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**HEALTHY EATING IN 10-13 YEAR OLD CHILDREN:
UNDERSTANDING CHOICE USING THE THEORY OF
PLANNED BEHAVIOUR AND THE ROLE OF PARENTAL
INFLUENCE**

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ABSTRACT

Currently, one fifth of New Zealand children are overweight and one tenth are obese. The majority of the literature reports that an increase in the intake of energy-dense foods, particularly those containing fats and sugar, are a contributing factor in the development of overweight among children. This study utilised a social cognitive model, the Theory of Planned Behaviour (TPB) to examine the influence of behavioural beliefs, subjective norm, perceived behavioural control, and attitudes towards healthy eating on a sample of 10-13 year old children. The model examined their intentions to consume particular types of food, and whether intention, in turn, predicted dietary behaviour (self-reported consumption of healthy food items). In addition, the role of parental influence on children's eating behaviour was examined. Two hundred and sixty one children, comprising males and females aged between 10 and 13 years old, from two types of school, completed a questionnaire, which focussed on five different food groups. Parents and caregivers of the children also completed a questionnaire examining their child-feeding practices. The TPB explained 65% of the variance in Ashhurst School children's behavioural intentions and 43% of Palmerston North Intermediate Normal School (PNINS) children's intentions. Intentions accounted for 47% (PNINS) and 28% (Ashhurst) of the explained variance in dietary behaviour. Parental influence did not contribute significantly to the model. For PNINS children, behavioural intention partly mediated the relationship between subjective norm, perceived behavioural control and dietary behaviour and fully mediated the relationship between behavioural belief and dietary behaviour. For Ashhurst School children, behavioural intention mediated the relationship between attitude and dietary behaviour. The results of this study support the use of the TPB in identifying healthy eating intentions and behaviour in school age children. These results however, do not support the addition of parental influence, measured by the Child Feeding Questionnaire, as a predictor of children's dietary behaviour over and above the TPB.

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CHAPTER ONE

INTRODUCTION – CHILD OVERWEIGHT AND OBESITY – AN OVERVIEW

The last twenty years have seen overweight and obesity among children reach epidemic proportions in many industrialised countries. To date, approximately 10 per cent of the world's school-aged children are estimated to be carrying excess body fat with a quarter of those obese (Lobstein, Baur, & Uauy, 2004). In the past, obese children have been considered a problem for western societies, particularly the United States (Taitz, 1983). However, many developing nations are now facing the same issue with high rates of overweight children apparent in countries such as Thailand, North Africa and Korea (Lobstein et al., 2004; Guillaume & Lissau, 2002). In wealthier societies risk is associated with social deprivation and children in lower socio-economic groups are more likely to develop obesity. The opposite occurs in developing nations where obesity is most prevalent in affluent sections of the population (Lobstein et al., 2004; Swinburn, Caterson, Seidell, & James, 2003). However, changes are occurring in these trends with incidence rising among the urban poor possibly due to exposure to westernised diets coupled with a history of under-nutrition (Lobstein et al., 2004).

There are a number of different methods for determining obesity and overweight, and while no agreed standards exist, anthropometric measures such as body mass index or (BMI) are most frequently used (Lobstein et al., 2004; Cole & Rolland-Cachera, 2002). $BMI = \text{mass (kg)} / \text{height (m)}^2$. A child is considered obese when their BMI is greater than or equal to 30 kg/m^2 and overweight when their BMI is greater than or equal to 25 kg/m^2 (Ministry of Health, 2003). Most children become obese and overweight in the same way as adults, through an energy imbalance. As part of our normal physiological processes energy taken in through foods is metabolised and then released through the body's activities including involuntary bodily functions such as breathing and voluntary functions such as movement and exercise (Robertson,

2002). When energy taken in exceeds that expended an imbalance occurs and the energy that is surplus to body requirements is stored as fat.

The last few decades have seen an alarming rise in the number of overweight and obese children in many countries. Since 1984, prevalence has doubled with the highest incidence and rates of increase observed in North America and some European countries (Lobstein et al., 2004). The United States now has a higher percentage of fat children than anywhere in the world with approximately 8 percent of American children obese and over 30 percent overweight and surveys reveal an additional 0.5 percent of the child population become overweight each year (Lobstein et al., 2004). High rates and rapid rises are also evident among Australian children. Between 1985 and 1995 overweight and obesity almost doubled among both genders (Magarey, Daniels, & Boulton, 2001) and recent cross-sectional data among a large sample of children revealed 17 percent were overweight and 5.7 percent were obese (Wake, Salmon, Waters, Wright, & Hesketh, 2002).

In the past, limited information has been available on the weight and nutritional status of New Zealand children. This has recently changed with publication of population data from a nation-wide survey examining children's food intakes, physical activity and body measurements (Ministry of Health, 2003). Over three thousand children aged between five and fourteen years were sampled and while the majority fell within an acceptable weight range (68.9 percent), one-fifth were found to be overweight and one-tenth obese (Ministry of Health, 2003). Survey results also revealed disparity between Maori and Pacific Island children compared with European and other ethnicities (NZEO). Overweight and obesity levels were highest for Pacific children, followed by Maori, and then NZEO children (Ministry of Health, 2003). Increases have been rapid with an almost 10 percent rise in overweight and obesity over the last decade. Among a sample of Hawkes Bay children average body mass index went from 18.1 kg/m² in 1989 to 19.8 kg/m² in 2000, a relative increase of 9.2 percent (Turnbull, Barry, Wickens, & Crane, 2004). The risk of being overweight among the sample was 2.2 times greater in 2000 compared to 1989 with the risk of obesity 3.8 times greater (Turnbull et al., 2004).

The speed at which rates of overweight and obese children are increasing has alarmed many health authorities. Much of this concern stems from the growing evidence that excess weight in childhood has substantial health consequences, short and long-term, medical and psychosocial. Overweight and obese children have a significant likelihood of developing type 2 diabetes, hyperinsulinaemia, sleep apnoea and orthopaedic problems (Mallory, Fiser, & Jackson, 1989; Rossner, 1998; Schechter, 2002; Davidson, Goulding & Chalmers, 2003). Type 2 diabetes, a relatively new and alarming consequence of obesity, is becoming increasingly prevalent among New Zealand children. A study of adolescents attending an Auckland diabetes clinic found a sharp rise in cases of type 2 diabetes from 1.8 percent of adolescents attending in 1996 to 11 percent in 2002 (Hotu, Carter, Watson, Cutfield, & Cundy, 2004). In addition, 85 percent of the adolescents studied were found to have adverse cardiovascular risk factors present.

Many obese children will go on to become obese adults as persistence of childhood obesity increases with age (Zwiauer, Caroli, Malecka-Tendera, & Poskitt, 2002; Zwiauer, 2000; Rossner, 1998). Both overweight and obese children are at increased risk of developing a number of chronic diseases in adulthood including heart disease, diabetes, hypertension, stroke, gallstones and some cancers (Davison & Birch, 2001; Ministry of Health, 2003; Lobstein et al., 2004; Zwiauer et al., 2002). Heart disease, stroke and cancer, the three main causes of morbidity and mortality in adult New Zealanders, are all diseases influenced by child obesity (Hodges, Maskill, Coulson, Christie, & Quigley, 1998). Statistical trends indicate that at least some of the present population of overweight New Zealand children will go on to become overweight adults, adding to what is already a significant public health issue in this country. More than half our adult population are already obese and overweight and more than 1000 New Zealanders die each year from obesity-related diseases (King, 2000). Obesity increased by 55 percent from 1989 and predicted increases for 2011 are 29 percent - an estimated rise of 73 percent. This will place a great burden on our health services with the financial cost of obesity in New Zealand already approximately \$135 million per year (King, 2000).

Excess weight also affects children's mental health and some researchers feel psychosocial problems are the most prevalent form of morbidity associated with childhood obesity (Dietz, 1998). Studies examining psychiatric morbidity among overweight children and adolescents have found significant correlations between depression and anxiety and weight status (Barnow, Bernheim, Schroder, Lauffer, Fusch & Freyberger, 2003; Buddeberg-Fischer, Klaghofer, & Reed, 1999). Overweight in childhood also increases the risk of certain eating disorders and studies comparing obese and average-weight children report dieting behaviours, weight and body image concerns, and restrained eating are more evident in obese children than their average-weight counterparts (Hill & Lissau, 2002; Vander Wal & Thelen, 2000; Hill, Draper & Stack, 1994). Because they appear physically different from their normal-weight counterparts overweight and obese children are open to discrimination and bullying (Wabitsch, 2000). Studies investigating negative stereotyping of obesity among children have found consistently disapproving perceptions regardless of children's gender, age or weight (e.g. Tiggerman & Anesbury, 2000; Hill & Silver, 1995). When presented with silhouette variations of slim or fat children children consider an overweight body shape to have far fewer friends, to do less well at school and be less content with their appearance (Hill & Silver, 1995). Fat figures are seen as extremely unhealthy and unlikely to eat healthily along with being rated as extremely unfit (Hill & Silver, 1995; Tiggerman & Anesbury, 2000).

Some studies have confirmed children's perceptions of the psychosocial effects of being overweight. American research examining the intermediate and long-term consequences of accumulated psychosocial problems, comparing obese adolescents with their normal-weight peers, indicate those who are overweight have worse school performance, fewer academic qualifications and lower college acceptance rates (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993). Furthermore, these psychosocial consequences are apparent in advance of adolescence (Hill & Lissau, 2002). Gortmaker et al. (1993) found women who were obese in late adolescence and early adult life were more likely to have lower family incomes, higher rates of poverty and lower rates of marriage than women with chronic physical disabilities who were not obese in childhood.

Research into the risk factors associated with children's weight gain has identified a number of influences on the development of overweight and obesity. For a small proportion of children their excess weight is due to medical causes associated with specific syndromes such as Prader-Willi or underlying pathology. However, the vast majority remain those whose excess weight can be attributed to a combination of exogenous or nonpathological elements such as familial, nutritional, physical and psychological influences (Zwiauer, Caroli, Malecka-Tendera & Poskitt, 2002; Robertson, 2002). Common factors include greater quantities and variety of energy-dense foods; dietary excesses in foods containing fats and sugar; poor child feeding practices; lack of exercise; increased sedentary recreation; rising levels of promotion and marketing of energy-dense foods; increased use of restaurants and fast food outlets; genetic predisposition; weight gain during critical developmental periods and the rising use of soft-drinks to replace water (Robertson, 2002; Swinburn et al., 2003; Lobstein et al., 2004).

Children's dietary patterns are an essential component of weight gain as excess calorie intake relative to energy expenditure results in the storage of unused energy as body fat (Davison & Birch, 2001; Rolland-Cachera, & Bellisle, 2002). The empirical evidence connected with adiposity and nutritional intake has produced some equivocal results (see chapter two). However, the majority of researchers agree that an increase in the intake of energy-dense foods (particularly those containing saturated fats and sugars) is a contributing factor in the development of overweight and obesity among children (Swinburn et al., 2003; Baur, 2002; Ministry of Health, 2003; Robinson & Killen, 2001; Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; Rolland-Cachera, 2002; Harnack, Stang, & Story, 1999; Gillis & Bar-Or, 2003). Consequently, finding ways to decrease consumption of such foods without compromising intake of essential nutrients is an important component of both management and prevention (Ministry of Health, 2003; Gillis & Bar-Or, 2003; Lissau, Burniat, Poskitt, & Cole, 2002). Measures encouraging healthy eating have been endorsed as a means of targeting rising numbers of overweight children. Such measures are of benefit to all children, not just those who are overweight or obese.

Much of the research into children's eating behaviour has focussed on assessing diet to provide aggregate estimates of energy intake and expenditure in relation to weight gain risk. While this data is important it tells us nothing about the key components that influence nutritional intake. Little research exists examining the factors underpinning nutritional intake such as the cognitive factors underlying children's decisions on food selection and their knowledge of healthy eating. An understanding of these components is important to children's nutritional education and the planning and delivery of intervention programmes targeting healthy eating.

Parents influence the development of children's eating behaviours by the foods they make accessible and their child feeding practices (Hill & Lissau, 2002; Francis, Hofer, & Birch, 2001). They are an important component of the management and prevention of excess weight gain in childhood. Little research has examined the relationship between child-feeding practices and nutritional intake; however, a small body of literature suggests the ways in which parents regulate what children eat has an influence on their eating behaviour. More research in this area is relevant to the management and prevention of child overweight and obesity.

Research and health promotion should be based on sound theoretical frameworks (Crawford & Ball, 2002); examining models such as the theory of planned behaviour allow us to understand health related behaviours. The application of this model in the current research should provide a useful insight into the eating behaviour of children studied. The following chapters focus on the risk factors and influences on child overweight and obesity. Chapter two reviews the literature concerning nutritional intake and adiposity and the influence various nutritional substances have on the development of overweight and obesity in children. Current prevention and intervention measures are also discussed. Chapter three introduces the theory of planned behaviour as a theoretical model applicable to understanding the cognitive factors underlying children's food choices. Chapter four looks at parental influence and particularly the effect of child-feeding practices on children's nutritional intake and adiposity.

CHAPTER TWO

RISK FACTORS – NUTRITIONAL INTAKE

Nutritional intake is an identified risk factor in the development of overweight and obesity in children. Research in this area has investigated the relationship between nutritional intake and adiposity and the role some foods play in the development of overweight in children. A changing world food economy has contributed to shifting dietary patterns among children and adults. There is increased consumption of energy-dense diets, high in fat and low in unrefined carbohydrates. These dietary changes coupled with increasingly sedentary lifestyles have been implicated in the development of increasing numbers of overweight and obese children.

2.1 The relationship between nutrition and adiposity.

Today's children are taller and heavier than they were in the past (Lobstein et al., 2004). Both the increased prevalence of overweight and changing patterns of growth can be related to changes in nutritional intake. Overall, children's eating patterns have changed and global trends show a decrease in the intake of fat and a shift away from the consumption of fruit, vegetables and grains (Rolland-Cachera et al., 2002). Children, particularly those who are overweight, are obtaining an increasing proportion of their energy from protein with protein intakes consistently higher in obese rather than lean children (Rolland-Cachera et al., 2002). Increases have also occurred in the consumption of animal products, while changes in carbohydrate intake are inconsistent (Rolland-Cachera et al., 2002).

Despite steady increases in the number of children who are overweight, overall energy intakes are reported to be falling, especially among children in industrialised countries (Rolland-Cachera et al., 2002; Lobstein et al., 2004; Davison & Birch, 2001). A study of the dietary intakes of 8 –13 year old Swedish children revealed energy intakes had declined for all age and gender groups over the previous 10-15 years with the exception of 13 year old boys. However, over the same time period, body fatness had increased (Sunnegardh, Bratteby,

Hagman, Samuelson & Sjolín, 1986). Other studies report similar findings making the literature regarding nutritional intake and adiposity on the whole, ambiguous. Results appear to differ according to research design. Overall, epidemiological studies do not report higher energy intakes among the obese compared with non-obese controls (Rolland-Cachera et al., 2002). Cross sectional and longitudinal research, on the other hand, provides convincing evidence of a relationship between children's percent fat intake and weight status; higher percent fat intake is concurrently associated with higher percentage body fat (Davison & Birch, 2001; Rolland-Cachera et al., 2002). This is especially true for families where both parents and children are overweight. Studies show fat children of fat parents enjoy fatty foods and eat them in large quantities (Rolland-Cachera et al., 2002). Surprisingly, many dietary surveys also reveal that sweet foods are not more highly rated by obese as opposed to normal weight individuals (Rolland-Cachera et al., 2002). Obese children do not exhibit excessive appetites for sweet foods and most studies find consumers of sweet foods (adults and children) are not fatter than low consumers of sweet foods (Rolland-Cachera et al., 2002).

One suggested methodological issue which may account for the inconsistency of findings on dietary intake and adiposity is bias associated with under-reporting (Rolland-Cachera et al., 2002; Gable & Lutz, 2000). This has been described as a major problem in research looking at obesity in adults as the obese tend to under-report intake more than lean people, especially in terms of high fat and high carbohydrate foods (Swinburn et al., 2003). This is potentially a problem with dietary research involving children, however, it may be less likely to occur when the children themselves answer questionnaires regarding nutritional intake. Davison & Birch (2001) cite reliance on reports from a third person, usually a parent as one of the methodological problems particular to dietary research among children.

In spite of trends reporting falling energy intakes among children the overall energy density of what is being consumed has increased. Energy density is highest in foods containing high levels of fat and high in foods containing significant amounts of refined carbohydrates such as sugar. It is lowest in foods such as fresh fruit and vegetables and wholegrain products (Lobstein et al.,

2004). The last few decades have seen an increase in the availability and consumption of highly palatable energy-dense foods such as snack foods, fast foods and sugar-sweetened beverages (Lobstein et al., 2004; Poskitt, 2000). Increasing consumption of such foods has generated research attention on the role foods of this nature may play in the development of excess weight among children.

2.2 Fast Foods

Of all the nutritional factors implicated in the development of overweight and obesity, fast foods have received the most attention. In recent years the number, popularity and accessibility of fast food outlets has resulted in rising numbers of adults and children consuming takeaways, or 'foods away from home'. While no comparable data is available for New Zealand, American surveys of nutritional intake report fast food use among 37 per cent of adults and 42 per cent of children studied (Paeratakui, Ferdinand, Champagne, Ryan, & Bray, 2003). Fast food restaurant eating captures 83 percent of the market for American children under the age of eighteen (Robertson, 2002) and international data shows consumption of restaurant and fast foods among children increased by almost 300 percent in the last two decades (St-Onge, Keller, & Heymsfield, 2003).

While not all takeaways are unhealthy the majority tend to be high in fat, salt and sugar and fast foods are noted for oversupplying fat, cholesterol and sodium in the diet (Robertson, 2002). The most popular meals for children at fast food restaurants include soft drinks, hamburgers, fries, pizza and fried chicken (Robertson, 2002). Generally, food and drink of this nature is high in calories and low in nutritional value therefore constituting an 'energy-dense' and 'micronutrient poor' nutritional source. A typical fast food meal for a child can provide as much as 36 percent of their caloric needs for a day but fall short of basic nutrients (Robertson, 2002). Increasing consumption of these types of foods has consequently led many researchers to place at least some of the blame for rising obesity rates on fast foods.

This accountability is not solely based on nutritional data. A number of empirical studies have shown how fast foods contribute to weight gain by

increasing overall energy intake and decreasing consumption of more healthy foods (Lobstein et al., 2004). A study by Bowman, Gortmaker, Ebbeling, Pereira & Ludwig (2004) found that on those days when children consumed fast food products their diet was likely to be less healthy with higher fat intakes, greater consumption of sugar-sweetened beverages and lower fruit and vegetable intakes than on other days. Similarly, Bell & Swinburn (2004) reported higher energy intakes and lower fruit consumption among children accessing fast foods, packaged snacks and confectionery sold at school canteens. Higher intakes of energy, fat, saturated fat, sodium, carbonated soft drink and lower intakes of some vitamins, milk and fruit and vegetables have also been reported among large numbers of adults and children consuming fast foods compared with those who do not (Paeratakui et al., 2003). Increasing numbers of fast food outlets now offer larger meal portions or the option of 'supersizing' and this is also seen as problematic. It is thought that larger portions potentially lead to increased energy intakes at the time and over the day and could therefore significantly contribute to obesity especially among populations utilising high amounts of non home-sourced foods (Swinburn et al., 2003; Lobstein et al., 2004). However, supersizing may be more of a problem for older children as research suggests that while very young children have innate control of appetite, this biological mechanism can more easily be overridden by environmental and social factors in children who are older (Lobstein et al., 2004). Overall, there is strong ecological evidence of a concurrent increase in portion size and obesity in places such as the United States (Swinburn et al., 2003).

2.3 Snacking

Behavioural traits such as snacking have been associated with adiposity in children and research shows snacking appears to facilitate the development or persistence of obesity (Rolland-Cachera et al., 2002). As snacking is a frequent part of the daily eating schedule of many children large amounts of energy can be ingested outside of mealtimes without children being fully aware of how much they have consumed (Rolland-Cachera et al., 2002). Snacking behaviour often occurs in front of the television over a long period of time. Both the content of snack foods and the increased eating frequency that snacking promotes can contribute to the development of excess weight. Representative

data from the United States showed the prevalence of snacking had increased across all age groups in the period from 1977 to 1996. While the average size of snacks and energy per snack remained relatively constant, the number of snacking occasions increased significantly therefore increasing the average daily energy intake from snacks (Jahns, Siega-Riz, & Popkin, 2001). In addition, the nutrient contribution of snacks decreased in calcium density and increased in energy density and proportion of energy from fat (Jahns et al., 2001).

2.4 Soft Drinks

Soft drinks make an increasing contribution to children's diets. Studies reveal that the quantity of soft drinks consumed increases with age and can account for the largest source of non-milk extrinsic sugar intake among young people significantly adding to a child's overall daily energy intake (Lobstein et al., 2004). Harnack, Stang & Story (1999) found that children ingesting nine or more ounces of soft drink per day consumed almost 200 kcal/day more than those who did not drink soft drinks. Sugar-sweetened drink consumption and body fat have also been linked (Gillis & Bar-Or, 2003) and a positive association between consumption and obesity has been reported in at least one prospective study of 11-12 year old children over 19 months. However, children consuming more soft drinks had other dietary differences compared with those consuming fewer soft drinks, raising the possibility that the association related to broader dietary or lifestyle habits instead of soft drink intake (Ludwig, Peterson, & Gortmaker, 2001). A general review of the literature in this area reports the evidence that high sugar drinks promote weight gain is consistent and moderately strong especially among populations exhibiting a high intake (Swinburn et al., 2003).

2.5 What children should be eating - healthy eating guidelines for New Zealand children.

The quality and quantity of food ingested by children and their selection of particular foods are all decisive influences on growth and development. Adequate nutrition during childhood is necessary and important to maintain health and provide for energy and growth; most countries have established nutritional guidelines to accomplish this task. The overall purpose of these guidelines is to promote healthy eating and decrease the prevalence of

overweight by increasing fruit and vegetable intake, and reducing fat, salt and sugar intakes (Robertson, 2002). In New Zealand, the Ministry of Health and the New Zealand Heart Foundation generate guidelines on healthy eating for children. They advise giving children a variety of foods from four main food groups every day. These include vegetables and fruit, breads and cereals, milks and milk products and lean meats, chicken, seafood, eggs and legumes. Serving size examples and suggestions are included for each group. According to these guidelines school children should be eating at least 3 servings of vegetables and 2 servings of fruit every day. Increasing the fruit and vegetable consumption of children is an important objective as childhood consumption is a strong predictor of adult consumption (Edwards & Hartwell, 2002). Diets high in fruit and vegetables maintain a healthy weight status and decrease the risk of diabetes, coronary artery disease, stroke and many cancers (Ministry of Health, 2003; Edwards & Hartwell, 2002). Plenty of snacks are suggested in the form of wholegrain breads, cereals, vegetable sticks and fresh fruit. Foods that are high in sugar, fat and salt, such as treats and takeaways, are recommended for special times only and not as everyday foods. Treat foods include sweets and lollies, fruit leathers, chippies, chocolate, sweet biscuits, ice cream and fizzy drinks. Plenty of fluids are recommended for children preferably in the form of water or milk as opposed to fruit juice and soft drinks. If children are encouraged to drink water at an early age they are more likely to use water to quench their thirst as opposed to sugary drinks (Robertson, 2002).

2.6 Are New Zealand children adhering to these guidelines?

Latest data from the New Zealand National Nutritional Survey shows that problems with nutritional intake are evident among New Zealand children (Ministry of Health, 2003). Results indicate only two out of every five children eat the recommended daily intake of fruit at least twice a day (Ministry of Health, 2003). Furthermore, only three out of five children eat the recommended daily intake of vegetables, at least three times a day. Biscuits, cakes and chippies are consumed by 80 percent of children at least once a week and 48 percent of children consume chocolate bars and sweets at least once weekly. These figures are probably not a true indication of consumption because while survey information regarding children's daily consumption was collected, the data were reported on a weekly basis.

In general, younger children are more likely to follow healthier food practices with better food and nutrient intakes than their older counterparts. They are also less likely to be overweight or obese. Younger children eat fruit more frequently and consume less sugar and sweets. Their fat intake is lower than older children with a higher proportion meeting the recommended guidelines for percent energy from fat. Survey findings regarding declining quality of food choice with age are evident across all ethnic groups (Ministry of Health, 2003). As children's level of social independence increases it seems to adversely effect their food choices and consequently their food and nutrient intakes. Older children are more likely to source greater proportions of their food from outside the home. In the case of Maori and Pacific Island children much of this food comes from shops, dairies, takeaways, tuckshops and canteens (Ministry of Health, 2003).

The disparity in weight status between Maori and Pacific Island children compared with their European counterparts is reflected in the data on nutritional intake. Maori children have higher median daily intakes of sugar and fat with the mean contribution of fat to energy increasing with age. Percent energy from fat ratios rises with age for Pacific children with less than one third of 11/14 year olds meeting dietary guidelines for proportion of energy from fat intakes (Ministry of Health, 2003). This is especially worrying in terms of the future. Continued disparity exists between Maori and non-Maori adult health status with Maori having higher rates of morbidity and a lower life expectancy of approximately seven years (King, 2002).

Overall, the nutritional intake of New Zealand children (especially Maori and Pacific Island) is widely discrepant from that which is thought to be desirable for good health. Accordingly, the Ministry of Health has targeted the implementation of measures aimed at decreasing the intake of energy-dense foods among children, particularly those containing saturated fats and sugars, as an urgent public health requirement.

2.7 Prevention Efforts based on modifying nutritional intake.

Historically, treatment efforts in childhood and adolescent obesity have been shown to have limited long-term success (Lissau et al., 2002; Zwiauer, 2000). In light of this, many researchers suggest that prevention is the most realistic and cost effective approach for dealing with the problem (Lobstein et al., 2004). It has already been established that an increase in the intake of energy-dense foods (particularly those containing saturated fats and sugars) is a contributing factor in the development of overweight among children. Consequently, a reduction in the intake of such foods is an important component of the prevention of excess weight in children. Changing the current eating practices of children can best be achieved through the promotion of healthy eating habits with a diet that includes all nutrients that are appropriate along with a decrease in the intake of energy-dense substances. Genetic studies show that most children are at risk of weight gain and strategies such as encouraging healthy diets and plenty of physical activity are likely to be beneficial to the health of all children whether they are at risk or not (Lobstein et al., 2004).

The formation of food habits have their onset early in life, therefore interventions to improve diet should start in childhood (Berg, Jonsson, & Conner, 2000). According to the literature many current interventions are based on traditional information and advice about the relationship between diet and health. Although this information is important in increasing children's nutritional knowledge the current high rates of overweight and obese children coupled with data on deficient nutritional intake indicate this information is not being translated into motivation to eat in a more healthy way. Educational strategies may have failed to take into account the range of relevant cognitions upon which dietary choices are made (Dennison & Shepherd, 1995).

Currently, we have little understanding of the factors that affect children's food choice decisions. Well-designed intervention programmes should be based on sound theoretical frameworks and these have been shown to be effective in the past (Huon, Wardle, & Szabo, 1999). A review of eight interventions based on social learning theory reported positive improvements in the eating habits of children participating in seven of the studies reviewed (Huon et al., 1999). Conner & Armitage (2002) point out there are statistically and clinically

significant benefits to be obtained from adopting a social psychological approach to dietary change. Health models such as the theory of planned behaviour incorporate a number of important cognitive variables which appear to determine health behaviours and offer a way of understanding the cognitive factors underlying children's decisions regarding nutritional intake.

CHAPTER THREE

HEALTH MODELS AND ADDITIONAL CONSTRUCTS

3.1 Health Models

A number of theoretical models have been used in the prediction of health-related behaviours. These include models based on behavioural decision-making such as the theory of reasoned action and the theory of planned behaviour. The theory of reasoned action (TRA) developed by Ajzen & Fishbein (1980) is based on the notion that the proximal determinant or cause of volitional behaviour is one's intention to engage in that behaviour. The theory of planned behaviour (TPB) is an extension of the theory of reasoned action developed to address the original model's limitations in dealing with behaviours over which people have incomplete volitional control (Ajzen, 1991). As in the theory of reasoned action, a pivotal factor in the theory of planned behaviour is the individual's intention to perform a given behaviour. Intentions are assumed to capture the motivational factors influencing a behaviour; they are indications of how hard people are willing to try or exert effort in order to perform a behaviour (Ajzen, 1991). Generally, the greater one's intention to perform a behaviour is, the more likely performance of the behaviour will occur.

Intentions are derived from three parallel cognitive processes, attitudes, subjective norms and perceived behavioural control (Ajzen, 1991). Attitudes comprise beliefs about the behaviour under consideration and reflect an individual's positive or negative evaluation of performing the behaviour, whether the behaviour is seen as good or bad, pleasant or unpleasant (Bennett & Murphy, 1997). Subjective norms consist of a person's beliefs about whether significant others think they should adopt a given behaviour. Significant others are those whose preferences are important to the individual and subjective norms reflect the social pressures individuals feel to perform or not perform the behaviour under consideration (Conner & Norman, 1996). Perceived behavioural control refers to people's perception of how easy or difficult performance of behaviour is and the extent to which they feel availability of other variables (resources, skills or opportunities) determine their adoption of a

given behaviour (Conner & Norman, 1996). Several reviews have provided support for use of the theory of planned behaviour as an effective model for predicting health-related behaviour. A meta-analysis of health-related studies (Armitage & Conner, 2001) revealed that the TPB accounted for 39 per cent of the variance in behavioural intention and 27 percent of the variance in behaviour itself. In addition, perceived behavioural control independently predicted intentions and behaviour (Armitage & Conner, 2001). Similarly, the quantitative review of Godin & Kok (1996) found the theory of planned behaviour to perform very well for the explanation of intention toward health-related behaviours. While intention was the most important predictor, attitude and perceived behavioural control were also significant with perceived behavioural control significantly adding to prediction in half of the studies reviewed (Godin & Kok, 1996).

More specifically, the theory of planned behaviour has been used in the prediction of food choice intentions among adults. Research in this area has been reviewed by Conner & Armitage (2002) with the TPB accounting for between 33 and 51 per cent of the variation in intentions to consume fruit and vegetables and fatty foods. Further research has applied the model to food choice and eating behaviour among younger populations.

3.2 Empirical Research on food choice among adolescents and children.

There have been several applications of the TPB to the prediction of food choice intentions and healthy dietary behaviour among adolescents and young adults. Research undertaken by Masalu & Astrom (2001) assessed applicability of the TPB to the avoidance of between-meal snacks and drinks among a group of Tanzanian students. The researchers were particularly interested in consumption and intended avoidance of snacks and drinks with high sugar content. The TPB provided a significant prediction of intention with attitude, subjective norm and perceived behavioural control also significant. Past behaviour predicted intention to avoid snacks but its effect was less than perceived behavioural control. An earlier study by Kida & Astrom (1998) found perceived behavioural control and subjective norms to be greater determinants

of intention to avoid daily sugared snacks and drinks than attitudes or perceived risk of tooth decay.

Backman, Haddad, Lee, Johnston, & Hodgkin (2002) utilised the model to examine psychosocial predictors of healthful dietary behaviour among adolescents. Intention to eat a healthy diet (defined as high in fruit and vegetables, low in fat and restricted in takeaways and snack foods) was found to predict healthy dietary behaviour among the adolescents studied. Intention was influenced most by attitude and then by perceived behavioural control and subjective norm. Those with positive attitudes towards healthy eating believed they would like the taste of healthful foods, feel good about themselves, tolerate giving up foods they liked to eat and lose weight or maintain a healthy weight. Mothers, siblings and friends were identified as important predictors of subjective norm. Knowledge about how to eat a healthy diet along with availability, motivation and access to money were salient facilitating factors related to perceived behavioural control (Backman et al., 2002). Similar studies by Dennison & Shepherd (1995) and Oygard & Rise (1996) have found attitude and perceived behavioural control to account for most of the variance in intentions when investigating food choice among adolescents with subjective norm again receiving the lowest weight.

Further research by Astrom & Rise (2001) investigated young adult's intention to eat healthy food. Subjects participated in a mailed questionnaire that assessed components of the TPB in relation to healthy food items defined as substances that were low in fat and sugar and high in fibre. The TPB explained 52 percent of the variance in young adults' decision to eat healthily with perceived behavioural control and subjective norms being the strongest and weakest determinants, respectively (Astrom & Rise, 2001). However, none of these studies included a measure of actual behaviour.

Very few studies have applied the theory of planned behaviour in the context of food choice among children. One exception, a study undertaken with Swedish children aged 11-15 years, applied the model to the choice of healthy breakfast foods (Berg et al., 2000). Children completed a questionnaire based on the TPB which focussed on the consumption of milk with varying fat content and high-

fibre bread (Berg et al., 2000). Two weeks later, a 7-day record of food consumed for breakfast was completed. Consumption of milk and high-fibre bread was predicted from intentions, and milk by perceived behavioural control. Intentions were influenced by attitudes, normative influence and perceived behavioural control. Notably, children's perceptions of parental behaviour (descriptive norm) also played an important role in food choice.

A goal for many researchers utilising the theory of planned behaviour has been to increase the proportion of variance explained in intentions and behaviour by including variables in addition to those of the TPB (Conner & Armitage, 2002). The aim of including these variables is to increase the effectiveness of the model (Ajzen, 1991). One such variable that has attracted research attention in association with the development of overweight and obesity among children is that of familial influence, and more specifically, the effect of child-feeding practices on children's dietary behaviour.

CHAPTER FOUR

PARENTAL INFLUENCE AND CHILD-FEEDING PRACTICES

The most important aspect of a young child's surroundings is thought to be the home and family environment (Cook, 2004 ; Swinburn et al., 2003). Parents shape their children's eating environments and food preferences in a variety of ways including the foods they make available and accessible and their feeding practices. Parent's child-feeding practices are associated with children's eating behaviours, food selection and preferences and the regulation of energy intake (Francis et al., 2001). One tool that has been used to measure this influence is the child-feeding questionnaire (CFQ). Limited research has utilised the CFQ in relation to children's nutritional intake and no studies have examined this measure in conjunction with health models such as the TPB.

4.1 The Child Feeding Questionnaire

The CFQ was designed to assess parent's perceptions and concerns regarding child overweight and obesity, as well as child-feeding attitudes and practices (Birch, Fisher, Grimm-Thomas, Markey, Sawyer & Johnson, 2001). It consists of 31 forced-choice items tapping parent's perceived responsibility for child-feeding; perceived parent weight; perceived child weight; concerns about child weight; parental pressure on a child to eat and restriction and monitoring of food intake. The questionnaire is based on a theory regarding the role of domain-specific parenting in children's proneness to obesity developed by Constanzo & Woody (1985). Domain-specific parenting proposes that parents do not have a single, consistent parenting style (Birch et al., 2001). Rather, parenting style differs within parents, across domains of the child's development, and across children within the same family (Birch et al., 2001). In relation to child obesity it is thought that parents are more likely to exert higher levels of external control over a child's food intake when they are concerned about the child's development and a) are highly invested in health fitness or child weight issues b) perceive the child to be at risk of developing eating or weight problems c) do not believe the child is capable of self control over eating

(Birch et al., 2001). Constanzo and Woody also believed that high levels of parental control imposed on feeding could impede the development of children's self-control based on responsiveness to hunger and satiety cues.

4.2 Empirical Research on parental influence

For younger children in particular, the family environment plays an important role in determining their risk of obesity (Lobstein et al., 2004). Several studies have looked at the relationship between childhood adiposity and parental influence using the child-feeding questionnaire and one study suggests that parental influence may be a more salient factor in relation to prevention than macronutrient intake. Spruijt-Metz, Lindquist, Birch, Fisher, & Goran (2002) assessed the relationship between mother's child-feeding practices and children's adiposity, finding the influence of feeding-practices to be more related to obesity than nutritional intake. Child-feeding practices were measured using the child-feeding questionnaire and children's adiposity was measured by total fat mass measurement. Two variables, concern for child's weight and pressure to eat, were directly related to children's total fat mass explaining 15 percent of the variance in adiposity. A unique finding of this study was that child-feeding practices were the key behavioural variables that explained more of the variance in body fat than dietary intake (Spruijt-Metz et al., 2002).

Correlational research by Gable & Lutz (2000) examined 65 parent-child pairs to examine the influence of parenting beliefs on obese and non-obese children. Two subscales of the child feeding questionnaire were assessed, control of child eating and inappropriate expectations of child nutrition. Results indicated that parents of obese children reported a greater tendency toward inappropriate expectations of child nutrition. However, the relationship was weak and power limited due to the small sample size.

The CFQ has been further used to investigate the ways in which parents attempt to promote dietary moderation in their children by limiting their consumption of certain foods. Fisher & Birch (1999) examined the association between mothers' restriction of children's access to palatable snack foods (high in sugar and fat) and young children's intake when given free access to these foods in an

unrestricted setting. Surprisingly, results revealed that providing access to palatable snack foods immediately following a meal eaten to satiety produced a substantial additional intake especially in girls, with higher levels of restriction predicting higher levels of snack food intake (Fisher & Birch, 1999). Less surprisingly, other studies examining the relationship between child-feeding practices and child obesity have reported an increased risk of obesity among children exposed to so called 'pushier' feeding – trying to feed a child more food than it wants (Sherman & Alexander, 1990). Francis et al. (2001) examined the relationships between maternal and child characteristics and aspects of child-feeding style that potentially placed daughters at risk for developing problems with energy balance. Child-feeding practices measured included restriction of daughter's intake of energy-dense snack food, and pressure to eat more food. Mothers reported using more restrictive feeding practices when they were invested in weight and eating issues, perceived daughters as overweight, were concerned about daughter's weight and when daughters were heavier. Pressure in feeding was used when daughters were thinner and mothers perceived daughters as underweight (Francis et al., 2001).

Parents play a major role in the prevention of inadequate nutrition or obesity in children by educating children and socialising them into healthy eating habits. The ways in which parents can influence children's nutritional intake and weight status through their child-feeding practices highlight the importance of an increased knowledge in this area. Such understanding would further enhance intervention measures.

CHAPTER FIVE

RATIONALE FOR THE CURRENT RESEARCH

5.1 Overview

Child overweight and obesity has reached epidemic proportions in many countries throughout the world and prevalence has doubled in the last two decades. High incidence and increasing rates are also apparent in New Zealand and current figures reveal approximately 20 percent of our children are overweight and 10 percent are obese. There is growing evidence that excess weight in childhood has substantial health consequences: short and long-term, medical and psychosocial.

Children's dietary patterns are an essential component of overweight and obesity. An increase in the intake of energy-dense foods (particularly those containing saturated fats and sugars) has been identified as a contributing factor in the development of excess weight among children. Recent data has revealed problems in the nutritional intake of New Zealand children. Accordingly, the Ministry of Health has outlined the development of measures to decrease the intake of foods as an urgent public health requirement for New Zealand children (Ministry of Health, 2003). Preventative measures targeting the problem are necessary and researchers agree that an understanding of the factors influencing children's food choices should inform the development of any programmes aimed at maintaining or improving eating patterns (Berg et al., 2000; Huon et al., 1999). Theory-driven investigations of eating, their determinants and their role in weight gain have been outlined as important research priorities. Without an understanding of the key behaviours that contribute to weight gain it will remain difficult to identify where to intervene and be confident that action will prevent future obesity (Crawford & Ball, 2002). Limited research exists investigating the cognitive factors underlying children's decisions on food selection and their knowledge of healthy eating. An increased comprehension of decision making and knowledge in these domains could be used to guide the development of future interventions targeting healthy eating practices for children.

Various models have been used to explain a range of health behaviours and these include the TPB; however, limited studies have examined this model in relation to food choice among children. Alongside this model, the construct of parental influence has been found to be an important determinant of food choice among children. Again, limited research has investigated this factor and further research applying the influence of child-feeding practices to food choice among children, and examining this variable over and above the TPB is required.

Despite steadily increasing numbers, it is only in the last five years that obesity and overweight have become recognised as a population-wide phenomenon that warrants preventative action (Crawford & Ball, 2002). Consequently, we have a poor understanding of the causes of this phenomenon and are, thus, ill equipped to deal with it.

Food intakes can be investigated qualitatively as well as quantitatively. Along with the quantity of food ingested, factors such as the selection of particular foods and knowledge regarding healthy eating are important aspects of feeding behaviour which can have decisive influences on growth and development (Rolland-Cachera et al., 2002). Several researchers (e.g. Dixey, Sahota, Serbjit, & Turner, 2001; Hart, Bishop, & Truby, 2002; Bellisle & Rolland-Cachera, 2000; Edwards & Hartwell, 2002) have emphasised the importance of knowledge regarding children's understanding of healthy eating and their perceptions of health when designing and delivering intervention programmes. An increased comprehension of decision-making and knowledge in these domains could be used to guide the development of future interventions targeting healthy eating practices for children.

5.2 Study Aims

This research aims to utilise the theory of planned behaviour to investigate the influence of attitudes, beliefs and other factors associated with children's choice of particular types of food. Knowledge of the attitudinal and other factors underlying children's decisions on food choice will increase our understanding of decision-making in this domain. Such knowledge could also be used to guide

the development of future education programmes targeting overweight/obesity prevention.

In addition, the present study aims to investigate parental influence, and in particular child-feeding practices, on children's eating behaviour. Previous research has documented that parents influence children's food choices in different ways suggesting that future research should focus more closely on the underlying beliefs and attitudes of parents in relation to the nutritional intake of children (Berg et al., 2000). Some research has shown how parents influence their children's nutritional intake through child-feeding practices, although this area has not been widely investigated thus far. The effects of perceived responsibility, parental concern and restriction will be examined to determine whether these variables impact on the eating behaviour of children studied.

Finally, this research will ask children about healthy foods, their perceptions of being healthy and the importance they place on this. It is hoped that this information will enhance the quantitative data collected and will increase understanding of the cognitive factors underlying children's decisions on food choice.

5.3 Hypotheses

Hypothesis One:

It is hypothesised that the constructs comprising the Theory of Planned Behaviour (TPB) behavioural belief, subjective norm, perceived behavioural control and attitudes towards healthy eating will explain intentions to consume healthy food.

Hypothesis Two:

It is further hypothesised that intention to consume healthy food will predict dietary behaviour (self-reported consumption of healthy food items).

Hypothesis Three:

Perceived responsibility by parents, parental concern about child weight and parental restriction will increase the proportion of variance explained in children's behaviour by the TPB.

Hypothesis Four:

Intention to consume healthy food will mediate the relationship between the constructs of the TPB and dietary behaviour (self-reported consumption of healthy food items).

CHAPTER SIX

METHODS

6.1 Study Design

A cross-sectional correlational study design was used to investigate the effect of behavioural beliefs, attitudes, subjective norms, behavioural intentions, perceived behavioural control and parental influence on children's food choice. Survey material has been outlined as an invaluable source of data for understanding the rising epidemic of obesity and overweight among children (Lobstein et al., 2004). A questionnaire was utilised for the collection of quantitative data and qualitative information relating to children's knowledge of healthy foods and their perceptions of health.

6.2 Participants

Participants in the study were children (males and females) aged between ten and thirteen years old (mean age, 11.4 yr) from Palmerston North Intermediate Normal School (PNINS) and Ashhurst School, as well as their parents or caregivers. Demographic information obtained from the children included their gender and age, and from adults, their relationship to the child, whether they were a mother, father or caregiver. In total 500 questionnaires were distributed; 261 of these were returned with both sections (children and parents or caregivers) completed (52%).

At PNINS 340 questionnaires were distributed and 154 returned (45 %). A total of 160 questionnaires were completed by Ashhurst School children; parents and caregivers subsequently returned 107 of these following completion at home (66 %).

Table 1. Characteristics of children who participated in the study (n = 256)

	n	%
Age years		
10	26	10.2
11	97	37.9
12	123	48.0
13	10	3.9
Gender		
Female	137	52.5
Male	119	45.6

*Responses do not total 261 as 5 participants chose not to answer

Table 2: Characteristics of Parents/Caregivers who participated in the study (n = 254).

Characteristic	n	%
Mother	224	88.1
Father	26	10.2
Caregiver	4	1.7

*Responses do not total 261 as 7 participants chose not to answer

6.3 Procedure

Prior to commencing the study, principals from both schools were approached with details of the proposed research and a draft of the questionnaire. Both principals granted approval for the research. In the case of PNINS consent also depended on a review of the research by the School Board of Trustees. Ethical approval was also granted by the Massey University Human Ethics Committee.

Each school determined the process for distribution and completion of their questionnaires. Teachers from PNINS issued sealed packages containing the information sheet (see Appendix 1), questionnaire (see Appendix 2) and reply-

paid envelope to children in classes within the stated age-range. A brief message from the principal outlining the study's purpose and background had been included in the school newsletter to parents prior to distribution. The procedure was similar for Ashhurst School with packages distributed to all children in the relevant age groups; however, the questionnaires were completed in the classroom under teacher supervision. Instructions were given prior to children completing their questionnaires and teachers were instructed not to prompt children. Following this, children were instructed to take their packages home for completion and return of section two by parents or caregivers who chose to participate.

Completion of the children's section of the questionnaire took approximately twenty minutes. Confidentiality and anonymity was assured and no names were asked for by the researchers or recorded anywhere on the questionnaires. Participants were offered the opportunity to be sent a copy of the study's results upon completion of the study. Interested parents included their name and address on a form attached to the questionnaires. These forms were subsequently removed and stored separately to further guarantee anonymity. In addition, both principals requested information on study results pertaining to their individual schools.

6.4 The Questionnaire

The questionnaire was divided into two sections. Section one was for children to complete and section two was for their parents or caregivers.

Section One for Children

The children's section of the questionnaire was designed specifically for this study and based on the TPB. It focussed on five different food groups (fruit, vegetables, treat foods, fizzy drinks and takeaways). These food types were chosen because the levels of, and reasons for, consuming or not consuming these particular food items in children are of potential importance. Research confirms the beneficial effects of consuming fruit and vegetable and the dietary problems associated with energy-dense foods therefore questions were included on healthy and less-healthy food items likely to be commonly consumed and familiar to children. Decisions on which food groups to investigate were based

on eating guidelines for healthy children aged 2 to 12 developed by the Ministry of Health (2002). These guidelines recommend at least 3 servings of vegetables and 2 servings of fruit each day for school aged children. Foods high in fat, salt and sugar including treat foods, fizzy drinks and takeaways are not recommended as everyday foods. Guidelines advise limiting these foods to special occasions only. Measures of each of the different components of the model were developed following guidelines from Conner & Norman (1996) who recommend clear specification of the action, target, context and time frame for the behaviour one wishes to predict. We wished to predict eating (action) of five different food groups (target) as part of a daily food intake (context) over a one week period (time frame). Each of the TPB measures was based on standard wording recommended for measuring components of the model. At the beginning of the questionnaire children were informed that questions would be asked about the five food categories and examples for each category were given (see Appendix 2). Instructions stressed that children should answer the questions honestly, as the questionnaire was not a test with right or wrong answers.

Behavioural Beliefs

Behavioural beliefs regarding healthy eating were assessed using five items. These were (a) eating some fruit every day helps me stay healthy; (b) eating some vegetables every day helps me stay healthy; (c) eating treat foods every day helps me stay healthy; (d) drinking fizzy drinks every day helps me stay healthy; (e) eating takeaways every day helps me stay healthy. Responses were measured on a five-point scale ranging from 1 (definitely no) to 5 (definitely yes). 1 indicated low belief in each statement and 5 indicated high belief in each statement. ($M = 4.51$, $SD = 1.85$, Cronbach's alpha = .75).

Attitudes

Six items were used to measure attitudes towards being healthy and eating foods from the five different groups. These included (a) for me being healthy would be; (b) for me to eat some takeaways every day over the next week would be; (c) for me to eat some fruit every day over the next week would be; (d) for me to eat some vegetables every day over the next week would be; (e) for me to eat some treat foods every day over the next week would be; (f) for me to drink

some fizzy drinks every day over the next week would be. Items were assessed using a five-point scale ranging from 1 (very enjoyable) to 5 (very unenjoyable). 1 indicated a positive attitude and 5 indicated a negative attitude to each statement. ($M = 2.58$, $SD = 1.20$, Cronbach's alpha = .79).

Subjective Norms

Subjective norms were measured by responses to five items assessing children's perceptions of whether parents or caregivers would want them to consume food/drinks from the five different groups. These included (a) my parents/caregiver think I should eat some fruit every day; (b) my parents/caregiver think I should eat some vegetables every day; (c) my parents/caregiver think I should eat some treat foods every day; (d) my parents/caregiver think I should drink some fizzy drinks every day; (e) my parents/caregiver think I should eat some takeaways every day. Responses were measured on a five-point scale ranging from 1 (definitely no) to 5 (definitely yes). 1 indicated low subjective norm and 5 indicated high subjective norm. ($M = 4.58$, $SD = 1.77$, Cronbach's alpha = .76).

Intentions

Intentions towards healthy eating were assessed using five items. These were (a) I will eat some fruit every day over the next week; (b) I will eat some vegetables every day over the next week; (c) I will eat some treat foods every day over the next week; (d) I will drink some fizzy drinks every day over the next week; (e) I will eat some takeaways every day over the next week. A five-point scale ranging from 1 (definitely no) to 5 (definitely yes) was again used to measure replies. 1 indicated low intention and 5 indicated high intention for each statement. ($M = 2.89$, $SD = 1.27$, Cronbach's alpha = .65).

Perceived Behavioural Control

Perceived behavioural control was measured by responses to ten items assessing children's perceptions of whether they could access food/drinks from the five different groups. These included (a) If I want to I can easily have some fruit every day; (b) I can decide for myself whether I have some fruit every day; (c) If I want to I can easily have some vegetables every day; (d) I can decide for myself whether I have some vegetables every day; (e) If I want to I can easily have some

treat foods every day; (f) I can decide for myself whether I have some treat foods every day; (g) If I want to I can easily have some fizzy drinks every day; (h) I can decide for myself whether I have some fizzy drinks every day; (i) If I want to I can easily have some takeaways every day; (j) I can decide for myself whether I have some takeaways every day. A five-point scale ranging from 1 (definitely no) to 5 (definitely yes) was again used to measure replies. 1 indicated low perceived control and 5 indicated high perceived control for these items. ($M = 3.96$, $SD = 1.69$, Cronbach's $\alpha = .68$).

Behaviour

Healthy food was defined as fruit and vegetables and less healthy foods were treat foods, takeaways and fizzy drinks. One measure of behaviour was used. Children were asked to indicate on how many days over the last week they had eaten foods from the five groups; fruit, vegetables, treat foods, fizzy drinks and takeaways. Replies were measured on a scale of 1 to 7 depending on how many days the food item had been consumed. ($M=3.50$, $SD = 1.8$).

Qualitative Data

In addition to the questions investigating aspects of the TPB some open ended questions assessing children's knowledge of healthy foods and perceptions of health were included. These were (a) what kinds of foods do you think are healthy? (b) what do you think being healthy means? (c) do you think being healthy is important? (d) why do you think this? (e) what are your favourite foods?

Section Two for Parents or Caregivers

Section two of the questionnaire was for the parents or caregivers of the children participating. It was based on sections of the Child Feeding Questionnaire which measures aspects of child feeding practices. The CFQ is designed for use with parents of children ranging in age from approximately 2 to 11 years (Birch et al., 2001). Good factorial validity has been demonstrated for the questionnaire among two separate samples and internal consistencies above 0.70 have been shown for seven factors of the questionnaire (Birch, et al., 2001). Three sections of the CFQ were utilised in this study: restriction, perceived responsibility and concern about child weight. Perceived responsibility consists of items designed to assess parent's perceived responsibility for child-feeding tasks in order to facilitate an understanding of factors that might elicit parents' use of control in child feeding. It is thought two distinct types of control are used - pressure and restriction. Restriction and pressure are thought to be employed by parents in addressing different problems with children's eating. Items tapping parents restriction of children's access to snack and 'junk' foods are designed to assess whether this increased or decreased children's intake of these foods.

Perceived Responsibility

Perceived responsibility was measured using 3 items. These were (1) when your child is at home how often are you responsible for feeding him/her? (2) how often are you responsible for deciding what your child's portion sizes are? (3) how often are you responsible for deciding if your child has eaten the right kinds of food? Responses were measured on a five-point scale ranging from 1 (never) to 5 (always). 1 indicated low perceived responsibility and 5 indicated high perceived responsibility. ($M = 4.08$, $SD = 1.69$, Cronbach's alpha = .78).

Concern about child weight

The extent to which parents or caregivers were concerned about their child's weight was assessed with two items. These included (1) how concerned are you about your child eating too much when you are not around him/her? (2) how concerned are you about your child becoming overweight? Items were assessed using a five-point scale ranging from 1 (unconcerned) to 5 (very concerned). 1

indicated a lack of concern and 5 indicated a high degree of concern. ($M = 2.31$, $SD = 1.29$, Cronbach's $\alpha = .81$).

Restriction

Five items were used to gauge parental restriction of children's food intake. These were (1) I have to be sure my child does not eat too many sweets; (2) I have to be sure my child does not eat too many high-fat foods; (3) I intentionally keep some foods out of my child's reach; (4) I offer sweets to my child as a reward for good behaviour; (5) I offer my child their favourite foods in exchange for good behaviour. Response options ranged from 1 (disagree) to 5 (agree). 1 indicated a low level of restriction and 5 indicated a high level of restriction. ($M = 3.2$, $SD = 1.35$, Cronbach's $\alpha = .60$).

6.5 Statistical Analysis

Statistical analysis was completed using SPSS for Windows, Release 11.5 (1999). Responses for questions regarding less healthy food items (treat foods, takeaways and fizzy drinks) were translated to numbers with higher values thus, corresponding to a more positive attitude towards being healthy and eating healthily. Means and standard deviations were computed for each of the continuous variables measured. Bivariate associations were analysed by use of Pearson's correlation coefficient. The main procedure used for analysis was multiple regression. The effect of each independent variable in terms of standardised regression coefficients, betas, was tested for statistical significance by means of t-tests. The goodness of fit of the linear model and the proportion of explained variance in the dependant variable by the predictors included in the model were assessed in terms of the multiple correlation coefficient, R , and the adjusted squared multiple correlation coefficient, R^2 , and tested for statistical significance by means of F-test. Results are outlined in chapter seven.

CHAPTER SEVEN

RESULTS

7.1 Data Management

Initially, results were screened for errors in data entry. Missing cases were excluded during analysis using pairwise deletion where SPSS deletes cases with missing values only on relevant variables.

Internal reliability analysis was conducted and coefficient alphas reported in the methods section. Normality of distribution was checked using normal probability plots and the calculation of skewness and kurtosis statistics on all continuous variables of hypothetical interest. Both the behavioural belief and subjective norm variables were negatively skewed and these were log transformed in order to improve normality.

7.2 Descriptive Statistics

One-way between-group ANOVAs were conducted on the main variables between the two school groups to examine any possible differences that had occurred due to the difference in testing conditions and geographical area. Table 3 reports the means and standard deviations for the variables of the TPB and total scores for behaviour and shows there were significant differences between the groups on attitude only, ($F_{1,260} = 10.6, p < .001$). These results indicate that children from Ashhurst School had higher positive attitudes towards healthy eating than children from Palmerston North Intermediate Normal School. The homogeneity assumption was not violated in any comparisons.

Table 3

Means and standard deviations for subscales of the TPB and total behaviour for children from Ashhurst and Palmerston North Intermediate Normal School (PNINS).

	Ashhurst School (n = 107)		PNINS (n=154)	
	Mean	(SD)	Mean	(SD)
Total Belief	23.02	(2.37)	23.37	(2.54)
Total Attitude	21.59*	(4.66)	19.74	(4.37)
Total Subjective Norm	22.65	(2.71)	23.14	(2.69)
Total Intention	20.63	(3.46)	20.32	(3.53)
Total Perceived Behavioural Control	39.79	(6.62)	39.59	(6.46)
Total Behaviour	25.04	(4.63)	25.37	(5.24)

* $p < .01$

A one way ANOVA was also conducted on the variables of the Child Feeding Questionnaire to examine any differences between groups of parents or caregivers from both geographical areas.

Table 4 reports the means and standard deviations for the subscales of the Child Feeding Questionnaire and shows there were significant differences between the groups on Total Concern only, ($F_{1,259} = 3.92, p < .05$). These results indicate that parents from Ashhurst School reported higher levels of concern regarding their children's weight than parents from Palmerston North Intermediate Normal School.

Table 4

Means and standard deviations for subscales of the CFQ (Child Feeding Questionnaire) for parents from Ashhurst and Palmerston North Intermediate Normal School (PNINS).

	Ashhurst School		PNINS	
	<i>(n = 107)</i>		<i>(n = 154)</i>	
	Mean	(SD)	Mean	(SD)
Perceived Responsibility	12.38	(1.94)	12.20	(1.90)
Total Concern	5.01*	(2.58)	4.37	(2.53)
Total Restriction	20.19	(3.29)	19.66	(3.40)

* $p < .01$

Finally, an ANOVA was carried out to investigate any differences between the two groups of children in actual dietary behaviour.

Table 5

Means and standard deviations for total dietary behaviour (self-reported consumption of healthy food over a week long period).

	Ashhurst School		PNINS	
	<i>n = (107)</i>		<i>n = (154)</i>	
	Mean	(SD)	Mean	(SD)
Total Fruit	5.18	(1.87)	5.10	(2.12)
Total Vegetables	5.51	(1.86)	5.86	(1.47)
Total Treat Foods	2.90	(1.61)	3.48*	(1.91)
Total Takeaways	2.63*	(1.83)	2.09	(1.83)
Total Fizzy Drinks	1.17	(.947)	.96	(.770)

* $p < .05$

Table 5 reports the means and standard deviations for actual dietary behaviour (self-reported consumption of food items). There were significant differences between the groups on total consumption of treat foods and takeaways. These results indicate that children from Palmerston North Intermediate Normal School (PNINS) ate treat foods on more days over a week-long period than children from Ashhurst School, ($F_{1,254} = 6.86, p < .01$). In addition, children from Ashhurst School ate takeaways on more days over a week-long period than children from PNINS, ($F_{1,254} = 5.36, p < .05$). Because of these differences the two school groups were treated as separate samples in subsequent analyses of relationships between the variables.

Gender Differences

A one way ANOVA was also conducted on the variables of the TPB to examine any gender differences for both schools.

Table 6

Means and standard deviations for subscales of the TPB and total behaviour for males and females.

	Females		Males	
	<i>n</i> = (137)		<i>n</i> = (119)	
	Mean	(SD)	Mean	(SD)
Total Belief	23.47	(2.08)	22.97	(2.85)
Total Attitude	21.61***	(4.30)	19.34	(4.64)
Total Subjective Norm	23.37**	(2.41)	22.44	(2.95)
Total Intention	21.01**	(3.14)	19.76	(3.77)
Total Perceived Behavioural Control	40.19	(6.48)	38.99	(6.59)
Total Behaviour	25.93**	(4.50)	24.23	(5.36)

*** $p < .001$ ** $p < .01$

Table 6 reports the means and standard deviations for the TPB constructs and shows there were significant differences between gender on Total Attitude, ($F_{1,255} = 16.32, p < .001$), Total Subjective Norm, ($F_{1,255} = 7.75, p < .01$), Total

Intention, ($F_{1,255} = 8.45, p < .01$) and Total Behaviour, ($F_{1,252} = 7.47, p < .01$). These results indicate that girls reported higher positive attitudes towards healthy eating, higher perceptions of whether parents or caregivers would want them to consume healthy food, higher intentions towards healthy eating and higher self-reported consumption of healthy food items than boys.

Finally, an ANOVA was carried out to investigate differences between the genders in actual dietary behaviour. Table 7 reports the means and standard deviations for dietary behaviour (self-reported consumption of food items) and shows there were significant differences between gender on total consumption of fruit, takeaways and fizzy drinks. These results indicate girls ate fruit on more days over a week long period than boys, ($F_{1,253} = 4.76, p < .05$). In addition, boys consumed takeaways ($F_{1,249} = 7.75, p < .01$), and fizzy drinks ($F_{1,250} = 4.64, p < .05$), on more days over a week long period than girls.

Table 7

Means and standard deviations for total behaviour for males and females.

	Females		Males	
	<i>n</i> = 136		<i>n</i> = 118	
	Mean	SD	Mean	SD
Total Fruit	5.37*	1.88	4.81	2.15
Total Vegetables	5.76	1.54	5.62	1.79
Total Treat Foods	3.22	1.75	3.32	1.91
Total Takeaways	2.04	1.67	2.69**	1.98
Total Fizzy Drinks	.95	.749	1.18*	.952

** $p < .01$, * $p < .05$

7.3 Hypothesis Testing

7.3.1 Hypothesis One

The constructs comprising the (TPB) behavioural belief, subjective norm, perceived behavioural control and attitudes towards healthy eating will explain intentions to consume healthy food. Tables 8 and 9 depict Pearson's correlation coefficients for the associations among the TPB variables for Ashhurst School and PNINS respectively.

Table 8

Bivariate correlations (Pearson's r) between, behavioural belief, attitude, subjective norms, perceived behavioural control and intention with respect to consumption of healthy food items for Ashhurst School ($n = 107$).

Ashhurst School	Intention	Behavioural Belief	Attitude	Subjective Norm
Intention				
Behavioural Belief	.64**			
Attitude	.65**	.47**		
Subjective Norm	.66**	.53**	.43**	
Perceived Behavioural Control	.47**	.30**	.50**	.42**

** $p < .01$

As can be seen from table 8, behavioural belief, attitude, subjective norms, and perceived behavioural control were significantly associated with intention in the following descending order: subjective norm; attitude; behavioural belief and perceived behavioural control.

Table 9

Bivariate correlations (Pearson's r) between, behavioural belief, attitude, subjective norms, perceived behavioural control and intention with respect to consumption of healthy food items for PNINS ($n = 154$).

PNINS	Intention	Behavioural Belief	Attitude	Subjective Norm
Intention				
Behavioural Belief	.48**			
Attitude	.42**	.44**		
Subjective Norm	.47**	.44**	.21**	
Perceived Behavioural Control	.50**	.37**	.28**	.28**

** $p < .01$

As can be seen from table 9, behavioural belief, attitude, subjective norms, and perceived behavioural control were significantly associated with intention in the following descending order: perceived behavioural control; behavioural belief; subjective norm and attitude.

To test hypothesis one, taking into account these associations, a standard multiple regression analysis was performed with intention as the dependent variable for each school group. In all analyses involving multiple regression the assumptions underlying the use of regression were met. Behavioural belief, attitude, subjective norm and perceived behavioural control were entered simultaneously into the regression analysis. As depicted in Table 10, the components of the TPB accounted for a higher proportion of the variance in behavioural intention for Ashhurst children ($R^2 = .65$, $F_{4,106} = 50.6$, $p < .001$) than PNINS children ($R^2 = .43$, $F_{4,153} = 29.9$, $p < .001$). Thus, the constructs of the TPB accounted for 65% of the variance in Ashhurst children's behavioural intentions and 43% of the variance in PNINS children's behavioural intentions.

Table 10

The intention to eat healthy food regressed upon behavioural beliefs, attitudes, subjective norms and perceived behavioural control (Ashhurst $n = 107$), (PNINS $n = 154$).

Prediction Model	Ashhurst	PNINS
	β	β
Behavioural Belief	.28***	.15*
Attitude	.33***	.20**
Subjective Norm	.33***	.27***
Perceived Behavioural Control	.07	.30***
R	.66	.44
Adjusted R²	.65	.43

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

In terms of relative contributions, both attitude (Beta = .33, $p < .001$) and subjective norm (Beta = .33, $p < .001$) turned out to be the strongest predictors of behavioural intention for Ashhurst children followed by behavioural belief (Beta = .28, $p < .001$). Perceived behavioural control had no independent impact on intentions. For PNINS children perceived behavioural control (Beta = .30, $p < .001$) was the strongest predictor of behavioural intention. This was followed in descending order of importance by subjective norm (Beta = .27, $p < .001$), attitude (Beta = .20, $p < .01$) and behavioural belief (Beta = .15, $p < .05$).

7.3.2 Hypothesis Two:

Intention to consume healthy food will predict dietary behaviour.

Behavioural intention was significantly associated with dietary behaviour for Ashhurst ($r = .54$, $p < .01$) and PNINS children ($r = .68$, $p < .01$). Having a stronger intention towards consuming healthy food was associated with a higher consumption of healthy food items for both schools.

A standard multiple regression analysis was performed with dietary behaviour as the dependent variable and behavioural intention as the independent

variable. As depicted in table 11, behavioural intention accounted for a higher proportion of the variance in dietary behaviour for PNINS children ($R^2 = .47$, $F_{1,151} = 134.9$, $p < .001$) than for Ashhurst children ($R^2 = .28$, $F_{1,105} = 42.9$, $p < .001$). Intentions towards healthy eating accounted for 47% of the variance in PNINS children's consumption of healthy food items and 28% of the variance in Ashhurst children's consumption of healthy food.

Table 11

Dietary behaviour regressed upon intention to eat healthy food (Ashhurst $n = 107$, PNINS $n = 154$).

Prediction Model	Ashhurst	PNINS
	β	β
Behavioural Intention	.54*	.68*
R	.29	.47
Adjusted R²	.28	.47

* $p < .001$

7.3.3 Hypothesis Three:

Perceived responsibility by parents, parental concern about child weight and parental restriction will increase the proportion of variance explained in children's behaviour by the TPB. Correlations between the variables comprising parental influence and the constructs comprising the TPB were tested.

Table 12

Bivariate correlations (Pearson's r) between perceived responsibility by parents, parental concern about child weight, parental restriction, behavioural belief, attitude, subjective norms, perceived behavioural control and intention with respect to consumption of healthy food for Ashhurst School ($n = 107$).

Ashhurst	Perceived Responsibility	Concern	Restriction
Behavioural Belief	-.045	-.167*	-.055
Attitude	.026	-.015	-.074
Subjective Norm	-.055	.037	.012
Intention	-.141	-.090	-.015
Perceived Behavioural Control	.107	.029	-.250**
Behaviour	-.017	-.064	.019

** $p < .01$, * $p < .05$

As can be seen from table 12, a negative relationship existed between Ashhurst parent's concern over their children's weight and children's behavioural beliefs, indicating lower beliefs regarding healthy eating are associated with lower levels of parental concern over children's weight. A negative relationship also existed between perceived behavioural control and restriction, indicating that lower perceived control over access to healthy food items was associated with lower levels of parental restriction. However, whilst significant, these relationships were weak.

Table 13

Bivariate correlations (Pearson's r) between perceived responsibility by parents, parental concern about child weight, parental restriction, behavioural belief, attitude, subjective norms, perceived behavioural control and intention with respect to consumption of healthy food for PNINS ($n = 154$).

PNINS	Perceived Responsibility	Concern	Restriction
Behavioural Belief	.078	-.212**	.246**
Attitude	.060	-.042	.115
Subjective Norm	.057	-.122	.189**
Intention	.160*	-.018	.158*
Perceived Behavioural Control	.178*	.050	.324**
Behaviour	.145*	.041	.208**

** $p < .01$, * $p < .05$

As can be seen from table 13, a stronger sense of parental responsibility over child feeding tasks was associated with higher levels of intention, a greater sense of perceived behavioural control and higher self-reported consumption of healthy food items for PNINS children. A negative relationship existed between parental concern over children's weight and children's behavioural beliefs indicating lower beliefs regarding healthy eating were associated with lower levels of concern over children's weight. Stronger beliefs in healthy eating, more perceived pressure from parents and caregivers, higher levels of intention, a greater sense of perceived control and higher self-reported consumption of healthy food items were also associated with higher levels of parental restriction. However, whilst significant, these relationships were again weak.

To test hypothesis three a hierarchical multiple regression was calculated. The constructs of the theory of planned behaviour were entered into the equation at step one and perceived responsibility by parents, parental concern over child weight and parental restriction were entered at step two to see if these constructs could further explain dietary behaviour for children. The relationship was non-significant for both schools. Perceived responsibility, parental concern and parental restriction only explained a further .011% (R^2 change) of the variance in Ashhurst children's dietary behaviour and .07% (R^2 change) of the variance in PNINS children's dietary behaviour and did not further increase the predictive power of the TPB model in this study.

Table 14

Hierarchical multiple regression analysis of the effects of the TPB constructs and perceived responsibility, parental concern and restriction on children's dietary behaviour (Ashhurst $n = 107$, PNINS $n = 154$).

Prediction Model	Ashhurst		PNINS	
	Step 1	Step 2	Step 1	Step 2
	β	β	β	β
Behavioural Belief	.009		.148*	
Attitude	.145		-.009	
Subjective Norm	.085		.136*	
Perceived Behavioural Control	.236*		.184**	
Intention	.272		.462**	
Perceived Responsibility		.008		.023
Total Concern		-.073		.084
Restriction		.107		.000
R²	.356**	.367	.543**	.550
Adjusted R²	.323**	.314	.527**	.525
R² change		.011		.007

** $p < .001$, * $p < .05$

7.3.4 Hypothesis Four:

Behavioural intentions will mediate the relationship between attitude, behavioural belief, subjective norm and perceived behavioural control and dietary behaviour (consumption of healthy food items).

As outlined by Baron and Kenny (1986) four criteria should be fulfilled to establish that behavioural intention mediates the relationship between the TPB constructs and dietary behaviour. These are:

1. The independent variable (TPB constructs) should be associated with the mediator variable (behavioural intention).
2. The mediator variable (behavioural intention) should be associated with the dependent variable (dietary behaviour).
3. The independent variable (TPB constructs) should be associated with the dependent variable (dietary behaviour).
4. The independent variable (TPB constructs) should not be associated with the dependent variable (dietary behaviour), after the mediator variable (behavioural intention) is controlled for (Baron & Kenny, 1986).

PNINS

To determine if behavioural intentions mediated the relationship between TPB constructs and dietary behaviour three regressions were run.

1. Association between the independent variable and the mediator.
In the first regression equation the variables of the TPB, Behavioural Belief (BB), Attitude (A), Subjective Norm (SN), and Perceived Behavioural Control (PBC) were entered as the independent variables and the mediator, behavioural intention, was entered as the dependent variable. The Beta values show that the TPB variables are significantly associated with behavioural intention (see table 15). Criterion one is satisfied.
2. Association between the mediator and dependent variable.
In step 1 of regression 3 behavioural intention was entered as the independent variable and dietary behaviour as the dependent variable. Behavioural intention is significantly associated with dietary behaviour (see table 15). Criterion two is satisfied.
3. Association between the independent variable and the dependent variable. A second regression equation was computed with the variables

of the TPB entered as the independent variable and dietary behaviour as the dependent variable. Behavioural belief, subjective norm and perceived behavioural control are the only variables significantly associated with dietary behaviour (see table 15). Criterion three is satisfied for these variables but not for attitude.

4. Controlling the mediator.

A third regression (hierarchical) was computed with dietary behaviour entered at step one as the dependent variable and behavioural intention as the independent variable. In step two the TPB variables were entered as the next independent variables. The change in R^2 was significant and thus did not support full mediation. Subjective norm and perceived behavioural control were still associated with the dependent variable, dietary behaviour, after the mediator, behavioural intention, was controlled for. Attitude was not associated with dietary behaviour at step two. The Beta values of subjective norm and perceived behavioural control were lower, showing reduced impact once the mediator was included, suggesting partial mediation. The change in beta values was tested for significance by calculating z values using the following formula from Sobel (1982):

$$z = B_1 \times B_2 / \text{square root of } (B_1^2 \times S_2^2 + B_2^2 \times S_1^2).$$

Where B_1 represents the unstandardised Beta value and SE_1 represents the standard error associated with the independent variable when the first criterion was assessed. B_2 represents the unstandardised Beta value and SE_2 represents the standard error associated with the mediator variable when the second criterion was assessed.

$$Z = 7.98 \text{ (SN)}, 10.56 \text{ (PBC)}.$$

A z value that exceeds 1.96 suggests partial mediation is significant at the 0.05 level (Sobel, 1982). Thus behavioural intention partly mediates the relationship between subjective norm, perceived behavioural control, and dietary behaviour for PNINS children. The beta value for behavioural belief was not significant at step two of the third regression, which supports full mediation. Behavioural intention mediates the relationship between behavioural belief and dietary behaviour for PNINS children.

Table 15

Mediation test using regression of TPB constructs on dietary behaviour mediated by behavioural intention for PNINS. ($n = 154$).

Independent Variables	R ²	β
Equation 1:	.44 ^{***}	
(DV=BI)		
BB		.15*
A		.20**
SN		.27 ^{***}
PBC		.30 ^{***}
Equation 2:	.42 ^{***}	
(DV=DB)		
BB		.19*
A		.09
SN		.25 ^{***}
PBC		.34 ^{***}
Equation 3:	.47 ^{***}	.47 ^{***}
(DV=DB)		
BI (step 1)	.54 ^{***}	
TPB (step 2)	R ² ∇ = .06 ^{***}	
BI		.47 ^{***}
BB		.12
A		-.00
SN		.12*
PBC		.19**

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

Ashhurst School

To determine if behavioural intentions mediated the relationship between TPB constructs and dietary behaviour for Ashhurst School three regressions were run.

1. Association between the independent variable and the mediator.
In the first regression equation the variables of the TPB were entered as the independent variables and the mediator behavioural intention was entered as the dependent variable. Betas showed that the TPB variables, behavioural belief, subjective norm and attitude are significantly associated with behavioural intention (see table 16). Criterion one is satisfied for these variables but not for perceived behavioural control.
2. Association between the mediator and dependent variable.
In step 1 of regression 3 behavioural intention was entered as the independent variable and dietary behaviour as the dependent variable. Behavioural intention is significantly associated with dietary behaviour (see table 16). Criterion two is satisfied.
3. Association between the independent variable and the dependent variable. A second regression was computed with the variables of the TPB entered as the independent variable and dietary behaviour as the dependent variable. Only attitude and perceived behavioural control are significantly associated with dietary behaviour (see table 16). Criterion three is satisfied for attitude only.
4. Controlling the mediator.
A third regression (hierarchical) was computed with dietary behaviour entered at step one as the dependent variable and behavioural intention as the independent variable. In step two the TPB variables were entered as the next independent variables. The change in R^2 was non-significant and thus supported full mediation. However, as indicated by the non-significant beta value there was no effect for attitude. Only attitude is not associated with the dependent variable, dietary behaviour, after the mediator, behavioural intention, is controlled for. In this instance behavioural intention fully mediates the relationship between attitude and dietary behaviour for Ashhurst school children.

Table 16

Mediation test using regression of TPB constructs on dietary behaviour mediated by behavioural intention for Ashhurst School. ($n = 106$).

Independent Variables	R ²	β
Equation 1:	.66***	
(DV=BI)		
BB		.28***
A		.33***
SN		.33***
PBC		.07
Equation 2:	.32***	
(DV=DB)		
BB		.10
A		.23*
SN		.18
PBC		.21*
Equation 3:	.29***	.54***
(DV=DB)		
BI (step 1)	.35***	
TPB (step 2)	R ² ∇ = .05	
BI		.29*
BB		.01
A		.13
SN		.08
PBC		.19*

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

Qualitative Analysis

Children's answers to the open ended questions assessing their knowledge of healthy foods and their perceptions of health were collated and examined for any similar recurring themes. Across both schools these themes generally covered five common areas; diet, sickness and disease, psychosocial, fitness and activity and body image. The terms children used within these themes were similar both within and across schools.

7.3.5 Qualitative Analysis – Ashhurst School

Healthy Foods

Children from Ashhurst School had a good understanding of healthy foods. The majority of children listed fruit and vegetables as foods they thought were healthy. Other answers included meats, including lean and red meat; fish, pasta, bread, water and milk, cereals, low-fat takeaways and vitamins. Two children thought 'a little bit of sugar' and 'a bit of lollies' were healthy.

The meaning of being healthy

Ashhurst children reported four clear themes regarding the meaning of health. These included the avoidance of sickness and disease; consuming a healthy diet; body image and fitness. Children generally felt that being healthy meant 'not being sick or diseased', 'keeping out of hospital' and 'dying later'. Children also knew the consequences of an unhealthy diet on the cardiovascular system expressing this in terms of 'not dying of an unhealthy heart'. One child linked health with 'all your body parts working'. Children also expressed health in terms of energy using concepts such as 'not feeling slum or dreary'. With regard to diet, children felt that 'eating well, right' or consuming a 'balanced diet' equated to health and also made the link between low-fat and sugar intake stating that 'not eating lollies' and eating 'less junk and fatty foods' would keep you healthy. In terms of body image, weight status was linked with health and expressed as 'not being over or underweight', 'fat or bulgy' and being 'thin' or 'sort of skinny'. Other physical characteristics of good health included 'not having pimples' or being 'stunted in growth'. The final theme for being healthy covered fitness and exercise and children used terms such as 'being fit, strong, active, muscly and energetic'. The importance of being able to 'run faster and

lots' also emerged as did 'being able to do more things' and 'not being a couch potato'.

The importance of health

All children believed that being healthy was important.

Why health was important

Children gave similar answers linked to the meaning of health when explaining why health was important. These fell into five themes: sickness and longevity, fitness and activity, psychosocial effects, body image and hygiene. Similar concepts were expressed with regard to sickness and longevity with most stating health was important in order to avoid sickness, prolong life or 'die later' and avoid diseases such as 'the flu'. Reasons for remaining healthy in terms of fitness and activity were all the same as those listed for the meaning of health. Health was important to mental well-being and meant 'being happy', 'feeling good or better' and being 'smarter'. Children also noted that being healthy meant you could 'do more things than others' and 'make friends easier'. Health was important in order to avoid 'being fat or obese' and several children referred to this as 'becoming a fat slob'. A few children stated otherwise 'you'll get fat like me'. Finally, children linked hygiene with health noting that the alternative to health was being 'dirty or smelly' and one child extended this to 'the whole nation becoming a very dirty and unhealthy place to live'.

7.3.6 Qualitative Analysis – Palmerston North Intermediate Normal School

Healthy Foods

Children from Palmerston North Intermediate Normal School also had a good understanding of healthy foods. The majority of children listed fruit and vegetables as foods they thought were healthy. Other answers included food items listed in the 'eat most' section of the healthy food pyramid. Children outlined specifics such as skinless chicken and occasional red meat.

The meaning of being healthy

PNINS children reported similar themes regarding the meaning of health. Once again avoiding illness was important as was consuming a healthy diet, body

image and fitness. PNINS children used terms such as 'less chance of getting sick' and 'you live longer' when describing what being healthy meant. Once again children knew the consequences of an unhealthy diet on the cardiovascular system expressing this in terms of 'strain on your heart' or 'having too much pressure on your heart'. Children also gave examples of other diseases such as diabetes 'you'll get fat and get diabetes'. With regard to diet, children outlined examples such as 'eating takeaways once a week', drinking lots of water' and 'eating a balanced diet including five or more fruit and vegetables a day'. In terms of body image, weight status was again linked with health and expressed mostly as 'not getting fat' or as one child put it 'otherwise we would have fat people who sat around and did nothing all day'. Many outlined reasons associated with sports and keeping active when describing what being healthy meant, 'if I'm not I miss out on stuff, sports and camps, I can do more'.

The importance of health

PNINS children also agreed being healthy was important. Some qualified their answers with reasons associated with weight such as 'there are lots of people you see who are obese' and 'young kiwis are getting too fat'. Others agreed health was important in avoiding diseases and in 'staying alive longer'.

Why health was important

PNINS children felt health was important because it gave you a longer and better quality of life, prevented illness, disease and obesity, and improved mental health and physical functioning. Children commonly stated that being healthy was important in order to avoid dying sooner and to have a more 'enjoyable life' where you were able to 'do more things' and 'get the most out of life'. Doing more was connected with both fitness and sports. Health was important to mental well-being in terms of 'feeling happy', and not feeling 'sad and depressed'. As one child stated 'when people are sick and overweight they feel sad and depressed, being healthy makes you happy and everyone needs to be happy'. Several children cited the source of their knowledge of why health was important as parents, teachers, and television (documentaries) and a few used examples of friends or family members who they perceived to be unhealthy. 'I have friends and family who are unhealthy – I don't want to look

like them'. 'Because some of my friends eat junk and fizzy and they don't have much energy – they're sick and groggy'.

DISCUSSION

CHAPTER EIGHT

8.1 Summary of results

This study was designed to investigate the influence of the constructs comprising the Theory of Planned Behaviour on children's choice of particular types of food. In addition, the study aimed to investigate parental influence, and in particular child-feeding practices, on children's eating behaviour. Two samples from two different schools were used. The samples comprised children aged between 10 and 13 years old. The results support the use of the TPB in identifying healthy eating intentions and behaviour in school age children. However, results do not support the addition of parental influence measured by the Child Feeding Questionnaire as a predictor of children's dietary behaviour over and above the TPB.

8.1.1 Gender Differences

An initial review of the data revealed interesting gender differences. There were significant differences between girls and boys on attitude, subjective norm, intention and behaviour. Across both school groups girls reported higher positive attitudes towards healthy eating, stronger perceptions of whether parents or caregivers would want them to consume healthy food, higher intentions to eat healthy food and higher self-reported consumption of healthy food items than boys. The girls in this study group appear to have a greater awareness of healthy food than their male counterparts and are translating this into reported dietary behaviour. This is in contrast to the study of Berg et al. (2000) who found no significant gender differences on children's intentions or consumption of healthy breakfast foods. However, in a study carried out with adolescents, participants reported more positive attitudes towards healthy eating, stronger subjective norms, greater intentions to eat a healthful diet and more positive beliefs regarding fruit intake in females than their male counterparts (Backman et al., 2002). Gender differences have also been reported in the literature investigating nutritional awareness and dietary behaviour. A study of 7-11 year old UK children found girls had a more accurate

knowledge of food-health and food-nutrient links than boys (Hart et al., 2002). Research on weight control and the importance of appearance among children has also shown early and strongly-held gender differences. Girls as young as nine years old report higher levels of dietary restraint, motivation and body shape aspirations, along with greater body shape dissatisfaction and lower self-worth (Hill & Pallin, 1998; Hill et al., 1994; Phillips & Hill, 1998; Rolland, Farnhill & Griffiths, 1998; Robinson & Killen, 2001). These apparent differences emphasise the need for caution when implementing interventions aimed at behaviour change. While a reduction of dietary energy intake is desirable it is important to be aware there can be some negative consequences of dietary control. A number of studies investigating this area have concluded there is an enhanced risk of eating disorders (anorexia nervosa and bulimia nervosa) especially among overweight girls (Hill & Lissau, 2002; Dixon, Adair, & O'Connor, 1996). While a relatively small number (eighteen percent) of children in this study mentioned issues of weight control or body image when discussing health, almost double the number of comments were made by girls than boys. Girls linked health to body image 'if you're not healthy you won't have a good body shape' and will be 'fat', or a 'fat slob'. Some comments indicating lower body-esteem were also expressed. 'Otherwise you'll get fat like me', 'I think I'm healthy but I'm fat' and 'otherwise you get fat and I don't think anyone should be fat'.

8.1.2 Hypothesis One

The hypothesis that the constructs of the (TPB) attitudes towards healthy eating, behavioural beliefs, subjective norms and perceived behavioural control would be significant predictors of intentions to consume healthy food was supported for both schools. The model predicted 65 percent of Ashhurst children's intentions to consume healthy food and 43 percent of PNINS children's intentions. For PNINS this finding is consistent with the level of variance reported in adult applications of the TPB where the model explains on average 41 percent (Godin & Kok, 1996) and 39 percent (Armitage & Conner, 2001) of the variance in behavioural intention. For Ashhurst School, the amount of explained variance was notably higher with attitudes and subjective norms being the strongest predictors of intention. These findings corroborate those of Berg et al. (2000) who found attitudes and subjective norms

constituted the strongest determinants of Swedish children's intentions to consume different types of breakfast foods. Perceived behavioural control did not contribute directly to the prediction of intention for Ashhurst School. Thus, Ashhurst school children mainly decide to eat healthily if they see positive consequences accruing from consuming healthy food and feel their parents or caregivers think they should eat healthily. External control factors seem to be of minor importance. This is interesting because perceived behavioural control is likely to reflect parental control over children's accessibility to healthy food along with whether children feel able to make their own decisions regarding healthy eating. It was expected that these factors would also be influential in children's intentions to consume a healthy diet. This finding is, however, at odds with studies carried out among mostly adult subjects. In a meta-analytic review Godin and Kok (1996) found perceived behavioural control to be an important variable for explaining intention in most studies reviewed. In addition, previous studies examining food choice among adolescents report significant influence on intentions by perceived behavioural control (Backman et al., 2002; Berg et al., 2000; Dennison & Shepherd, 1995; Masalu & Astrom, 2001; Oygard & Rise, 1996).

For PNINS children, intention to eat healthily was influenced by perceived behavioural control, subjective norms, attitudes and behavioural beliefs. In contrast to Ashhurst School, perceived behavioural control was the strongest predictor of behavioural intention for PNINS children. External control factors, whether PNINS children felt they could make their own decisions regarding the consumption of healthy food, along with how easily they felt able to access these items, were the most important influences on their intentions to eat healthily. Healthy eating in this group was also influenced by subjective norms and attitudes. Beta values indicated that the perceptions of parents and caregivers regarding healthy eating were almost as influential on PNINS children's intentions to eat healthily as perceived behavioural control. Behavioural beliefs were the weakest predictor of intention indicating beliefs regarding healthy eating were the least important determinant of children's intentions to eat healthily. Interestingly, across both schools subjective norms were an important influence on behavioural intention. This is in contrast to studies involving adults where social influence on intention has a generally lower

contribution to prediction (Godin & Kok, 1996). However, it might be expected that for children the perceptions of parents or caregivers would be more important to them than the perceptions of significant others (generally friends) might be to adults.

Several possibilities may help explain the difference in reported intentions among both groups of children. One explanation might be the variation in testing conditions between schools. While specific instructions were given to teachers at Ashhurst School regarding questionnaire completion and prompting, the researcher was not present and therefore it was not certain whether this occurred. Testing children in their classrooms with teachers present may have inadvertently placed pressure on them to give the 'right' answer as opposed to a more honest answer. Children at Ashhurst School also completed their questionnaires under a time constraint and therefore had less time than PNINS children to give thought to their answers. PNINS children completed their questionnaires at home, thus, their answers may also have been influenced by parents or caregivers if children asked for assistance or input when completing the survey. A further possibility might be differences in nutrition education between the schools. Information regarding the content or extent of nutritional health education for each school was not known. It is therefore not possible to say whether educational differences exist and if they do whether they may have influenced the different findings regarding the TPB constructs.

8.1.3 Hypothesis Two

Intention to eat healthily was found to be a direct determinant of healthy dietary behaviour for children at both schools. The TPB model predicted 47 percent of PNINS children's healthy eating behaviour and 28 percent of Ashhurst children's behaviour. These findings compare favourably with Godin and Kok's (1996) meta-analysis of health-related TPB studies, accounting for a greater amount of variance in behaviour (47% vs. 34%) for PNINS children and a similar amount of variance for Ashhurst School children (28% vs. 34%). The amount of explained variance for this study group is also larger than similar studies investigating healthful dietary behaviour among adolescents. Masalu and Astrom (2001) found adolescent's intention to avoid sugared snacks and

drinks predicted 15 percent of their dietary behaviour. Similarly, Backman et al. (2002) reported intention to eat healthily explained 17 percent of the variance in adolescent's healthful dietary behaviour.

There are a limited number of studies examining the TPB in relation to food choice that include actual measures of healthy eating behaviour. Those studies that have done so, also report lower predictions of behaviour from intention, compared with prediction of intention from the TPB constructs. The children in this study, especially Ashhurst school children, reported relatively high intentions to eat healthily. These intentions were supported by the qualitative findings revealing children at both schools had a good understanding of healthy foods and were able to provide examples of a balanced diet and what they should be consuming. Similar surveys of food intake, nutritional knowledge and awareness among children have found children are able to list 'healthy foods' competently (Bellisle & Rolland-Cachera, 2000; Dixey et al.,; Hart et al., 2002). In their research among a group of 8-11 year olds Edwards & Hartwell (2002) discovered 52 percent of children identified the term 'healthy eating' with consumption of a balanced diet and intake of fruit and vegetables. Moreover, in line with previous research children in this study were conscious of the present and future consequences of not eating healthily (Dixey et al., 2001). Despite this awareness, and corresponding to similar research among adults, intentions are often not translated into healthy dietary behaviour. Comparable average weekly intakes of fruit and vegetables were reported by both groups of children in this study with neither sample reporting consumption every day of the week. These findings resemble those of the National Nutritional Survey where only two out of every five children were found to eat the recommended daily intake of fruit at least twice a day (Ministry of Health, 2003). Furthermore, only three out of five children ate the recommended daily intake of vegetables, at least three times a day. Both groups of children in this study also reported comparatively high mean daily intakes of treat foods (2.90, Ashhurst, 3.48 PNINS) and takeaways (2.63 Ashhurst, 2.09 PNINS) over a week long period. These intakes are obviously not consistent with Ministry of Health guidelines regarding foods that are high in sugar, fat and salt being recommended for special times only and not as everyday foods.

There are several influences on children's dietary behaviour that may help to explain the gap in variance between intentions and behaviour. Children, as well as adults will experience difficulties in acquiring or eating certain foods and in not eating (or overeating) certain foods. Data obtained from focus groups on healthy eating shows that children are well aware of the importance of eating fruit and vegetables but do not always act on what they know to be healthy and are aware of the contradictions in their behaviour when they don't (Dixey et al., 2001). Both psychosocial and environmental factors influence children's consumption of fruit and vegetables. Independent predictors of children's fruit and vegetable consumption include mother's nutritional knowledge, frequency of fruit consumption, beliefs regarding the importance of disease prevention when choosing children's food, children's liking for commonly eaten vegetables, availability and parental intake (Gibson, Wardle & Watts, 1998). Social cognitive predictors include food preferences and outcome expectations (Resnicow, Davis-Hearn, Smith, Baranowski, Lin, Baranowski, Doyle & Wang, 1997). Preference for children is possibly more likely to be based on taste rather than cognitive factors. Information regarding the nutritional value, fat and sugar content of foods is less accessible to children and probably less important. In comparison to adults, such information is likely to be less influential in their decisions regarding healthy food choices

Further influences on children's dietary behaviour include the media and school environment. Rising levels of promotion of energy dense foods is one problematic aspect of television viewing that has received some research attention. Concerns have been raised regarding advertising aimed at children and adolescents that promote over-consumption of unhealthy food and drink. Research undertaken by Hammond, Wyllie, & Casswell (1999) found that in comparison to other countries New Zealand had the third-highest rate of food advertising, the highest rate of confectionery and drinks advertising and the second highest rate of restaurant advertising (including fast-food restaurants). Neither content, nor exposure, followed the recommendations of healthy dietary guidelines. Heavy advertising of less healthy foods may lead to requests by children for parents to purchase such foods and consequently influence children's dietary patterns. This has led some researchers to advocate changes in the legislation regulating television food advertising aimed at children

(Lobstein et al., 2004; Swinburn et al., 2003). There is little research examining the links between children's consumption of unhealthy foods and television advertising. It is possible that advertising and consequent pressure on parents to purchase unhealthy foods may be influencing the reported intakes of treat foods and takeaways for both groups of children in this study. Advertising of foods and beverages to children remains a contentious issue. Organisations such as the Advertising Standards Authority Inc. argue a ban on television advertising to children would do little to prevent obesity and overweight. Others point out that while it is impossible to establish causative links between advertising and consumer behaviour, advertising is one of the many underlying factors contributing to dietary behaviour and its influence on young children should not be underestimated. The mechanisms of television food advertising on children's nutritional intake and the possible effects of pressure to purchase on parents requires further investigation.

The food and nutrition environment within schools is an important influence on children's dietary behaviour. Approximately half of New Zealand children buy some of the food they consume at school from a canteen or tuckshop (Ministry of Health, 2003). Overseas studies suggest children's daily fat intake is influenced by the fat content of school diets and daily intake of fruit and vegetables can also vary based on availability in school lunch programmes (Davison & Birch, 2001). School food programmes endorsed by the New Zealand Heart Foundation aim to address food choices available in schools and promote healthy choices and education regarding healthy nutrition. These policies have been adopted by some schools that now have rules regarding what foodstuffs children are able to access and consume on school premises. Ashhurst school children are encouraged to bring water bottles to school and fizzy drinks and sweets are not allowed. Some classrooms have a 'fruit break' during the day. The school has an option for children to buy lunches on Monday, Wednesday and Fridays only and there are 'healthy options' included on the set menu. PNINS also has rules disallowing fizzy drinks, energy drinks and sweets at school. Children are not allowed to bring takeaways from fast food outlets for lunch. There is no tuckshop or canteen on the school premises and there are no vending machines. The school also has an external lunch provider who comes in each day and provides healthy school lunch options

including low sugar drinks. For children in this study, the potential influence of foods consumed within the school environment would depend on how often children access foods and the types of choices they make. Both school's food policies suggest that children's relatively high reported consumption (in comparison to MOH guidelines) of treat foods and takeaways are less likely to be related to the school environment. Similarly, the rules regarding fizzy drinks may have influenced the relatively low reported intakes of such beverages for both groups of children over a week long period.

8.1.4 Hypothesis Three

The hypothesis that perceived responsibility by parents, parental concern about child weight and parental restriction would increase the proportion of variance explained in children's behaviour by the TPB was not supported. Inclusion of a measure of child-feeding practices into the TPB model did not increase prediction of children's dietary behaviour. Limited research has looked at parental influence in relation to children's nutritional intake. Research investigating parental beliefs about children's nutritional needs and their control over nutritional intake has found associations with children's weight status – parental control of child eating has positive associations with increased risk for child overweight (Gable & Lutz, 2000). Moreover, data from focus groups has revealed that parents are perceived by children as a key influence on eating behaviour (Dixey, et al., 2001; Robinson, 2000). The absence of an effect in this study was therefore surprising. However, in terms of parental restriction this finding may reflect that parental control has an opposite effect to that intended. Fisher & Birch (1999) examined the association between mothers' restriction of children's access to palatable snack foods (high in sugar and fat) and young children's intake when given free access to these foods in an unrestricted setting. Their results revealed that providing access to palatable snack foods immediately following a meal eaten to satiety produced a substantial additional intake especially in girls, with higher levels of restriction predicting higher levels of snack food intake (Fisher & Birch, 1999). Similar results have been reported with children whose parents indicated greater attempts to control their child's diets reporting higher intakes of both healthy and unhealthy snack foods (Brown & Ogden, 2004). Some studies suggest that restriction of particular foods from a child's diet may be something that parents

apply only in response to an elevated weight status in children (Francis et al., 2001). It may therefore be of limited value as a construct in this type of research without the inclusion of anthropometric measures assessing children's weight status. The subjective nature of the questions regarding restriction in the Child Feeding Questionnaire could also be problematic. Parent's estimation of restriction may vary too widely. They may believe they are restricting children's intake of high fat or sugar foods when in fact they are not. Children's own reports of the frequency they consume takeaways and treats tends to reflect this. It is also possible parents may be over-reporting their degree of restriction in order to appear socially acceptable.

Parental influence involves a complex set of interacting factors. Perceived responsibility by parents, restriction and parental concern about child weight may be less related to children's nutritional intake than other factors. In addition to child feeding practices there are numerous pathways by which parents shape their children's dietary behaviour. These include parent nutritional knowledge, the types of foods parents make available to children, direct encouragement and reinforcement of healthy eating behaviour and parental modelling of particular eating behaviours (Davison & Birch, 2001). Some research indicates parental role modelling is a better method of improving a child's diet than attempts at dietary control (Brown & Ogden, 2004). Studies investigating fruit and vegetable consumption in children have found that when mothers believe increasing their children's consumption will reduce their cancer risk these beliefs are predictive of children's intake (Gibson et al., 1998). If parents are health focussed and follow healthful dietary practices they may be more likely to purchase healthy foods and make these more readily accessible in the home. Similarly, when parents have low nutritional knowledge and unhealthy dietary patterns they may provide greater accessibility to, and promote the consumption of, energy-dense foods (Davison & Birch, 2001). These additional aspects of parental influence may help explain more of the variability in the healthful dietary practices of children. Future research could examine whether these factors in conjunction with the TPB increase the predictive power of the model. Finally, parental influence may have little impact on diet when dietary choices are dictated by external factors. Factors outside the home include the influence of peers, the school environment, after

school visits at friend's homes and food purchased from dairies and takeaways to and from school.

8.1.5 Hypothesis Four

The fourth hypothesis was that the relationship between the TPB constructs and dietary behaviour would be mediated by behavioural intentions. The results illustrated that for PNINS children behavioural intention partially mediated the relationship between subjective norm, perceived behavioural control and dietary behaviour and fully mediated the relationship between behavioural belief and dietary behaviour. The stronger PNINS children's beliefs regarding the benefits of eating healthily were, the more likely they were to intend to eat healthily. The result of these intentions was an increase in healthful dietary behaviour. Children's attitude predicted intention but not their behaviour. Behavioural intention showed a partial mediating role in the relationship between subjective norms, perceived behavioural control and dietary behaviour. The results illustrated, that for Ashhurst children, behavioural intention mediated the relationship between attitude and dietary behaviour. The more favourable Ashhurst children's attitudes were towards healthy eating, the more likely they were to intend to eat healthily. The result of these intentions was an increase in the reported consumption of healthy food items. Behavioural beliefs and subjective norms predicted intentions but not behaviour. In line with the TPB model perceived behavioural control directly predicted behaviour for Ashhurst children. Perceived behavioural control has been reported as an important factor in other studies investigating health behaviour. In research examining risk factors in adults with coronary artery disease perceived behavioural control predicted subsequent exercise and smoking cessation (Johnston, Johnston, Pollard, Kinmoth & Mant, 2004).

8.2 Limitations

This study was cross-sectional and therefore cannot demonstrate causality among variables. Furthermore, self-report measures were used and such measures are often susceptible to bias when used with adult populations. However, at least one TPB based study assessing the impact of social desirability on questionnaire responses among adults has reported minimal impact (Armitage & Conner, 1999). Moreover, it could reasonably be suggested that

children are more likely to be honest when answering questions regarding nutritional intake especially as there is less incentive for them to appear socially acceptable. Overall, children have had less exposure to the social pressures associated with the consumption of few calories. Moreover, they are less aware of the value judgements and social stigma connected to the quality and quantity of foods reported to be consumed. A further limitation of this research was the difference in testing conditions between schools. As testing conditions were decided by each school this was unavoidable. The possible effects of such a difference have already been discussed and ideally future studies would examine measures under equivalent testing conditions. Finally, this study was limited by its cross-sectional nature. Future findings would be strengthened by the inclusion of a prospective measure of behaviour. A prospective study would test the model's efficiency in predicting subsequent choice of healthy food items and thus strengthen the utility of the TPB for children. Previous research findings investigating healthy eating among adults have reported support for the predictive ability of the TPB both cross-sectionally and prospectively (Conner, Norman & Bell, 2002).

8.3 Implications for Health Education

Few studies have investigated the determinants of childhood overweight and obesity. Meanwhile, the problem has grown to the extent where it is a significant public health issue for many countries including New Zealand (Lobstein et al., 2004). Therefore, any information that adds to our understanding of the factors contributing to excess weight in children is useful. With an increasing awareness of the need to implement measures targeting the problem government bodies, health officials, parents and teachers are being forced to address this issue. Providing nutritional information, in itself, is generally not enough to bring about behaviour modification for children (Tershakovec & Van Horn, 2002). Focussing on the underlying cognitive structures involved in children's decisions on food choice provides us with information about which cognitions should be targeted in persuasive communication programmes. The results of this study suggest that for both groups of children; attitudes, subjective norms and behavioural beliefs are important determinants of healthy eating. As these variables account for a significant amount of the variance in behavioural intention, and in turn

behaviour, it would be productive to target these areas when designing interventions. In addition, as the perceptions of significant others seem to be meaningful to children, reinforcing the importance of promoting the consumption of healthy food items to parents and caregivers should also be endorsed. Some evidence also supports the influence of external control factors on children's behavioural intentions. Accordingly, enabling access to healthy food items and encouraging children's own ability to make healthy food choices would also be beneficial.

The qualitative results of this research reinforce the potential advantages of identifying and concentrating on salient beliefs when designing behavioural interventions. For many of the children in this study, being healthy is not only related to diet but to fitness, activity and the avoidance of sickness. Past evidence suggests children are aware of the possible links between the intake of certain nutritional substances and disease (Bellisle & Rolland-Cachera, 2000); this was true of the children in this study, who commonly linked heart disease and diabetes with an unhealthy diet. Being healthy was important to children in both school groups, and some clear and similar themes were reported in relation to the meaning of health. Including their own beliefs regarding eating healthily ('eating less junk and fatty foods keeps you healthy') and the importance of being healthy ('I can run faster and lots', 'I'm able to do more things, including cool stuff', 'if I'm not I miss out on stuff, sports and camps') will make messages regarding healthy nutrition both attractive and relevant to children's life experiences. This approach has been shown to be an effective basis on which to design interventions for children based on behaviour change. Quine, Rutter & Arnold (2001) identified a small number of salient beliefs that predicted children's intention to use a safety helmet and helmet use. A group of children were then presented with a booklet containing a series of messages based on these identified salient beliefs. This resulted in a significant change in behaviour for a number of these children who took up helmet wearing and this effect was maintained over time. As a tool to effect behaviour change this approach is neither time consuming or expensive.

Attempts at dietary modification should also take into account a child's broader social environment. Consumption behaviours and patterns need to be

understood not only in terms of beliefs, values, perceived social pressure and control, but also in terms of important moderating variables such as physical activity and sedentary behaviour. Major reviews (e.g. Lobstein et al., 2004; Swinburn et al., 2003; Davison & Birch, 2001) point out, that along with increases in energy-dense foods declining physical activity is a contributing factor in the rise in overweight among children. Support for this can also be found in individual studies such as that of Gable & Lutz (2000) who found no significant differences in obese and non-obese children's intake of foods high in fat, sugar and junk foods. Significant differences, were, however found, between physical activity and time spent watching television; therefore variance may have been explained in terms of lower energy output in relation to intake for obese children. High levels of physical activity can compensate for excessive calorie or fat intake, allowing maintenance of a healthy weight status.

Unfortunately, both adults and children are moving less and less. According to Swinburn et al. (2003) we are living in an 'obesogenic' environment that discourages physical activity and encourages sedentary behaviour and consumption of greater food energy than is required. Increasing traffic hazards for pedestrians and cyclists as well as issues over children's safety mean many children are now driven to and from school including almost 50 percent of New Zealand children (Ministry of Health, 2003). Adding to a lack of exercise are the energy-saving effects of sedentary behaviour, television, video, DVD and computer game viewing. Children are spending increasing amounts of time in front of television e.g. American children watch at least 3 hours of television a day (Davison & Birch, 2001). Only 9 percent of recently surveyed New Zealand children report not watching television or videos during the week, and 7.4 percent watch more than 20 hours a week (Ministry of Health, 2003). The relevance of these important predictors of childhood overweight should be included in attempts to bring about behaviour change. Modifying dietary intake alone will not achieve a reduction in the growing numbers of overweight children (Davison & Birch, 2001; Lobstein et al., 2004; Swinburn et al., 2003).

8.4 Conclusion.

The present study found support for the TPB as a useful tool to apply in attempting an understanding of children's eating behaviour and in the implementation of interventions aimed at promoting healthy eating. In

endeavouring to bring about dietary change in this age group, intervention should aim to have an effect on the cognitive factors underlying children's healthy eating choices. The qualitative information obtained in this study highlighted children's ability to comprehend concepts relating to a healthy diet and the link between eating behaviour and remaining healthy. This stresses the importance of broadening education in nutritional matters. The qualitative findings in this study have also identified some salient beliefs that are important to children. Including these beliefs in existing nutritional education programmes or designing persuasive messages to target them may also be helpful in attempting to bring about dietary change in this age group. However, as some of the children's comments in this study emphasise, it is important to be aware there can be some negative consequences of dietary control. Interventions should also consider the wider social context, factors such as physical activity and sedentary behaviour, when promoting healthy eating behaviour among young children. Dietary modification alone will not reduce the growing numbers of children who are overweight and obese.

Future research should build on these findings to identify additional factors that children associate with healthy eating so that the promotion of this behaviour is relevant to children's knowledge and life experiences. Focus groups might be a useful tool to utilise in eliciting more detailed information regarding children's thoughts. Identifying children's beliefs regarding healthy food choice, and discriminating between those children who intend to eat healthy foods and those who do not, may facilitate the design of effective intervention strategies in the future. Interventions can then explain the consequences of unhealthy eating to children in terms they value and stress the meaningful short-term benefits of healthy eating.

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APPENDIX 1

- **Information Sheet**

EATING BEHAVIOUR STUDY

Information Sheet

My name is Allison Hewitt and I am a Masters student at the School of Psychology, Massey University. I am also a registered nurse employed part-time at Midcentral Health. I am interested in some influences on children's eating behaviour such as thoughts about food and eating choices. I would like to invite year 7 children, and their parents or caregivers, to take part in our research by filling in this questionnaire and returning it in the freepost envelope provided (no stamp needed). This should take about 20 minutes.

Completing the questionnaire implies your consent to participate in the study and your right to:

- Decline to participate
- Decline to answer any particular question
- Withdraw from the study
- Ask any questions about the study at any time during participation

The questionnaire is anonymous. If you would like information about the results of the research please write your name and address in the spaces on the last page. This page will be separated from the questionnaire as soon as we receive it to keep your information private.

If you have any questions about the study please don't hesitate to contact either myself or my supervisor, Dr Stephens, by phoning or writing to either of us at:

Dr Christine Stephens
Phone: 350-5799 ext. 2071
Email: C.V.Stephens@massey.ac.nz

Allison Hewitt
Phone: 359-5122
Email: allisonhewitt@clear.net.nz

Yours sincerely

Allison Hewitt

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 03/98. If you have any concerns about the conduct of this research, please contact Professor Sylvia V Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 06 350 5249, email humanethicspn@massey.ac.nz

APPENDIX 2

- **Questionnaire**

**EATING BEHAVIOUR QUESTIONNAIRE
FOR CHILDREN AND PARENTS OR
CAREGIVERS
OF PALMERSTON NORTH INTERMEDIATE
NORMAL SCHOOL**

There are two sections to the study. Section one is for children to complete and section two is for parents or caregivers to complete.

Please read the instructions carefully and answer all questions.

Do not spend a lot of time on each question, usually your first answer is best.



SECTION ONE FOR CHILDREN TO COMPLETE

First two things about yourself to write here:

Are you female or male? _____

How old are you? _____ Years.

Please answer the following questions **honestly**. This is not a test - there are no right or wrong answers. The questions are just about what you think and do.

We will ask you different questions about five sorts of foods:

1. **Fruit** are foods like bananas, pears and apples.



2. **Vegetables** are foods like tomatoes, broccoli and beans.



3. **Treat foods** are foods like lollies, chippies and chocolate.



4. **Fizzy drinks** are drinks like coke, fanta and sprite.



5. **Takeaways** are foods like Hamburgers, Fish & Chips, Pizza and Fried Chicken.



In the questions below please draw a circle around one number to show your answer for each question asked.

Here is how to do it. In this question the person does not think eating fruit helps them stay healthy so she has answered definitely no by drawing a circle around the 1:

		Definitely No 1	Maybe No 2	Don't Know 3	Maybe Yes 4	Definitely Yes 5
1.	Eating some fruit every day helps me stay healthy.	1	2	3	4	5

Here are your questions:

In the questions below please draw a circle around one number to show your answer for each question asked.

		Definitely No 1	Maybe No 2	Don't Know 3	Maybe Yes 4	Definitely Yes 5
1.	Eating some fruit every day helps me stay healthy.	1	2	3	4	5
2.	Eating some vegetables every day helps me stay healthy.	1	2	3	4	5
3.	Eating treat foods every day helps me stay healthy.	1	2	3	4	5
4.	Drinking fizzy drinks every day helps me stay healthy.	1	2	3	4	5
5.	Eating takeaways every day helps me stay healthy.	1	2	3	4	5

In the questions below please draw a circle around one number to show your answer for each question asked.

		Very Enjoyable 1	Enjoyable 2	Don't Know 3	Unenjoyable 4	Very Unenjoyable 5
6.	For me being healthy would be.	1	2	3	4	5
7.	For me to eat some takeaways every day over the next week would be.	1	2	3	4	5
8.	For me to eat some fruit every day over the next week would be.	1	2	3	4	5
9.	For me to eat some vegetables every day over the next week would be.	1	2	3	4	5
10.	For me to eat some treat foods every day over the next week would be.	1	2	3	4	5
11.	For me to drink some fizzy drinks every day over the next week would be.	1	2	3	4	5

		Definitely No 1	Maybe No 2	Don't Know 3	Maybe Yes 4	Definitely Yes 5
12.	My parents/caregiver think I should eat some fruit every day.	1	2	3	4	5
13.	My parents/caregiver think I should eat some vegetables every day.	1	2	3	4	5
14.	My parents/caregiver think I should eat some treat foods every day.	1	2	3	4	5

In the questions below please draw a circle around one number to show your answer for each question asked.

		Definitely No 1	Maybe No 2	Don't Know 3	Maybe Yes 4	Definitely Yes 5
15.	My parents/caregiver think I should drink some fizzy drinks every day.	1	2	3	4	5
16.	My parents/caregiver think I should eat some takeaways every day.	1	2	3	4	5
17.	I will eat some fruit every day over the next week.	1	2	3	4	5
18.	I will eat some vegetables every day over the next week.	1	2	3	4	5
19.	I will eat some treat foods every day over the next week.	1	2	3	4	5
20.	I will drink some fizzy drinks every day over the next week.	1	2	3	4	5
21.	I will eat some takeaways every day over the next week.	1	2	3	4	5
22.	If I want to I can easily have some fruit every day.	1	2	3	4	5
23.	I can decide for myself whether I have some fruit every day.	1	2	3	4	5
24.	If I want to I can easily have some vegetables every day.	1	2	3	4	5
25.	I can decide for myself whether I have some vegetables every day.	1	2	3	4	5

In the questions below please draw a circle around one number to show your answer for each question asked.

		Definitely No 1	Maybe No 2	Don't Know 3	Maybe Yes 4	Definitely Yes 5
26.	If I want to I can easily have some treat foods every day.	1	2	3	4	5
27.	I can decide for myself whether I have some treat foods every day.	1	2	3	4	5
28.	If I want to I can easily have some fizzy drinks every day.	1	2	3	4	5
29.	I can decide for myself whether I have some fizzy drinks every day.	1	2	3	4	5
30.	If I want to I can easily have some takeaways every day.	1	2	3	4	5
31.	I can decide for myself whether I have some takeaways every day.	1	2	3	4	5

SOME FOOD QUESTIONS

How many days over the last week did you eat these foods? Please circle the number of days.

On how many days over the last week did you eat some fruit?



1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
-------	--------	--------	--------	--------	--------	--------

On how many days over the last week did you eat some vegetables?



1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
-------	--------	--------	--------	--------	--------	--------

On how many days over the last week did you eat some treat foods?



1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
-------	--------	--------	--------	--------	--------	--------

On how many days over the last week did you drink fizzy drinks?



1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
-------	--------	--------	--------	--------	--------	--------

On how many days over the last week did you eat takeaways?



1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
-------	--------	--------	--------	--------	--------	--------

In the questions below we are interested in what you think. Please write a short answer for each question asked in the space provided.

32. What kinds of foods do you think are healthy?

33. What do you think being healthy means?

34. Do you think being healthy is important?

35. Why do you think this?

36. What are your favourite foods?

THANKYOU! THE NEXT SECTION IS FOR MUM OR DAD OR YOUR CAREGIVER

SECTION TWO FOR PARENTS OR CAREGIVERS TO COMPLETE

What is your relationship to the participant?

(please tick)

Mother

Father

Caregiver

In the questions below please circle one number for each question asked.

	Never 1	Seldom 2	Half of the time 3	Most of the time 4	Always 5
When your child is at home, how often are you responsible for feeding him/her?	1	2	3	4	5
How often are you responsible for deciding what your child's portion sizes are?	1	2	3	4	5
How often are you responsible for deciding if your child has eaten the right kinds of food?	1	2	3	4	5
	Unconcerned 1	A little concerned 2	Concerned 3	Fairly concerned 4	Very concerned 5
How concerned are you about your child eating too much when you are not around him/her?	1	2	3	4	5
How concerned are you about your child becoming overweight?	1	2	3	4	5
	Disagree 1	Slightly disagree 2	Neutral 3	Slightly agree 4	Agree 5
I have to be sure my child does not eat too many sweets.	1	2	3	4	5
I have to be sure my child does not eat too many high-fat foods.	1	2	3	4	5
I intentionally keep some foods out of my child's reach.	1	2	3	4	5
I offer sweets to my child as a reward for good behaviour.	1	2	3	4	5
10. I offer my child their favourite foods in exchange for good behaviour.	1	2	3	4	5

Thank you very much for taking the time to complete the questionnaire.

Your contribution to this study is appreciated.

Please return this questionnaire in the pre-paid envelope provided (no stamp required).



If you complete this section it will be promptly removed from the questionnaire to protect your privacy.

Please send me a summary of the results at the conclusion of the study:

Name: _____

Address: _____
