put to limited use to date, it has potential as a measure of parental physical activity practices, due to its clear focus on behavioural (rather than attitudinal) items and its coverage of a range of parental behaviours.

Most investigations of parental influence on child sedentary behaviour utilise questions developed for the specific study. For example, the question of parental rules in relation to television watching is asked, but tends to take different forms, such as implied restriction of television watching or screen time (Van Zutphen, et al., 2007), parental permissiveness regarding passive use of television (TV on at all times), child choice of programming (Van Sluijs, et al., 2010), presence of television in children’s bedrooms (Dennison, Erb, & Jenkins, 2002), and television use during family meals (He, Piché, Beynon, Kurtz, & Harris, 2011). Recommendations have been made for parents to monitor their children’s screen time duration (Jordan & Robinson, 2008) on the basis of findings that parents have limited awareness of the length of time their
children spend in screen-based sedentary activities (Jordan, Hersey, McDivitt, & Heitzler, 2006). No studies have focussed on the direct relationship between parental monitoring of child screen time and child sedentary behaviour or weight. To date, no comprehensive scales have been developed to measure parenting practices in relation to child sedentary behaviour.

The relationship between parenting styles and practices

It is possible that general parenting style may determine domain specific practices that, in turn, influence child behaviour and weight. Alternatively, the impact of domain specific practices may be moderated by child perceptions of parenting style. Consistent with the latter possibility, one study indicated that restriction of sugar-sweetened beverages was deemed to be most effective in moderating adolescent consumption among those who perceived their parents to be highly involved and only moderately strict (Van Der Horst, Kremers, et al., 2007).

A study investigating parenting associations with physical activity found maternal permissive parenting style and both maternal and paternal provision of support to be positively associated with child physical activity (Jago, et al., 2011). Permissive parents also tended to provide higher levels of logistic support for physical activity compared to authoritative parents (Jago, et al., 2011). One study found that parental monitoring of physical activity was positively associated with child PA when presented in the context of a permissive parenting style (Hennessy, et al., 2010a).

Conversely, two studies found parental food-related practices such as permissive feeding practices to be associated with child diet, whereas general parenting
style was not (Hennessy, et al., 2010b; Vereecken, et al., 2009). It has been suggested that parenting style, at least as conceptualised in the abovementioned studies, may be too broadly defined to predict specific outcomes such as child diet (Vereecken, et al., 2009). Measurement of parenting style may again be an alternative explanation in this case, as studies involving child-reported parenting style reported evidence for an association with child outcomes (Jago, et al., 2011; Van Der Horst, Kremers, et al., 2007), whereas those using parent-reported parenting style did not (Hennessy, et al., 2010b; Vereecken, et al., 2009).

Parenting style and child weight-related psychological outcomes

Given the observation that the psychological impact of weight may be evidenced as young as six (Dohnt & Tiggemann, 2006b), it is surprising to note that limited research has been conducted on the impact of parenting on the relationship between child weight and psychological outcomes. It is widely acknowledged that parents are key influencers of child outcomes, particularly for very young preschool and early primary school-aged children and particularly in the area of child psychosocial functioning (Steinberg, et al., 1994). Parenting style has been investigated in samples of adolescents with eating disorders, with findings indicating that an authoritative parenting style may be associated with lower drive for thinness (Enten & Golan, 2009).

Children who are overweight or obese may experience psychological consequences comparable to those associated with eating disorders, including body dissatisfaction and decreased self-esteem (Gibson, et al., 2008; Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008). It has been suggested that the psychological impacts of obesity may be more widespread for children than health-related
consequences (Dietz, 1998). Low self-esteem and poor body image have been associated with increased risk for eating disorders by adolescence (Erickson, Hahn-Smith, & Smith, 2009; Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006). Lower self-esteem can also result in broad implications for children, including social problems, lower academic attainment, and increased risk for depression (Griffiths, Parsons, & Hill, 2010).

The extent to which parenting moderates the relationship between child weight and psychological consequences remains to be established. The preponderance of research to date has focussed on the influence parental attitudes, including concern about child weight (Lampard, Byrne, Zubrick, & Davis, 2008), and specific parenting practices, that include encouragement to lose weight (McCabe, Ricciardelli, & Holt, 2005) or parent criticisms of their child’s weight (Davison & Birch, 2002), may have on child psychological outcomes such as body dissatisfaction. These studies have failed to consider the possibility that more global aspects of parenting style might be at least as important in influencing psychological outcomes as these very specific, and narrowly operationalised, parenting behaviours (Rhee, 2008). In addition, specific parenting practices or behaviours may operate in the context of parenting styles, much like findings in relation to child dietary intake or physical activity (Jago, et al., 2011; Van Der Horst, Kremers, et al., 2007).

*Thesis summary and aims*

The research summarized in this chapter highlights the complexity of the relationship between parenting and child weight-related outcomes and identifies the need for clarification of these multi-level, interactive relationships. Developing a clear
understanding of parental influence on child weight-related outcomes will allow the development of intervention and prevention programs designed to optimise child physical and emotional health. The present dissertation aims to address this need. The first study clarifies and extends previous research examining the relationship between parenting style and weight in young children by investigating measurement of parenting style and the longitudinal effects of mothers’ and fathers’ parenting style on the weight of young children.

Subsequently, research in this thesis extends the investigation of the relationship between parenting and child weight by broadening the focus to include parenting practices and by measuring parenting style from both the child’s and parent’s perspective. The latter allows for determination of the importance of the viewpoint of the respondent in predicting outcomes. A component of this study determines the differential influence of maternal and paternal parenting on child outcomes, in order to clarify how programs may effectively target these two sources of influence in the child environment.

Finally, the thesis extends the investigation of parental influence to the broader weight-related environment by examining the relationship between parenting and psychological outcomes associated with excess weight in children. This provides a broad-stroke understanding of how parenting shows associations with the child weight-related environment, and whether parenting is able to mitigate the relationship between child weight and associated psychological outcomes.
The overall aims of thesis are:

1. To clarify the relationship between parenting style and child weight through investigation of parenting style measurement and through examination of associations between parenting and weight-related behaviours in children.

2. To identify appropriate methods for investigation of parental influence on child weight-related outcomes through the assessment of differential associations between measures of parenting style and child weight-related outcomes.

3. To determine broader associations between parenting styles, parenting practices, and child weight-related behaviours and psychological outcomes.
CHAPTER 2. EXEGESIS

Exegesis.

Preamble

The research contained within this thesis was driven by the shift in discourse around the development of obesity from a disorder that develops through poor behavioural choices made by an individual (i.e., eating too much, exercising too little) to a focus on an ecological approach whereby behaviour arises in response to environmental circumstances (Lobstein, et al., 2004). The ‘obesogenic’ nature of the environment in many developed countries is associated with the widespread availability of energy-dense foods and high prevalence of sedentary behaviour (World Health Organisation, 1999). As this environment has developed over the past three decades, it is the children of today who are most at risk for the development of obesity, resulting from exposure to an obesogenic environment from a very early age (Lobstein, et al., 2004).

Identifying and modifying environmental influences on behaviours that lead to overweight and obesity is an important part of obesity prevention. Parents exert a strong influence on the weight-related environment and consequent behaviour of young children. They act as gatekeepers for food access and provide support for engagement in physical activity and sedentary pursuits (Kitzmann, et al., 2008). In addition, weight-related behaviours in children are encouraged through the use of specific parenting practices such as restriction of energy-dense foods and modelling of physical activity (Birch & Anzman, 2010). General parenting style has also been posited as an important potential contributor to weight in children (Rhee, 2008). Nonetheless, understanding to date of the processes by which parenting style shows its associations with child weight and related outcomes has been limited.
Before the research reported here commenced, studies had identified the effectiveness of weight-loss programs for overweight children when parents were targeted as the ‘exclusive agents of change’ (Golan, Weizman, Apter, & Fainaru, 1998), and when programs added parenting skills training to a diet and lifestyle change protocol (Golley, Magarey, Baur, Steinbeck, & Daniels, 2007). Despite showing some promising early results, these studies did not investigate the processes by which this change in parenting practices influenced child outcomes. In addition, child characteristics, including psychological factors, have been found to predict the development of obesity (Braet, et al., 1997; Tanofsky-Kraff et al., 2006) and may also influence the effectiveness of prevention or treatment attempts (Haines & Neumark-Sztainer, 2006).

Many early studies that investigated parental influence on child weight-related outcomes focussed on specific parental behaviours and their associations with discrete child outcomes, such as eating in the absence of hunger or food preferences (Birch & Fisher, 2000; Wardle, et al., 2002), failing to take into account broader familial predictors or investigate weight-related outcomes comprehensively. One longitudinal study was conducted into associations between general maternal parenting style and the weight of young children (Rhee, et al., 2006). This study was based upon an observational measure of maternal parenting style and found that non-authoritative parenting predicted increased risk for development of overweight and obesity (measured objectively), relative to an authoritative parenting style (Rhee, et al., 2006). It was suggested at the time that parenting style may represent a fruitful avenue for research into familial predictors contributing to overweight in children (Rhee, 2008). An Australian study published cross-sectional data, based upon a large, nationally representative sample, which indicated that fathers’ but not mothers’ parenting style showed associations with child (objectively measured) weight (Wake,
The finding that mothers’ parenting style showed no associations with child weight was surprising, particularly given mothers are often the primary caregiver for children in the pre-school years. In addition, it was at odds with the previous longitudinal finding that mothers’ parenting style predicted child weight status. Questions about measurement of parenting in this study were identified as possible explanations for its counter-intuitive findings.

As highlighted in Chapter 1, a range of limitations have been identified in the existing literature on parenting style and its associations with child weight-related outcomes. First, it has been suggested that parental influence on child outcomes fails to operate directly on child weight; the influence is thought to be operate via child behaviours (Ventura & Birch, 2008). Some studies that have demonstrated associations between parenting and weight-related behaviour in children have focussed on one domain only (e.g., eating or physical activity; Patrick & Nicklas, 2005; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). Findings in adolescent samples suggest that parenting style may moderate associations between parenting practices and child behaviours (Van Der Horst, Kremers, et al., 2007).

When conducting the background research for this thesis, it was noted that limited investigations had been made into interactions between parenting styles and practices in predicting weight-related outcomes in children. Moreover, most studies in pre-adolescent samples relied solely on the use of parent-report of their own parenting in their investigations; a practice that is linked with a range of important limitations, as discussed in Chapter 1.

Although observation of parenting practices is likely to be best practice because it minimises the subjective nature of the assessment that is likely to contaminate the measure, resource constraints mean that this approach is generally impractical. This is particularly true
for large scale studies and where the dependent measure is a general or typical behaviour (e.g., normal diet and typical physical activity) rather than a specific behaviour (e.g., nail biting). Identification of a reliable but less resource-intensive method for measuring parenting was therefore needed for the current research. Findings with adolescent samples based upon child reports of perceived parenting were considered promising (e.g., Van Der Horst, Kremers, et al., 2007). Further, it has been argued that the child’s perception of parenting may be a more important influence on child outcomes than parents’ reports of their parenting, because children may be less susceptible to reporting biases such as social desirability (Sessa, Avenevoli, Steinberg, & Morris, 2001). In the current series of studies both child- and parent- reported parenting were assessed to assist in disentangling the impact of different perceptions of parenting on child weight-related outcomes.

Finally, most studies investigating the parent-child environment pertinent to weight have been limited in their focus on health risk factors as the primary outcome. This is despite the fact that psychosocial consequences may be more important for long term well-being than health-related sequelae in children who are overweight and obese (Dietz, 1998). It is known that psychological factors are correlated with weight and with parenting (Baumrind, 1991a; Hesketh, Wake, & Waters, 2004). In addition, child psychological functioning may influence the effectiveness of interventions targeting weight, along with weight maintenance (Haines & Neumark-Sztainer, 2006). Investigating how parenting is associated with the relationship between weight and psychological outcomes is an important activity because it can help provide information on the broader associations between parenting and weight-related factors in the child and optimise the long term effectiveness of prevention programs.

The research agenda for this thesis was to investigate child weight and related outcomes and their associations with parenting. This was important because involving
parents in obesity prevention and intervention strategies is recommended widely in the
treatment literature (Golan & Crow, 2004). Despite the importance of this issue, however,
no clear understanding has been developed of the complex dynamics between parents and
children in the context of an obesogenic environment. Clarification of best practice in the
measurement of parenting style was also important because conclusions have been drawn
regarding parenting and child weight-based findings using particular measures that may not
have reliably assessed parenting style as originally conceptualised, and limitations in
measurement were thought to provide a potential explanation for mixed findings in the
existing literature on parenting and child weight.

The layout of this thesis is as follows. Chapter 3 involves an analysis of the
longitudinal relationship between parenting style and child weight, utilising the Longitudinal
Study of Australian Children (LSAC; Sanson, et al., 2002). The subsequent chapters
(Chapters 4, 5, and 6) report aspects of a cross-sectional study involving mothers, fathers,
and children in the middle primary years, which was designed to allow three separate
research questions to be addressed.

Because the contents of this thesis have been configured as three papers for
publication, chapters do not flow as naturally as would a traditional dissertation. The
following paragraphs are therefore presented as an aid to the reader in following the
progression of the research program, and to tie the papers together, prior to their reading.

Chapter 3: LSAC data and the relationship of parenting style to child weight-related outcomes (Journal
paper 1)

Following a review of the literature, the research program for this thesis began with
an examination of the opportunities offered by the large, nationally representative dataset
from the LSAC (Sanson, et al., 2002). The LSAC dataset was the dataset employed by Wake,
Nicholson, and colleagues (2007) in their cross-sectional investigation of maternal and paternal parenting style and child weight. At the time of the first study, two waves of the LSAC data were available for analysis: data collected at child age 4 to 5 years and at child age 6 to 7 years. Previous research suggested that maternal parenting style measured at child age of 4 predicts child weight at age 7 (Rhee, et al., 2006), although this research was limited by the failure to control for parent BMI and did not include fathers in its analysis. This highlighted the need for further investigation.

Examination of the LSAC research protocol suggested the possibility that Wake et al.’s (2007) measure of demandingness was contaminated by a focus on punitive tendencies among parents. This indicated a need to re-examine the data and the association between parenting and child outcomes after examining the validity of the taxonomic structure. Wake et al.’s conclusion that paternal ‘control’, which was equated with demandingness and was associated with lower risk for overweight and obesity may have reflected confusion between the constructs of punitiveness and demandingness.

The study also extended past research by examining the influence of parenting longitudinally (i.e., assessing the influence of parenting style at child age of 4-5 years on child weight at age 6-7 years). Findings highlighted the importance of fathers’ parenting for the child weight-related environment. In addition, findings suggested that further investigation regarding the use of proxy scales for measuring parenting style was necessary. Finally, the counter-intuitive finding for an association between paternal responsiveness and increased risk for child overweight provided support for the need to conduct a more detailed analysis of associations between parenting and child weight and related behaviours. This is a view endorsed by authors of a review on parenting and child diet and weight, who suggested that
the influence of parenting on child weight operated through parental influence on child behaviour rather than directly impacting child weight (Ventura & Birch, 2008).

_A cross-sectional investigation of parenting style and parenting practices, and their association with weight-related behaviours and child psychological wellbeing (Chapters 4, 5 and 6)_

A cross-sectional study was undertaken to address a number of hypotheses that arose from the study reported in Chapter 3. A sample of mothers, fathers, and children provided information on a range of factors pertinent to the family and the child weight-related environment. This allowed three separate research questions to be addressed, which are reported in Chapters 4, 5, and 6 of this dissertation.

**Chapter 4. Mothers’ and fathers’ parenting style and child weight-related behaviours**

The study reported in Chapter 3 identified that fathers exert an important influence on the child weight-related environment. The relationship between parenting and child weight has, however, been suggested to be not sufficiently direct to allow for reliable associations to be determined (Ventura & Birch, 2008). Further investigation of the differential associations between mothers’ and fathers’ parenting and child weight-related _behaviours_ was therefore an important. Further, no investigation had been made into the appropriateness of using brief, proxy measures to indicate the dimensions of general parenting style. The findings of the study reported in Chapter 3 highlighted the need for further investigation of one such scale, used as a proxy measure of _demandingness_. A second aim of this study was therefore to analyse differential associations between two different measures of parenting style and child weight-related outcomes. Mothers and fathers reported on parenting style and child diet, activity, and sedentary behaviour, and children had their height and weight objectively measured. Two measures of parenting style were used: a proxy measure of parenting style, which was used in the study contained in Chapter
3, and a validated measure of parenting style dimensions (demandingness and responsiveness), namely the Authoritative Parenting Index (Jackson, et al., 1998). The investigation comprised 178 mothers, 85 fathers, and 233 children between 7 and 11 years. Both mothers’ and fathers’ parenting showed associations with child weight-related outcomes. Findings lent support to the suggestion that parenting style constructs are important for healthy behaviours in children, but provided evidence for a need to caution against the use of proxy-measures for parenting style, as they did not appear to show equivalent associations with child outcomes.

Chapter 5 (Journal paper 2). Child vs parent reported parenting style, parenting practices, and child weight-related behaviours.

In order to further clarify identified associations between parenting and child weight-related behaviours, it was necessary to conduct a detailed investigation of parenting styles, parenting practices and child weight-related outcomes. This is because it has been identified that both domain-specific practices and general parenting styles show associations with child weight-related behaviour (Patrick & Nicklas, 2005; Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011). In addition, the importance of including the child perspective in research involving child outcomes has been identified (Haines, Neumark-Sztainer, Hannan, & Robinson-O’Brien, 2008), but the use of child-reported variables in weight-related research is limited. A comprehensive analysis was therefore conducted to investigate associations between parenting styles, specific parenting practices (related to eating and activity), and child weight, diet, and activity outcomes, from both the child and parent perspective. The analysis involved 175 children (aged 7 to 11) and their primary caregivers, of whom 90% were mothers. Unfortunately, due to sample size concerns fathers were not able to be included in these analyses as a group, and thus parenting, in this chapter and in Chapter 6,
was represented by the primary caregiver (predominantly mothers). In addition, the large number of variables included in the analyses precluded the use of all 12 factors of parental feeding practices as measured by the Comprehensive Feeding Practices Questionnaire. As a result, measures of those aspects of feeding found to show the most reliable associations with child eating and weight (i.e., Restriction, Pressure to eat, and Child control over eating (as a proxy for permissive feeding practices) were included (Hughes, et al., 2008; Patrick & Nicklas, 2005). Findings suggested that parenting styles and practices were uniquely associated with child outcomes. In regards to parenting style, child-reported but not parent-reported parenting style was found to be associated with child outcomes. Reliance on parent-reported parenting style in the existing literature may, in part, explain the mixed findings on the relationship between parenting styles and child weight-related outcomes.


Parenting style has been identified as an important influence on a range of child outcomes (Jackson, et al., 1998), particularly psychological outcomes. Overweight in children has been associated with a range of negative psychological outcomes, including body dissatisfaction and low self esteem (Hesketh, et al., 2004). Despite this, a strong focus in parenting style research in the obesity sphere has been upon associations with discrete child behaviours such as dietary intake and physical activity. No previous investigation has been made into associations between parenting style, child weight, and child psychological outcomes, something that is of use for clinicians and for research programs focussed on obesity prevention, as psychological factors have been shown to influence the effectiveness of interventions. This study analysed associations between child-reported parenting style, child weight, and the weight-related psychological outcomes of self-esteem and body image. The analysis involved 158 children (aged 7-11) and their primary caregivers. The difference in
sample size compared to the previous study was due to missing data on psychosocial parameters in the parent sample. Findings highlighted the importance of attending to potential problems with psychological functioning in young children who are overweight, and that parenting may prevent further negative psychological consequences from developing in children who are overweight.

Final comments on the collection of papers

Overall, the current series of papers provide a number of important insights into the relationship between parenting and the child weight-related environment. This is done through a detailed investigation of the measurement of parenting style, along with an analysis of the complex association between parenting, child behaviour, and child psychological outcomes. The findings highlight the importance of parenting for both weight-related behaviours and wellbeing in children. Moreover, they demonstrate the need to attend to child behaviours and psychological functioning in weight-related research, as these factors may predict long-term health and wellbeing outcomes for children that are broader than those predicted by the specific outcome of child weight.

For each of the papers conclusions, limitations, and implications are discussed within the manuscripts. The final chapter of this dissertation brings together the findings of each of the papers, and reframes them in accordance with the overall aims of the thesis. A model of parental associations with child weight-related outcomes is presented, informed by the findings of each of the papers contained within the dissertation, along with a discussion of overall conclusions and directions for future research.
CHAPTER 3. PAPER 1

Parenting and child body mass index: Longitudinal investigation of maternal and paternal influence.

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Carlene Wilson, Flinders University and Cancer Council South Australia

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Statement of Contributions

Amanda Taylor (Candidate)

Along with Prof. Wilson, Dr Slater, and Dr Mohr, I was responsible for the design and implementation of the research project, including the collection and management of the data. I performed all statistical analyses, interpreted the results, and wrote the manuscript, with input from all co-authors. I served as corresponding author, and took responsibility for responding to reviewers and revisions to the manuscript. I certify that the statement of contribution is accurate.

Signed:                      Date: 24/11/11
Carlene Wilson (Primary supervisor)

I oversaw the planning and implementation of this project, and have provided input into the interpretation of the results, drafts of the manuscript, and in addressing reviewers’ comments. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date: 24/11/11

Amy Slater (External supervisor)

I provided input into the design of the study, assisting in drafting and conducting revisions of the manuscript and responses to reviewers’ comments. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date: 24/11/11

Philip Mohr (Co-supervisor)

I contributed to the design of the study, interpretation of the results, and provided input on drafts of the manuscript and responses to reviewers’ comments. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date: 24/11/11
Abstract

The aim of this study was to investigate the cross-sectional and longitudinal relationships between general parenting and Body Mass Index (BMI) status of children between the ages of 4 and 7 in Australia. A nationally representative sample of 4423 children (49% female) and their parents was used for the present study. Measures of parental demandingness and responsiveness were completed by parents at child age 4-5 years. Height and weight measurements of children were taken at child age 4-5 and again at 6-7, from which BMI status was calculated. No influence of mothers’ parenting on child BMI status was shown, and fathers’ responsiveness was found to be predictive of increased risk for overweight/obesity at 6-7 years. While the present study is complicated by measurement issues, findings suggest that increased risk for overweight in young children may be associated with responsiveness in fathers. Obesity prevention programs involving parents should take into account the influence of fathers’ parenting on child BMI status.
Parenting and child body mass index: Longitudinal investigation of
maternal and paternal influence.

The incidence of obesity in Australian children has increased significantly over the past 20 years, with approximately one in four children between the ages of 5 and 15 years overweight or obese according to recent estimates (Booth et al., 2003; Booth, et al., 2007). The experience of overweight and obesity in childhood is associated with a myriad of negative consequences, both physical (such as increased risk for diabetes and liver dysfunction), and psychosocial (including social stigmatisation, lower self esteem and body dissatisfaction; Braet, et al., 1997; Dietz, 1998). Childhood obesity is also a significant risk factor for obesity in adulthood (Venn et al., 2007; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Treatment for children who are obese has been shown to produce a small size of effects, a recent Cochrane review of lifestyle interventions for obesity in children under the age of 12 years finding an overall long-term reduction of less than one standard deviation in body mass index (Oude Luttikhuis et al., 2009). In obese children, a loss of a single standard deviation in BMI, while clinically meaningful, would fail to move them into the ‘healthy’ weight range. It is thus important to identify modifiable factors in the child’s environment that contribute to the development of overweight and obesity, which can then be targeted in preventative and treatment programs.

Parental behaviour has long been accepted as a key influence on weight-related behaviours of young children (Birch & Davison, 2001; Costanzo & Woody, 1985; Patrick & Nicklas, 2005). It has also been suggested that general ‘parenting style’ may have a greater impact on child outcomes such as weight, compared to specific parenting
practices alone (Rhee, 2008). This is because parenting style represents the context under which specific practices such as feeding behaviours are presented, thereby influencing how these practices are experienced by children (Darling & Steinberg, 1993; Rhee, 2008).

A taxonomy consisting of four categories of parenting style has been developed on the basis of research undertaken with parent-child dyads in the USA (Baumrind, 1971; Maccoby & Martin, 1983). These categories reflect dichotomous categorization along two dimensions of parental behaviour, demandingness and responsiveness. Demandingness, according to Baumrind (1991), relates to the extent to which parents place clear boundaries on child behaviour, expect the child to behave appropriately within those bounds, and show willingness to confront or discipline the child who disobeys. Responsiveness refers to the extent to which parents attune to the needs and demands of their child and respond in a supportive manner.

Baumrind (Baumrind, 1971; Baumrind & Black, 1967), and subsequently Maccoby and Martin (1983), suggested that levels on these two dimensions created four categories of parenting style, as shown in Figure 1.

<table>
<thead>
<tr>
<th>High responsiveness</th>
<th>High demandingness</th>
<th>Authoritative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low responsiveness</td>
<td>Low demandingness</td>
<td>Permissive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High responsiveness</th>
<th>Authoritarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low responsiveness</td>
<td>Disengaged</td>
</tr>
</tbody>
</table>

*Figure 1*. Parenting styles (Maccoby & Martin, 1983)
The relationship between parenting style and child weight has received attention in the literature, but studies have failed to establish a clear explanation of the nature of this relationship. Authoritative parenting has been associated with decreased BMI, along with healthful behaviours such as increased physical activity and consumption of fruit and vegetables in adolescent samples (Kim et al., 2008; Lytle, et al., 2003; Schmitz, et al., 2002). In the USA and Europe, permissive parenting style has been associated cross-sectionally with increased BMI in children between the ages of 4-11 years (Humenikova & Gates, 2008; Olvera & Power, 2010). Permissive ‘feeding style’ (parenting style specific to the domain of child feeding) has also been associated with increased child BMI (Gable & Lutz, 2000; Hennessy, et al., 2010b; Hughes, et al., 2005; Hughes, et al., 2008; Moens, Braet, & Soetens, 2007). One longitudinal study found that non-authoritative (permissive, authoritarian, disengaged) parenting style in mothers at child age 4.5 years was predictive of increased BMI at child age 7 years (Rhee, et al., 2006). Other studies have, however, found no association between parenting style and child weight (Blissett & Haycraft, 2008; Brann & Skinner, 2005; Hennessy, et al., 2010b; Vereecken, et al., 2009), though these have predominantly used cross-sectional designs, older children, and involved small (n<100) samples. The only Australian study investigating this topic that employed a large, nationally representative sample reported that fathers' scores on the parenting dimension ‘control’ (equated with demandingness) was associated cross-sectionally with decreased child weight in a sample of 4-5 year-olds (Wake, Nicholson, et al., 2007). In addition, they found warm, firm, ‘authoritative’ parenting style in fathers to be protective against overweight and obesity. These findings suggest that Australian fathers’ rather than
mothers’ parenting style may influence the obesity preventing or promoting environment of their young children.

On the face of it, a finding that maternal parenting style exerted no significant influence on child weight at age 4-5 is at least partially consistent with suggestions that a lack of child autonomy over food and activity choices in the preschool years limits the opportunity for more general environmental variables such as parenting style to influence child weight (Blissett & Haycraft, 2008). From this perspective, cross-sectional research would not be expected to reveal the effects of parenting style in this age group. Indeed, as mentioned above, maternal non-authoritative parenting style at age 4.5 years has been found to predict child weight at 7 years (Rhee, et al., 2006). It is therefore important to investigate the longitudinal association between parenting and child weight in Australian families. To our knowledge, no previous study has tested the longitudinal influence of both maternal and paternal parenting on the weight status of young children.

In addition, the measures used to define parenting style in the study by Wake, Nicholson, and colleagues (Wake, Nicholson, et al., 2007) may compromise some of the conclusions made. Measures of parenting style need to effectively capture the two underlying dimensions of demandingness and responsiveness in order to accurately classify parents into four parenting style categories. It is clear, for example, that the dimension of ‘demandingness’ is intended to capture more than simple disciplinary efforts. A parent high on demandingness is not necessarily predominantly punitive according to Baumrind’s characterisation (Baumrind, 1968). The demandingness, or ‘control’ measure used in the Longitudinal Study of Australian Children (LSAC), the
dataset utilised by Wake, Nicholson, and colleagues, is a 5-item scale previously used in the National Longitudinal Survey of Children and Youth (Statistics Canada, 1995), and originally conceptualised as measuring ‘consistency’. It includes one clear demandingness item – ‘When you give this child an instruction or make a request to do something, how often do you make sure that he/she does it?’ The remaining four items are, however, concerned with punishment (e.g., (reverse scored) ‘How often is this child able to get out of punishment if s/he really sets his/her mind to it?’). The result is a measure that appears to be tapping punitive control more than demandingness. This creates difficulties for its use, both as a dimensional measure of ‘demandingness’, and for combining with responsiveness to define general ‘parenting style’. A re-examination of effects will therefore allow us to determine whether the findings of Wake, Nicholson, and colleagues regarding the influence of paternal parenting on child weight remain stable when a measure of demandingness, as conceptualised in the parenting style literature (Maccoby & Martin, 1983), is used.

The first aim of this study, therefore, was to clarify the influence of parenting on the weight of young children in Australia, utilising the same dataset employed by Wake, Nicholson, and colleagues (2007). This was done by modifying the ‘control’ measure through removal of the punishment items – resulting by necessity in a single-item measure of demandingness – and then testing the relationship between responsiveness and demandingness in mothers and fathers and weight status in children cross-sectionally at child age of 4-5 years. The second aim of the study was to investigate whether mothers’ and fathers’ parenting style at child age 4-5 predicts child weight status at age 6-7, to determine whether parenting shows greater influence on
child weight once children are older and therefore have greater autonomy. It was expected that a non-authoritative parenting style by either parent would place children at risk for the development of overweight and obesity, relative to an authoritative parenting style.

Method

Sample

The sample for the present study comprised all the children for whom height and weight data were recorded in the first two waves of the ‘Longitudinal Study of Australian Children’ (LSAC; Sanson, et al., 2002). The study involved 10,000 children and their families across two cohorts, a birth (B) cohort, involving children who were 0-1 years at the first wave of data collection, and a kindergarten (K) cohort, involving children who were 4-5 years at the first wave (Sanson, et al., 2002). For the present study, the K cohort only, consisting of 4983 children, was used. The Health Insurance Commission Medicare enrolment database was used to randomly select children for involvement in the study, and stratified cluster sampling was employed based upon postcodes (Sanson, et al., 2002). At the time of the present analysis, two waves of data had been collected, one in 2003-04 and another in 2005-06, thus data were available for the K cohort at ages 4-5 and 6-7. Further details on study methods and sampling frame have been described elsewhere (Soloff, Lawrence, & Johnstone, 2005).

Data collection procedure

The primary and secondary carer completed written questionnaires that were provided to them by study investigators. Written, informed consent was obtained by study investigators from parents for each child participating in the study, and approval
for the study was granted by the Australian Institute of Family Studies ethics committee. Approval for the present study was given by the Australian Institute of Family Studies through acceptance of the authors’ application for access to the Longitudinal Study of Australian Children dataset for the present investigation.

*Measures*

**Parenting.** The measure of parenting style for the present study was developed from items taken from two different pre-existing measures. Responsiveness was assessed by six items adapted from the “Warmth” subscale of the Child Rearing Questionnaire (Paterson & Sanson, 1999), measuring the frequency with which parents displayed warmth and affectionate behaviour toward their child (e.g., ‘How often do you have warm, close times together with this child?’).

The demandingness measure was adapted from the existing five-item scale of ‘Control’ (Statistics Canada, 1995) by the removal of all items equating control with punishment. The result was a single-item measure: ‘If you make a request of (child), how often do you make sure that he/she follows through on that request?’. This item has its origin in a validated measure of parenting, the Parent Practices Scale (Strayhorn & Weidman, 1988), designed to measure the extent to which parents exhibit consistency in placing and enforcing boundaries and expectations for control over behaviour upon their children.

A number of previous studies testing the relationship between parenting and weight have utilised a single item measure of demandingness or parental control in their study design (Berge, Wall, Bauer, & Neumark-Sztainer, 2010; Berge, Wall, Loth, et al., 2010; Faith et al., 2003; Rhee et al., 2009). While often criticised, single item
measures have been found to be acceptable for measuring general psychological constructs, particularly when compared to multi-item measures that tap a variety of discrete behaviours related to the construct (which may therefore be less cohesive; Gardner, et al., 1998; Wanous, Reichers, & Hudy, 1997). This is particularly relevant for the ‘control’ measure, where reliability analyses showed the demandingness item to have the lowest item-total correlation and squared multiple correlation for both maternal and paternal responses. Factor analysis using principal axis factoring further revealed a one-factor and two-factor structure for paternal and maternal ‘control’ respectively, with the demandingness item as the lowest-loading item ($r = .3$) in the former case and loading weakly on a 2-item factor ($r = .4$) in the latter; factor loadings for the remaining items ranged from $r = .6$ to $r = .8$ in each case. These data support the view that the single item used for the present study is measuring a construct that is sufficiently different from the punishment items to justify its separate use as a measure of ‘demandingness’.

Response options for each scale were given on a five-point Likert-type scale ranging from one (never/ almost never) to five (always/ almost always). Scale scores for the ‘responsiveness’ dimension were calculated by obtaining the mean of the items that comprised the scale.

To produce the four parenting styles (authoritative, authoritarian, permissive, disengaged), responsiveness and demandingness scores were dichotomized at the least positive tertile and then combined. This method was chosen to provide maximal similarity to the method used by Wake, Nicholson, and colleagues (2007). The single item ‘demandingness’ measure was dichotomized at ‘3’ to produce high/low scores.
This procedure resulted in approximately 20% of parents characterised as ‘low’ control and 80% as ‘high’ control as the closest approximation to the 33%:66% taxonomic cut-offs employed by Wake, Nicholson, and colleagues. High responsiveness and high demandingness was classified as ‘authoritative’, high responsiveness and low demandingness as ‘permissive’, low responsiveness and high demandingness as ‘authoritarian’, and low responsiveness and low demandingness as ‘disengaged’.

Child weight (BMI status). Children’s weight was measured in light clothing to the nearest 50g using digital scales (Code 79985, Salter; Springvale, Victoria, Australia) and height was measured to the nearest 0.1cm using a portable rigid stadiometer (Code IPO955, Invicta; Oadby, Leicester, United Kingdom) in order to calculate Body Mass Index (BMI; BMI = weight(kg)/height(m)^2). International Obesity Taskforce age and gender specific cut-offs were used to produce three BMI categories (non-overweight, overweight, obese; Cole, et al., 2000).

Covariates. A number of variables have been found to contribute independently to child BMI in the LSAC sample (Wake, Hardy, Canterford, Sawyer, & Carlin, 2007), and these were included as covariates in the present study. At the neighbourhood/geographic level, the Socio-Economic Index for Areas (SEIFA), a measure of geographically determined economic disadvantage, was included. A family covariate of structure (1 or 2 parent household) was included to account for variations in parenting according to family structure (Zubrick et al., 2007). Parent (maternal or paternal) covariates were highest completed education level (<12 years, school completion, or tertiary) and BMI status (not overweight, overweight or obese; calculated from self-reported height and weight). Child variables as reported by parents
were gender (male or female), number of siblings in the household (0, 1, 2, or 3), and language other than English (LOTE) spoken in the home by the child (yes or no). The variable of irritable parenting was included as a covariate, as this aspect of parenting may vary independently from general parenting style (Wake, Nicholson, et al., 2007). This was measured using four items taken from the National Longitudinal Survey of Children and Youth (e.g., ‘How often do you get annoyed with this child for saying or doing something he/she is not supposed to do?’; Statistics Canada, 1995). Finally, child weight status at age 4-5 years was included as a covariate in the analyses that investigated the influence of parenting at child age 4-5 years on child weight status at age 6-7 years.

Data analysis

Analyses were conducted simultaneously for both mothers and fathers, adjusting for covariates. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 17. Separate analyses were run to determine the influence of the parenting dimensions of responsiveness and demandingness and of the four parenting styles (authoritative, authoritarian, permissive, disengaged) on child weight. The influence of parenting at age 4-5 on child weight at 4-5 years and at 6-7 years was investigated.

The SPSS complex samples add-on module was used for analyses in order that appropriate weights could be applied to take into account study design and response patterns. SPSS missing values analysis add-on module was also used to conduct multiple imputation of missing maternal data. Maternal BMI status (24.8% missing), maternal education (0.9% missing), and maternal parenting variables of warmth (1.5% missing),
control (1.2% missing), and irritability (1.6% missing), were imputed. Estimates from multiple imputations were pooled to produce a single set of results. No paternal variables were imputed due to high prevalence (>30%) of missing values.

Ordinal regressions utilizing the proportional odds model were conducted to test the relationship between parenting and the odds of a child being in a higher weight category. The criterion for rejection of the null hypothesis was set as $p<.05$.

Results

BMI data were available for 4934 children in Wave 1, and 4423 children in Wave 2 of data collection. In Wave 1, 49.1% were female, 15.2% were overweight and 5.2% were obese. 87.5% of children lived in two parent households, and English was the predominant language in the household for 86.0% of children. In Wave 2, 49.0% of children were female, 13.3% were overweight and 5.4% were obese. 85.2% of children had 2 parents in the home, and 88.4% spoke English as the predominant language in the home. Descriptive statistics for maternal and paternal parenting variables at Wave 1 are presented in Table 1.
Table 1. Descriptive statistics for parent variables at child age 4-5 years.

<table>
<thead>
<tr>
<th>Parenting dimensions (range 1-5)</th>
<th>Mothers</th>
<th>Fathers</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>4902</td>
<td>3392</td>
</tr>
<tr>
<td>% or Median (IQR)</td>
<td>4.5 (4.2-4.8)</td>
<td>4.2 (3.7-4.5)</td>
</tr>
<tr>
<td>Demandingness</td>
<td>4.0 (4.0-5.0)</td>
<td>4.0 (4.0-5.0)</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>2.0 (1.8-2.5)</td>
<td>2.3 (1.8-2.8)</td>
</tr>
<tr>
<td>Irritability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parenting styles</th>
<th>Mothers</th>
<th>Fathers</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>4902</td>
<td>3387</td>
</tr>
<tr>
<td>Authoritative</td>
<td>58.6</td>
<td>54.5</td>
</tr>
<tr>
<td>Authoritarian</td>
<td>26.7</td>
<td>28.2</td>
</tr>
<tr>
<td>Permissive</td>
<td>8.5</td>
<td>9.7</td>
</tr>
<tr>
<td>Disengaged</td>
<td>6.3</td>
<td>7.6</td>
</tr>
</tbody>
</table>

Ordinal regressions were used to investigate the influence of parenting (maternal and paternal) on child weight status. A number of covariates were significantly associated with child weight status. Child gender was associated with differential risk for overweight or obesity, with girls at increased risk relative to boys, OR (boys) = .703, p<.01. Increased maternal and paternal weight status were both associated with increased risk for overweight/obesity in children, OR (mother) = 1.51, OR (father) = 1.47, p<.001.
Summary statistics for maternal and paternal parenting dimensions and parenting styles for child weight at 4-5 years are presented in Table 2. Odds ratios were calculated for the association between parenting and child weight status, adjusting for covariates.
Table 2. Ordinal regression results for maternal and paternal parenting dimensions and parenting style and child weight at child age 4-5 years.

<table>
<thead>
<tr>
<th>Parenting model</th>
<th>Population value according to child BMI status (IQR or %)</th>
<th>Adjusted model*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not overweight</td>
<td>Overweight</td>
</tr>
<tr>
<td>Parenting dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers’ responsiveness</td>
<td>4.5 (4.2-4.7)</td>
<td>4.5 (4.2-4.7)</td>
</tr>
<tr>
<td>Mothers’ demandingness</td>
<td>4.4 (4.0-4.6)</td>
<td>4.4 (4.0-4.6)</td>
</tr>
<tr>
<td>Fathers’ responsiveness</td>
<td>4.1 (3.7-4.5)</td>
<td>4.0 (3.7-4.5)</td>
</tr>
<tr>
<td>Fathers’ demandingness</td>
<td>4.0 (4.0-5.0)</td>
<td>4.0 (4.0-5.0)</td>
</tr>
<tr>
<td>Mothers’ style</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authoritative</td>
<td>50.3 (48.6-51.9)</td>
<td>51.4 (47.3-55.5)</td>
</tr>
<tr>
<td>Authoritarian</td>
<td>27.2 (25.8-28.7)</td>
<td>27.0 (23.5-30.8)</td>
</tr>
<tr>
<td>Permissive</td>
<td>13.3 (12.2-14.5)</td>
<td>11.9 (9.4-14.8)</td>
</tr>
<tr>
<td>Disengaged</td>
<td>9.2 (8.3-10.2)</td>
<td>9.7 (7.5-12.4)</td>
</tr>
<tr>
<td>Fathers’ style</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authoritative</td>
<td>55.0 (53.1-56.9)</td>
<td>49.9 (44.9-54.9)</td>
</tr>
<tr>
<td>Authoritarian</td>
<td>28.1 (26.4-30.0)</td>
<td>33.1 (28.5-38.0)</td>
</tr>
<tr>
<td>Permissive</td>
<td>8.8 (7.7-9.9)</td>
<td>10.8 (8.0-14.3)</td>
</tr>
<tr>
<td>Disengaged</td>
<td>8.1 (7.1-9.2)</td>
<td>6.3 (4.2-9.2)</td>
</tr>
</tbody>
</table>

*Covariates included in adjusted model: child gender, LOTE spoken by child in the home (yes/no), child weight status at 4–5 years, maternal/paternal weight status, maternal/paternal education, parent irritability, presence of two parents in the household, number of siblings in the household, and SEIFA index (population quintiles).
No aspect of maternal parenting measured in the present study was associated with child weight at 4-5 years. Paternal parenting dimensions of responsiveness and demandingness also showed no significant association with child weight. Paternal parenting style did, however, show a trend toward significant relationship with child weight. Relative to authoritative fathers, permissive fathers placed their child at 61% increased risk for being in a higher weight category, OR = 1.61, 95% confidence interval (CI): 1.16-2.43. Children of authoritarian and disengaged fathers were at no greater risk for overweight or obesity relative to children of authoritative fathers.

In order to investigate the longitudinal influence of parenting on child weight, child BMI status at age 6-7 years was regressed onto parenting variables and covariates at child age of 4-5 years. Significant covariate predictors of child weight were child weight status at age 4-5 years, which was strongly associated with increased risk for higher weight category status at age 6-7 years, OR= 23.01, p<.001. Increased maternal and paternal weight status were both associated with increased risk for overweight/obesity in children, OR (mothers) = 1.61, OR (fathers) = 1.29, p<.02. Finally, increased levels of maternal and paternal education were associated with decreased risk for overweight/obesity in children, OR (mothers) = .826, OR (fathers) = .866, p<.05. The results of the multivariate investigation into parenting and child weight are presented in Table 3.
Table 3. Ordinal regression results for maternal and paternal parenting dimensions and parenting style at child age of 4-5 years and child weight at age 6-7 years.

<table>
<thead>
<tr>
<th>Parenting model</th>
<th>Population value according to child BMI status (IQR or %)</th>
<th>Adjusted model*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not overweight</td>
<td>Overweight</td>
</tr>
<tr>
<td>Parenting dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers’ responsiveness</td>
<td>4.5 (4.2-4.7)</td>
<td>4.5 (4.2-4.7)</td>
</tr>
<tr>
<td>Mothers’ demandingness</td>
<td>4.4 (4.0-4.6)</td>
<td>4.4 (4.0-4.6)</td>
</tr>
<tr>
<td>Fathers’ responsiveness</td>
<td>4.1 (3.7-4.5)</td>
<td>4.0 (3.7-4.5)</td>
</tr>
<tr>
<td>Fathers’ demandingness</td>
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<td>4.0 (4.0-5.0)</td>
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<td>Mothers’ style</td>
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<td>51.4 (47.3-55.5)</td>
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<td>Authoritarian</td>
<td>27.2 (25.8-28.7)</td>
<td>27.0 (23.5-30.8)</td>
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<td>13.3 (12.2-14.5)</td>
<td>11.9 (9.4-14.8)</td>
</tr>
<tr>
<td>Disengaged</td>
<td>9.2 (8.3-10.2)</td>
<td>9.7 (7.5-12.4)</td>
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<tr>
<td>Fathers’ style</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authoritative</td>
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</tr>
</tbody>
</table>

*Covariates included in adjusted model: child gender, LOTE spoken by child in the home (yes/no), child weight status at 4–5 years, maternal/paternal weight status, maternal/paternal education, parent irritability, presence of two parents in the household, number of siblings in the household, and SEIFA index (population quintiles).
Of the parenting dimensions, only paternal responsiveness was significantly associated with child weight status at age 6-7. Increased paternal responsiveness was associated with 54% increased risk for the child being in a higher weight category, OR = 1.54, 95% CI: 1.16-2.06. When the combined multivariate model for maternal and paternal parenting style was tested, neither maternal nor paternal parenting style showed a significant influence on child weight at age 6-7 years.

Discussion

The present study provides preliminary evidence that general parenting style, as far as can be determined by measures employed in LSAC, may have little influence on child weight status across the ages of 4-7 years, but that paternal responsiveness and possibly permissiveness may be associated with increased risk for child overweight. The modified measure of paternal demandingness as a parenting dimension did not, however, show the significant negative association with child overweight observed for the ‘control’ measure used in the study by Wake, Nicholson, et al. (2007).

Consistent with previous findings in the literature, parental education and weight status were found to be associated with child weight status. Child gender was also found to be associated with weight status cross-sectionally, but not longitudinally. Nonetheless, the findings of the present study with regards to the influence of parenting on child weight were retained once these covariate predictors were controlled for.

The present study found a trend toward significant cross-sectional association between paternal permissiveness and risk for overweight obesity, which was in a similar direction to the findings of Wake, Nicholson et al. (2007). Their major finding,
however, that paternal control may result in decreased risk of overweight in children was found to be equivocal. When the four items invoking punishment are removed from the measurement of ‘Control’, the association with child weight status goes with them. The absence of a unique effect for demandingness on child weight indicates that the findings of Wake, Nicholson, and colleagues in regard to the protective influence of paternal control on child weight, may have related to paternal punitiveness\(^2\). The reason for this finding is unknown. It is possible that this punitiveness may result in parenting practices that prevent the child from engaging in behaviours that place them at risk of overweight and obesity. It is also possible that mothers are countering paternal punitiveness in a way that is protective against overweight in children but is not captured by the measures in the present study.

When the longitudinal influence of parenting was assessed two years later in children aged 6-7, paternal responsiveness was found to be predictive of child weight in an unexpected direction: increased paternal responsiveness at age 4-5 resulted in increased risk of overweight or obesity at age 6-7. No maternal parenting variables showed an influence on child weight, nor did paternal parenting style.

Parental responsiveness, in combination with demandingness has previously been found to be protective against the development of obesity (Rhee, et al., 2006; Wake, Nicholson, et al., 2007). The findings of the present study are therefore at odds with previous literature. However, the present study may have been limited by the use of a single item measure of demandingness. While the use of this measure was necessary given the inappropriateness of the alternative, punitively focussed multi-item measure,\(^2\) This was confirmed by analyses (not reported) in which substituting the punitiveness items for demandingness yielded a significant effect for paternal punitiveness on child weight as expected.
it is possible that it was still not sufficient to capture the complex construct of demandingness. It cannot be ruled out, therefore, that the finding of increased risk of overweight associated with paternal responsiveness relates instead to paternal permissiveness (i.e., the combination of high responsiveness and low demandingness). This is consistent with the findings of previous literature, which suggest that an association exists between permissive parenting and both child weight as well as ‘at risk’ behaviours for the development of overweight and obesity in children and adolescents (Gable & Lutz, 2000; Hennessy, et al., 2010b; Hughes, et al., 2005; Hughes, et al., 2008; Humenikova & Gates, 2008; Moens, et al., 2007; Olvera & Power, 2010; Van Der Horst, Kremers, et al., 2007).

There are a number of possible explanations for the present finding that parenting style exerts limited effect on child weight status. A recent study employing a sample of 11 year old Belgian children found that parent-reported parenting style was not significantly related to child dietary intake or parent-reported child weight status (Vereecken, et al., 2009). These authors concluded that general parenting style may be too broadly defined to have the sensitivity to show influences on outcomes as specific as dietary intake or child weight status. It is also possible that using a broadstroke approach to measuring parenting style may mask underlying relationships. The suggestion by Costanzo and Woody (1985) that parents may employ differing styles of parenting practices across domains of parenting according to level of concern for the outcomes for their child has been substantiated in the area of child feeding. It has been found, for example, that mothers exert increased restrictive control over their children’s eating when concerned about their own and their child’s risk for overweight (Birch & Fisher,
It is possible, therefore, that by ignoring parenting practices that may be more domain specific, important influences of parenting on child weight are missed. It has also been suggested that the findings on the relationship between general parenting and child weight are equivocal because parents are unable to impact on child weight directly (Ventura & Birch, 2008). Rather, the influence of parenting is likely to operate through child behaviours such as eating and activity that subsequently increase or decrease the risk of child overweight or obesity (Ventura & Birch, 2008). Future studies should therefore also include measures of child eating and activity along with child weight, in order to test whether such child behaviours mediate the relationship between parenting and child weight.

The present study was limited by measurement issues, most notably the reliance on a single item to assess a construct of primary interest, as previously discussed. Future studies should compare the outcomes associated with this single measure to a more comprehensive measure of demandingness designed specifically to capture this construct, as opposed to a related but conceptually different parenting construct such as ‘control’ or ‘punitiveness’.

Finally, measuring parenting using only self-reported parenting measures presents problems, which may in part explain the small size of effects found in the present study. Although parental self-report is widely used in the literature on parenting, it is vulnerable to a range of biases (Haines, et al., 2008). Parent reports of their own behaviour have been found to be limited in their ability to predict child outcomes when compared to child-report or observational methods of parenting.
assessment (Sessa, et al., 2001). Some authors have suggested that in research for which
the primary aim is to evaluate parental influence on child outcomes, children’s
perceptions may be more important than what parents say about their own behaviours
(Tein, Roosa, & Michaels, 1994). Studies specifically investigating the influence of
parenting on child weight have found child report of parent behaviour to show stronger
associations with child weight and eating behaviour than does parent-reported parenting
(Haines, et al., 2008; Keery, Eisenberg, Boutelle, Neumark-Sztainer, & Story, 2006).
Future research would benefit from the inclusion of both child and parent report of
parenting behaviour, in order to clarify their influence on child outcomes. In younger
(i.e., preschool) children, who may have difficulty reporting accurately on parenting
behaviour, the use of observational methods of parenting measurement may also be
appropriate.

Despite its limitations, the implications of the present study are twofold, in that
it clarifies the findings of Wake, Nicholson, et al. (2007) and provides suggestions for
future research. We concur with Wake, Nicholson, and colleagues’ suggestion that
fathers are important influencers of child outcomes and should be included in all such
research. Their finding that paternal control shows a unique protective influence against
overweight appears, however, to be related to paternal punitiveness. The aetiology of
the relationship between paternal punitiveness and decreased risk for overweight in
children is unclear and warrants further investigation. That paternal warmth places a
child at increased risk for obesity by age 6-7 was a surprising finding, but may reflect
paternal permissiveness, which has previously been shown to predict increased weight
in children of this age (Rhee, et al., 2006). These findings do not necessarily negate the
suggestion that warm, firm parenting produces positive outcomes in children, but do
provide support for the suggestion that permissiveness, particularly in fathers, should be
cautions against, particularly for families in which a young child is at risk of developing
overweight and/or obesity.
CHAPTER 4

Mothers’ and fathers’ parenting and child weight-related behaviours

Overview

The present investigation was designed in response to an identified need to analyse the measurement of maternal and paternal parenting styles. Many investigations of associations between maternal and paternal parenting style and child weight outcomes have utilised measures that were not originally designed to measure the constructs that comprise the most widely-held conceptualisation of parenting style: parental demandingness and responsiveness (Maccoby & Martin, 1983). The present study aimed to redress this problem by investigating parenting style associations with child weight and weight-related behaviours (i.e., dietary intake, physical activity, and sedentary behaviour), using both a measure designed to capture parental demandingness and responsiveness, alongside measures of similar constructs (parental warmth and control) that have been used in the literature to operationalise parenting style (e.g., Wake, Nicholson, et al., 2007).

Parenting style and child weight-related behaviours

Few studies have examined the relationships between both maternal and paternal parenting and child weight-related outcomes (Morgan et al., 2011). Although mothers generally have the main responsibility for child care, changing labour arrangements have increased the father’s input in parenting (Coltrane, 1994; Craig & Sawrikar,

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1 Note to the reader: The previous paper (Chapter 3) labelled parenting style measures used in the Longitudinal Study of Australian Children (LSAC) as responsiveness and demandingness. The original label names for these scales, as used in LSAC were warmth and control. For the purpose of clarity, in this chapter the parenting measures used in the LSAC study will be referred to as warmth and control, and the scales of the Authoritative Parenting Index will be labelled responsiveness and demandingness, which is the original label name for these scales.
with fathers exerting increasing influence on the child’s environment. Researchers have responded to this, finding evidence for unique paternal influence on a variety of child outcomes, including emotional development and school commitment (Simons & Conger, 2007), cognitive development (Lewis & Lamb, 2003), and mental health (Adamsons & Buehler, 2007). In the obesity sphere, however, mothers remain the focus for studies of parenting. Some studies have involved fathers, but these have tended to focus on either pre-school children or adolescents. Children in middle-childhood are of specific interest in terms of parenting and weight-related outcome research; they remain influenced by parents but are starting to become more autonomous with regards to food and activity choices. Greater opportunity therefore exists for general parenting variables such as demandingness and responsiveness to influence child weight-related behaviours in this age range compared to preschool-aged children who have minimal autonomy over food choices (Blissett & Haycraft, 2008), or adolescents who may not be reliably influenced by parents in relation to food and activity choices. In order to provide context to the current investigation, findings from pre-school and adolescent samples will first be reviewed, followed by a more detailed coverage of the few studies that have investigated the age range of interest.

Findings in preschool and adolescent samples

A number of studies have investigated parenting and adolescent weight, eating, and activity. One study found that mothers’ but not fathers’ parenting was associated with weight in an adolescent sample, with the combination of high demandingness and high responsiveness in mothers predicting lower adolescent Body Mass Index (BMI; Berge, Wall, Loth, et al., 2010). It has also been found that the combination of high
responsiveness and high demandingness from both parents was associated with healthy weight in adolescents (Kim, et al., 2008).

Examination of dietary choices among adolescents has identified some evidence of parental influence. For example, fathers’ permissiveness (high responsiveness, low demandingness) correlated positively with daughter’s fruit and vegetable intake, whereas mothers’ authoritative parenting (high responsiveness, high demandingness) correlated with higher adolescent fruit and vegetable intake (Berge, Wall, Loth, et al., 2010). Further ambiguity in the data examining parenting predictors of adolescent diet is evident in a study that indicated that fathers’ authoritarian parenting (low responsiveness, high demandingness) predicted higher fruit and vegetable consumption (Lytle, et al., 2003). Thus healthy dietary behaviour among adolescents has been associated with permissive, authoritative, and authoritarian parenting by mothers and fathers; this result provides no useful guidance for parents.

Parenting has also been found to be an important influence on adolescent activity. A review of environmental determinants of children’s physical activity suggested that fathers appear to be more important role models than mothers (Ferreira et al., 2007). One study found an association between mothers’ authoritative parenting style and increased physical activity in daughters (Schmitz, et al., 2002), while other studies have found no significant association between parenting style and child or adolescent physical activity or sedentary behaviours (Berge, Wall, Loth, et al., 2010; Gable & Lutz, 2000). Overall, findings of research involving adolescent samples indicate that parenting style is associated with a range of weight-related behaviours,
although not in a consistent way, and that both mothers’ and fathers’ parenting styles are important influencers of the child weight-related environment.

As reported in Chapter 3, fathers’ and not mothers’ parenting has been found to be associated with child weight in preschool and early primary school aged Australian children. Increased ‘control’ (equated with demandingness) in fathers was cross-sectionally associated with decreased risk for overweight and obesity (Wake, Nicholson, et al., 2007), although as shown in Chapter 3, these associations appear to be related to punitive parenting rather than control or demandingness as defined more broadly. The longitudinal analysis conducted in Chapter 3 further indicated that fathers’ responsiveness, or possibly permissiveness (high responsiveness, low demandingness), was associated with increased risk for overweight and obesity. That mothers’ parenting showed no significant associations with child weight was particularly surprising because a previous study utilising observational measures of demandingness and responsiveness found non-authoritative parenting to be associated with 2 to 5 times increased risk for overweight and obesity by age 7 (Rhee, et al., 2006). Finally, one study involving preschool children (mean age 3.5 years) found no evidence for an association between parenting style and child BMI (Blissett & Haycraft, 2008).

Parenting style and child weight-related outcomes in middle childhood

A recent review of parenting styles and child weight-related outcomes identified only three studies in the middle childhood years that involved both mothers and fathers (Sleddens, et al., 2011). All three of these studies used different conceptualisations for parenting style. One utilised a dimensional taxonomy based on Baumrind’s original parenting style categories (authoritative, authoritarian, and permissive) with a small
sample \((n=53)\) of mothers and fathers of children of mean age 9 years, and found no associations between parenting style and child body mass index (BMI; Brann & Skinner, 2005). A second study involved 104 parents of children of a wide range of ages (grades 1 to 8) and used a measure of parental ‘nurturance’ and ‘restrictiveness’ (Ludrosky, 2005). This study found associations between maternal nurturance and lower fat and calorie content of home-packed school lunches, while paternal nurturance was associated positively with physical activity. Paternal restrictiveness was positively correlated with child BMI, and extra fat and calories eaten from school food purchases, whereas maternal restrictiveness was not associated with weight, eating, or activity outcomes (Ludrosky, 2005).

Problems with the definition and operationalisation of constructs are evident in the research described above. ‘Restrictiveness’ cannot be used to approximate ‘demandingness’ because it has a largely negative control connotation. Demandingness is intended to describe the broader use of structure and boundaries to guide children’s behaviour rather than being limited to simple restrictiveness. Describing parents high in restrictiveness as ‘authoritative’ is not consistent with the original conceptualisation of authoritativeness. It is important, therefore, to be cautious about making interpretations linking these findings with other conceptualisations of parenting style. A large study in Germany \((n=432)\) used a child-report measure of maternal and paternal warmth, psychological pressure, and parental demands/control, with cluster analysis used to assign parents to four parenting styles (authoritative, authoritarian, permissive, neglectful). For example, the combination of relatively higher levels of warmth and demand/control, and lower levels of psychological pressure represented
authoritativeness, whereas the combination of high psychological pressure, moderate
demands/control and low warmth represented authoritarian parenting. The findings
showed that relative to an authoritative parenting style, non-authoritative parenting in
both mothers and fathers negatively predicted an index of ‘positive health behaviours’,
which included physical activity and healthy dietary intake, but also consisted of hygiene
and health care (Lohaus, Vierhaus, & Ball, 2009).

Measurement of parenting

An increasing tendency in the literature is to use large, omnibus studies to study
relationships between parenting and child weight-related outcomes. These studies are
typically designed to measure a broad range of factors pertinent to the child including
the family environment, the physical environment, and the academic environment, and
test associations between these factors and a wide range of child outcomes (e.g., health,
academic, social, psychological). As they consist of such a large number of variables,
along with large numbers of participants, a wide range of potentially confounding
variables are able to be controlled for, thus they are appealing to researchers who want
to develop a comprehensive understanding of posited influences on child outcomes.
However, due to the number of variables studied, the opportunity to study each
measured construct in detail is limited. The measures used therefore need to be brief,
in some cases based on a single item or two item measure (e.g., Berge, Wall, Loth, et
al., 2010). This has implications for the measurement of complex constructs such as
those that comprise parenting style, as it may be unlikely for such brief measures to
capture all aspects of that construct. No investigations have been made into the
construct validity of these measures through comparison with an existing measure of
the construct. This is important to ensure that conclusions made based upon these measures are reliable.

Summary

In summary, the existing literature is unclear with regards to the influence of mothers’ and fathers’ parenting on child weight-related behaviours. No previous study has investigated the differential associations between different measures purported to be measuring the same construct of parenting styles, and weight-related outcomes in children of the middle childhood years.

Chapter aims

The study contained within this chapter builds on existing literature by investigating associations between mothers’ and fathers’ parenting style and child weight-related behaviours across both sides of the energy equation. The analysis also included an investigation of whether a measure used as equivalent to demandingness and responsiveness (Wake, Nicholson, et al., 2007, Chapter 3), but not designed for this purpose, performs in a similar way to a scale explicitly designed to measure these constructs.

It was expected that demandingness and responsiveness would be positively associated with healthy weight-related behaviours (fruit and vegetable intake, physical activity) and negatively associated with unhealthy weight-related behaviours (non-core food intake, sedentary behaviour). It was further hypothesised that both mothers’ and fathers’ parenting would show associations with child outcomes. Consistent with the
longitudinal findings from Chapter 3, it was thought that fathers’ warmth would be associated with higher child weight, but paternal responsiveness was not expected to show this association.

Method

Participants

Participants were recruited from primary schools across South Australia. Thirty-nine schools were approached for participation, and ten schools agreed to participate in the study. Consent forms were sent to the parents of students in Years 3 to 5 (total: 1278). Of these, 252 children and primary caregivers, and 123 secondary caregivers agreed to participate. Questionnaires were sent to all parents who gave consent to participate. Questionnaires were returned by 190 primary caregivers (91.1% female) and 76 secondary caregivers (88.3% male), producing a response rate of 76.4% for primary caregivers and 61.8% for secondary caregivers. This consisted of 178 mothers (95.6% primary caregiver), 85 fathers (80.0% secondary caregiver), and 233 children. All questionnaire measures were completed by parents, and weight and height measurements were taken of children, from which body mass index was calculated.

Measures

Parenting

Two separate measures were used to characterise parenting style in the present study. The first was a validated measure, designed for the purpose of measuring the dimensions of responsiveness and demandingness (Jackson, et al., 1998). The second involved brief measures of two parenting dimensions that have been used as proxies for
responsiveness and demandingness in previous studies investigating the relationship between parenting and child weight; warmth and control (See Chapter 3; Wake, Nicholson, et al., 2007).

**Authoritative Parenting Index (API).** The API was chosen because it was designed to measure the underlying dimensions that comprise parenting style. It has been used to determine parenting style associations with a range of child outcomes including smoking, health behaviours, and dietary intake, and has been found to be appropriate for use with children from the age of approximately 8 years (Jackson, et al., 1998). Modifications to the original, child-report measure were made so that it could be used for parent-report. These consisted of wording changes, for example from ‘He/she makes rules without asking what I think’ to ‘I make rules without seeking input from my child’. The changes were pilot tested successfully with a small sample of parents \(n=3\), ensuring that wording was appropriate and the measure was easy to complete.

The API consists of two scales: Responsiveness, which is comprised of nine items (e.g., ‘I comfort my child when he/she is upset’), and Demandingness, which consists of seven items (e.g., ‘I have rules that my child must follow’). Response options for each item were on a Likert-type scale that ranged from 1 (not like me) to 4 (exactly like me). Three items were removed from the ‘responsiveness’ scale after reliability analysis revealed low item-total correlations, and internal consistency was improved for this scale following removal of these low-loading items. Internal consistency for the revised responsiveness scale in the present sample was \(\alpha=0.72\) and \(\alpha=0.73\) for mother-report and father-report respectively. Alpha values for the demandingness scale were \(\alpha=0.69\) and \(\alpha=0.64\) for mothers and fathers respectively.
Parental warmth and control These scales measure two aspects of parenting: Warmth and Control, which have been equated with the dimensions demandingness and responsiveness (Chapter 3; Wake, Nicholson, et al., 2007). The Warmth measure consists of six items taken from the Child Rearing Questionnaire (e.g., ‘How often do you have warm, close times together with this child?’; Paterson & Sanson, 1999). The Control measure consisted of a single item taken from the Parent Practices Scale (‘When you give this child an instruction or make a request to do something, how often do you make sure that he/she does it?’; Strayhorn & Weidman, 1988). Responses were given on a 5 point Likert-type scale ranging from 1 (never/almost never) to 5 (always/almost always). Scale scores for the warmth measure were calculated by taking the mean of the six scale items. The range of possible responses was therefore 1 to 5. Internal consistency values for the warmth scale in the present sample was $\alpha=0.85$ for mothers and $\alpha=0.90$ for fathers. Internal consistency for the control measure could not be calculated due to its single-item nature.

The dimensions of responsiveness and demandingness or warmth and control are typically dichotomised via median split and combined to categorise parents into four styles (i.e., authoritative, authoritarian, permissive, uninvolved). There exists, however, a myriad of difficulties associated with this practice, including a lack of standard definition for identifying an appropriate “cut-point” for dichotomisation, loss of meaning through the arbitrary transformation of a continuous construct into a categorical variable, risk for overestimation of effect sizes, and reduction in measurement reliability (MacCallum, Zhang, Preacher, & Rucker, 2002). In order to avoid these problems, we retained the dimensional scales for analyses of parenting.
**Child behaviours**

**Diet** Child diet was assessed using the fruit, vegetable, and non-core food intake sections of the parent-reported Children’s Dietary Questionnaire (CDQ; Magarey, Golley, Spurrier, Goodwin, & Ong, 2009). This measure records child food intake over a 24-hour period via five items that record frequency of fruit and vegetable intake and 13 items measuring non-core food intake (e.g., potato chips, chocolate, ice-cream). The CDQ is based upon the Australian Dietary Guidelines (NHMRC, 2003) and recent data on dietary intake in Australian children (Bell, Kremer, Magarey, & Swinburn, 2005). It has been used with parents of children between 5 and 16 years and has been shown to have acceptable reliability, with internal consistency values at or above $\alpha=0.6$ (Magarey, et al., 2009). Response format consisted of a seven-point Likert-type estimation scale (0 1 2 3 4 5 6+ times).

**Activity** The measure of activity was adapted from the Time Use Diary of the Longitudinal Study of Australian Children (Baxter, 2007). This parent-report measure estimates children’s time use over the previous 24 hours across a range of activities such as leisure, sleeping/resting, self-care, and travel. Given that the activities of interest for the present study consisted of physical activity and sedentary activities, only items pertaining to these activities were used. Items that comprised the scale Sedentary Behaviour (SB) were ‘Watched television, DVD, movie’, ‘Used computer’, ‘Used electronic games system, and ‘Listened to tapes, CDs, radio, music’. Physical Activity (PA) was comprised of ‘Walk for fun or travel’, ‘Ride bicycle, trike, etc’, ‘Other exercise (swim, dance, run about)’, and ‘Organised sport’. Response format was modified from the original 15 minute interval time use diary format to a Likert
response scale for each activity, with response options of none, less than 30 minutes, 30 minutes–1 hour, 1-2 hours, and more than 2 hours.

Child Body Mass Index (BMI)

Objective measurements were taken of child height and weight. Height measurements were taken without shoes to the nearest 0.5cm. Weight measurements were taken in light clothing and without shoes, to the nearest 100grams. These were then used to calculate child BMI, defined as weight(kg)/height(m)^2. For all analyses, standardised BMI score was used (BMI z-score; BMIz), which was adjusted for child age and gender in accordance with International Obesity Taskforce criteria (Cole, et al., 2000).

Covariates

Parental education consisted of a single item taken from the demographic questionnaire administered in the Longitudinal Study of Australian Children (Australian Institute of Family Studies, 2008) – ‘What is the highest level of education you have completed?’ Both mothers and fathers responded to this question. Nine response options were given, ranging from 1 (primary school) to 9 (postgraduate degree).

Parent weight status and child gender were also included as covariates because these variables have been shown to relate significantly to child BMI (Whitaker, et al., 1997) and parenting (Berge, Wall, Bauer, et al., 2010; Blissett, Meyer, & Haycraft, 2006). Height and weight were reported by parents to the nearest kilogram and centimetre respectively. These reported values were then used to calculate parent BMI, defined as weight(kg)/height(m)^2.
Statistical analysis

All analyses were conducted using PASW Statistics, version 18.0.0 (SPSS Inc., Chicago IL, 2009). Analyses were conducted separately for mothers and fathers, adjusting for covariates. Given the focus of the present analysis was testing the effect of multiple continuous predictors on continuous outcomes, multiple regression was indicated as a robust analysis method. However, because the present analysis involves testing for the effect of each individual predictor, a sample size of 104 plus \( k \) is recommended, with \( k \) representing the number of variables in the regression analysis (Green, 1991). In this instance, with four parenting variables and three covariates, a sample size of at least 111 was necessary for the model to be reliably estimated. This requirement was met for the sample of mothers, but not for fathers. Consequently, multiple regression analyses were conducted for maternal data, adjusting for covariates of parent BMI, parent education and child gender. For paternal data, partial correlations were conducted, adjusting for the same set of covariates. Criterion for rejection of the null hypothesis for all analyses was set at \( p < .05 \).

The measures of responsiveness and demandingness were significantly negatively skewed for both mothers and fathers in the present sample. Reflected square-root transformations were therefore conducted on Authoritative Parenting Index scales for both mothers and fathers thereby allowing these variables to meet assumptions of normality of distribution.
Results

Sample characteristics

Children were of mean age 9.28 years (range 7-11), and were 52.8% female. Mean BMI for girls was 17.88 (SD=2.46) and for boys was 18.00 (SD=3.04). According to International Obesity Taskforce standards (Cole, et al., 2000), 17.9% of children in the present sample were overweight and 4.8% were obese. This is comparable to recent estimates for Australian children, with mean prevalence estimates at 18.1% (overweight) and 7.2% (obese) in children aged 7-12 years (Booth, et al., 2007).

Summary descriptive characteristics for parents are presented in Table 1. Fathers were significantly older ($t(70)=5.30$, $p<.001$) and heavier ($t(65)=4.32$, $p<.001$) than mothers. In the present sample, overweight and obesity levels in fathers were comparable to Australian adult overweight and obesity prevalence estimates based upon self reported height and weight, which are 42.1% and 25.6% for overweight and obesity respectively (Australian Bureau of Statistics, 2009). Levels of overweight and obesity in mothers of the present sample were considerably lower than Australian prevalence estimates (see Table 1). No differences in education level were shown between fathers and mothers, $p=.097$. 

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Table 1. Descriptive characteristics for parent sample

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) or %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mothers (n=179)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40.41 (4.99)</td>
</tr>
<tr>
<td>BMI</td>
<td>25.50 (4.88)</td>
</tr>
</tbody>
</table>

**Weight status**
- not overweight: 53.5 vs. 32.5
- overweight: 28.8 vs. 45.8
- obese: 17.6 vs. 21.7*

**Education**
- % Tertiary (University): 50.6 vs. 53.9

**Authoritative Parenting Index**
- Responsiveness (range: 6-24): 21.02 (2.82) vs. 20.55 (2.81)
- Demandingness (range: 7-28): 25.23 (2.50) vs. 23.57 (3.01)*

**Child Rearing Questionnaire**
- Warmth (range: 1-5): 4.29 (0.51) vs. 3.94 (0.70)*
- Control (range: 1-5): 4.39 (0.88) vs. 4.31 (0.76)

* denotes a significant difference (p<.05) according to parent gender.

There were significant differences between mothers and fathers on measures of parenting. Mothers were higher on demandingness than fathers, as measured by the Authoritative Parenting Index, $t(67)=4.61$, $p<.001$. Mothers were also significantly more warm than fathers, as measured by the Child Rearing Questionnaire, $t(69)=3.82$, $p<.001$. 
$p < .001$. No differences were shown according to parent gender on the measures of responsiveness ($p = .136$) or control ($p = .192$).

Maternal education was positively correlated with warmth ($r = .16, p = .033$), and responsiveness ($r = .17, p = .030$). Fathers’ parenting was not significantly associated with their education. There were no differences shown on parenting measures according to child gender, and parent BMI did not show significant associations with parenting measures.

Warmth was significantly positively correlated with responsiveness for both mothers and fathers; $r = .47$ for both. Responsiveness was also positively correlated with demandingness for both mothers and fathers; $r = .26, p < .001$, and $r = .31, p = .004$ respectively. Demandingness was positively correlated with warmth for mothers ($r = .24, p = .001$), but not for fathers ($r = .182, p = .104$). No correlations were evident between control and demandingness for mothers or fathers.
Table 2. *Multiple regression analysis results for maternal sample.*

<table>
<thead>
<tr>
<th>Predictor variables</th>
<th>Child BMIz</th>
<th>Child fruit and veg</th>
<th>Child non-core food</th>
<th>Child Physical Activity (PA)</th>
<th>Child Sedentary Behaviour (SB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal responsiveness</td>
<td>-.07</td>
<td>-.12</td>
<td>-.19</td>
<td>-.15</td>
<td>-.23*</td>
</tr>
<tr>
<td>Maternal demandingness</td>
<td>-.09</td>
<td>.02</td>
<td>.08</td>
<td>-.08</td>
<td>.03</td>
</tr>
<tr>
<td>Maternal warmth</td>
<td>.14</td>
<td>.05</td>
<td>-.09</td>
<td>.23*</td>
<td>.13</td>
</tr>
<tr>
<td>Maternal control</td>
<td>.11</td>
<td>.00</td>
<td>.04</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>Maternal BMIZ</td>
<td>.24*</td>
<td>-.07</td>
<td>.30*</td>
<td>-.04</td>
<td>.14</td>
</tr>
<tr>
<td>Maternal education</td>
<td>-.08</td>
<td>-.01</td>
<td>-.05</td>
<td>-.13</td>
<td>-.11</td>
</tr>
<tr>
<td>Child gender</td>
<td>-.11</td>
<td>-.04</td>
<td>-.08</td>
<td>-.15</td>
<td>-.21*</td>
</tr>
</tbody>
</table>

Regression equation:

\[ R^2(6,137)=.10* \]
\[ R^2(7,137)=.02 \]
\[ R^2(7,129)=.15* \]
\[ R^2(7,136)=.07 \]
\[ R^2(7,136)=.12* \]

* *p*<.05
The results of the regression analyses of the association between mothers’ parenting and child weight-related behaviour outcomes are presented in Table 2. Mothers’ responsiveness negatively predicted child sedentary behaviour, and maternal warmth positively predicted child physical activity. No other associations were found between parenting variables and child outcomes. Mothers’ BMI positively predicted child BMI and child non-core food intake, and child gender was associated with child sedentary behaviour. Boys engaged in significantly higher level of sedentary behaviour than did girls, $t(164)= 2.19$.

Table 3. Partial correlation results for fathers’ parenting and child weight-related behaviour outcomes adjusted for parent BMI, parent education, and child gender.

<table>
<thead>
<tr>
<th>Predictor variables</th>
<th>Child BMI</th>
<th>Child fruit and veg.</th>
<th>Child non-core food</th>
<th>Child PA</th>
<th>Child SB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paternal responsiveness</td>
<td>-.00</td>
<td>-.01</td>
<td>.06</td>
<td>.06</td>
<td>-.02</td>
</tr>
<tr>
<td>Paternal demandingness</td>
<td>.00</td>
<td>-.12</td>
<td>-.26*</td>
<td>-.03</td>
<td>-.12</td>
</tr>
<tr>
<td>Paternal warmth</td>
<td>-.02</td>
<td>.21</td>
<td>-.04</td>
<td>.26*</td>
<td>-.05</td>
</tr>
<tr>
<td>Paternal control</td>
<td>.05</td>
<td>.21</td>
<td>.11</td>
<td>.03</td>
<td>.04</td>
</tr>
</tbody>
</table>

* $p<.05$

In the partial correlation analyses, the results of which are presented in Table 3, fathers’ demandingness was negatively associated with non-core food intake, while paternal warmth was positively associated with child physical activity. There were no other significant associations.
Summary of chapter aims and results

The main aim of the present study was to investigate the relationship between mothers’ and fathers’ parenting and child weight and weight-related behaviours in children between the ages of 7 and 11 years. The secondary purpose of the study was to determine whether parenting measures of warmth and control, which have previously been equated with the constructs of responsiveness and demandingness, operated in a similar way to a scale explicitly designed to measure these constructs.

With regard to aim two, some associations were found between the two approaches to assessing parenting used in the present study. Warmth and responsiveness were significantly correlated for both mothers and fathers. This indicates that the warmth and responsiveness measures may be measuring similar, though not completely equivalent, constructs. Demandingness was not, however, related to ‘control’ for either mothers or fathers, which indicates that the single item control measure may be measuring a different construct to demandingness. Finally, responsiveness was correlated with demandingness for mothers and fathers, suggesting that these constructs may not be completely orthogonal.

Analyses showed that no parenting dimension was associated with child BMI. This was in contrast to expectations, but not completely inconsistent with previous literature; many studies have failed to find a relationship between general parenting style and child weight (Brann & Skinner, 2005; Chen & Kennedy, 2005; Hennessy, et al., 2010b), including that reported in Chapter 3. In fact, it has been suggested that the
relationship between parenting and child weight may not be sufficiently direct for associations between the two to be accurately identified (Ventura & Birch, 2008).

Associations were found, however, between parenting and child dietary intake, physical activity, and sedentary behaviour. After adjustment for relevant covariates (parent BMI, parent education, and child gender), maternal responsiveness was negatively related to child sedentary behaviour, and warmth was related to child physical activity. Paternal warmth was associated with child physical activity and showed a trend toward association with fruit and vegetable intake, although no associations were shown between paternal responsiveness and child outcomes. Paternal demandingness was negatively associated with child non-core food intake. Overall, the findings are of differences between mothers and fathers, and between different measures of similar parenting constructs, in their association with child outcomes. Similar associations were found for mothers’ and fathers’ warmth, both being positively associated with child physical activity, but no other measures showed consistent associations for parents of both genders. The relationships of maternal warmth and responsiveness and paternal warmth and demandingness with child weight-related outcomes were in the expected direction and consistent with previous findings showing evidence for an association between demandingness and responsiveness and healthful behaviours in children and adolescents, in an ‘authoritative’ parenting style; (De Bourdeaudhuij, et al., 2009; Kremers, Brug, De Vries, & Engels, 2003; Lytle, et al., 2003).
**Paternal warmth**

The longitudinal study reported in Chapter 3 used the same measure of warmth as the present study and found that fathers’ warmth predicted increased risk for overweight and obesity in young children. The present investigation did not support these findings, finding no evidence for associations between parenting and child weight, and additionally showing both mothers’ and fathers’ warmth to be associated with healthier weight-related practices in children. Permissive feeding practices (defined as high responsiveness in the context of limited demandingness particular to the feeding domain) have been associated with higher weight in pre-school children (Hughes, et al., 2008). It is possible that the use of this type of practice may be driving the association between father’s warmth and weight in these younger child samples, while in older children, warmth may promote healthy weight-related behaviours.

**Implications for measurement of parenting style**

The present study utilised a measure of parenting equivalent to that used in previous studies investigating the relationship between parenting and child weight (see Chapter 3; Wake, Nicholson, et al., 2007), and additionally included a measure of parenting style that was designed specifically to measure the constructs of responsiveness and demandingness (Jackson, et al., 1998). This allowed us to investigate whether a purpose-designed measure operated in a different way to scales that have been suggested to be measuring to these constructs but were not designed specifically for this purpose. It was found that neither warmth/responsiveness nor control/demandingness showed similar associations with child weight-related behaviours. This suggests that while warmth and responsiveness may be related
constructs, given that they were significantly correlated for both mothers and fathers, using a measure of warmth as a de facto measure of responsiveness may not be appropriate, as they do not appear to show equivalent associations with child outcomes. The measures of demandingness and control did not appear to be related, and in fact, the control measure showed limited associations with any index of child behaviour. The investigation reported in Chapter 3 similarly showed limited associations between this measure of control and weight in younger children. Caution should be taken generally when employing measures of constructs that were originally designed to measure a different construct. The Authoritative Parenting Index (Jackson, et al., 1998), does, however, show some usefulness as a measure of parenting style; it is not onerous to complete, shows adequate reliability and, as the present study demonstrated, allows for identification of associations with child weight-related outcomes.

Limitations

The small sample size of the present study, particularly for fathers, limits the generalisability of the findings. In addition, its cross-sectional nature does not allow for determination of the direction of effects. The reliance on parent-reported methods for estimation of diet and activity indices may have influenced effects. It has been found, for example, that parent-report of children’s activity can be unreliable (Dollman et al., 2009). The results do, however, provide an indication of aspects of parenting that may be associated with child weight-related behaviours, which is of use to health professionals who work to promote healthy behaviours in children.
Future directions

It is becoming increasingly evident as the literature on this topic increases that it is difficult to determine unequivocally the relationship between general parenting and child weight due to the inherent limitations in the literature in measuring these parenting variables. Such limitations include lack of equivalence of measures, the use of very brief scales that were not designed to specifically measure the constructs they are suggested to be measuring, and problems associated with parent report of parenting. It has been suggested that children’s perceptions may be more important for predicting child outcomes than those of parents (Haines, et al., 2008; Tein, et al., 1994). It is therefore desirable to consider the child’s perspective in parenting research. The present study found a cross-sectional association between parenting style and child weight-related behaviours that have been previously associated with risk for or protection against overweight/obesity (Davison & Birch, 2001a), but found no evidence for a direct association between parenting style and child BMI. It may prove more useful to both researchers and health professionals to focus on child behaviour outcomes that are known to be associated with child weight, rather than attempting to determine stable associations between parenting and child weight. Eliciting change in children’s health-related behaviours may produce positive outcomes for their health and wellbeing, irrespective of changes to weight. The influence on weight may occur immediately, over a period of months, or some years later, dependent upon a myriad of contextual factors. Shifting the focus from changing child weight to changing child behaviours appears warranted.
Associations between parenting style and child weight-related outcomes often show a small size of effect, consistent with findings reported here. It is possible that parenting style is itself not influencing child weight directly, but rather through associations with specific parenting behaviours tied to particular domains of child behaviour, such as feeding behaviours. Some evidence has been found, for example, that parenting styles may moderate the relationship between parenting practices and child outcomes (Sleddens, et al., 2011). A parenting style high in responsiveness has been shown to enhance the effectiveness of a specific parental strategy of monitoring of physical activity (Hennessy, et al., 2010a). Children may therefore respond differently to parenting practices, dependent upon the parenting style under which they are presented. Future studies should investigate this in further detail, utilising a valid measure of parenting styles and comprehensive measures of parenting practices that cover child weight-related behaviours spanning both sides of the energy equation (i.e., eating and activity).

Concluding comments

The present study adds to existing literature by identifying that mothers’ responsiveness, along with fathers’ demandingness, was associated with lower engagement in unhealthy behaviours in children. Both mothers’ and fathers’ warmth were also associated with higher levels of child physical activity. Researchers should be careful about making conclusions based upon measures of parenting style that were not purpose designed, as different outcomes can result from measures that may appear to be equivalent, but in fact measure constructs that differ in their influence on child outcomes. Investigating how parenting styles and practices interact in their associations...
with child weight-related behaviour is also needed to help identify processes by which parenting style may show associations with child weight and behaviour.
CHAPTER 5. PAPER 2

Parent- and child-reported parenting: Associations with child weight-related outcomes.

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Carlene Wilson, Flinders University and Cancer Council South Australia

Amy Slater, Flinders University

Philip Mohr, CSIRO Food and Nutritional Sciences

Appetite, December 2011

57(3), 700-706

Statement of Contributions

Amanda Taylor (Candidate)

Along with Prof. Wilson, Dr Slater, and Dr Mohr, I was responsible for the design and implementation of the research project, including the collection and management of the data. I performed all statistical analyses, interpreted the results, and wrote the manuscript, with input from all co-authors. I served as corresponding author, and took responsibility for responding to reviewers and revisions to the manuscript. I certify that the statement of contribution is accurate.

Signed:      Date:  24/11/11
Carlene Wilson (Primary supervisor)

I oversaw the planning and implementation of this project, and have provided input into the interpretation of the results, and in framing research arguments. I also provided comments on drafts and revisions of the manuscript. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date:  24/11/11

Amy Slater (External supervisor)

I provided input into the design of the study, and assisting in drafting and conducting revisions of the manuscript. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date:   24/11/11

Philip Mohr (Co-supervisor)

I contributed to the design of the study, interpretation of the results, and provided input into drafting and revising the manuscript and addressing reviewer comments. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date:   24/11/11
Abstract

The present study aimed to investigate associations of both parent-reported and child-perceived parenting styles and parent-reported parenting practices with child weight and weight-related behaviours. Participants were 175 children (56% female) aged between 7 and 11, and their primary caregivers (91% female), recruited through South Australian primary schools. Children completed measures of parenting style, attitude toward fruit, vegetables, and non-core food, and attraction to physical activity. Parents completed measures of parenting style and domain-specific parenting practices (feeding and activity-related practices) and reported on child dietary intake, physical activity, and sedentary behaviour. Objective height and weight measurements were taken from children, from which Body Mass Index (BMI) was calculated. Child-reported parenting style and parent-reported parenting practices were uniquely associated with child weight-related outcomes, but styles and practices did not interact in their association with child outcomes. Child-reported parenting style was associated with child food and activity attitudes, whereas parent-reported parenting style was not associated with child outcomes. The findings of the present study generally support the recommendation of a parenting style high in demandingness and responsiveness for supporting healthy child weight-related behaviours, along with appropriate domain-specific practices. The child’s perspective should be incorporated into research involving child outcomes wherever possible.
Parent- and child-reported parenting: Associations with child weight-related outcomes.

Parental influence has been identified as a key predictor of weight-related outcomes in children (Birch & Davison, 2001; Procter, 2007). The processes by which parenting may impact child weight and weight-related behaviours are, however, poorly understood. This is because in order to fully test the relationship between parenting and child weight-related outcomes it is important to assess a range of parental behaviours that may be associated with child weight-related behaviours, and capture the range of child weight-related behavioural outcomes (i.e., eating, physical activity, and sedentary behaviours). Most studies tend to focus on child diet or activity, or only one aspect of parenting. A further possible explanation is the tendency to focus on the parent perspective in assessment of parenting styles and child outcomes. The influence of parenting on child weight-related outcomes is generally accepted to occur through two channels: the general emotional and behavioural climate parents create for their children (termed ‘parenting style’) and parenting actions or practices (i.e., feeding and activity-related practices) that are employed to influence specific aspects of a child’s behaviour.

Parenting style is typically measured along two dimensions; ‘demandingness’ and ‘responsiveness’ (Maccoby & Martin, 1983). Demandingness refers to the extent to which parents place limits and boundaries upon their child’s behaviour and are willing to implement consequences for the child who disobeys (Baumrind, 1991b; Maccoby & Martin, 1983). Responsiveness refers to the extent to which parents are attuned and
responsive to their child’s needs and demands (Baumrind, 1991b; Maccoby & Martin, 1983).

A recent review of the relationship between general parenting styles and child weight-related behaviours suggested that the combination of parental demandingness and responsiveness has generally been found to be associated with healthy weight-related outcomes in children, including healthy dietary intake, higher levels of physical activity, and lower BMI (Sleddens, et al., 2011). Parenting style has also been found to moderate the relationship between parenting practices and weight-related behaviours in children and adolescents, with parental restriction of adolescent sugar sweetened beverages associated with less consumption when presented in the context of nurturance (equated with responsiveness) and moderate strictness (c.f., demandingness; Van Der Horst, Kremers, et al., 2007). In the physical activity domain, monitoring and reinforcement for physical activity was associated with higher child physical activity when presented in the context of a permissive (high responsiveness, low demandingness) parenting style (Hennessy, et al., 2010a). Other studies investigating both parenting styles and practices have found an association of healthy child behaviour with parenting practices only, with no associations found for parenting styles and child outcomes (De Bourdeaudhuij, et al., 2009; Vereecken, et al., 2010).

Studies that have included both child- and parent-report in investigating parental influence on child weight-related outcomes have found that child perception of parenting showed stronger associations with child eating behaviour (Haines, et al., 2008) and physical activity (Barr-Anderson, Robinson-O'Brien, Haines, Hannan, & Neumark-Sztainer, 2010) than did studies using parental perception of parenting.
Despite this, most studies investigating parental influence on the outcomes of young children tend to use parents as the sole respondent. Theoretical understandings of the parent-child relationship are influenced by such paradigms as family systems theory, which values the child perspective as equally important when providing information on the child-parent relationship (Kitzman-Ulrich et al., 2010). Investigating the relationship between parent- and child- report of parenting and both parent- and child-reported diet and activity outcomes may therefore help to clarify the complex relationship between parenting and child weight-related outcomes.

The present study was designed to examine differential associations of parenting style (demandingness and responsiveness) and domain-specific parenting practices with child weight and weight-related outcomes (i.e., dietary intake, physical activity and sedentary behaviours), from both the parent and child perspective (i.e., parent-reported and child-reported). It was predicted that the higher levels of parental demandingness and responsiveness would be associated with healthy weight-related outcomes in children. It was also expected that for outcomes associated with both parenting styles and practices, parenting style would moderate the association between parenting practices and child outcomes. Finally, it was hypothesised that child-reported parenting style would be more closely associated with child weight-related outcomes than parent-report of parenting style.

Method

Participants

Participants were 175 children and their primary caregivers, recruited from primary schools across South Australia between October 2009 and June 2010. Of 37
schools approached, 10 schools agreed to participate in the study, and letters of introduction and consent forms were sent to the parents of all students in Years 3 to 5 (total: 1278). Signed consent forms were returned by the primary caregivers of 252 children. Questionnaires were sent to all caregivers who gave consent to participate, and participating children completed questionnaires in class. Questionnaires were returned by 190 primary caregivers (91% female) giving a response rate of 75.4%. Fifteen children whose primary caregivers had returned questionnaires were absent on the day of data collection, and were therefore removed from the sample, resulting in a final sample size of 175. Primary caregivers’ mean age was 40.7 (SD = 5.77), and children’s mean age was 9.21 (SD = 1.09). Approval for the study was gained from the ethics committees of the Department of Education and Children’s Services, the Commonwealth and Scientific and Industrial Research Organisation, and the University of Adelaide.

Measures

Parenting style

Both parents and children reported on parenting style using the Authoritative Parenting Index (API; Jackson, et al., 1998). This measure consists of two scales: responsiveness which is comprised of nine items, and demandingness, which consists of seven items. The API has been validated for use with children from the age of 8 years (Jackson, et al., 1998) and was originally designed to be reported by children and adolescents. Minor wording changes were therefore made so that the API could also be used for parent-report (e.g., responsiveness: ‘He/she comforts me when I am upset’ to ‘I comfort my child when he/she is upset’;-demandingness: ‘He/she has rules that I
must follow’ to ‘I have rules that my child must follow’). The changes were pilot tested successfully with a small sample of parents (n=3). Response options for each item were on a Likert-type scale that ranged from 1 (not like my parent or not like me) to 4 (exactly like my parent or exactly like me).

Three items were removed from the child- and parent-report responsiveness scales after reliability analysis revealed low item-total correlations. Internal consistency values for the revised API scales were adequate (Gregory, 2004); child-report responsiveness $\alpha = .71$, child-report demandingness $\alpha = .69$, parent-report responsiveness $\alpha=.73$, parent-report demandingness $\alpha=.69$.

In most studies investigating parenting style, the dimensions of responsiveness and demandingness are dichotomised and combined to categorise parents into four ‘styles’. There are, however, difficulties that arise from this practice, including loss of meaning through the arbitrary transformation of a continuous construct into a categorical variable, and reduction in measurement reliability (MacCallum, et al., 2002). To avoid these problems, the dimensional scales were retained for analyses involving parenting style.

**Parental feeding practices**

Three aspects of parental food-related practices were measured using scales taken from the Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007): Child control over feeding, Restriction of child’s food intake for weight reasons, and Pressure to eat. These scales were chosen due to previously identified associations with child weight-related outcomes (Patrick & Nicklas, 2005; Pearson, Biddle, & Gorely, 2009). Responses were given on a five-point
Likert-type scale, with response options ranging from 1 (never), to 5 (always). The CFPQ has been found to be valid and reliable for use with parents of young children (Musher-Eizenman & Holub, 2007). Reliability coefficients for each of the scales in the current sample were good (Child Control $\alpha=.73$, Restriction (weight) $\alpha=.84$, Pressure to eat $\alpha=.71$).

**Parental activity-related practices**

A measure of parent physical activity practices was created based on a measure developed by Timperio and colleagues (Timperio, et al., 2008). Items taken from this measure captured two parental physical activity practices that have been shown to influence child activity: Encouragement of physical activity and Modelling of physical activity (Edwardson & Gorely, 2010; Gustafson & Rhodes, 2006; Van Der Horst, Paw, et al., 2007). The Encouragement scale consisted of five items (e.g., ‘How frequently do you praise your child for being physically active?’; $\alpha=.72$), and the Modelling scale consisted of three items (e.g., ‘How frequently does your child see you being physically active?’; $\alpha=.77$).

A measure of parental sedentary behaviour practices was developed for the purposes of the present study. This consisted of six items, producing two three-item scales: Restriction of sedentary behaviour (e.g., ‘How often do you restrict the amount of time your child spends using electronic games?’) and Modelling of sedentary behaviour (e.g., ‘How often do you watch Television/DVDs/videos with your child?’). These two constructs have been consistently identified in the literature as influencing child sedentary behaviour (Hoyos Cillero & Jago, 2010; Salmon, et al., 2005; Van Zutphen, et al., 2007). Both scales showed acceptable internal consistency, with
coefficients of $\alpha = .88$ for the Restriction scale and $\alpha = .63$ for the Modelling scale.

Responses for all items on measures of parental activity-related practices were given on a 5-point Likert-type scale, ranging from 1 (never/almost never) to 5 (always/almost always).

**Parent-reported child behaviours**

*Diet* Child diet was assessed using an adaptation of the Children’s Dietary Questionnaire (Magarey, et al., 2009). This questionnaire is a parent-report measure, based upon the Australian Dietary Guidelines (NHMRC, 2003). Two items provided a measure of the frequency of intake of fruit and vegetables over the past 24 hours. Thirteen items were used to produce a measure of frequency of intake over the past 24 hours of a range of non-core foods (including soft drink, confectionery, and processed meats). Response format was on a 7-point scale (0 1 2 3 4 5 6+ times). The measure has been shown to have acceptable validity and reliability in Australian samples of parents of children between the ages of 5 and 16 years (Magarey, et al., 2009).

*Activity* The measure of activity was adapted from the Time Use Diary of the Longitudinal Study of Australian Children (Baxter, 2007). This parent-report measure estimated children’s time use over the past 24 hours and included measures of physical activity and sedentary behaviours, which were used for the present study. Four items comprised the scale Sedentary behaviour (e.g., ‘Watched television, DVD, movie’). Physical activity was also comprised of four items (e.g., ‘Walk for fun or travel’). Response format was on a five-point scale for each activity, with response options ranging from 1 (none), to 5 (more than 2 hours).
**Child Body Mass Index (BMI)**

Objective measurements were taken of child height and weight. Height measurements were taken without shoes to the nearest 0.5 cm. Weight measurements were taken in light clothing and without shoes, to the nearest 100 grams. These were then used to calculate child BMI, defined as \( \frac{\text{weight (kg)}}{\text{height (m)}^2} \).

**Child-reported attitudes**

*Food* A measure of child-reported attitude towards food was taken from the Child Nutrition Questionnaire (CNQ; Wilson, Magarey, & Mastersson, 2008). The present study utilised the attitude toward fruit (four items; e.g., ‘Fruit makes me feel healthy’) and vegetables (four items; e.g., ‘I like tasting new vegetables’) scales from the CNQ. To provide a measure of child attitude toward non-core food, a brief scale assessing preference for non-core food was developed for the purposes of this study. This consisted of six items (e.g., ‘If I could, I would eat chips, lollies and chocolate all the time’). Responses to all items were on a 5-point Likert-type scale, ranging from 1 (no, not at all) to 5 (yes, a lot). Reliability analyses indicated acceptable internal consistency values: Liking of vegetables \( \alpha = .75 \), Liking of fruit \( \alpha = .73 \), Liking of non-core foods \( \alpha = .83 \).

*Activity* Thirteen items, taken from the Children’s Attraction to Physical Activity questionnaire (CAPA; Brustad, 1993), were used to provide a measure of child attraction toward sport and physical activity (example item, ‘I look forward to playing games and sports’). Responses were given on a four-point Likert-type scale with response options ranging from 1 (none of the time) to 4 (all of the time). Reliability
analyses indicated good internal consistency for the attraction to physical activity scale, with an alpha value of $\alpha = .91$.

**Covariates**

Parental education was measured using a single item asked of the parent, taken from the demographic questionnaire administered in the Longitudinal Study of Australian Children: ‘What is the highest level of education you have completed?’ (Australian Institute of Family Studies, 2008). Nine response options were given, ranging from 1 (*primary school*) to 9 (*postgraduate degree*).

Parent weight status and child gender were also included as covariates because these variables have been shown to relate significantly to child BMI (Whitaker, et al., 1997) and parenting (Berge, Wall, Bauer, et al., 2010; Blissett, et al., 2006). Height and weight were reported by parents to the nearest centimetre and kilogram respectively. These reported values were then used to calculate parent BMI. Finally, child BMI was used as a covariate for analyses involving child diet or activity variables as outcomes.

**Statistical analyses**

To improve normality of parenting style indices (obtained from the API measure), square root transformations were conducted on both child- and parent-reported demandingness and responsiveness. Low levels of missing data (<6%) were present for a number of parent-reported parenting variables and child-reported diet outcomes. Missing values were therefore imputed using expectation maximisation (EM) methods to produce a complete dataset. Standardised BMI scores (BMI z-scores) were calculated for both child and parent BMI and these standardised scores were used
in all analyses involving BMI. Child BMI z-score (adjusted for age and gender using
International Obesity Taskforce criteria; Cole, et al., 2000) was regressed onto
parenting style, parental food and activity-related practices, and covariates. Child diet-
related outcomes were regressed separately onto the following set of predictors:
parenting style variables, child feeding practices, and covariates. Child activity-related
outcomes were regressed separately onto the predictors of parenting style, parental
activity-related practices, and covariates. Due to the large number of analyses
conducted, the criterion for statistical significance for regression analyses was set at
$p<.01$.

The large number of parental practices and style variables involved in the
present analyses precluded the ability to conduct routine moderated regression to test
for interactions between parenting styles and all parenting practices. Limited
moderated regression analyses were therefore conducted in all cases where a significant
effect, or trend toward significant effect (i.e., $p<.05$) was found for both parenting
style and parenting practice variables. These moderated regressions were conducted
according to the procedures outlined by Baron and Kenny (1986). Variables were first
centred to prevent problems associated with multicollinearity. Product terms were
then calculated and entered into the second step of hierarchical multiple regression
analyses with parenting style, relevant parenting practices, and covariates entered into
the first step. This allowed for determination of the influence of the
interaction between each parenting style and relevant parenting practice after
controlling for the unique influence of each of the predictors. All statistical analyses
were conducted using PASW Statistics, version 18.0.0 (SPSS Inc., Chicago IL, 2009).
Results

Sample characteristics

Descriptive characteristics for children and parents are presented in Table 1. According to the International Obesity Taskforce standards (Cole, et al., 2000), 23.8% of children in the present sample were overweight or obese. This is comparable to recent estimates for Australian children, with mean prevalence estimates at 25.3% for overweight/obesity in children aged 7-12 years (Booth, et al., 2007). Based upon self-reported height and weight, parents in the present sample had lower rates of overweight and obesity than Australian adult overweight/obesity prevalence estimates (48.2% cf. 67.7%; Australian Bureau of Statistics, 2009). The parents in the present sample were also highly educated, with 70.7% having completed some form of tertiary education (TAFE certificate or higher).
Table 1. Descriptive characteristics for parents and children.

<table>
<thead>
<tr>
<th>Child</th>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, n</td>
<td>77M 98F</td>
</tr>
<tr>
<td>Age (years), mean (SD)</td>
<td>9.21 (1.09)</td>
</tr>
<tr>
<td>BMI, mean (SD)</td>
<td>17.81 (2.62)</td>
</tr>
<tr>
<td>% overweight/obese</td>
<td>23.8%</td>
</tr>
<tr>
<td>Gender</td>
<td>15M 160F</td>
</tr>
<tr>
<td>% mothers</td>
<td>91.4%</td>
</tr>
<tr>
<td>Age (years), mean (SD)</td>
<td>40.70 (5.77)</td>
</tr>
<tr>
<td>Education (%)</td>
<td></td>
</tr>
<tr>
<td>&lt;Year 12</td>
<td>13.6</td>
</tr>
<tr>
<td>Yr 12 or equivalent</td>
<td>17.8</td>
</tr>
<tr>
<td>Tertiary</td>
<td>68.7</td>
</tr>
<tr>
<td>BMI, mean (SD)</td>
<td>25.59 (4.92)</td>
</tr>
<tr>
<td>% overweight/obese</td>
<td>48.2%</td>
</tr>
</tbody>
</table>

Child- and parent- reported parenting style

Children and parents differed in their reports of parental responsiveness and demandingness. Children’s report of parenting style indicated significantly lower levels of demandingness ($M=22.27$, $SD=3.70$) than reported by parents ($M=25.06$, $SD=2.65$), $t(174)=3.22$, $p<.01$. Similarly, children reported significantly lower
perceived parental responsiveness \((M=20.24, SD=3.07)\) compared to parent-reported responsiveness \((M=21.12, SD=2.49)\), \(t(174)=8.45, p<.01\).

**Child BMI**

Table 2 shows the results of the multiple regression analysis on Child BMI \(z\)-score (standardised BMI). As can be seen, general parenting style was not associated with child BMI, whereas the domain-specific practices of parental food restriction and pressure to eat showed associations in the expected direction.

**Table 2. Regression results for parenting styles, parenting practices and child BMI \(z\)-score**

<table>
<thead>
<tr>
<th>Child BMI(z)</th>
<th>Coefficients</th>
<th>B</th>
<th>±SE</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child-reported responsiveness</td>
<td>-.09</td>
<td>.12</td>
<td>-.06</td>
<td></td>
</tr>
<tr>
<td>Child-reported demandingness</td>
<td>.05</td>
<td>.11</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Parent-reported responsiveness</td>
<td>.05</td>
<td>.13</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Parent-reported demandingness</td>
<td>.02</td>
<td>.13</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>CFPQ Restriction (weight)</td>
<td>.08</td>
<td>.02</td>
<td>.29*</td>
<td></td>
</tr>
<tr>
<td>CFPQ Pressure to eat</td>
<td>-.07</td>
<td>.03</td>
<td>-.23*</td>
<td></td>
</tr>
<tr>
<td>CFPQ Child control</td>
<td>.01</td>
<td>.03</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Model physical activity</td>
<td>.09</td>
<td>.05</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>Encourage physical activity</td>
<td>-.04</td>
<td>.03</td>
<td>-.12</td>
<td></td>
</tr>
<tr>
<td>Restrict sedentary behaviour</td>
<td>-.01</td>
<td>.03</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>Model sedentary behaviour</td>
<td>-.03</td>
<td>.04</td>
<td>-.05</td>
<td></td>
</tr>
<tr>
<td>Child gender</td>
<td>-.08</td>
<td>.16</td>
<td>-.04</td>
<td></td>
</tr>
<tr>
<td>Parent BMI(z)</td>
<td>.26</td>
<td>.08</td>
<td>.25*</td>
<td></td>
</tr>
<tr>
<td>Parent education</td>
<td>-.03</td>
<td>.04</td>
<td>-.06</td>
<td></td>
</tr>
</tbody>
</table>

\(R^2(14,160)=.20, p<.01\)

\* \(p<.01\).
Table 3 presents the regression results for child diet-related outcomes. Only child-reported parenting style was associated with child diet outcomes, specifically child-reported attitude toward fruit and non-core food. The outcomes of child fruit and vegetable intake and child non-core food intake were not significantly predicted by parenting styles and practices.

For the outcomes that involved significant effects or trends toward effects for both parenting styles and practices or significant effects for both parenting styles (i.e., child liking of vegetables, child liking of fruit), moderated regressions were conducted (Baron & Kenny, 1986). The product term did not add to the variance explained by the regression model on the outcome of child liking of vegetables for the interaction between child-reported demandingness and parental pressure to eat (R² Change (1, 163)=.00), or for the interaction between child-reported demandingness and child control (R² Change (1, 163)=.01). Similarly, there was no significant interaction effect of child-reported responsiveness and child-reported demandingness on child liking of fruit, R² Change (1, 163)=.00.
Table 3. Regression results for parenting styles, parenting practices and child diet-related outcomes

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Child fruit and veg. intake&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Child non-core food intake&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Child liking of veg.&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Child liking of fruit&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Child liking of non-core food&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficients B ±SE Beta</td>
<td>Coefficients B ±SE Beta</td>
<td>Coefficients B ±SE Beta</td>
<td>Coefficients B ±SE Beta</td>
<td>Coefficients B ±SE Beta</td>
</tr>
<tr>
<td>Child-reported responsiveness</td>
<td>.45 ± .25 .15</td>
<td>.08 ± .14 .05</td>
<td>.79 ± .42 .15</td>
<td>.85 ± .29 .23&lt;sup&gt;*&lt;/sup&gt;</td>
<td>-.03 ± .60 -.27&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Child-reported demandingness</td>
<td>.45 ± .23 .16</td>
<td>.00 ± .13 .00</td>
<td>.88 ± .39 .18&lt;sup&gt;†&lt;/sup&gt;</td>
<td>.73 ± .27 .22&lt;sup&gt;*&lt;/sup&gt;</td>
<td>-.51 ± .56 -.07</td>
</tr>
<tr>
<td>Parent-reported responsiveness</td>
<td>-.32 ± .27 -.10</td>
<td>-.31 ± .15 -.17&lt;sup&gt;†&lt;/sup&gt;</td>
<td>-.17 ± .46 .03</td>
<td>.28 ± .32 .07</td>
<td>-.76 ± .65 -.09</td>
</tr>
<tr>
<td>Parent-reported demandingness</td>
<td>.15 ± .26 .05</td>
<td>.04 ± .15 .02</td>
<td>.20 ± .45 .04</td>
<td>.16 ± .31 .04</td>
<td>.79 ± .63 .10</td>
</tr>
<tr>
<td>CFPQ Restriction (weight)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.02 ± .05 .04</td>
<td>.01 ± .03 .02</td>
<td>.09 ± .08 .09</td>
<td>.02 ± .05 .02</td>
<td>-.10 ± .11 -.07</td>
</tr>
<tr>
<td>CFPQ Pressure to eat&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.03 ± .05 -.05</td>
<td>.07 ± .03 .19&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>-.22 ± .09 -.19&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>-.03 ± .06 -.03</td>
<td>-.07 ± .12 .04</td>
</tr>
<tr>
<td>CFPQ Child control&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.12 ± .06 -.16&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>.02 ± .03 .05</td>
<td>.20 ± .11 -.15&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>-.03 ± .07 -.03</td>
<td>.16 ± .14 .08</td>
</tr>
<tr>
<td>Child gender</td>
<td>-.07 ± .33 -.02</td>
<td>-.17 ± .19 -.07</td>
<td>.71 ± .65 .10</td>
<td>-.24 ± .39 -.05</td>
<td>-.20 ± .80 -.20&lt;sup&gt;‡&lt;/sup&gt;</td>
</tr>
<tr>
<td>Child BMI&lt;sub&gt;z&lt;/sub&gt;</td>
<td>.07 ± .16 .03</td>
<td>-.11 ± .09 -.10</td>
<td>.23 ± .27 -.07</td>
<td>.02 ± .19 .01</td>
<td>.08 ± .39 .02</td>
</tr>
<tr>
<td>Parent BMI&lt;sub&gt;z&lt;/sub&gt;</td>
<td>-.12 ± .16 -.06</td>
<td>.22 ± .09 .19&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>.01 ± .27 .00</td>
<td>.14 ± .19 .05</td>
<td>.04 ± .39 .01</td>
</tr>
<tr>
<td>Parent education</td>
<td>.02 ± .08 .02</td>
<td>-.03 ± .04 -.05</td>
<td>.05 ± .13 -.03</td>
<td>.20 ± .09 .17&lt;sup&gt;†&lt;/sup&gt;</td>
<td>.02 ± .18 .01</td>
</tr>
</tbody>
</table>

Regression equation

- $R^2(11,163) = .12, p < .05$
- $R^2(11,163) = .13, p < .05$
- $R^2(11,163) = .18, p < .001$
- $R(11,163) = .18, p < .001$
- $R(11,163) = .18, p < .001$

<sup>a</sup>parent-reported  <sup>b</sup>child-reported

* $p < .01$

† $p < .05$
Child activity-related outcomes

Results of regression analyses involving child activity-related outcomes are presented in Table 4. Only child-reported parental responsiveness was associated with child activity outcomes, specifically with child-reported liking of physical activity. Child physical activity was associated with parental encouragement of physical activity, whereas sedentary behaviour in children was associated negatively with parental modelling of physical activity.

A moderated regression analysis (Baron & Kenny, 1986) showed no significant contribution to the variance explained on child liking of physical activity by the interaction between parental encouragement of physical activity and child-reported parental responsiveness, $R^2$ Change (1, 161) = .00.
<table>
<thead>
<tr>
<th>Coefficients</th>
<th>B</th>
<th>±SE</th>
<th>Beta</th>
<th>B</th>
<th>±SE</th>
<th>Beta</th>
<th>B</th>
<th>±SE</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child-reported responsiveness</td>
<td>.51</td>
<td>.31</td>
<td>.13</td>
<td>.04</td>
<td>.35</td>
<td>.01</td>
<td>2.78</td>
<td>.84</td>
<td>.26*</td>
</tr>
<tr>
<td>Child-reported demandingness</td>
<td>.05</td>
<td>.29</td>
<td>.01</td>
<td>-.26</td>
<td>.32</td>
<td>-.06</td>
<td>1.22</td>
<td>.77</td>
<td>.12</td>
</tr>
<tr>
<td>Parent-reported responsiveness</td>
<td>-.40</td>
<td>.34</td>
<td>-.09</td>
<td>-.59</td>
<td>.38</td>
<td>-.12</td>
<td>-1.44</td>
<td>.91</td>
<td>-.12</td>
</tr>
<tr>
<td>Parent-reported demandingness</td>
<td>-.23</td>
<td>.33</td>
<td>-.06</td>
<td>.16</td>
<td>.37</td>
<td>.04</td>
<td>.04</td>
<td>.90</td>
<td>.00</td>
</tr>
<tr>
<td>Model physical activity</td>
<td>.10</td>
<td>.12</td>
<td>.06</td>
<td>-.54</td>
<td>.14</td>
<td>-.30*</td>
<td>.40</td>
<td>.33</td>
<td>.09</td>
</tr>
<tr>
<td>Encourage physical activity</td>
<td>.27</td>
<td>.07</td>
<td>.29*</td>
<td>.07</td>
<td>.08</td>
<td>.07</td>
<td>.41</td>
<td>.20</td>
<td>.16†</td>
</tr>
<tr>
<td>Restrict sedentary behaviour</td>
<td>.03</td>
<td>.07</td>
<td>.08</td>
<td>-.10</td>
<td>.08</td>
<td>-.10</td>
<td>-.13</td>
<td>.19</td>
<td>-.05</td>
</tr>
<tr>
<td>Model sedentary behaviour</td>
<td>.22</td>
<td>.10</td>
<td>.16</td>
<td>.27</td>
<td>.12</td>
<td>.18†</td>
<td>.09</td>
<td>.28</td>
<td>.02</td>
</tr>
<tr>
<td>Child gender</td>
<td>-.78</td>
<td>.41</td>
<td>-.15</td>
<td>-1.04</td>
<td>.46</td>
<td>-.17†</td>
<td>-2.65</td>
<td>1.11</td>
<td>-.18†</td>
</tr>
<tr>
<td>Child BMIz</td>
<td>-.13</td>
<td>.19</td>
<td>-.05</td>
<td>.05</td>
<td>.21</td>
<td>.02</td>
<td>-.75</td>
<td>.52</td>
<td>-.11</td>
</tr>
<tr>
<td>Parent BMIz</td>
<td>.04</td>
<td>.21</td>
<td>.02</td>
<td>.19</td>
<td>.23</td>
<td>.06</td>
<td>-.40</td>
<td>.57</td>
<td>-.05</td>
</tr>
<tr>
<td>Parent education</td>
<td>-.12</td>
<td>.09</td>
<td>-.10</td>
<td>-.03</td>
<td>.11</td>
<td>-.02</td>
<td>-.34</td>
<td>.25</td>
<td>-.10</td>
</tr>
</tbody>
</table>

Regression equation

R²(12,162)= .18, p< .01  
R²(12,162)= .19, p< .01  
R²(12,162)= .20, p< .001

Discussion

The present study investigated the relationship of parenting style and parenting practices to child BMI, dietary intake, physical activity, and sedentary behaviours. The findings suggest that both general parenting style and specific parenting practices are associated with child weight-related outcomes.
The hypotheses of the study were partially supported. Although parenting style was not associated with child weight, parenting style dimensions of demandingness and responsiveness were associated with healthy weight-related attitudes in children. The prediction that child-perceived parenting would show stronger associations with child outcomes compared to parent-reported parenting was supported. Child-perceived parenting style was associated with diet and activity indices, whereas parent-reported parenting style showed no associations with child weight-related attitudes or behaviours.

Previous studies have suggested that parenting style may moderate the associations between parenting practices and child outcomes (Hennessy, et al., 2010b; Rhee, 2008), but the present findings did not show evidence for an interaction between styles and practices. Rather, for the weight-related outcomes of child BMI and child activity, specific practices were found to be unique predictors, and for weight-related attitudes such as liking of fruit, non-core foods, and physical activity, perceived parenting styles showed associations.

The findings support the suggestion that parents and children provide unique perspectives on the child-parent relationship. Previous community-based studies focussing on areas such as child conduct problems and internalising/externalising behaviours have suggested that the child’s perspective, particularly in those areas involving problematic parenting, may lead to better discrimination of children at risk for negative outcomes (Sessa, et al., 2001). In addition, parents may be at risk of social desirability bias when reporting on behaviours that may be considered as positive (of which parental responsiveness is a clear example). Indeed, the parents of the present
study perceived themselves to be significantly higher in both responsiveness and demandingness compared to children’s perception of the same dimensions. The relationship between children and parents is dynamic, with child and parent factors often interacting to influence both child and parent behaviours (Kitzman-Ulrich, et al., 2010). A burgeoning body of research in the field of treatment for child overweight and obesity is demonstrating evidence for the effectiveness of systemic family therapy, which uses both the parent and child perspective to conceptualise concerns, develop goals for treatment, and effect change (Nowicka & Flodmark, 2008). The present findings support the suggestion that inclusion of both child and parent perspectives may provide a clearer understanding of familial associations with child outcomes, thus lending further credence to the possible usefulness of such systemic strategies for working with families to promote healthy weight-related behaviours in children.

The findings of the present study indicate that parenting style as perceived by children, along with particular parental feeding and activity practices, is associated with healthy weight-related outcomes in children. These findings are consistent with those of previous studies that have investigated parenting styles and practices separately in predicting child weight-related outcomes (Edwardson & Gorely, 2010; Gustafson & Rhodes, 2006; Patrick & Nicklas, 2005; Rhee, 2008; Webber, Cooke, Hill, & Wardle, 2010) and lend further support to the importance of both practices and styles for child outcomes across both sides of the energy equation (eating and activity). Even though parenting styles are generally considered to be more stable, ‘trait’-like qualities compared to specific practices, evidence in the intervention literature has determined that it is possible to make changes to general parenting, for example by increasing
parental ‘warmth’, or ‘acceptance’, and that these changes are found to be associated with beneficial outcomes in children (Stein, Epstein, Raynor, Kilanowski, & Paluch, 2005). Consequently, clinicians working with parents and families might consider encouraging parental responsiveness, including warmth and acceptance, as a strategy to help parents achieve healthy lifestyle choices in children.

Strengths of the present study were the inclusion of multiple respondents (parents and children), and the use of measures that captured behaviours related to diet, physical activity, and sedentary behaviours. Limitations of this study included its cross-sectional nature, which does not allow for conclusions to be made about whether parenting factors influenced weight-related outcomes, or parental behaviour occurred as a response to child weight or child behaviours. The use of parent-reported rather than objectively measured diet and activity may have also influenced effects. Parent-report of indices such as diet and activity are at risk for social desirability bias and problems associated with difficulty recalling specific behaviours, and may over-estimate behaviours that may be considered positive or healthy (Sallis & Saelens, 2000). Although it has been suggested that parent-reported physical activity may be appropriate for use when objective measures are unavailable due to resource concerns (Dollman, et al., 2009), a recent review also found parent-report measures to show limited associations with objective measures such as accelerometry (Loprinzi & Cardinal, 2011). The inclusion of child-reported preference data does, however, provide further information on relationships because preferences have been associated with weight-related behaviours in children (Brug, Tak, Te Velde, Bere, & De Bourdeaudhuij, 2008). Finally, the proportion of parents and children who were
overweight or obese in the present sample was somewhat lower than Australian prevalence estimates, and the parent sample was very highly educated, with 70% of parents having completed some form of tertiary education. This is likely to be the result of the self-selected nature of the sample, and may limit the generalisability of the findings.

Despite its limitations, this study provides further evidence that child-perceived parenting styles of demandingness and responsiveness are associated with healthy diet and activity attitudes in children, and supports previous findings in relation to specific parenting practices and child outcomes. Studies of the longitudinal relationships between parenting styles and practices and child weight-related outcomes are needed to elucidate the direction of these relationships. Finally, the present findings suggest that what may be important for research involving parental influence on child outcomes is not parents’ perspective of their own behaviour, but rather how children themselves experience their world. Future studies should, wherever feasible, include the child’s perspective when investigating outcomes relevant to the child
CHAPTER 6 PREAMBLE

The preceding chapters have demonstrated the importance of parenting style dimensions for the weight-related environment of young children. The findings build on previous literature by indicating that parental responsiveness and demandingness are important for a range of behaviours and attitudes that may predict the development of overweight and obesity in young children. However, the weight-related context of young children is not limited to the discrete behaviours of physical activity and dietary intake, or attitudes like food and activity preferences. The development of obesity is influenced not only by child behaviours but also by child characteristics, one important aspect of these being psychological factors (Braet, 2005). In addition, similarities have been identified between psychological sequelae of overweight and the psychological profiles of children with eating disorders (Haines & Neumark-Sztainer, 2006). Finally, not only do psychological factors contribute to the development of overweight and obesity, but excess weight has also been shown to influence wellbeing in young children (Strauss, 2000). In order to promote the long-term wellbeing of children, along with their long-term physical health, it is important to identify how parenting may moderate the relationship between weight and psychological outcomes that have been associated with overweight.

The findings of the study reported in Chapter 5 demonstrated that child-perceived parenting style is associated with child weight-related attitudes. Chapter 6 therefore investigates associations between child-perceived parenting style for and child weight-related psychological outcomes. This will allow for identification of how the emotional and behavioural climate that parents provide for their children can both
promote wellbeing in their children. It is important that this association is explored because it is possible that, over the longer term, parental behaviour may protect overeight children from adverse psychological sequelae including, but not limited to, disordered eating.
CHAPTER 6. PAPER 3

Self-esteem and body dissatisfaction in young children: Associations with weight and perceived parenting style.

Amanda Taylor, University of Adelaide and CSIRO Preventative Health Flagship

Carlene Wilson, Flinders University and Cancer Council South Australia

Amy Slater, Flinders University

Philip Mohr, CSIRO Food and Nutritional Sciences

Clinical Psychologist 2011; Submitted paper (for special issue on child health)

Statement of Contributions

Amanda Taylor (Candidate)

Along with Prof. Wilson, Dr Slater, and Dr Mohr, I was responsible for the design and implementation of the research project, including the collection and management of the data. I performed all statistical analyses, interpreted the results, and wrote the manuscript, with input from all co-authors. I served as corresponding author. I certify that the statement of contribution is accurate.

Signed:       Date:   24/11/11
Carlene Wilson (Primary supervisor)

I oversaw the planning and implementation of this project, and have provided input into the interpretation of the results, and in framing research arguments. I also provided comments on drafts of the manuscript. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date:  24/11/11

Amy Slater (External supervisor)

I provided input into the design of the study, and assisting in drafting the manuscript. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date: 24/11/11

Philip Mohr (Co-supervisor)

I contributed to the design of the study, interpretation of the results, and provided input into drafting the manuscript. I certify that the statement of contribution is accurate and I give permission for the inclusion of the paper in the thesis.

Signed:       Date: 24/11/11
Abstract

**Background:** Parenting style has been associated with weight-related outcomes in children, but relationships between parenting, weight, and overweight-related psychological outcomes remain largely unstudied. The aim of the present study was to determine whether parenting was a moderator of the relationship between overweight and psychological outcomes in children.

**Methods:** Participants were children aged 7 to 11 years and their primary caregivers (n=158), recruited from primary schools across South Australia. Children completed measures of parenting style, self-esteem, body dissatisfaction, and had their weight and height objectively measured. Parents completed measures of body dissatisfaction and depressive symptoms, and reported on their education. Regression analyses investigated associations between perceived parenting style, child weight, and outcomes of child self-esteem and body image.

**Results:** Larger child BMI was negatively associated with child self-esteem and positively associated with child body dissatisfaction. Parental responsiveness was positively associated with child self-esteem, but parenting was not associated with child body dissatisfaction. Child weight and parenting styles were not found to interact in their association with child outcomes.

**Conclusions:** Higher child BMI is associated with higher body dissatisfaction and lower self-esteem in young, non-treatment seeking samples. A responsive parenting style may assist in promoting child self-esteem, although it may not mitigate the association between excess weight and self-esteem in children.
Self-esteem and body dissatisfaction in young children: Associations with weight and perceived parenting style.

The prevalence of childhood overweight and obesity has increased dramatically in developed countries over the past three decades (Booth, Dobbins, Okely, Denney-Wilson, & Hardy, 2007; Lobstein, Baur, & Uauy, 2004). Low self-esteem, poor body image, and disordered eating have been regularly identified as consequences of overweight and obesity (Gibson et al., 2008). In fact, the psychosocial consequences of obesity have been suggested to be more widespread for children than physical consequences such as diabetes, hypertension, and growth problems (Dietz, 1998; Lobstein, et al., 2004). Parenting has long been identified as an important part of the weight-related environment of young children (Davison & Birch, 2001), and has been shown to influence psychosocial outcomes in young children (Maccoby & Martin, 1983). Treatment and prevention programs for overweight and obesity often involve parents, but tend to focus on changing child weight or weight-related behaviours without taking into account psychological outcomes that may be associated with overweight. It has been suggested that psychological difficulties may impede the progress of weight-loss attempts (Haines, Neumark-Sztainer, Wall, & Story, 2007), thus developing a better understanding of the relationships between parenting, child weight, and child wellbeing may also offer insights into strategies for increasing the effectiveness of obesity prevention and remediation efforts.

Two aspects of psychological functioning that have been regularly associated with child weight are body dissatisfaction and self-esteem. Increased weight has been consistently associated with body dissatisfaction in children (Anschutz, Kanters, Van...
Strien, Vermulst, & Engels, 2009; Clark & Tiggemann, 2007), while a recent review of research into self-esteem in obese children and adolescents concluded that strong evidence exists to suggest that childhood obesity impairs global self-esteem (Griffiths, Parsons, & Hill, 2010). Both low self-esteem and body dissatisfaction have been found to correlate with higher levels of unhealthy weight-control behaviours or risk for development of eating disorders in adolescence (Erickson, Hahn-Smith, & Smith, 2009; Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006). Identifying aspects of the child’s environment that may help to promote healthy weight-related psychological outcomes may therefore also help to prevent development of more serious weight-related psychological sequelae as the child becomes older.

Children develop in the context of multiple levels of interacting environmental factors including the family, the physical environment, and the broader social context (Brofenbrenner, 1992). For young children, the familial environment represents a strong influencing factor for a range of outcomes, including but not limited to weight, weight-related behaviours, and psychological wellbeing (Davison & Birch, 2001; Maccoby & Martin, 1983). When parents are able to meet children’s needs for support and affection, and provide them with appropriate levels of structure, children are well placed for positive developmental outcomes (Maccoby & Martin, 1983). Stable individual differences in parenting have been referred to as ‘parenting style’, which consists of two dimensions: demandingness and responsiveness (Baumrind, 1971; Maccoby & Martin, 1983). Demandingness refers to the extent to which parents place limitations and boundaries on their children’s behaviour and are willing to confront the child who disobeys (Baumrind, 1991). Responsiveness relates to a parent’s tendency to
be attuned and responsive to their children’s needs and demands (Baumrind, 1991).

The relationship between parenting style and child diet, activity and weight is well studied, with (both cross-sectional and longitudinal) findings generally suggesting that higher levels of parental demandingness and higher levels of responsiveness are associated with healthy weight-related outcomes in children (Berge, 2009; Rhee, 2008; Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011).

Differences in childhood self-esteem have been found to correlate with parenting style, with higher levels of demandingness and responsiveness associated with higher self-esteem in children (Heaven & Ciarrochi, 2008; McClure, Tanski, Kingsbury, Gerrard, & Sargent, 2010). The relationship between parenting style, child weight, and child self-esteem has not, however, received attention in the literature. This is surprising because both parenting style and increased child weight have been found to be associated with self-esteem in children (Griffiths, Parsons, & Hill, 2010). Parents are uniquely placed in terms of their ability to influence both weight-related behaviours and psychological outcomes in their children, particularly during the pre-adolescent years. The emotional and behavioural environment they provide for their child through their parenting style may therefore influence the relationship between child weight and child psychological outcomes such as self-esteem and body image dissatisfaction.

Most previous investigations into parental influence on child body image have focussed on specific parental behaviours or attributes such as parents’ own drive for thinness and comments about the child’s weight (Anschutz, et al., 2009; Buri, 1989; Kluck, 2010). One study did find that retrospective recollections of maternal control
(i.e., mothers’ attempts to control child behaviour) were negatively associated with body satisfaction in college-aged women (Sira & White, 2010), while two found a cross-sectional but not longitudinal association between family ‘connectedness’ and body satisfaction in adolescent girls (Archibald, Graber, & Brooks-Gunn, 1999; Byely, Archibald, Graber, & Brooks-Gunn, 2000). Paternal authoritativeness (high demandingness, high responsiveness) has also been found to be negatively associated with drive for thinness and body dissatisfaction in adolescents undergoing treatment for anorexia nervosa (Enten & Golan, 2009). The relationship between parenting style and body dissatisfaction in children, however, remains unstudied. Given that associations have been found between parenting style and body image in adolescents, one would expect that in children, for whom parents exert a stronger influence on the environment, the relationship between parenting and child body image may be stronger than found for adolescents. Many prevention and intervention programs for child overweight and obesity that involve parents tend to focus on younger children rather than adolescents (Golan, 2006; Golley, Magarey, Baur, Steinbeck, & Daniels, 2007). Studying the influence of parenting style on the relationship between child weight, self-esteem and body dissatisfaction will help to ensure that recommendations regarding parenting style, which are regularly included in programs targeting child overweight and obesity, also serve to promote positive psychological outcomes in young children.

The preponderance of studies investigating associations between parenting style and child outcomes have used a parent-report method of measurement. This is despite findings that child-perceived parenting demonstrated significantly stronger associations with child body dissatisfaction and dieting behaviour (Haines, Neumark-Sztainer,
Hannan, & Robinson-O’Brien, 2008), and with observed parenting (Sessa, Ave
nevoli, Steinberg, & Morris, 2001), compared to the parent’s own perspective of their parenting. A recent study also found that child-reported parenting style was associated with children’s attitudes toward diet and activity, whereas parent-reported parenting style was not (see Chapter 5). It appears, therefore, that for child outcomes, it is the parenting that children experience that is important, rather than parent’s perspective of their own behaviour.

The present study was designed to investigate the relationship between parenting style, as perceived by the child, and child outcomes; weight, self-esteem and body dissatisfaction. Given that findings of previous studies suggest that parental responsiveness and demandingness are associated with positive psychological outcomes for children (e.g., Baumrind, 1991), it was expected that parental responsiveness and demandingness would be positively associated with child self-esteem and negatively associated with child body dissatisfaction. Secondly, it was predicted that child BMI would be positively associated with child body dissatisfaction, and negatively associated with child self-esteem. It was also expected that parenting would moderate the association between child BMI and psychological outcomes, with higher levels of responsiveness and higher levels of demandingness associated with a weakening of the relationship between BMI and problematic psychological outcomes, suggesting that responsiveness and demandingness in parents are protective factors against the development of weight-related negative psychological outcomes.
Method

Participants

Participants were children aged between 7 and 11 years from 10 primary schools across South Australia, and their primary caregivers. Information sheets about the study and consent forms were sent out to all students in grades three, four, and five at those schools (total: 1251). In response to these, 233 primary caregivers consented for themselves and their child to participate. Children completed questionnaires in relation to perceived parenting style, body image, and self-esteem at school in class and had their weight and height measured by study researchers, from which data BMI was calculated (defined as weight(kg)/height(m)^2). Questionnaires that included measures of parental depressive symptoms, body image, and self-reported height and weight were sent directly to parents, and 190 parents returned completed questionnaires, providing a response rate of 82%. Fifteen children were absent on the day of data collection, and 17 parents failed to provide data on parental psychological outcomes, resulting in a final sample size of 158.

Measures

Child-perceived parenting style

Children reported on parenting style, using the Authoritative Parenting Index (Jackson, Henriksen, & Foshee, 1998). This consists of two scales measuring the dimensions that comprise the most widely studied conceptualisation of parenting style, namely responsiveness, the measure of which is comprised of nine items (e.g., “He/she comforts me when I am upset”), and demandingness, the measure of which is comprised of seven items (e.g., “He/she has rules that I must follow”). Children were asked to
relate responses to the parent who spends the most amount of time looking after them (i.e., their primary caregiver). Response options were on a four-point Likert-type scale ranging from 1 (not like my parent) to 4 (exactly like my parent). Internal consistency (Cronbach’s alpha) values for this scale have been found to be adequate, with ranges of $\alpha = .67-.76$ for the responsiveness scale and $\alpha = .67-.88$ for the demandingness scale (Botello-Harbaum, Nansel, Haynie, Iannotti, & Simons-morton, 2008; Nansel et al., 2009). One item (“He/she tells me what to do” (reverse-coded)) was removed from the perceived parental responsiveness scale because of low item-total correlation.

*Child body mass index (BMI)*

Objective height (to the nearest 0.5cm) and weight (to the nearest 100 grams) measurements of children were taken. Both were taken by trained researchers, and children wore light clothing and no shoes for the measurements. Child BMI was calculated from these height and weight measurements.

*Child self-esteem*

Sixteen items were taken from the Self-Description Questionnaire (SDQ; Marsh, Craven, & Debus, 1991) to provide a measure of child self-esteem. This measure was developed in Australia and has been used widely with children in the primary school years. The items used for the current study represented the peer-related (e.g., “Other kids want me to be their friend”) and general self-esteem (e.g., “I like being the way I am”) scales of the SDQ, which have been found to exhibit good reliability in samples of young children, with internal consistency estimates ranging from $\alpha = .72-.81$ (Marsh, et al., 1991). Responses for all items on the SDQ were given on a five-point Likert-type scale, with options ranging from 1 (no, not at all) to 5 (yes, a
A factor analysis of the items was conducted because these two scales have not previously been used as a stand-alone measure. This revealed the presence of a single factor explaining 40.1% of the variance on the items, determined through inspection of the scree plot and confirmed through Monte Carlo parallel analysis (Horn, 1965).

**Child body dissatisfaction**

Collins’ (1991) sex-specific figure rating scales were used to assess child body dissatisfaction. This measure consisted of two arrays of seven figures ranging from very underweight to obese. Children rated their perceived current size on a line presented underneath the figures (i.e., “Put a mark on the line under the picture that most looks like how you think your body looks right now”). Under the second array of figures, children gave a rating of ideal size (i.e., “Put a mark on the line under the picture that looks most like how you would like your body to look”). Children were told to place a mark on the line between two pictures if they felt their perceived or ideal size fell between two specific pictures on the scale. Actual and ideal ratings were calculated by measuring to the nearest millimetre from the beginning of the scale to the point at which the child placed the mark. This produced a linearly defined variable in which higher values represented desire for a thinner body. Body dissatisfaction is therefore, in the context of the present study, represented by endorsement of an ideal body that is thinner than a child’s perceived current body size.

**Covariates**

Children gave details of their gender and age. Parents provided information on their education level achieved, as a proxy for socioeconomic status. Response options for parental education ranged from 1 (*primary school*) to 9 (*postgraduate degree*). Because
socio-economic status and child gender have been associated with child weight and child psychological outcomes (Collins, 1991; Lobstein, Baur, & Uauy, 2004), these variables were included in all analyses as covariates.

Parental body dissatisfaction Because parental body dissatisfaction has been associated with child body dissatisfaction, parents completed a measure of body dissatisfaction using Gardner’s figure rating scale (Gardner, Jappe, & Gardner, 2009). This consists of two arrays of 17 figures ranging from very underweight to very overweight under which parents placed an estimation of current body size (first figure array) and an estimation of ideal body size (second figure array). The body images were based upon anthropometric measurements of USA adults, with the centre figure representing average body size and figures on either side of the centre figure ranging from 60% of average size to 140% of average size (Gardner, et al., 2009). Body dissatisfaction was calculated by subtracting the ideal body size rating from the current body size rating. Higher levels on the resultant variable therefore represented desire for a smaller body.

Parental depressive symptoms A measure of parental depressive symptoms was taken from the Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995). This measure was included because parental psychological functioning has been associated with parenting and with psychological outcomes in children (Berge-Nielsen, Vikan, & Dahl, 2002). The DASS-21 is a validated short-form questionnaire for symptoms of depression, anxiety and stress over the past seven days. It has been shown to demonstrate good reliability in adult samples (α=.97; Antony, Cox, Enns, Bieling, & Swinson, 1998), and the depression subscale has been found to correlate highly with
comprehensive measures of depressive symptoms (Lovibond & Lovibond, 1995). The
depression scale consists of seven items (e.g., “I felt downhearted and blue”), and
responses were given on a four-point likert-type scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time).

Statistical analysis

All analyses were conducted using PASW Statistics, version 18.0.0 (SPSS Inc., Chicago IL, 2009). Inspection of the parenting style dimensions indicated the presence of positive skew, which was corrected using a logarithmic transformation. Standardised body mass index scores (z-scores), adjusted for age and gender using International Taskforce on Obesity criteria (Cole, Bellizzi, Flegal, & Dietz, 2000), were calculated for child BMI and used in all analyses.

Simultaneous multiple regression analyses were conducted to determine the relative influence of child weight, parenting, and covariates on the outcomes of child self-esteem and body dissatisfaction. In order to control for the influence of parents’ own psychological functioning on child psychological outcomes, parents’ own body image and depressive symptoms were included as covariates for analyses involving child body dissatisfaction and child self-esteem respectively, along with child gender and parental education.

Moderated regression analyses were also conducted for the interaction between child BMI and each parenting style dimension. These followed the procedures outlined by Baron and Kenny (1986). Variables were first centred, and a product term was calculated from the centred variables. The product variables for BMI and each parenting style dimension were entered simultaneously into the second step of a regression
analysis as recommended by Frazier and colleagues (2004), with the centred predictors and covariates entered into the first step, allowing the unique influence of the interactions on the outcome to be determined. For moderation to be confirmed, a significant change in the regression coefficient needed to occur at the second step, when the interaction terms were entered. The criterion for statistical significance for all analyses was set at $p<.05$.

**Results**

Descriptive statistics for children and parents of the sample are presented in Table 1. The proportion of children who were overweight or obese in the present sample according to International Taskforce on Obesity standards (Cole, et al., 2000) was slightly lower than Australian prevalence estimates (22.7% compared to 25.3%; Booth 2007). The parents of the sample were highly educated, with 70% having completed some form of tertiary education (TAFE certificate or higher). Both children and parents’ ideal body rating was significantly smaller than their current perceived body size, $t(232)=7.15$, $p<.001$ and $t(186)=12.37$, $p<.001$ respectively.

There were no gender differences in child BMI z-score or child self-esteem. Body dissatisfaction also did not differ according to child gender, but girls showed a trend towards perceiving their current size as significantly larger than did boys, $t(231)=2.00$, $p=.05$. There was no significant correlation between child self-esteem and child body dissatisfaction, $r=.01$.

All measures used in the study showed adequate reliability, with Cronbach’s alpha values of $\alpha=.71$ for the revised child-perceived responsiveness scale, $\alpha=.69$ for
child-perceived demandingness, $\alpha=.91$ for the child self-esteem scale, and $\alpha=.82$ for the DASS depression scale.
Table 1. Descriptive statistics for parent and child characteristics

<table>
<thead>
<tr>
<th></th>
<th>Mean or %</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (% female)</td>
<td>233 (52.8%)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>9.28</td>
<td>1.09</td>
</tr>
<tr>
<td>BMI</td>
<td>17.94</td>
<td>2.74</td>
</tr>
<tr>
<td>% overweight/obese</td>
<td>22.7%</td>
<td></td>
</tr>
<tr>
<td>Perceived parental responsiveness (range 8-32)</td>
<td>20.21</td>
<td>3.00</td>
</tr>
<tr>
<td>Perceived parental demandingness (range 7-28)</td>
<td>22.24</td>
<td>3.73</td>
</tr>
<tr>
<td>Self-esteem (range 16-80)</td>
<td>65.76</td>
<td>9.95</td>
</tr>
<tr>
<td>Current body size (range 0 – 20)</td>
<td>8.15</td>
<td>2.55</td>
</tr>
<tr>
<td>Ideal body size (range 0 – 20)</td>
<td>7.05</td>
<td>2.46</td>
</tr>
<tr>
<td><strong>Parent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (% female)</td>
<td>190 (91.1%)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>40.69</td>
<td>5.65</td>
</tr>
<tr>
<td>Education %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;Year 12</td>
<td>15.7</td>
<td></td>
</tr>
<tr>
<td>Yr 12 or equivalent</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>70.7</td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms (range 0-21)</td>
<td>3.97</td>
<td>5.21</td>
</tr>
<tr>
<td>Current body size (range 0-27)</td>
<td>10.64</td>
<td>6.23</td>
</tr>
<tr>
<td>Ideal body size (range 0-27)</td>
<td>6.89</td>
<td>4.10</td>
</tr>
</tbody>
</table>
Self-esteem

Child self-esteem was regressed onto child-reported parental responsiveness and demandingness, along with covariates child BMI, child gender, parental education and parent depressive symptoms. The results are presented in Table 2. Parental responsiveness and child BMI were significant unique predictors of child self-esteem. Moderated regression analyses were subsequently conducted; these indicated that neither parental responsiveness nor parental demandingness interacted significantly with child BMI in their association with child self-esteem.

Table 2. Results of regression analysis to predict child self-esteem \((n=158)\)

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>±SE</th>
<th>Beta</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child self-esteem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R^2 (7,150)= .20, p&lt;.001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child BMIz</td>
<td>-1.84</td>
<td>.70</td>
<td>-.20</td>
<td>.010</td>
</tr>
<tr>
<td>Child gender</td>
<td>-.28</td>
<td>1.51</td>
<td>-.01</td>
<td>.851</td>
</tr>
<tr>
<td>Child age</td>
<td>-.76</td>
<td>.64</td>
<td>-.09</td>
<td>.243</td>
</tr>
<tr>
<td>Parent education</td>
<td>-.22</td>
<td>.34</td>
<td>-.05</td>
<td>.530</td>
</tr>
<tr>
<td>Parent depression</td>
<td>-.34</td>
<td>.57</td>
<td>-.05</td>
<td>.545</td>
</tr>
<tr>
<td>Child-reported responsiveness</td>
<td>3.39</td>
<td>.78</td>
<td>.35</td>
<td>.000</td>
</tr>
<tr>
<td>Child-reported demandingness</td>
<td>.93</td>
<td>.82</td>
<td>.09</td>
<td>.262</td>
</tr>
<tr>
<td><strong>Step 2. †</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R^2 \text{ Change (2,148)= .00, } p=.668)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†Step 2: interaction terms \((\text{child BMIz x child-report responsiveness and child BMIz x child-report demandingness})\)
Child body dissatisfaction

Table 3 presents the results of the regression analysis for child body dissatisfaction. Only child BMI was significantly associated with child body dissatisfaction. No significant interaction was shown between perceived parental demandingness and child BMIz or parental responsiveness and child BMIz in predicting child body dissatisfaction.

Table 3. Results of regression analysis to predict child body dissatisfaction (n=158)

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>±SE</th>
<th>Beta</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body dissatisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R² (7,150)= .22, p&lt;.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child BMIz</td>
<td>.83</td>
<td>.15</td>
<td>.43</td>
<td>.000</td>
</tr>
<tr>
<td>Child gender</td>
<td>.54</td>
<td>.30</td>
<td>.14</td>
<td>.072</td>
</tr>
<tr>
<td>Child age</td>
<td>.10</td>
<td>.13</td>
<td>.06</td>
<td>.436</td>
</tr>
<tr>
<td>Parent education</td>
<td>-.06</td>
<td>.07</td>
<td>-.07</td>
<td>.378</td>
</tr>
<tr>
<td>Parent body dissatisfaction</td>
<td>.04</td>
<td>.03</td>
<td>.08</td>
<td>.280</td>
</tr>
<tr>
<td>Child-reported responsiveness</td>
<td>-.06</td>
<td>.16</td>
<td>-.03</td>
<td>.683</td>
</tr>
<tr>
<td>Child-reported demandingness</td>
<td>-.05</td>
<td>.16</td>
<td>-.03</td>
<td>.746</td>
</tr>
</tbody>
</table>

Step 2. †

R² Change (2,148)= .01, p=.639

†Step 2: interaction terms (child BMIz x child-report responsiveness and child BMIz x child-report demandingness)
Discussion

The present study investigated the relationship of parenting style and child weight to child self-esteem and body dissatisfaction, two aspects of psychological functioning commonly associated with overweight and obesity. The findings suggest that both child BMI and parental responsiveness are associated with aspects of child psychological functioning.

Child BMI was negatively associated with child self-esteem and positively associated with child body dissatisfaction in the present sample, providing further evidence for the existence of an association between excess weight and poorer psychological functioning in pre-teen children. The relationship between excess weight and body dissatisfaction is well established, even in young children (Clark & Tiggemann, 2008; Dohnt & Tiggemann, 2006b). Earlier studies suggested that weight-related influences on self-esteem might not occur until a child reaches teenage years (Strauss, 2000), but more recent studies have suggested that younger children with excess weight also experience difficulties with self-esteem (Griffiths, et al., 2010), with evidence for a causal relationship between BMI and lower self-esteem (Hesketh, Wake, & Waters, 2004). The present findings indicate that children as young as seven, who are not necessarily seeking treatment for overweight or obesity, may be experiencing lower self-esteem associated with excess weight. Professionals working with children who are overweight or obese should be attentive to the possibility that these children are experiencing problems with psychological wellbeing. Assuming that children are too young may result in professionals missing precursors to the development of unhealthy weight control behaviours; both low self-esteem and body image dissatisfaction have
been associated with the development of eating disorders (Gibson, et al., 2008; Sancho, Arija, Asorey, & Canals, 2007).

The association between child-perceived parenting style and child self-esteem provided partial support to the study hypothesis. Parental responsiveness showed a positive association with child self-esteem, whereas demandingness did not predict child self-esteem. Previous studies have suggested that parental demandingness and responsiveness promote self-esteem in children (McClure, et al., 2010), but the findings of the present study indicate that responsiveness may be the more important aspect of parenting style for associations with child self-esteem. Indeed, it has been found that low parental responsiveness and high demandingness predicts low self-esteem in older children (Heaven & Ciarrochi, 2008). It is possible that associations found between this type of parenting and low child self-esteem may be driven by a low level of parental responsiveness, rather than by parental demandingness, though further investigations are needed in order to verify this. Child BMI and parental responsiveness appear to be uniquely associated with child self-esteem; parenting may not mitigate the association between weight and self esteem but both weight and parental responsiveness are important for self-esteem in children.

Parenting style was not associated with child body image: only child BMI predicted child body dissatisfaction. Previous studies have investigated parental influence on child body dissatisfaction and found specific parental behaviours and attitudes such as encouragement for the child to lose weight, comments about child weight, and parent’s own drive for thinness and dieting behaviour to be associated with child body dissatisfaction (Anschutz, et al., 2009; Davison & Birch, 2002; Haines, et
al., 2008; McCabe, Ricciardelli, & Holt, 2005). General parenting variables like demandingness and responsiveness have been shown to be associated with body dissatisfaction only in adolescents and young adult women (Archibald, et al., 1999; Byely, et al., 2000; Enten & Golan, 2009). It may be that in younger children, specific practices and attitudes are more important for body satisfaction than is general parenting style. Recommendations regarding specific parenting behaviours such as decreasing criticisms about child weight may be more beneficial for promoting child body satisfaction than attempts to change parental responsiveness or demandingness.

Parents’ own psychological concerns and affective functioning (body dissatisfaction and depressive symptoms) were not found to be associated with body image or self-esteem in children. Body dissatisfaction in mothers has previously been found to be associated with daughter’s dissatisfaction (Smolak, 2004), though other studies have found evidence for associations with overt parental behaviours only (e.g., comments about weight), and not for factors such as parents’ own body dissatisfaction or dieting (Haines, et al., 2008). The present findings showed support for the latter suggestion, as parental behaviours, in terms of a responsive parenting style, were associated with child self-esteem, while internal factors such as parent’s own depressive symptoms and body dissatisfaction were not associated with child outcomes.

Child gender, child age, and parental education were not significantly associated with child self-esteem or body dissatisfaction. Although no gender differences were shown in either BMI or absolute body dissatisfaction, girls perceived their current body shape to be larger than did boys. It is the case that the images used for the study were an artist’s interpretation of body size rather than based upon standardized body size...
images, thus the difference may be a function of measurement error (i.e., deviations in body size on figure arrays may not have been equal across genders). Further investigation using standardised images is therefore warranted. It is also possible that girls’ perceptions are influenced by societal thinness ideals to a greater extent than boys. Girls as young as five years have been found to be influenced by media messages regarding weight (Dohnt & Tiggemann, 2006b), and internalisation of this ‘thin ideal’ may lead to misperception of own body size.

Overall, findings support the view that parental responsiveness appears to be an important target for facilitating positive self esteem in children, including overweight and obese children. Previous studies have shown responsiveness to be associated with healthy behaviours such as increased fruit intake (Berge, Wall, Loth, & Neumark-Sztainer, 2010; Kremers, Brug, De Vries, & Engels, 2003) and increased engagement in physical activity (Jago et al., 2011). Parental demandingness was not found in the present study to be associated with child psychological outcomes, but it has previously been suggested that demandingness in the absence of responsiveness produces negative influences on child self-esteem (Heaven & Ciarrochi, 2008), and has been associated with eating disorder symptoms (Enten & Golan, 2009). This type of parenting has also been found to predict increased child weight, relative to a parenting style characterised by high levels of both demandingness and responsiveness (Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). The current study highlights the important role responsive parenting plays in supporting positive self-concept among children, particularly those at risk because of excess weight. Interventions aiming at reducing child weight, or those designed to assist overweight children deal with the negative psychological sequelae of
weight gain, could usefully focus on encouraging parental responsiveness to their children. Although further research is required, it is possible that parental support of children’s self-esteem may mitigate child risk of eating disorders or other unhealthy compensatory behaviours.

Strengths of the present study include the focus on multiple aspects of child psychological well-being. The measurement of parenting style through child-report rather than self-report was also a strength, as it has been found to be more strongly associated with child outcomes (Haines, et al., 2008), and also more closely associated with observed parenting style compared to parent-reported parenting style (Sessa, et al., 2001). Limitations in study interpretation arise from the cross-sectional nature of the study and the associated difficulty with the attribution of causality. While it would be expected that parenting and child weight influence psychological outcomes, it is also possible that low self-esteem and poor body image may be contributing to overweight and may induce a change in parenting style. Nevertheless, the result indicates the importance of longitudinal cohort data collection that tracks how self-esteem develops in obese and overweight children in households with more or less responsive parents. Objective measures of parenting are also needed to verify the findings for parental responsiveness, given that they were based upon proxy-reports of parenting. The use of single-dimensional scales for body image and self-esteem may have underestimated effects, as there is some evidence to suggest that both outcomes involve multiple dimensions (Griffiths, et al., 2010; Smolak, 2004). In providing estimations of parenting style, children did not identify the gender of who they considered to be the primary caregiver. For families in which the gender of the primary caregiver identified
by the child differed from the gender of the parent-identified primary caregiver, this 
may have influenced the findings for associations between parent and child body 
dissatisfaction, which could provide a potential explanation for the null findings for this 
relationship. Finally, the small sample size, particularly given over one thousand people 
were initially approached to participate, limits the generalisability of the findings. It 
cannot be ruled out that characteristics specific to the present sample may have 
influenced the results of the study.

Longitudinal studies are also needed in order to elucidate the nature of the 
relationship between parenting, child weight, and child psychological outcomes such as 
self-esteem and the risk for development of unhealthy weight control behaviours. 
Studies in the area of parenting and child feeding have found that parenting styles are 
associated with specific feeding practices, that in may turn influence child outcomes 
(Hubbs-Tait, Kennedy, Page, Topham, & Harrist, 2008). Investigating how parenting 
styles may map onto specific practices related to such outcomes as body image and self-
esteeem may also help to clarify understanding of these relationships. For example, 
specific parental behaviours such as encouragement of dieting or criticism about weight 
have been found to be associated with drive for thinness and disordered eating in 
children (Haines, et al., 2008; Kluck, 2010). It is possible that parenting styles may 
predict these parent behaviours, thus informing us of the processes by which parenting 
styiles may influence weight-related psychological outcomes in children. Finally, it 
would be useful to investigate the relationship between parenting style and unhealthy 
weight control behaviours in children, in order to identify whether parental 
responsiveness may help to mitigate the onset of eating disorder symptoms, as studies
to date have focussed on populations already undergoing treatment for eating disorders (e.g., Enten & Golan, 2009).

The present study provides further evidence that child weight is associated with negative psychological outcomes in young, non-treatment seeking children. Psychologists should ensure that they are cognisant of the potential negative impacts of weight, and the strategies that parents use when responding to their child’s concerns (i.e., their responsiveness) when consulting with children who are overweight and obese. It appears that parents are able to have a positive influence on child weight-related psychological outcomes through ensuring they are involved with their children and responsive to their needs. Emphasising a responsive parenting style is particularly important as it is associated with both healthy weight-related behaviours such as fruit and vegetable intake (Berge, et al., 2010), and positive psychological outcomes in children, something that might not be achieved solely through changing specific weight-related parenting practices.
CHAPTER 7. CONCLUSIONS, IMPLICATIONS, AND FUTURE DIRECTIONS

Review of thesis aims

The prevalence of overweight and obesity in developed countries has risen to alarming levels (Lobstein, et al., 2004). Approximately one in four Australian children is overweight or obese according to recent estimates (Commonwealth Scientific and Industrial Research Organisation & University of South Australia, 2008). Although there is some evidence for a plateau of rate of increase, levels remain high (Booth, et al., 2007). In addition, overweight and obesity have been shown to track to adulthood, with attendant increases in risk for a range of morbidities, including metabolic syndrome, cardiovascular disease, and cancer (Biro & Wien, 2010; Dietz, 1998). Effective interventions are needed in order to mitigate the rate of increase of overweight and obesity and their associated physical, psychosocial and financial burden.

In children, the familial environment exerts a strong influence on behaviour and outcomes (Costanzo & Woody, 1985). This is particularly salient for the early to middle childhood years; during these pre-adolescent years the parent’s role includes that of gatekeeper of the environment pertinent to weight (Kitzmann, et al., 2008). Children in the middle childhood years are, however, beginning to develop a sense of autonomy that may impact on their response to parental attempts at influence. It would be expected, therefore, that the child response to specific parenting practices may vary according to the parenting style context the practice is presented under (Rhee, 2008).

The main focus of existing literature, prior to initiation of this research program, was upon simple associations between a single aspect of parental (and specifically, maternal) behaviour, and a specific weight-related domain (i.e., weight,
eating or activity) (e.g., see Patrick & Nicklas, 2005 for a review). Few studies reported a comprehensive investigation of the associations between domain-specific maternal and paternal parenting practices and weight-related outcomes in middle childhood together with examination of parenting style, broadly defined, and child outcomes (Rhee, 2008).

A further consideration arising from the literature related to problems associated with the measurement of parenting. In particular, conclusions had been drawn regarding associations between parenting and child weight-related outcomes that can be considered questionable. Thus, while the aim of the first study was to clarify these previously drawn conclusions, a broader aim of the dissertation was to investigate the influence of measurement approach on associations between parenting and child weight-related outcomes.

Finally, although the connection between parenting style and child psychological outcomes was well established in domains such as the development of emotional regulation and behavioural problems (Yahav, 2007), and cognitive or academic skills (Radziszewska, et al., 1996), the associations with psychological outcomes related to child weight were largely unknown. Many prevention and intervention studies focused on child health and wellbeing include parenting style as an influence (Gerards, Sleddens, Dagnelie, De Vries, & Kremers, 2011). Given that psychosocial considerations have been suggested to influence intervention effectiveness (Haines & Neumark-Sztainer, 2006), understanding how parenting style is associated with psychological outcomes in children is an important area for research.

To summarise, the aims of the thesis were threefold. Firstly, clarification and extension of previous findings in relation to parenting style and child weight were
needed. Determining how different conceptualisations of parenting style related to child outcomes was a subsequent goal of this research. The third aim was to explore the associations between parenting styles, parenting practices, child energy-balance behaviours (eating and activity), and child psychological outcomes.

Review of thesis findings

Mothers’ and fathers’ parenting style

Chapters 3 and 4 investigated both mothers’ and fathers’ parenting style and their associations with child weight and weight-related outcomes. The majority of previous weight-related research focused on maternal influence on child outcomes (Morgan, et al., 2011). Findings reported here supported the suggestion that both mothers and fathers play a role in shaping children’s weight-related environment and, importantly, that these roles may not be equivalent. Chapter 3 indicated that fathers’ parenting may be more important than mothers’ parenting for influencing the weight of young children. This was a surprising finding, particularly because mothers tend to be the primary caregiver and are therefore likely to exert more control over the environment of young children. It was also at odds with previous findings, which suggested that mothers’ influence was important for the child weight-related environment (Rhee, et al., 2006). In addition, the finding in relation to fathers’ influence on child weight was in an unexpected direction, with paternal warmth (or responsiveness) predicting increased weight. Difficulties with the measurement of the control construct, however, lead to the suggestion that paternal permissiveness, rather than responsiveness, may have been driving this association. Permissiveness has been
shown to be associated with increased weight and obesity risk behaviours in the feeding literature (Hughes, et al., 2005).

The study reported in Chapter 4 attempted to determine processes by which mothers’ and fathers’ parenting might show associations with child weight by examining parenting predictors of child behaviours that may influence weight (diet and activity). This was done by analysing associations using the same measure utilized in Chapter 3, and adding a parenting style scale that had been designed to specifically measure the dimensions that are widely held to comprise parenting style (i.e., demandingness and responsiveness; Jackson, et al., 1998). Findings were at odds with those of Chapter 3; neither parenting style dimension showed an association with child weight, indicating that it is difficult to reliably identify associations between parenting style and child weight. This suggested that a focus on parenting style associations with child behaviours may be more important (Ventura & Birch, 2008).

The main finding of Chapter 3, that paternal responsiveness (or warmth) was associated with increased risk for overweight and obesity, was not replicated in the study reported in Chapter 4. Rather, paternal (and maternal) warmth, the equivalent measure to that from the first study, were associated with higher levels of physical activity in children, a behaviour that may be associated with lower levels of adiposity (Saelens, Grow, Stark, Seeley, & Roehrig, 2011). Maternal responsiveness was additionally associated with lower levels of unhealthy weight-related behaviour (i.e., non-core food intake and sedentary behaviour), and paternal demandingness was associated with lower intake of unhealthy foods. The findings therefore suggest that
encouragement of both a demanding and responsive parenting style may show associations with healthy behaviours in children.

*Measurement of parenting style*

In addition to the impact of parent gender on parenting associations with child weight-related outcomes, Chapters 3 and 4 established that relationships between parenting and child weight-related behaviours differs according to the manner in which parenting style was measured. Parenting style is a complex construct, and measures of parenting style therefore need to capture 'stable' parental behaviours across a broad range of situations (Maccoby & Martin, 1983). Doing this accurately while also minimizing the participant burden that arises from a large number of items is difficult. This is particularly the case for studies that involve a large number of variables, including nationally representative cohort studies like the Longitudinal Study of Australian Children (LSAC; Sanson, et al., 2002). Nonetheless, it is important that brief measures like those used in such cohort studies have demonstrable validity. Examination of the measure used to represent demandingness in the LSAC study indicated that it did not appear to be consistent with the construct of demandingness. The single item in the LSAC data that appeared to be capturing demandingness more broadly was separated from the punitiveness items, and its associations with child weight were tested. This measure of control failed to show associations with child weight, or with a purpose-designed measure of parental demandingness. In addition, the measures of warmth and responsiveness correlated with each other but were not completely equivalent in their associations with child outcomes, indicating that neither of these proxy measures of parenting style showed consistency with a purpose designed
measure. This highlights the importance of being aware of the complexities associated with operationalising the dimensions of parenting style created by Baumrind (1971). A recent review of parenting style associations with child weight-related outcomes identified that 21 different measures were used to approximate the parenting styles defined by Baumrind and Maccoby and Martin (1983; Sleddens, et al., 2011). The findings of Chapters 3 and 4 therefore provide a possible reason for the present lack of clarity in the understanding of the relationship between parenting style and child weight and related behaviours: findings may not be comparable because different studies are not, in fact, reliably measuring the same parenting style constructs.

*Parenting styles, practices, weight-related behaviours and psychological wellbeing.*

The focus of Chapters 5 and 6 was to follow up on the previous findings regarding the association between parenting style and child weight-related behaviours by investigating the processes by which parenting style might influence child behaviour along with broader associations between parenting style and the weight-related context. Darling and Steinberg (1993) posited that parenting style influences child outcomes through its moderating influence on specific parenting practices. Burgeoning research in the diet and activity domains indicated this to be a sensible avenue for investigation. It was found, for example, that restriction of sugar-sweetened beverages was effective in reducing adolescent consumption when accompanied by highly responsive and moderately demanding parenting (Van Der Horst, Kremers, et al., 2007). In the physical activity domain, parental monitoring of physical activity has also been associated with higher levels of physical activity in children when presented in the context of high responsiveness and lower demandingness (Hennessy, et al., 2010a). The
Darling & Steinberg (1993) model, applied to the weight-related context, is depicted in Figure 1. Darling and Steinberg’s original model depicted general parenting style and domain-specific practices as separate variables, with non-shared variance. In the weight-related context, however, parenting styles have been found to be correlated with specific parental feeding practices (Hubbs-Tait, et al., 2008), and are thus depicted as overlapping constructs

![Diagram of contextual model of parenting style associations with child weight-related (energy balance) behaviours (adapted from Darling & Steinberg, 1993).](image)

*Figure 1.* Contextual model of parenting style associations with child weight-related (energy balance) behaviours (adapted from Darling & Steinberg, 1993).

The relationships contained within Figure 1 were tested cross-sectionally in Chapter 5, and findings indicated that rather than parenting style moderating the relationship between parenting practices and child outcomes, specific parenting practices were associated with weight and activity, whereas (child-perceived) parenting style was associated with attitudes toward food and activity, as depicted in Figure 2. The present series of studies did not explicitly test the relationship between children’s attitudes to eating and activity and actual behaviour but previous evidence exists to
suggest that child preferences and attitudes toward food and activity predict engagement in those behaviours (Brug, et al., 2008; Deforche, De Bourdeaudhuij, & Tanghe, 2006; Johnson, van Jaarsveld, & Wardle, 2011).

Figure 2. Parenting styles, parenting practices, and child diet and activity attitudes and behaviours.

The finding of an association between parental domain-specific practices and child domain-specific behaviours was consistent with previous literature investigating these associations (e.g., Edwardson & Gorely, 2010; Patrick & Nicklas, 2005). Although explanations for a direct association between parenting styles and child outcomes are not as clear to discern as those for domain-specific parental practices, it is feasible that a level of direct association between parenting style and child weight-related attitudes may exist. Perceived competence, which may be facilitated by a responsive parenting style, has been associated with increased attraction to physical activity (Brustad, 1993). Children of parents low in responsiveness have been shown to be of increased risk for symptoms of anxiety and depression (Maccoby & Martin, 1983),
and emotional eating (or eating for comfort) may be a coping strategy for negative emotions in these children, placing the child at increased risk for overweight (Goossens, Braet, Van Vlierberghe, & Mels, 2009). Whether and how these proposed associations may develop over time is a question for future research.

Psychological factors may influence the associations between parenting style and child weight-related behaviours, but parenting was not found to moderate the association between weight-related psychological outcomes and child weight in the present research. Rather, unique cross-sectional associations were found between child-perceived parenting style and child self-esteem, and child weight and both self-esteem and body dissatisfaction (specifically, desire for a thinner body), as summarised in Figure 3. It appears, therefore, that the parenting style dimension of responsiveness, while showing associations with higher self esteem, is not able to mitigate the association between child weight and poorer psychological wellbeing. Nonetheless, the findings do indicate that associations between parental responsiveness and child weight-related outcomes are not limited to specific diet and activity behaviours.

Figure 3. Associations between parenting style (parental responsiveness), child weight, and child weight-related psychological wellbeing.
Psychological outcomes may influence the effectiveness of weight-related interventions (Haines, et al., 2007), along with weight maintenance post-intervention (Wing & Phelan, 2005); it is therefore important to attend to factors that may be associated with psychological wellbeing, for example parental responsiveness, when designing intervention programs.

**Child versus parent report**

The importance of acknowledging the impact of potential reporter bias (or social desirability) when examining perspectives on parenting was a key issue examined in the present series of studies. The analyses of the papers reported in Chapters 4 and 5 indicated that although parent-reported parenting style did correlate with child weight-related variables, these associations were not retained once relevant covariates (including domain-specific parenting practices) were controlled for. By contrast, child-reported parenting styles did show reliable associations with child food and activity indices. Further detail regarding implications of these findings for research and practice are discussed in the following section.

**Implications of thesis findings**

A range of important insights were gained from the present series of studies, all of which can potentially influence research and practice pertinent to the child weight-related environment. These are outlined below, followed by a discussion of overall study limitations and directions for future research.

**Mothering and fathering**

The first two studies of this thesis focussed upon relationships between both mothers’ and fathers’ parenting and child weight and associated behaviours. As
discussed earlier in this chapter, mothers’ and fathers’ parenting did not show equivalent associations with child weight-related outcomes. This was consistent with previous findings investigating associations between mothering, fathering, and child outcomes in a range of domains (Adamsons & Buehler, 2007; Berge, Wall, Loth, et al., 2010; Stein, et al., 2005; Wake, Nicholson, et al., 2007). It has been recognised that fathers are able to influence the child weight-related environment and may play an important role in paediatric weight control (Morgan, et al., 2011). Sole reliance on assessing mothers’ parenting in research may therefore produce a limited picture of the familial environment pertinent to child weight. Researchers need to attend to the influence fathers may have on child weight-related outcomes, as failing to do so may prevent parenting associations with child outcomes from being reliably identified.

**Measuring parenting style**

The dimensions that comprise parenting style represent complex constructs that are difficult to measure reliably using proxy-report. Nonetheless, as parenting style represents stable individual differences in parenting, and has been associated with a range of child outcomes, it represents a key influence on child development and thus an important part of research investigating the parent-child relationship (Darling & Steinberg, 1993; Maccoby & Martin, 1983). There have, however, been limited reliable associations drawn between parenting style and child weight-related outcomes. Parenting style was found in Chapter 4 to have different associations with child weight-related outcomes as a consequence of the manner in which it was measured, thus measurement error may be an explanation for the difficulty experienced in identifying clear associations between parenting style and child outcomes. Child-reported
parenting was found to reveal important associations with weight-related outcomes but, as a broader goal, identification of a ‘gold standard’ for measuring parenting style is important. Findings reported in this thesis suggest parenting style research has been limited by the practice of employing measures thought to approximate parenting style dimensions but which do not, in fact, explicitly measure parenting style as originally defined. The findings of the present series of studies therefore highlight the importance of examining in detail the scales intended to measure parenting style, prior to their use. To further understanding of the relationship between parenting style and child weight-related outcomes, it is important for researchers to identify a consistent method for measuring parenting style that can be employed across studies, in order to ensure findings are reliable and outcomes are comparable.

A further important concern in regard to the measurement of parenting style is the practice of dichotomizing and combining the dimensions of demandingness and responsiveness to produce four categorical parenting ‘styles’. This practice allows for description of child outcomes according to a parenting typology, which assists with ease of interpretation. This practice is, however, problematic, due to the lack of a standard definitions for cut-points to define each of the parenting styles, resulting in differences in allocation of parents to particular ‘styles’ dependent upon the characteristics of particular samples. Indeed, it has been highlighted that the dichotomisation of continuous variables continues despite considerable literature demonstrating the negative consequences of this practice for reliability of measurement and loss of information, with the suggestion that dichotomization is ‘rarely justified from either a conceptual or statistical perspective’ (MacCallum et al., 2002, p.20). The present
series of studies allowed for identification of associations between parenting style
dimensions, in their unaltered continuous format, and a range of child outcomes.
Future researchers should continue this practice, again to ensure findings are reliably
comparable across studies so that understanding of relationships between parenting
styles and child outcomes relationships can be further clarified.

The importance of parental responsiveness

Parental demandingness and responsiveness have been thought to be equally
important for associations with child outcomes, with the ‘authoritative’ parenting style
(i.e., high demandingness and responsiveness) associated with a range of positive child
outcomes (Maccoby & Martin, 1983; Sleddens, et al., 2011). Due to the practice of
dichotomizing and combining dimensions to produce categorical parenting styles,
previous studies had not been able to investigate the relative importance of each
parenting style dimension for child outcomes. The findings of the studies that comprise
this dissertation indicate that parental responsiveness may be the important aspect of
parenting for healthy child weight-related behaviours and self-esteem. This was
somewhat at odds with some previous findings; the combination of high responsiveness
and low demandingness specific to the feeding domain had been associated with higher
weight in children (Hughes, et al., 2008). Indeed, in the study reported in Chapter 3,
paternal warmth was associated with overweight. It may be, however, that
responsiveness differs from warmth. Items contained within the ‘warmth’ measure
imply physical affection (e.g., ‘How often do you show affection towards your child’),
whereas responsiveness, as measured by the Authoritative Parenting Index, appears
more closely associated with positive response to child behaviours that include telling a
child they do a good job on things, praising the child, and showing interest in their activities (Jackson, et al., 1998). In analyses conducted in Chapter 4, warmth and responsiveness were found to be correlated, but the size of the correlation was quite small. Warmth and responsiveness therefore represented related, but not equivalent concepts. It is possible, therefore, that the non-shared variance on warmth relates to a permissive style of parenting. We may speculate that, were both to be compared to the Child Feeding Styles Questionnaire (Hughes, et al., 2005) - a measure of parenting style specific to the feeding domain - the warmth measure may show closer associations with a permissive feeding style, while responsiveness may be more closely associated with authoritative feeding. This is an important distinction because it appears that responsiveness is influential in terms of associations with healthy weight-related behaviours, while permissiveness has been associated with less healthy behaviours or outcomes (Hughes, et al., 2008). In the current study, however, permissive feeding practices (i.e., child control over feeding) were not associated with child weight or diet indices. This warrants further investigation with a more comprehensive range of diet outcomes.

On the basis of the findings of this series of studies, targeting responsiveness with parents of children may produce associations with a broad range of health-related outcomes in children: behavioural, attitudinal, and psychological. In parenting interventions, therefore, where a range of needs are competing for attention, a focus on responsiveness may be associated with greater intervention effectiveness. This suggestion is supported by findings from the intervention literature. Previous research by Stein (2005) showed that change in parental acceptance (which has been associated
with responsiveness) accounted for approximately 10% of the variance in weight change in obese children following a family-based weight-loss intervention. Similarly, a community-based weight-loss intervention study with families of overweight children was effective in producing weight-loss in children when a positive parenting program was combined with a diet and lifestyle intervention (Golley, et al., 2007). Interventions that involved parent skills training have been generally limited in terms of the extent to which they were based, a-priori, upon research findings regarding parenting style and child weight. For example, the positive parenting program utilized in the abovementioned study was employed as an intervention before any links were made between child weight and the parenting concepts involved in the program. The findings of this series of studies therefore suggest that encouraging parental responsiveness may form part of effective intervention and prevention programs for childhood overweight and obesity.

Child and parent perspectives

A range of parenting factors and child behaviours were important for weight and wellbeing of children in the present series of studies. Parenting facilitated child health behaviours and attitudes through their specific goal-directed behaviour along with the general emotional and behavioural climate they provided for their children. Importantly, the parenting that parents reported was not consistent with the parenting children experienced. These findings have implications for the manner in which the child-parent relationship is investigated in parenting research, and for professionals working with parents and families. Both children and parents provide important insights into the parent-child relationship. Sole reliance on self-report is likely to be problematic.
and should be avoided given that children have been shown to understand complex
behaviours including parenting (Sessa, et al., 2001). Moreover, it is likely that it is the
parenting that children experience that ultimately influences child outcomes, rather
than parents’ perceptions of their own behaviour. Thus, wherever possible the child
experience should be included in research involving child outcomes. The current
findings indicated that failing to do so may result in important associations being
missed. This suggestion is also consistent with a family systems perspective, which
views the parent-child relationship as dynamic and interactive (Kitzman-Ulrich, et al.,
2010). Accessing both the child and parent perspective is therefore important for
identifying patterns of influence. Indeed, systemic family therapy has shown promise as
a therapeutic framework for working with families of children who are obese
(Nowicka, Pietrobelli, & Flodmark, 2007), with beneficial effects found for both child
weight and for family functioning. Further investigation of the processes by which
systemic family therapy may be influencing child outcomes is a suitable target for future
research.

Limitations

Aspects of the study design, sampling framework, and the measurement tools
used limit interpretations and generalisability of the findings, and conclusions from the
thesis results. Because many of these have been covered within each of the chapters and
papers presented in this thesis, a brief summary will be given here, followed by overall
future directions for research.
Study design

The design of the current series of studies allowed for a number of research questions to be answered. Chapter 3 reported findings from a longitudinal study of parenting and child weight, thus inferences were able to be made about the direction of influence between parenting style and child weight. The cross-sectional design of the subsequent study precluded conclusions from being drawn about the direction of relationships, which creates difficulties for understanding the processes by which parenting style may influence child weight. Examination of the longitudinal associations between parenting styles, practices, and weight-related behaviours and psychological outcomes is needed in order to reliably identify whether parents are able to influence weight-related outcomes in children, children influence parenting through their behaviours, or a cyclical relationship is occurring between these two sources of influence.

Chapter 3 was based upon an analysis of a pre-existing dataset from a large, nationally representative study. The enviable sample size of this study was unable to be replicated in the follow-up study due to resource and time constraints. The aim of the series of analyses reported in Chapters 4 and 5 was to identify processes by which parenting may influence child weight and related outcomes, but sample size considerations precluded investigations from being as comprehensive as originally intended, particularly in regards to measuring a range of parental feeding practices. Variables chosen for inclusion were therefore those that previous studies had identified to show the most reliable associations with child weight-related outcomes. Nonetheless, it must be acknowledged that conclusions about the familial environment
depicted in the present series of studies are limited by the variables included, and more comprehensive studies of contextual factors are needed to provide a comprehensive picture of the range of interacting variables pertinent to child weight and related outcomes.

**Inclusion of fathers**

In addition to the abovementioned constraints on generalisability due to an inability to capture all aspects of familial influence on child weight-related behaviour, the focus on the primary caregiver in Chapters 5 and 6, while necessary due to sample size considerations, limits the extent to which findings may be applicable to two-parent households. The primary caregiver (and usually the mother) has been identified as the main gatekeeper for a range of environmental factors including food choices for the family (Birch & Fisher, 2000). As shown in Chapters 3 and 4, however, fathers exert an important influence on the child weight-related environment. In the present study, explicit invitations were provided to both parents of two-parent households. This may not, however, have been sufficient in order to gain participation from fathers.

Participation from fathers has been shown to be enhanced when fathers are targeted specifically in recruitment strategies (Phares, Lopez, Fields, Kamboukos, & Duhig, 2005), recruited face to face (Sherr, Davé, Lucas, Senior, & Nazareth, 2006), and when the research questions are framed in such a way that fathering is highlighted (Costigan & Cox, 2001). A recent intervention study has demonstrated success in gaining participation from fathers using the latter method (Morgan, et al., 2011). Alternative strategies for recruitment have also been suggested, including recruiting fathers through places of employment, rather than recruiting through sites traditionally targeted, such
as schools (Phares, et al., 2005). Future studies may benefit from employing these strategies in order to help ensure fathers are appropriately represented in parenting research.

Data measurement

While the use of objective anthropometric measures was a strength of this thesis, the parenting and behavioural measures were assessed via self- or proxy- report and were therefore subject to respondent bias. The choice of behavioural and parenting measures needed to provide a balance between ensuring reliable and valid estimates of variables and minimising participant burden, particularly for child participants. For this reason, brief, validated, self- or proxy- report measures were used, where possible including multiple items to enable reliability to be assessed. Resource constraints precluded the use of more rigorous measures such as food diaries, accelerometers, and daily activity diaries. Opportunities for further improving data measurement in future studies are discussed in the following section.

Future directions

The present collection of papers represents a step forward for understanding of both how parenting style may be measured and conceptualized, and through associations between parenting styles, practices, and child weight-related outcomes. Nevertheless, further research is needed to confirm the directions of associations and their uni- versus bi-directional status. In addition, better definitions of parenting style and parenting practices are required because it is only through enhanced definition and widespread acceptance that the variables can be appropriately operationalised.
Predicting behaviour change

The current series of studies established that cross-sectional associations exist between parenting behaviour and child outcomes. The next step is to determine how parenting predicts weight-related behaviour change in children. Changing behaviour related to the development of overweight and obesity, along with preventing the development of unhealthy weight-control behaviours, is the primary objective of intervention and prevention programs. It is therefore important that parenting factors identified as important in the present series of studies are able to predict behaviour change in children, which needs to be investigated using a longitudinal study design. Previous longitudinal studies in the field of parenting have identified associations over a 1.5 to 3 year follow-up period (e.g., Rhee, et al., 2006; Laura Webber, et al., 2010). Given the stability of parenting style, and the possibility that parenting associations with child weight may occur over the longer rather than shorter term, follow-up periods of 3 years and longer would be advisable.

Measurement of parenting

The findings overall indicate that child-perceived parenting style may be more important for detecting associations with child outcomes than parent-reported parenting style. In order to provide a more complete indication of parenting associations, however, completing an analysis of how parenting from the maternal, paternal and child perspectives may be correlated with each other or cluster together represents a useful next step. This would allow for a more comprehensive understanding of not just unique parental influence, but also how mothers’ and fathers’ parenting may operate together to influence child outcomes. In addition, it would
elucidate what may be the optimal combination of mothers’, fathers’ and child-perceived parenting for understanding influences on weight-related outcomes in children.

The findings of this series of studies showed few associations between feeding practices and child dietary outcomes, which may again be explained by the reliance on parent reports of parent behaviour. One study that investigated associations between parent- and child- reported parenting practices specific to the domain of feeding found stronger associations for child-reported parenting practices (i.e., restriction and pressure to eat) and child eating outcomes than were found for parent reports of their practices and child outcomes (Carper, Orlet Fisher, & Birch, 2000). An investigation into the feasibility of measuring children’s perceptions of parenting practices across a broader range of parenting behaviours in both the feeding and activity domains may therefore provide useful insights.

**Measurement of child weight-related outcomes**

The findings reported here in relation to child diet and activity behaviours were based upon brief, proxy-report estimates. Food frequency questionnaires were used to provide an estimation of the dietary indices of fruit and vegetables and non-core food intake. This form of dietary intake measurement is suggested to be useful as an indicator of general dietary quality, but does not correlate well with overall energy intake or with micronutrient intake (Burrows, Warren, & Collins, 2010). Comparisons between methods of child dietary intake have suggested that, for children between the ages of 4 and 11 years, the use of parent-reported, multiple-pass estimation is the most reliable and valid method of estimating dietary intake (Burrows, et al., 2010). Multiple-pass
reporting methodologies involve a three-step method of estimation, with each step providing an increasing level of detail. The first ‘pass’ provides information on meals, snacks, and beverages consumed, the second pass provides details on cooking methods, quantities, and brands, and the third pass is used as a review, prompting for forgotten items and helping to ensure recall completeness (Marshall, Golley, & Hendrie, 2011). Three-day estimations that include one weekend day have been suggested to be the minimum number of days required in order to reliably estimate intake (Burrows, et al., 2010).

In addition to child diet, measuring child eating is important in order to provide information on child characteristics that might be influencing both intake and parenting practices. In the present study, the inclusion of child attitudes provided useful information on associations with parenting, but a range of eating behaviours have also been found to be associated with specific parenting practices such as parental pressure to eat and child food fussiness (Gregory, Paxton, & Brozovic, 2010), and use of food for emotional regulation and child eating in the absence of hunger (Blissett, Haycraft, & Farrow, 2010). The Child Eating Behaviour Questionnaire (ChEBQ), has been widely used with parents of children in the preschool to primary school age ranges (Wardle, Guthrie, Sanderson, & Rapoport, 2001). It provides detail on a range of child behaviours, including satiety responsiveness, food responsiveness (thought to be an eating behaviour associated with increased obesity risk), and food fussiness. The inclusion of this measure may provide additional information of the dynamic relationship between children and parents in predicting child weight-related outcomes.
It has been argued that parental estimates of physical activity regularly overestimate child physical activity (Adamo, Prince, Tricco, Connor-Gorber, & Tremblay, 2009). Although in the present study the use of parent-report was necessary as resources for including objective measurement of physical activity were not available, the findings need to be validated with an objective measure of child physical activity. A recent review of measures of physical activity in children suggested that overall physical activity (including intensity of activity) should be measured using accelerometry (Dollman, et al., 2009). This is costly, with estimates of approximately $AU500 per device, but accelerometry is presently the gold standard for assessing child physical activity (Loprinzi & Cardinal, 2011). It also has particular appeal as a measure because it allows both physical activity and sedentary behaviour to be estimated. Proxy-reports can, however, provide useful qualitative information, including the types of activity children are engaged in (e.g., organized sport, active transport; Dollman, et al., 2009).

**Parental feeding practices**

The sample size of the present collection of studies did not allow for comprehensive testing of the measure of parental feeding practices used in the second study. The Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007) is yet to be tested in full in an Australian sample. It does, however, show promise as a measure of parental feeding practices, due to its focus on specific parental behaviours (as opposed to parental attitudes; c.f. Birch, et al., 2001), and because it captures behaviours that may be considered positive influences on child diet and eating, for example teaching children about nutrition (Musher-Eizenman & Holub, 2007). Further investigations using the CFPQ are required to validate the factor.
structure of the complete measure in an Australian sample, and test associations with child diet and eating outcomes.

*Child weight-related psychological outcomes*

In developing a stronger understanding of associations between parenting, weight and psychological outcomes, it is necessary for future studies to involve a comprehensive assessment of potential weight-related psychological outcomes. The findings of this dissertation indicated that higher child weight is associated with lower self-esteem and higher body dissatisfaction, and that parental responsiveness shows unique associations with child self-esteem. How these variables are connected with the development of disordered eating can provide information useful to interventions. The child-report Children’s Eating Attitude Test (Smolak & Levine, 1994) has been developed to measure disordered eating behaviours and attitudes in children. This has been found to show acceptable validity for use with non-clinical samples of children from second grade, with a revised factor structure compared to the original measure (Anton et al., 2006). Psychological symptoms associated with overweight have been identified in children as young as 6 years (Dohnt & Tiggemann, 2006b), and inclusion of younger children is therefore important for identifying pre-clinical indices of disordered eating. In addition, as identified in Chapter 6, both body dissatisfaction and self-esteem have been suggested to be most appropriately measured as multi-dimensional constructs, rather than on a single dimension such as figure rating scales (Griffiths, et al., 2010; Smolak, 2004). Inclusion of a multidimensional body dissatisfaction scale such as the Body Esteem Scale (Mendelson & White, 1982) and a multidimensional self-esteem scale such as the Self-Perception Profile for Children
Changes over the developmental period

An important consideration for the field of parenting research is how associations between parenting and child outcomes differ across the developmental period. Parental influence on child outcomes is likely to change with the child’s age. In preschool children, parents make all decisions regarding food and activity choices (Blissett & Haycraft, 2008). As children grow older and develop increasing autonomy, general parenting variables like parenting style may become more important. Testing the associations found in this thesis across pre-school, middle childhood, early adolescence, and late adolescence would allow for identification of the aspects of parenting that are associated with child outcomes across different age ranges. For example, focusing on parenting style may be more important in the middle childhood to adolescent years, while in younger children specific parenting practices may be more influential (Darling & Steinberg, 1993). This will provide key information on the most effective targets for intervention in facilitating healthy behavioural outcomes in children across the developmental period.

Final comments

The series of studies contained within this thesis have provided insight into the complex relationship between parenting and weight-related outcomes in children. Both parenting styles and domain-specific practices were uniquely associated with child weight-related outcomes. Child-perceived parenting style was found to show associations for child weight-related outcomes, whereas parent-reported parenting style
was not. Findings highlighted the importance of ensuring that scales of complex constructs are measuring what they purport to be measuring. Finally, the findings help provide direction for better understanding of the complex relationship between parenting and child weight-related outcomes. This may inform future research and prevention programs for facilitating familial relationships and healthy weight-related behaviour in children. This is an important priority for research, as prevention and intervention programs that are effective in changing attitudes and behaviours in children may assist in reducing the current high prevalence of overweight and obesity, improve the health of the population, and potentially promote positive wellbeing for children in Australia and around the world.
REFERENCES


APPENDIX A. Summary of measures of general parenting style
**APPENDIX A. Summary of measures of general parenting style used in childhood obesity research**

<table>
<thead>
<tr>
<th>Name</th>
<th>Authors</th>
<th>Details</th>
<th>Ages of children (years)</th>
<th>Internal consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authoritative Parenting Index 16 items</td>
<td>(Jackson, et al., 1998)</td>
<td>Child (and parent) report: - Demandingness - Responsiveness</td>
<td>9-16</td>
<td>α = .67-.88</td>
</tr>
<tr>
<td>Parent Authority questionnaire. (revised) 30 items</td>
<td>(Reitman, et al., 2002)</td>
<td>Parent report: - Authoritative - Authoritarian - Permissive</td>
<td>2-10</td>
<td>α = .72-.77</td>
</tr>
<tr>
<td>Parent Behaviour Checklist 100 items</td>
<td>(Fox, 1992)</td>
<td>Parent report: - Expectations - Discipline - Nurturing</td>
<td>1-5</td>
<td>α = .82-.97</td>
</tr>
<tr>
<td>Parenting Dimensions Questionnaire 53 items</td>
<td>(Power, 1993)</td>
<td>Parent report: - Nurturance - Inconsistency - Following Through on Discipline - Amount of Control - Organization - Let Situation Go - Physical Punishment - Material/Social</td>
<td>3-14</td>
<td>α = .51-.89 (most scales α = &gt;.7)</td>
</tr>
</tbody>
</table>
Parenting Scale
28 items
(Arnold, O'Leary, Wolff, & Acker, 1993)
- Consequences
- Reasoning
- Scolding
- Reminding
Parent report:
- Laxness
- Overreactivity
- Verbosity
1-4
$\alpha = .63-.83$

Parenting Style Inventory
26 items
(Lamborn, et al., 1991)
- Acceptance/ involvement
- Strictness/ supervision
- Psychological autonomy
Child report:
11-18
$\alpha = .72-.76$

Parenting Styles and Dimensions Questionnaire
32 items
(Robinson, et al., 1995)
- Authoritative
- Authoritarian
- Permissive
Parent report:
2-8
$\alpha = .75-.91$
APPENDIX B. Summary of measures of parental feeding practices
**APPENDIX B. Summary of measures of parental feeding practices. Note: all measures are parent-reported**

<table>
<thead>
<tr>
<th>Measure name</th>
<th>Author(s)</th>
<th>Subscales</th>
<th>Ages</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Feeding Questionnaire</td>
<td>(Birch, et al., 2001)</td>
<td>Monitoring, Pressure to Eat, Restriction, Perceived child weight, Perceived parent weight, Concern re: child weight, Perceived responsibility</td>
<td>2-11</td>
<td>α = .70-.92</td>
</tr>
<tr>
<td>Child Feeding Styles Questionnaire</td>
<td>(Hughes, et al., 2005)</td>
<td>Demandingness, Responsiveness</td>
<td>3-6</td>
<td>α = .71-.86</td>
</tr>
<tr>
<td>Covert and Overt control Questionnaire</td>
<td>(Ogden, et al., 2006)</td>
<td>Covert control, Overt control</td>
<td>4-11</td>
<td>α = .71-.79</td>
</tr>
<tr>
<td>Comprehensive Feeding Practices Questionnaire</td>
<td>(Musher-Eizenman &amp; Holub, 2007)</td>
<td>Child control, Emotional regulation, Encourage balance and variety, Environment, Food as reward, Involvement, Modelling, Monitoring, Pressure to eat, Restriction for health, Restriction for weight control</td>
<td>2-9</td>
<td>α = .58-.81</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>Teaching about nutrition</td>
<td>Age</td>
<td>Reliability</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>Parent Feeding Styles Questionnaire</td>
<td>(Wardle, et al., 2002) Emotional feeding, Instrumental feeding, Prompting/encouragement to eat, Control over eating</td>
<td>3-5</td>
<td>α = .65-.77</td>
<td></td>
</tr>
<tr>
<td>Preschooler feeding questionnaire</td>
<td>(Baughcum, et al., 2001) Concern about child overeating or being overweight, Concern about child underweight, Difficulty in child feeding, Pushing child to eat more, Using food to calm child, Child control over feeding interactions, Structure during feeding interactions, Age-inappropriate feeding</td>
<td>3-6</td>
<td>α = .75-.91</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C. Paper 1 reprint
*Australian Journal of Psychology, v. 63 (4), pp. 198-206*

NOTE: 
This publication is included on pages 204-212 in the print copy of the thesis held in the University of Adelaide Library.

It is also available online to authorised users at:

APPENDIX D. Paper 2 reprint

NOTE:
This publication is included on pages 214-220 in the print copy of the thesis held in the University of Adelaide Library.
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