Television Food Advertising to Children:

Nature, Extent and Potential Consequences.

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by

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Abstract

Background: Experimental studies have shown that exposure to food advertising on television can affect children's food preferences, choices and consumption in the short-term. However, little is known about the role of habitual television viewing (and therefore food advert exposure) and its potential relationship with brand awareness, brand requests, food preferences and weight status in children. The published research examining the UK television food advertising landscape also has a number of limitations that restrict its usefulness in assessing the potential influence of such food promotion on children's diets. The current thesis used innovative methodologies to examine hypotheses arising from these issues in 6-13 year old children and on the UK television channels most popular with this age group.

Key Findings:

Effects of acute, experimental food advertising exposure (Chapter 3): Relative to toy advertisement exposure, food advertising exposure increased all children's selection of branded and non-branded fat and carbohydrate items from food preference measures. No weight status differences in food preferences or response to advertising were found. Preferences for branded food items were particularly enhanced in high TV viewing children following food adverts suggesting that these children may have an increased susceptibility to these messages. However, all children were better able to recognise food adverts than toy adverts.

Effects of habitual food advertising exposure (Chapters 3-5): Food preference differences between high and low TV viewers were evident in the absence of experimental television food advertising exposure in Chapters 4 and 5. All children were better able to correctly identify product names from brand character stimuli than vice versa. Higher habitual advertising exposure did not confer a greater ability to recognise food advertisements (Chapter 3) nor identify brand characters or products. Children with greater brand awareness did not display greater self-reported preferences for branded food items.

The extent of food advertising on UK television (Chapter 6): Food advertising on television varied across channels, channel types, broadcast platforms, viewing

times and recording periods (months of the year). The foods advertised on the channels most popular with young people were predominantly unhealthy items, even during periods when large numbers of children are watching, with promotions for healthy foods comprising less than a fifth of all food advertisements.

The nature of food advertising on UK television (Chapter 6): Promotional characters (such as brand equity characters, licensed characters and celebrities) were often used to promote unhealthy foods to young people, although their use to promote healthier food items was greatest on dedicated children's channels. Food adverts aimed at children principally rely on 'fun' as a key attribute of both the advertising experience and the use/consumption of the product. Food brand websites were most likely to be promoted during food adverts aimed at teenagers or adults.

Implications: This thesis increases understanding of the effects of habitual food advertising exposure on food preferences and food preference responses to acute, experimental food advertising, in addition to providing a comprehensive assessment of the television food advertising landscape in the UK following regulatory reform.

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Glossary of Acronyms

BMI	Body mass index
SDS	Standard deviation score
LFPM	Leeds Food Preference Measure
AFPM	Adapted Food Preference Measure
LFCT	Leeds Forced Choice Test
HTVQ	Habitual Television Viewing Questionnaire
HTVQ-R	Revised version of the Habitual Television Viewing Questionnaire
BC-FT	Brand character flashcard task
PI-FT	Product image flashcard task
SL	Shopping list task
FA	Food advert condition
TA	Toy advert/control condition
CHO	Carbohydrate
NW	Normal weight
OW	Overweight
OB	Obese
CI	Consumers International
WHO	World Health Organisation
HFSS	High fat/sugar/salt foods
IOM	Institute of Medicine (US)

Chapter One

1. Television Food Advertising to Children: Nature, Extent and Potential Consequences - A review of the literature

This thesis examines the effects of television food advertising on children's food preferences and choices. Aspects of branding, a key component of advertising, are also explored in relation to children's food preferences and choices. In addition, this work provides the largest and most comprehensive analysis to date of the nature and extent of food advertising on UK television in 2008, following significant regulatory reform of this type of promotional activity. Elucidating how such factors affect food preference and choice in children is critical if we are to encourage healthy dietary choices, which are fundamental to the improvement of diet quality in young people and consequently their lifelong health.

This literature review begins by examining the problem of obesity and its adverse health and socioeconomic consequences, establishing that there is a clear need to better understand the development of obesity during childhood. Relevant research relating to the link between poor dietary choices and obesity is reviewed, alongside research related to the development of food preferences and factors affecting food choice in children. Furthermore, literature related to the effects of television viewing and specifically food advertising on children's diet is reviewed, and the gaps in knowledge identified that this thesis seeks to address. The chapter concludes with an explicit statement of the aims and objectives of this thesis.

1.1 Obesity: The Scale of the Problem

1.1.1 Defining obesity and weight status

Before examining the relationship between television viewing and obesity, specifically the effects of food adverts on dietary choices, it is important to understand what the term 'obesity' means and what proportion of children are suffering from obesity.

Obesity can be defined as "a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired" (WHO, 1998).

Weight status in adults is typically defined using the body mass index (BMI), a measure of weight in kilograms (kg) relative to an individual's height in metres squared (m^2). The BMI range for an adult of normal, healthy weight is 18.5 – 24.9 kg/m^2. Overweight and obesity, conditions of excessive fatness, are categorised by BMI values in the ranges of 25 – 29.9 kg/m^2 and 30 – 40 kg/m^2 respectively. An individual with a BMI greater than 40 kg/m^2 is considered to be morbidly obese. These cut-off points are related to health risk according to the World Health Organisation (WHO, 1998) but are also 'round numbers' for ease of use (Cole, Bellizi, Flegal, & Dietz, 2000). As greater risk for obesity-related disease such as hypertension, dyslipidaemia and the metabolic syndrome are particularly related to increased adiposity (specifically centrally distributed body fat), BMI is regarded by many to be a less sensitive or reliable method of health risk than assessments of percentage body fat, or measurements of waist circumference or skinfold thickness (Cole et al., 2000; Bray & Bellanger, 2006). Furthermore, BMI does not distinguish between different forms of increased mass such as fat, lean tissue or bone, and therefore can lead to classification errors (McCarthy, Cole, Fry, Jebb, & Prentice, 2006). However, despite these disadvantages, BMI measurements are simple to do and provide a valuable tool for monitoring of trends, and therefore BMI is recognised as the international definition of adult obesity (Cole et al., 2000; McCarthy et al., 2006).

In children, the classification of weight status is a little more complex. During childhood, weight and height are highly correlated (Cole, Freeman, & Preece, 1995) and BMI is subject to much variation according to age and gender (related to differing growth patterns, weight gain, and changes in body composition). Therefore overweight and obesity must be defined according to age-specific and sex-specific BMI distribution curves (Butland et al., 2007). The International Obesity Taskforce (IOTF) established reference points for 2 to 18 year olds, which specify overweight and obesity cut offs corresponding to adult BMIs of 25 kg/m^2 and 30 kg/m^2 (Cole et al., 2000). Because the IOTF cut off points are derived from international data (over 190,000 children in six countries) and allow a smooth transition from child to adult assessment criteria, these definitions are considered more effective for international comparisons of epidemiological data and a more accurate indication of health risk than the often used 85^{th} and 95^{th} percentiles for sex and age from the 1990 UK Growth Charts (Cole et al., 1995; Butland et al., 2007). Alternative charts with similar relative cut offs to those put forward by the IOTF have been produced by McCarthy et al., (2006) based on measures of bio-impedance. This measure is thought to be a better reflection of actual adiposity (and therefore health risk), and would be a useful tool for those studies with the capacity to conduct bio-impedance assessments of child participants.

1.1.2 The prevalence of obesity

The prevalence of overweight and obesity in children and adolescents has risen rapidly over the last 40 years in many westernised countries and in those undergoing economic development, and is now widely considered to qualify as an epidemic.

A 2004 survey of school aged children in the European Union indicated that 18% (approximately 14 million children) were overweight, with 400,000 or more new cases each year (Lobstein, Baur, & Uauy, 2004). Of these overweight children, at least 3 million were believed to be obese, with an additional 85,000 cases expected every year (Lobstein et al., 2004).

The obesity epidemic in the UK is thought to have begun in the 1980s, with prevalence having continued to rise to the extent that obesity is now the most common disorder of childhood and adolescence (Reilly & Wilson, 2006). It has been suggested that levels of obesity are now more than double that of 1980 (Lowell, 2004). According to the 2007 Health Survey for England (HSE, 2007), 14% of 2 – 15 year old boys were overweight and 17% obese. For girls in the same age band, 14% were overweight and 16% obese.

1.1.2.1 Gender differences

No significant differences in prevalence of overweight/obesity were found between the sexes in the Health Survey for England (HSE, 2007), the results suggested that around 3 in 10 boys and girls aged 2 – 15 years (31% and 30% respectively) were classified as either overweight or obese in 2007. Since 1995, obesity prevalence amongst boys in this age group increased 6 percentage points from 11% to 17% and 4 percentage points for girls (from 12% to 16%). However, the prevalence of overweight did not significantly change over this period. It has been suggested that overall trends in overweight and obesity prevalence for boys and girls may actually be levelling off with no significant change in levels between 2002/3 and 2006/7 (HSE, 2007; Stamatakis, Wardle, & Cole, 2010). However, the National Child Measurement Programme of 2008/9 (NHS, 2009b) found that whilst levels of overweight were very similar between gender groups (13.8% and 12.6% at reception level [4-5 years] and 14.4% and 14.2% at year 6 level [10-11 years] for boys and girls respectively), obesity prevalence was greater in boys in both age groups (10.2% v 8.9% reception, 20.0% v 16.5% at year 6).

These findings reflect similar trends seen in the adult data. The proportion of men who were overweight actually decreased from 44% in 1993 to 41% in 2007, while the proportion of overweight women did not change at 32% (HSE, 2007). However, obesity prevalence in males rose from 13% in 1997 to 24% in 2007, and female obesity increased to 24% in 2007 from 16% in 1993 (HSE, 2007). Therefore the prevalence of obesity has been rising more rapidly in the male population both for children and adults; with trends predicting that by 2035 47% of men and 36% of women in the UK will be obese (Butland et al., 2007). This would demonstrate a reversal of the pattern of previous years as, to date, obesity prevalence has typically been higher in women than in men, and this remains the case in many countries across the globe (Legato, 1997).

1.1.2.2 Regional differences (UK)

There is some evidence of variation in levels of adiposity between 'environmentally distinct populations' in the UK. For example, one study found that children (particularly boys) were more likely to be overweight and obese in the Isle of Man than in Avon in Southwest England (Goodfellow & Northstone, 2008).

However, the HSE report (2007) identified the West Midlands, East of England, East Midlands and London as the Government Office Regions to have had the highest overall rates of overweight and obesity in 2 – 15 year old boys in England in 2007 (see Figure 1-1).

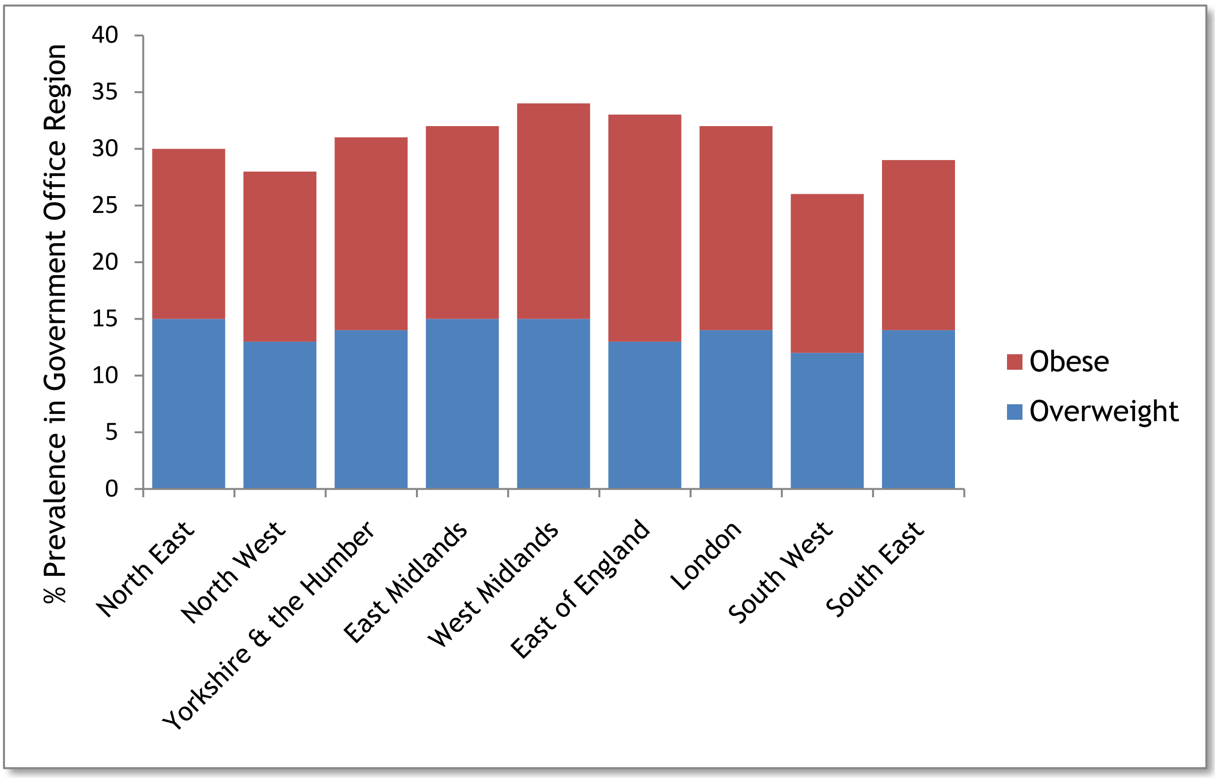


Figure 1-1 Prevalence of overweight and obesity in boys aged 2-15 years in 2007 by Government Office Region.

In girls, the regions with the highest prevalence of overweight and obesity in 2007 were the North East and the West Midlands (HSE, 2007) (see Figure 1-2).

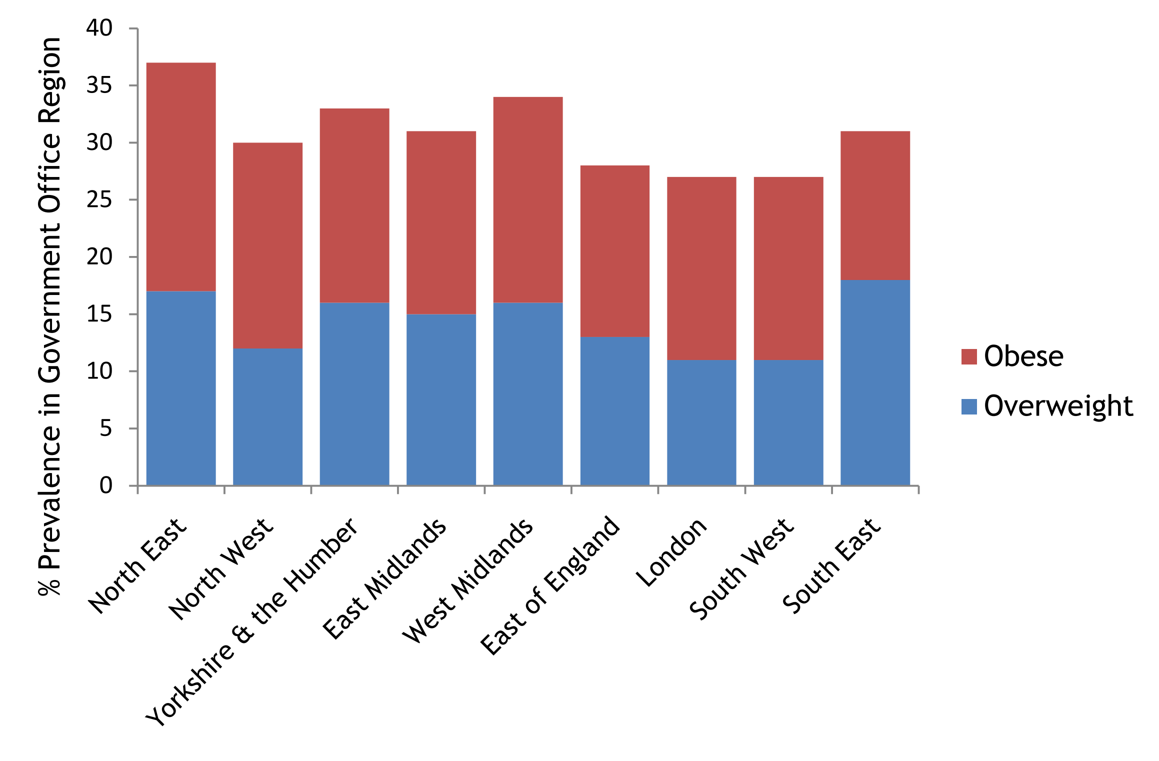


Figure 1-2 Prevalence of overweight and obesity in girls aged 2-15 years in 2007 by Government Office Region.

Furthermore, data from a previous report (HSE, 2003) were used to project discernable trends forward to forecast the number and proportion of children predicted to be obese and overweight in 2010 within governmental regional groups (Zaninotto, Wardle, Stamatakis, Mindell, & Head, 2006). As figures 1-3 to 1-6 show, these data predicted that the pattern would vary across regions, with some showing increases and others showing either no change or potentially declining levels of obesity by 2010 (Zaninotto et al., 2006).

For boys, the greatest increase was predicted to be in the London area with the number of obese boys projected to increase from 143,052 to 174,216 by 2010 (Zaninotto et al., 2006). For girls, the North West was expected to see the biggest increase, with the number of obese girls predicted to rise from 98,469 to 128,999 between 2003 and 2010 (Zaninotto et al., 2006).

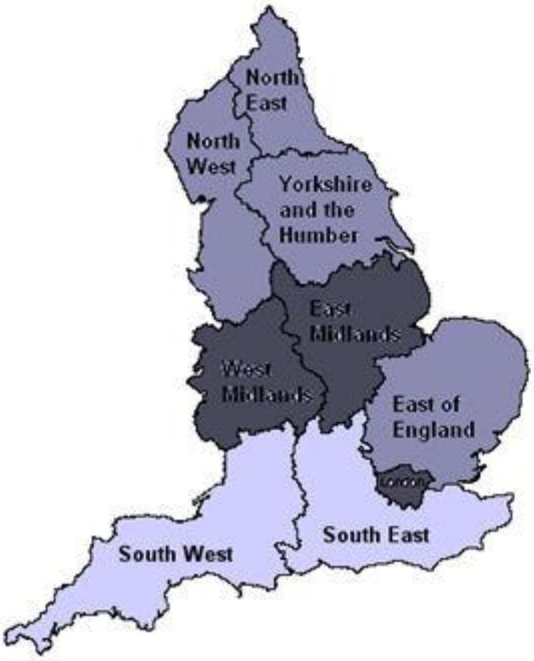


Figure 1-3

Key: Prevalence of obesity in 2003 among boys aged 2-15 years by Government Office Region (0-4%, 5-9%, 10-14%, 15-19%, 20+%)

Figure 1-4

Key: Predicted prevalence of obesity in 2010 among boys aged 2-15 years by Government Office Region (0-4%, 5-9%, 10-14%, 15-19%, 20+%)

Figure 1-5

Key: Prevalence of obesity in 2003 among girls aged 2-15 years by Government Office Region (0-4%, 5-9%, 10-14%, 15-19%, 20+%)

Figure 1-6

Key: Predicted prevalence of obesity in 2010 among girls aged 2-15 years by Government Office Region (0-4%, 5-9%, 10-14%, 15-19%, 20+%)

1.1.2.3 Socioeconomic differences

The link between socioeconomic status (SES) and childhood obesity has been well established both in the UK (HSE, 2007; Stamatakis et al., 2010; Hardy, Wadsworth, & Kuh, 2000) and internationally (Wake, Hardy, Canterford, Sawyer, & Carlin, 2007; Singh, Kogan, Van Dyck, & Siahpush, 2008; Proper, Cerin, Brown, & Owen, 2007; Olson, Bove, & Miller, 2007; Morgenstern, Sargent, & Hanewinkel, 2009; McLaren, 2007).

In a recent comprehensive review of epidemiological studies carried out in school aged children from western developed countries since 1989, Shrewsbury & Wardle (2008) found that SES was inversely associated with adiposity in 19 studies (42%), no association was found in 12 studies (27%), and in 14 studies (31%) there was a combination of no association and inverse associations across sub-groups. Importantly, no positive associations between SES and adiposity were found (Shrewsbury & Wardle, 2008). The variability in study findings is likely to be related to the use of different SES indicators between researchers, including parental education, parental occupation, and family income (Shrewsbury & Wardle, 2008).

However, Stamatakis et al., (2010) found that, despite some evidence of a stabilization of the overall prevalence of overweight and obesity in recent years, social disparities seemed to have grown - with a rising trend of overweight and obesity being evident in the low SES group only. In 2006/7 it was even found that obesity prevalence in boys in the low SES group was twice that of the higher groups (Stamatakis et al., 2010). It has also been demonstrated that growing up in a poor SES household is positively associated with an increased risk of obesity in adulthood (Olson et al., 2007).

Although the mechanisms behind this association are not well known, a number of potential explanations have been put forward including differences in response to health-related media messages between SES groups (Stamatakis et al., 2010), access to resources being related to income (Shrewsbury & Wardle, 2008) and the suggestion that a greater economic capacity is required in order to purchase healthier foods (McLaren, 2007).

1.1.2.4 Ethnic differences

Data related to obesity prevalence by ethnic groups are limited, particularly for children and young people. Jebb et al., (2004) found that in 1997, Asian young people (4 – 18 years) were almost four times as likely to be obese than white subjects (13.6% v 3.5%). This issue was not addressed in the Health Survey for England 2007, but the data from 2004 shows some evidence of variation between the minority ethnic groups. Obesity prevalence was found to be lowest for the 2-15 year old boys from Indian and Chinese ethnic groups (13.7% and 14% respectively), lower than that of the general population at that time (16.5%) (HSE, 2004). Black African and Black Caribbean groups had the highest levels of obesity prevalence in both boys (30.6% and 27.6% respectively) and girls (26.8% and 26.9%) in that age group (HSE, 2004). The lowest prevalence for girls was found in the Chinese (12.2%) and Pakistani groups (14.5%), again below the proportion of obesity found in the general population (16.2%) (HSE, 2004). Studies in the US have also found racial/ethnic disparities to be apparent in children (Singh et al., 2008; Anderson & Whitaker, 2009).

1.1.3 Health and other consequences of obesity

The WHO has described obesity as “one of today’s most blatantly visible – yet most neglected – public health problems” (WHO, 2003a). It has been suggested that, globally, excess adiposity is the sixth most important risk factor contributing to the overall burden of disease (Haslam & James, 2005). For young people, overweight and obesity are associated with a number of health-related and psychosocial consequences, both in the short term and the long term. Children and adolescents who are obese are at increased risk of suffering psychological ill health (for example, related to bullying and social isolation resulting in low self esteem and poor quality of life), cardiovascular risk factors, asthma, chronic inflammation, diabetes (types I and II), orthopaedic abnormalities and liver disease (Reilly & Wilson, 2006). Signs of actual cardiovascular damage have even been seen in obese children, such as increased late diastolic myocardial motion and decreased systolic strain, compared to normal weight children (Lorch & Sharkey, 2007). Franks et al., (2010) found that the rate of death from ‘endogenous causes’ (including liver disease, cardiovascular disease, infections, cancer diabetes and alcoholic poisoning) was twice as high in the highest quartile of childhood BMI than in the lowest quartile. Furthermore, it was found that childhood hypertension increased the risk of premature death from endogenous causes by 57% (Franks et al., 2010). Incidences of type II diabetes and fatty liver (associated with excessive weight) in young people were unheard of in the pediatric literature prior to 1980 but are now occurring in approximately a third of obese children (Ludwig, 2007). In the US it has even been predicted that paediatric obesity may shorten life expectancy by 2 to 5 years by 2050, an effect that is equal to that of all cancers together (Ludwig, 2007). Fontaine et al., (2003) also suggested that obesity has a marked effect on life span, with the risk of 'years of life lost' due to obesity found to be greater at younger ages. For white males and females aged 20 years with BMIs greater than 45 kg/m^2, the reductions in total life expectancy were calculated as 13 years and 8 years (17% and 13% of life remaining respectively) (Fontaine, Redden, Wang, Westfall, & Allison, 2003).

For adults who were obese as children or adolescents, their obesity is likely to have persisted into adulthood (at least 60% of obese children and 70-80% of obese adolescents are likely to become obese adults) and such individuals have an elevated likelihood of suffering cardiovascular risk factors, diabetes, some forms of cancer, depression, arthritis, adverse socioeconomic outcomes and premature mortality (Reilly & Wilson, 2006). As obesity is a medical disorder that can lead to several co-morbidities, this is not only damaging for the individual but can be an economic challenge for society as a whole. 30,000 deaths annually in the UK are believed to be attributable to obesity (Haslam & James, 2005), and the condition has been estimated to cost the UK National Health Service (NHS) £1 billion annually, with a total impact on employment of potentially up to £10 billion (HSE, 2007).

It is clear that obesity is a significant problem in the UK, with detrimental effects on children's short and long-term health. Although television is linked to an increased risk of obesity, obesity is a multi-factorial disease and therefore there are numerous other important factors that need to be considered in order for the role of food advertising to be placed in context.

1.2 The Aetiology of Obesity

1.2.1 Energy balance

In its simplest terms, obesity is a consequence of an energy imbalance. If energy intake exceeds energy expenditure persistently over time, the result is a positive energy balance and weight gain, ultimately leading to obesity. It has not yet been established definitively what level of energy imbalance is required and how long term caloric dysregulation needs to be in order for childhood obesity to develop (Butte, Christiansen, & Sørensen, 2007), however it has been suggested that an imbalance of 100 – 200kcal/day could be sufficient (Moreno & Rodriguez, 2007). It is thought that energy balance can also be influenced by genetic, metabolic, behavioural and environmental factors (and therefore, individual susceptibility to obesity can be identified at all these levels), these factors will now be briefly discussed.

1.2.2 Factors affecting energy balance

1.2.2.1 Genetic factors

Genetics alone cannot explain the rapid recent rise in childhood obesity but genetic susceptibilities may at least partially explain some inter-individual differences in propensity to gain weight, when that individual susceptibility interacts with adverse environmental conditions (see section 1.2.2.3) promoting weight gain (Prentice & Jebb, 1995). But the rate at which worldwide prevalence has increased (and the lack of substantial change to our genes in that time) suggests that other factors are perhaps more important to obesity causation (Rennie, Johnson, & Jebb, 2005). Traditionally, examinations of the role of genes in weight gain have focused on the operation of metabolic processes underpinning energy balance, rather than individual differences in behavioural expression. Nevertheless, the role of genetics in eating behaviour (particularly regarding taste preference and food preference) is of relevance to this thesis and therefore will be discussed in more detail in section 1.3.3.1.

1.2.2.2 Metabolic factors

A complex network of neurohormonal and metabolic processes operate to regulate energy balance as part of a homeostatic mechanism (Moreno & Rodriguez, 2007) and of particular importance to this thesis is the role of individual macronutrient oxidation in that process.

Regarding protein, which typically comprises approximately 15% of dietary energy, stores of this macronutrient are thought to increase in size only in response to growth stimuli not as a result of increased dietary intake (Galgani & Ravussin, 2008). Protein oxidation appears to be tightly controlled on a day to day basis and tends to act to re-establish balance (Jebb, 1999), therefore an imbalance of protein intake versus oxidation cannot be considered as a direct cause of obesity but may be implicated in the process of fat balance (Galgani & Ravussin, 2008).

Carbohydrates are typically the main source of dietary energy, and this intake comprises about 50 – 100% of the body's stores (considerably more than the 1% for protein and fat), meaning that the amount of carbohydrate stored in the body as glycogen can vary considerably depending on consumption (Galgani & Ravussin, 2008). However, similarly to protein, carbohydrate oxidation has been shown to be tightly regulated (Prentice & Jebb, 1995; Galgani & Ravussin, 2008), changing to closely match consumption over a range of intake of 83 to 539 grams per day (Jebb, 1999). This level of control over excess carbohydrate consumption, as well as the extremely limited occurrence of its conversion to fat in the body, suggests that it is not excess carbohydrate that is responsible for the majority of weight gain (Prentice & Jebb, 1995; Galgani & Ravussin, 2008).

In contrast, the control of fat balance is relatively poor. Body fat stores are considerable, and as fat intake has very little or no influence on fat oxidation there is scant evidence that this is regulated at all (Prentice & Jebb, 1995; Galgani & Ravussin, 2008; Jebb, 1999). Rather fat is the 'energy buffer' for the body, whereby a caloric deficit from other macronutrients is compensated for by use of the fat stores and a caloric excess is converted to fat to be stored (Galgani & Ravussin, 2008; Jebb, 1999). Indeed, a low capacity for fat oxidation is associated with a tendency to gain weight (Blundell & Finlayson, 2004). Therefore it is reasonable to suggest that fat intake may be critical to energy imbalance and as a result, weight gain. The importance of the macronutrient composition of the diet, particularly regarding the proportion/amount of fat consumed, will be discussed further in the context of overall dietary behaviour in sections 1.2.2.4 and 1.3.4.

1.2.2.3 Environmental factors

Although energy imbalance can be considered to cause obesity at an individual level, at a population level it is thought that the obesity epidemic is the result of an environment characterised by a virtually limitless supply of convenient, relatively affordable, highly palatable, energy-dense (a high number of kilocalories (kcal) per gram) foods which, in many societies, are aggressively marketed through various media, with only minimal levels of physical activity required on a day-to-day basis (Hill & Peters, 1998; Elinder & Jansson, 2009; Blundell & Gillett, 2001). These factors have all been proposed as potential environmental determinants of behaviour (Elinder & Jansson, 2009). Overall, this has been referred to as an 'obesogenic' environment, and is believed to act to promote high energy intake and low energy expenditure (Hill & Peters, 1998; Washington, 2005).

An examination of environmental factors that promote physical inactivity is beyond the scope of this thesis; however one of the key factors of the environment thought to influence the energy intake side of the equation is the use of media – particularly television, and more specifically the marketing and promotion of foods via television. This is a fundamental focus of the thesis and will be explored in more detail in section 1.5.3.

1.2.2.4 Behavioural and psychological factors

Eating is entirely behavioural, and it is this behaviour that ultimately links all previous internal molecular factors and external environmental factors together (Blundell, 2006). It is clear that one factor likely to affect an individual's susceptibility to weight gain is their eating pattern. This can be defined as both the arrangement of eating episodes (i.e. meals and snacks) across the day and the foods selected for consumption (Blundell & Gillett, 2001; Blundell et al., 2005). It is reasonable to assume that large eating episodes (i.e. big meal sizes), more frequent eating, and the selection of the most energy dense foods would lead to a high daily intake of energy and therefore (without significant adjustments to energy expenditure) would characterise the eating pattern of a person at risk of weight gain (Blundell et al., 2005). Indeed, the WHO has stated that the consumption of energy dense foods is one of the major dietary causes of the obesity epidemic (WHO, 2003b). Therefore, according to Blundell et al., (2005) the key behavioural risk factors for obesity may include weakened satiation (where satiation refers to the processes that operate to terminate an eating episode), comparatively weak satiety (where satiety is the inhibition of hunger and further eating that occurs as a consequence of food ingestion), the potential for bingeing, chronically high levels of hunger (both state (oscillating periodically throughout the day in accordance with eating pattern) and trait (longer term resilient influences on behaviour)), a high food-induced pleasure response (hedonic response to food), a preference for energy-dense foods, and strong oro-sensory preferences (for sweetness as well as fattiness in foods).

To summarise, the causes of excess adiposity in children and young people are multi-factorial and not yet fully elucidated. It is essential that an improved understanding of the aetiology of obesity is obtained, in order that successful interventions and relevant policies can be designed. In particular, the identification of key modifiable variables and risk factors is critical (Reilly, Ness, & Sherriff, 2007). This thesis focuses on furthering understanding of how one environmental feature (television food advertising) may potentially affect those behavioural risk factors related to the selection of foods for consumption, given that such factors may be amenable to change (Rennie et al., 2005). Therefore, in order to explore this process, it is important to have an appreciation for the origin of food preferences, how they develop and how food choices are made.

1.3 Food Preferences

1.3.1 Defining food preference

Birch (1999) defines preference as "the selection of one item over others". Use of the word 'preference' implies that liking is at the root of the selection, and indeed this is often the case, but liking is not the only motive that affects food preference (Birch, 1999; Guidetti & Cavazza, 2008). The food that is more palatable (e.g. butter) is not necessarily the one chosen (e.g. low fat margarine) because of price, or perceived health benefits (Rogers, 1999). Therefore, it must be taken into consideration that whilst both liking and palatability play a central role in determining food preference particularly in children, the terms are not synonymous.

1.3.2 The importance of food preferences

Children tend to eat what they like and leave the rest, therefore food preferences are particularly important determinants of the dietary composition and intake of young people (Birch, 1998; Nicklaus, Boggio, Chabanet, & Issanchou, 2004; Pérez-Rodrigo, Ribas, Serra-Majem, & Aranceta, 2003; Wardle & Cooke, 2008). Adult considerations of fat and cholesterol content, the nutrient density of a food, the cost and ease of preparation do not typically feature in children's preference decisions (Birch, 1998; Owen, Schickler, & Davies, 1997). Domel et al., (1996) investigated the effects of a number of variables including psychological, social and demographic factors on children's fruit and vegetable intake and found that the only significant predictors of consumption were the reported preferences for these items. Therefore food preferences are key drivers of food choice (Nicklaus et al., 2004; Drewnowski, 1997), discussed in detail in the next section (1.4). Consequently the food preferences children have are vital to the overall nutritional quality of the diet (Birch & Fisher, 1998) as well as their likelihood of consuming excess energy and being vulnerable to weight gain and obesity.

Whilst it is clear that certain foods are almost universally liked and frequently selected (e.g. chocolate) and others are often disliked and rarely selected (e.g. brussel sprouts), less has been elucidated regarding the determinants of such preferences (Wardle, Sanderson, Gibson, & Rapoport, 2001). If we can further our understanding of the development of food preferences in children this may assist with ascertaining ways in which healthier preferences and eating patterns can be fostered in childhood. This is a crucial period when poor eating habits may be less established and therefore more modifiable (Brug, Tak, Te Velde, Bere, & De Bourdeaudhuij, 2008; Gibson, Wardle, & Watts, 1998; Warren, Parry, Lynch, & Murphy, 2008). Studies have shown that food preferences and habits that are established in childhood tend to be maintained into adulthood (Gibson et al., 1998; Benton, 2004; Gibson & Wardle, 2003; Hamilton-Ekeke & Thomas, 2007; Mennella, Ziegler, Briefel, & Novak, 2006). Therefore it is extremely important that our understanding of how factors such as television food advertising may affect the formation of food preferences is increased, as dietary improvements made during the early years of life may provide benefits to health throughout the lifespan (HSE, 2007).

1.3.3 Development of food preferences

In any consideration of the development of food preferences, it is necessary to initially examine underlying genetic predispositions before exploring ways in which learning and experience (including television food advertising exposure) may influence these predispositions.

1.3.3.1 Innate/genetic predispositions

Measures of parent-child resemblance in food preferences are surprisingly low, suggesting that, ultimately, genetics has only a limited role, if any (Rozin, 1991; Rozin, Riklis, & Margolis, 2004).

However, according to Birch (1999), there are several genetic predispositions which act to initially constrain our food preferences; i) a predisposition to prefer sweet and salty foods and to reject sour and bitter foods, ii) the predisposition to reject novel foods (termed neophobia) and to learn preferences for more familiar items, and iii) the predisposition to learn preferences via the association of food with the context in which they were eaten and the consequences of having eaten them.

The predispositions for basic tastes (sweet, salty, sour, and bitter) have been identified through study of infants' facial expressions as well as intake. Newborn children have been shown to prefer sugar solutions to water (Liem & Mennella, 2002), indicated by an relaxation of facial muscles and the movement of mouth angles to resemble a smile (Birch, 1999), thought to be an evolutionary response whereby sweetness indicates an energy source (Benton, 2004; Mennella, Pepino, & Reed, 2005a). Children are known to prefer the sweetest solution available, whereas adults are able to select an optimal dose and acknowledge that there is such as thing as a solution being 'too sweet' (Benton, 2004; de graaf & Zandstra, 1999). It is also thought that sweet taste preference may be partially genetically inherited (Mennella et al., 2005a; Keskitalo et al., 2007).

Children's innate rejection of bitter tastes is also thought to be evolutionarily derived, given that, for our ancestors such a taste would be potentially indicative of toxicity, and therefore being able to identify such tastes and reject them would confer a survival advantage (Drewnowski, 1997). Tasters and non-tasters of the 'thioureas' phenylthiocarbamide (PTC) and 6-N-propylthiouracil (PROP) have been identified, and ability to taste these substances has an effect on food preference (Benton, 2004; Keller, Steinmann, Nurse, & Tepper, 2002; Breen, Plomin, & Wardle, 2006). Mennella et al., (2005b) also found that genetic variability at the locus associated with PROP sensitivity was related to children's preference for sucrose, and for sweet tasting foods and beverages.

Unlike sweet taste, salt does not consistently elicit distinctive facial expressions or changes in intake to reflect a preference for salty taste (Birch, 1999; Benton, 2004). Studies by Beauchamp et al., (1994) demonstrated that newborn infants were more likely to reject salt solutions more than 4 – 8 month old infants, this and other studies suggest that a developmental change in salt sensitivity and acceptability occurs at around the 3-6 month stage possibly relating to the maturation of taste receptors (Schwartz, Issanchou, & Nicklaus, 2009). Children's preference for a stronger salt taste than adults mirrors that of sweetness (Benton, 2004).

Data related to human's innate responses to sour taste are limited compared to other basic tastes, however some studies have shown that infants demonstrate negative gusto facial reactions to sour substances and tend to reject sour tasting solutions (Birch, 1999). It has also been found that the addition of a sour flavour (citric acid) to sweet solutions decreased intake in 2 – 24 month old infants, although some 15 – 20 month old infants and 5- to 9-year-old children demonstrated heightened preference for sour fruit juices (Schwartz et al., 2009).

Schwartz et al., (2009) additionally noted that evolutions in tastes observed to occur over the first year of life were not uniform across all children, and that inter-individual differences in taste acceptance actually increased over this time. The authors believe that this confirms that such evolutions were not due to generic changes in taste perception, rather they indicate the crucial role that experience plays in preference development (Schwartz et al., 2009).

Infants and children are also predisposed to be neophobic, meaning that they will reject novel foods particularly between 18 and 24 months of age (Benton, 2004). The decision to avoid consumption of a new food is often visually derived, as tasting would risk poisoning (Dovey, Staples, Gibson, & Halford, 2008). Therefore it is thought that children build up a schemata of how a food should look (and perhaps smell) in order for it to be safe and acceptable, and any foods who do not conform to this are rejected (Dovey et al., 2008). Neophobia is minimal in infancy but has a powerful influence over food choice in young children, during which time it has a negative effect on dietary variety (Falciglia, Couch, Siem Gribble, Pabst, & Frank, 2000). Neophobia then declines to a minimal level in adulthood (Benton, 2004; Cooke, Wardle, & Gibson, 2003).

Children are also predisposed to learn preferences via the association of food with the context in which they were eaten and the consequences of having eaten them. If the consequence is normal satiety, the pleasant post-ingestive signals this generates serve as a positive experience which can lead to learned preferences (Birch, 1999). Alternatively, if consumption leads to an association between that food and negative gastrointestinal consequences such as nausea, then an aversion to that food is likely to develop (Birch, 1999).

Overall, evidence suggests that children have genetic predispositions specifically for sweet and salty items, and more generally for those items that are a good energy source and generate positive post-ingestive satiety signals. This describes foods that are high in fat, sugar and/or salt (hereafter HFSS) and therefore, young children have innate preferences for energy-dense foods – preferences that can later be exploited through exposure to promotional activity.

However, the formation of food preferences can also occur through learning and although this may occur more slowly, with more subtle effects, such effects are likely to be more pervasive (Birch, 1999). It is clear that early experiences with food and food acceptance are crucial factors affecting the food preferences that children will develop. Nevertheless, it is not yet fully understood how variability in genetic predispositions interact with later experiences (such as exposure to television food advertising) in order to ultimately shape individual food preferences. Much research has been conducted in order to further our understanding of learning events and their effects.

1.3.3.2 Learned preferences

There is considerable evidence that predispositions to the basic tastes are readily altered via experience with food and eating (Birch, 1999). As most fruits and vegetables have low energy densities, and some have a slight bitter taste, preferences for these foods are not as easily learned as for sweeter foods (Brug et al., 2008). However, many children develop a liking for coffee, tea or beer during childhood or adolescence, demonstrating that there is some ability to ‘unlearn’ our innate dislike of bitter (Brug et al., 2008; Drewnowski, 1997).

Research has demonstrated that food preferences can be affected by the very earliest life experiences. Exposure to flavour compounds present in the amnion (the prenatal environment) have been shown to influence the facial, mouthing and orienting responses newborns make to those flavours, at least in the short term (Mennella, Jagnow, & Beauchamp, 2001). Further evidence for prenatal influences on flavour acceptance comes from work by Crystal & Bernstein (1998) who showed that mothers who were dehydrated due to moderate or severe vomiting during pregnancy had offspring with an enhanced salt preference at 16 weeks compared to the infants of mothers who'd experienced little or no vomiting (Birch, 1999).

Mennella et al., (2001) demonstrated that infants who had been exposed to carrot flavour in either amniotic fluid or breast milk displayed fewer negative facial expressions and were perceived by their mothers to be showing more enjoyment while feeding on a carrot-flavoured cereal compared with a plain cereal, whereas control infants whose mothers had drunk water throughout pregnancy and lactation displayed no difference. Similar findings demonstrating the transmission of flavour from the mothers' diet to breast milk, and its subsequent effects on infants suckling behaviour and intake, have been found with vanilla, garlic and alcohol (Mennella & Beauchamp, 1996).

Other early experiences can establish individual differences in preference. Beauchamp & Moran (1984) found that children who were fed a sweetened solution between birth and six months of age showed a greater preference for sweetened water at two years compared to children who'd had little or no experience of sweetened solutions. Even in young children, initially avoided foods can become accepted following repeated exposures to that food and repeated opportunities for consumption, after which intake is typically increased (Birch & Fisher, 1998). There is some debate over the number of exposures required to produce this effect, with some suggestions of between 5 - 10 (Birch & Fisher, 1998) and 0 – 89 with a median of 11 (Young & Drewett, 2000). Repeated exposure has the effect of making an unfamiliar and novel food more familiar, and allows the child the opportunity to learn that the food is safe to eat thereby reducing neophobia and potentially developing preference (Birch, 1999; Benton, 2004).

There is also evidence that flavour preferences in children can be conditioned (Birch, 1999; Field, 2006; Kerkhof, Vansteenwegen, Baeyens, & Hermans, 2009; Myers & Sclafani, 2006). Two theoretical models have been proposed to account for preferences acquired in this way; flavour-nutrient learning (FNL) and flavour-flavour learning (FFL) (Yeomans, Leitch, Gould, & Mobini, 2008). The FNL model proposes that an individual's liking for a flavour may reflect associations made between the flavour (acting as a conditioned stimulus, CS) and the post-ingestive consequences (unconditioned stimulus, US) of that food or drink (Yeomans et al., 2008). FFL, however, suggests that if a novel neutral flavour (CS) is repeatedly paired with an already liked or disliked flavour (US) then the liking for the flavour CS will be modified (Yeomans et al., 2008). Liking for flavours following pairing with the positive effects of other food components (FNL) has previously been shown in rats (Revelle & Warwick, 2009) and children (Appleton, Gentry, & Shepherd, 2006). Birch et al., (1990) found that if novel flavours were repeatedly paired with the post-ingestive consequences of high calorie carbohydrate consumption, then the children reported increased preference for the flavour. This was not the case when the flavours were paired with the low caloric carbohydrate drink, indicating that the children were sensitive to caloric density (Birch, McPhee, Steinberg, & Sullivan, 1990). Further evidence has been found for such conditioning with fat content, whereby Johnson et al., (1991) demonstrated that children displayed increased preference for high-fat paired flavours over low-density paired flavour. Despite a failure by some authors to replicate these findings (Zeinstra, Koelen, Kok, & de graaf, 2009), the real world validity of such studies is supported by a study showing that liking for a high energy novel flavoured yoghurt increased when the yoghurt was consumed in a state of high energy requirement (Appleton et al., 2006).

It has also been suggested that feeding practices and social context are heavily involved in preference learning. Modelling is purported to play an important role, whereby parents, other adults, peers, and siblings can all be involved in the formation of children's food preferences (particularly towards unpalatable items) by virtue of their food selection patterns and eating behaviours being observed (Birch & Fisher, 1998). Parental control over what children can eat often has effects in a counter-productive direction (Hill, 2002). For example, restricting a child's access to a certain food does not achieve reduced liking for that food, indeed it is more likely to enhance preference for the forbidden item (Birch & Fisher, 1998; Fisher & Birch, 1999b). That a child can access healthy food, that it is readily available in the home environment, also appears to be important in shaping preferences (Hill, 2002). In addition, it is typical for parents to use sweet items (e.g. desserts such as ice-cream) as a reward for good behaviour, thereby placing that item in a positive context; whereas vegetables are used in a negative context where consumption is required in order to access something more liked (Benton, 2004; Hill, 2002). The effects of such a strategy are that previously liked sweet items become even more liked and disliked items are disliked further (Benton, 2004; Hill, 2002). Also, children learn to associate certain foods with the social context in which they have experienced them. Therefore, as high fat foods are often experienced in positive socio-cultural contexts such as holiday meals or celebrations, it is clear that such associations are likely to result in preferences for such foods being enhanced (Birch, 1992). Preferences for high fat foods that develop in childhood are often maintained into adult life (Nicklaus, 2006), this is likely to be because of the contribution fat makes to the taste, texture and palatability of foods (Ledikwe et al., 2007).

Ultimately, research shows that high fat and sugar rich foods are among the most preferred foods for children and adolescents (Brug et al., 2008), and as Cooke & Wardle (2005) point out “it is an unfortunate truth that the foods children report liking the most are rarely those foods of the highest nutritional value”. It is probable that the promotion of such foods through advertising activity increases children’s overall exposure to energy-dense HFSS foods, and as the literature demonstrates, greater exposure may act to boost acceptance and the likelihood of a child consuming these foods. In addition, placing HFSS foods in the context of an advertisement that appeals to children may result in the child making positive associations between the product and the experience of enjoying the advert, and may therefore generate enhanced preferences for that food or brand. Therefore it is important to consider the process of learning food preferences as it may inform our understanding of the effects of food advertising on children. Also, having examined how food preferences are derived, it is useful to assess how such preferences can be related to obesity risk.

1.3.4 Food preferences linked to obesity

Food preferences have been causally linked to the current obesity epidemic (Birch, 1999). This statement is based on the evidence from epidemiological studies that links food preferences, dietary intake and adiposity (Birch, 1998; Benton, 2004). The link between children’s food preferences and their consumption is generally agreed, although the relationship is not so clear cut in adolescents (Iglesias-Gutiérrez, Garcia-Rovés, Garcia, & Patterson, 2008).

Considerable research has been conducted to investigate the assumption that overweight and obese individuals must differ from normal weight individuals in terms of their food preferences, particularly relating to their liking of sweetness and fat (Benton, 2004). Studies of the sugar and fat preferences of obese women found that as body weight increased, so did preference for fat, and the massively obese subjects typically reported the high fat foods as being their favourite when completing a food preference checklist (Drewnowski, 1997). In addition, Pasquet et al., (2007) showed that massively obese adolescents (mean BMI of sample was 39.5 kg/m^2) had higher taste responsiveness than non-obese adolescents, particularly regarding sucrose and salt. There are also data to suggest that preference for high fat foods correlates positively with measures of body fat, including tricep skinfold measurements and BMI (Ricketts, 1997) and that of monozygotic twins, an obese twin is more likely to report a current preference for fatty foods than their lean co-twin (Rissanen et al., 2002).

Wardle et al., (2001) found that children from obese/overweight families (and therefore at higher risk of becoming obese themselves) demonstrated greater preference for high fat foods and lower preference for low energy-density foods (e.g. vegetables) than children from normal weight families. These, and similar studies, have shown that obese children and adults display a tendency to prefer high fat, energy-dense foods (Drewnowski, 1997; Mela & Sacchetti, 1991; Fisher & Birch, 1995; Mela, 2001) and show reduced preference for vegetables (Wardle, Guthrie, Sanderson, Birch, & Plomin, 2001; Müller, Koertzinger, Mast, Langnäse, & Grund, 1999). However, several studies have found no such effect (Benton, 2004; Hill, Wardle, & Cooke, 2009; Perl, Mandic, Primorac, Klapec, & Perl, 1998).

Nevertheless, a negative association has been found between children's reported preference for fruit and vegetables and their BMI, such that children who had a very low preference for fruit and vegetables were 5.5 times more likely to be at risk of being overweight or actually overweight (Lakkakula, Zanovec, Silverman, Murphy, & Tuuri, 2008).

In summary, among other influences, environmental factors such as television food advertising are thought to contribute to the development of food preferences, which are implicated in the causal mechanisms through which obesity may develop (see Figure 1-7). Food preferences are the drivers of food choice in children, and therefore their impact upon overall energy intake and the macronutrient composition of the diet is manifested in food choice decisions. This will be addressed in the next section.

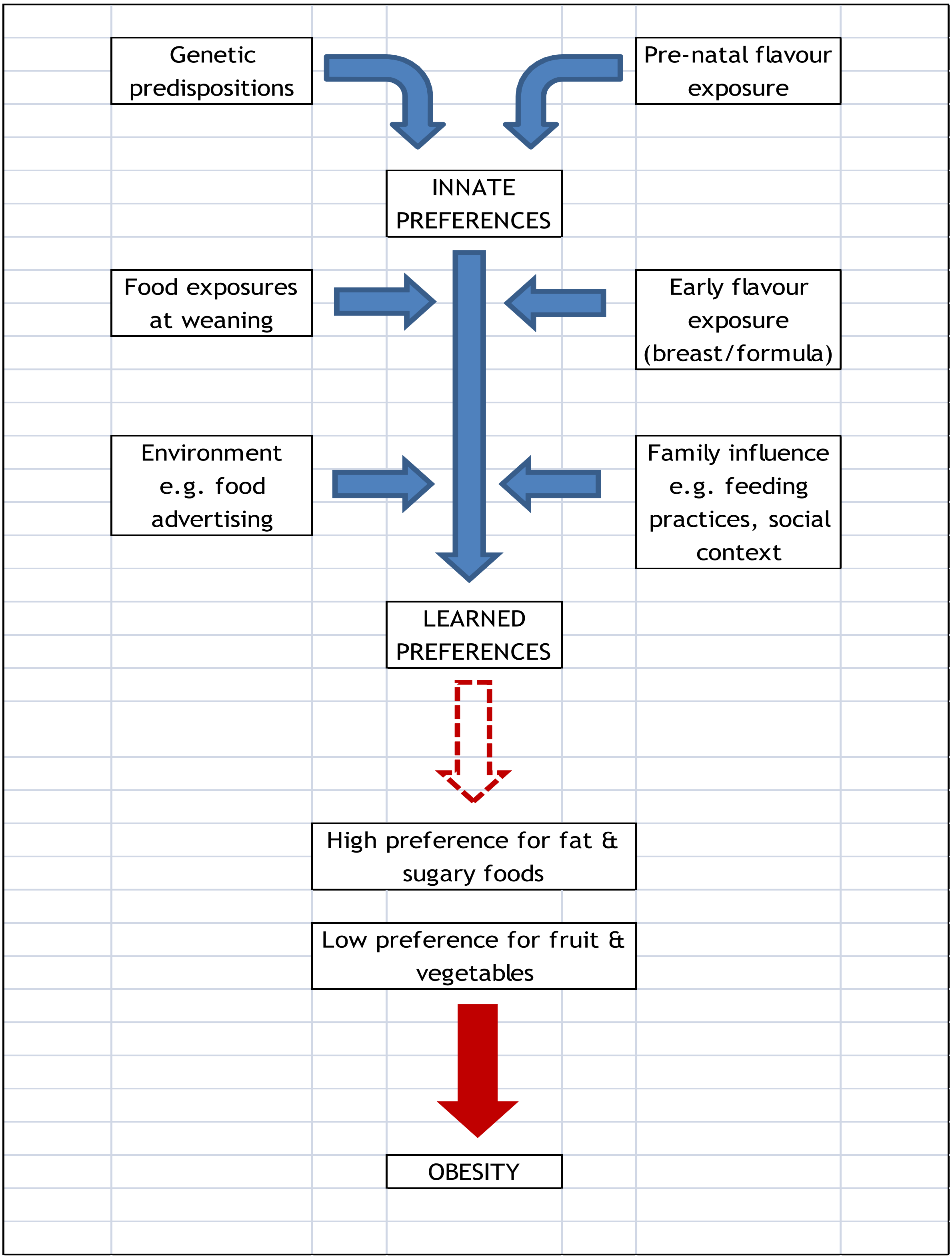


Figure 1-7 How key internal and external factors involved in the development of food preferences during childhood may lead to poor diet and obesity.

1.4 Food Choice

1.4.1 Defining food choice

Food choice can be defined simply as “the process of choosing foods” (Eartmans, Baeyens, & Van den Bergh, 2001) or in a more detailed manner as “a complex function of preferences for sensory (taste, odour, texture) characteristics, combined with the influence of non-sensory factors, including food-related expectations and attitudes, health claims, price, ethical concerns and mood” (Prescott, Young, O'Neill, Yau, & Stevens, 2002). People in westernised societies are faced with numerous food choices on a daily basis, and the abundance and variety of foods from which the choice can be made is extensive (Connors, Bisogni, Sobal, & Devine, 2001). Food choice decisions have been described as “frequent, multifaceted, situational, dynamic, and complex” (Sobal & Bisogni, 2009). Understanding how these decisions are made, and how television food advertising may affect this process or the outcome, is an important step towards developing effective health promotion strategies (Byrd-Bredbenner, Abbot, & Cussler, 2008).

1.4.2 The importance of food choice

Food choice determines an individual’s diet, the macronutrient composition of that diet, and the specific nutritional intake. An extensive volume of research has debated the link between dietary composition and obesity, particularly the macronutrient breakdown of the diet, and the results are often controversial.

The consumption of a high fat diet, specifically, has been implicated in the development and maintenance of obesity (Fisher & Birch, 1995; Blundell & Macdiarmid, 1997). In a summary of the literature, Hill & Prentice (1995) stated that diets high in fat are more likely to result in weight gain than high carbohydrate diets. They concluded that a high intake of dietary fat is positively associated with obesity, and also that the ratio between intake of carbohydrate and fat is important to the development of obesity (Hill & Prentice, 1995). In support of this, one study found that overweight boys derived more energy from fat and less from carbohydrate than their normal weight counterparts, and for overweight girls the percentage of energy from fat increased with body mass index (Garaulet et al., 2000). A significant and positive relationship between fat intake and measurements of body fat has been found in several studies and reviews (Obarzanek, Schreiber, Crawford, Goldman, & Barrier, 1994; Gazzaniga &

Burns, 1993; Bray, Paeratakul, & Popkin, 2004; Gillis, Kennedy, Gillis, & Bar-Or, 2002; Hill, Melanson, & Wyatt, 2000; Magarey, Daniels, Boulton, & Cockington, 2001; Nguyen, Larson, Johnson, & Goran, 1996).

Where studies have not found such a link (Alexy, Sichert-Hellert, Kersting, & Schultze-Pawlitschko, 2004; Atkin & Davies, 2000; Moreno, Ochoa, Wärnberg, & Marti, 2008) this can be explained at least in part by chronic underreporting of consumption particularly in obese subjects, and other difficulties in accurately measuring total energy intake (Alexy et al., 2004; Newby, 2007).

The link between fat and obesity should be placed in the context of the overall energy balance equation, and the consumption of fatty foods considered in terms of the effect on energy intake (Bray et al., 2004). As fat is the macronutrient with the highest energy density, it stands to reason that a high fat diet could easily equate to a positive energy balance (Blundell & Gillett, 2001). Particularly as foods with a high fat content are both extremely palatable and only exert a weak effect on satiation, which can lead to overconsumption, and also have a relatively weak effect on satiety (in comparison to protein and carbohydrate) (Blundell & Macdiarmid, 1997). Therefore, it is clear that a preference for high fat foods in particular, resulting in frequent choice of such foods, is an important dietary risk factor for obesity (Blundell & Finlayson, 2004).

Fewer studies have addressed the role of carbohydrates or protein in weight gain. Some studies have found sugars to have an inverse relationship with obesity (Gibson, 1997). Similarly, carbohydrate intake was found to have a negative relationship with obesity in several studies (Tucker, Seljaas, & Hager, 1997; Magarey et al., 2001; Skinner, Bounds, Carruth, Morris, & Ziegler, 2004), which is consistent with carbohydrate being significantly lower in energy density than fat (~4 kcal/g compared to ~9 kcal/g). However, carbohydrates can take many forms, and although their per-gram energy content is generally the same, different forms of carbohydrate can have very different effects on appetite i.e. variations in satiating potential. Complex carbohydrates produce stronger post-meal satiety, and are often found in foods also containing indigestible forms of carbohydrate (dietary fibre). The consumption of such wholegrain, high fibre foods is inversely associated with weight gain (Liu, Willett, Manson, Hu, & Colditz, 2003). Furthermore, low carbohydrate diets have been shown to be effective for achieving weight loss in a number of studies (Abete, Astrup, Martínez, Thorsdottir,

& Zulet, 2010; Yancy, Olsen, Guyton, Bekst, & Westman, 2004) although long-term effects are yet to be fully elucidated (Grieb, Klapcinska, & Smol, 2008).

Conversely, highly processed foods often have high levels of refined carbohydrates such as fructose (i.e. rapidly absorbable forms of carbohydrate) which have been associated with increased body weight (Bray, 2010). If excess carbohydrate is consumed it can get converted to body fat (although this is believed to be limited) (Prentice & Jebb, 1995) unless the excess is sufficiently large as to overwhelm glycogen stores (Acheson et al., 1988). There is an increasing amount of literature to suggest that the consumption of sugar-sweetened drinks is associated with both increased BMI and increased likelihood of obesity (Rennie et al., 2005; Ludwig, Peterson, & Gortmaker, 2001; Hasselbalch, Heitmann, Kyvik, & Sorensen, 2010). Malik et al., (2010) purport that sugar-sweetened beverages contribute to weight gain because the high levels of added sugar only exert weak effects on satiety, and are not effectively compensated for in terms of total energy intake, therefore consumption of such beverages may lead to increased overall energy intake. In addition, as foods that are high in both fat and sugar are particularly appealing, consumption of these types of energy dense foods (such as processed foods and snacks) can promote overeating and therefore weight gain (Sclafani, 2001).

Regarding protein, longitudinal studies have suggested that protein intake in infancy is related to BMI in childhood. A consistently high protein intake at 12 months and between 18 – 24 months was found to be independently related to a higher BMI and greater percentage body fat at age 7 (Günther, Buyken, & Kroke, 2007). Similarly, Scaglioni et al., (2000) found that protein intake at 1 year of age was positively associated with overweight at 5 years. Skinner et al., (2004) demonstrated that mean protein and fat intakes between the ages of 2 years and 8 years were significant predictors of BMI at 8 years. The reasons for the link between protein and weight gain are not yet fully elucidated. Possible explanations for the increased obesity risk are that protein intake during infancy and early childhood generates hormonal responses that are involved in metabolic programming for later obesity (Günther et al., 2007). Alternatively, the imbalance caused by a relative overconsumption of protein during weaning (compared to the protein content of milk) may contribute to obesity risk (Günther et al., 2007). A further study in adolescents found that the overweight participants derived a greater proportion of their energy from protein and fats, and less from carbohydrates than the normal weight participants (Ortega et al., 1995). However, studies in adults suggest that a high-protein diet is associated with reduced caloric intake (enhanced satiety) and significant weight loss (Weigle et al., 2005) therefore the relationship is not fully understood.

The macronutrient content of an individual's diet is a consequence of their food choice, therefore a diet rich in energy dense, processed HFSS foods will, by virtue of the composition of those foods, comprise high levels of fat and refined carbohydrates. Research evidence exists to link consumption of such foods with weight gain and an increased risk of developing obesity. Further, in addition to being low in energy density and therefore beneficial in terms of obesity risk, the nutrients provided by a diet high in fruit and vegetables are believed to contribute to the prevention of cancer and cardiovascular disease (Wardle et al., 2003; Wardle, Herrera, Cooke, & Gibson, 2003).

Therefore it is important to examine the food choices children make.

1.4.3 An expression of food choice: the diet of UK children

A 2005 study investigating the fruit and vegetable intake of children in 9 European countries (Norway, Spain, Iceland, Denmark, Portugal, Austria, Netherlands, Sweden and Belgium) found that mean fruit and vegetable intake ranged from 143g/day (Iceland) to 265g/day (Austria) with a mean across all countries of 227g/day (Yngve et al., 2005). This is considerably lower than the 400g/day recommended by the WHO (WHO, 2003a). It was also demonstrated that only 17.3% of boys and 17.9% of girls had a combined fruit and vegetable intake above this WHO threshold (Yngve et al., 2005).

There are limited data available on the food and drink choices or intake patterns of UK children. The National Diet and Nutrition Surveys assess the dietary habits of adults and children, and although phase I of the new rolling programme of surveys commenced in 2008, preliminary findings were not publicly available at the time of writing.

However, the Health Survey for England (HSE, 2007) surveyed children's diets, specifically their consumption of fruit and vegetables, using a 24-hour recall method where parents responded on behalf of children 12 years or under. Of children aged 5 – 15 years, 21% of both boys and girls reported eating the government's recommended guideline of five or more portions of fruit and vegetables per day (HSE, 2007). This has increased relative to 2001 and 2004 when reported levels were 10 to 13% (NHS, 2009a). These data are supported by the results of a study of the trends in healthy food intakes in 9 – 10 year old school children in Liverpool, UK between 2000 and 2005. Johnson & Hackett (2007) found that reported fruit, vegetable and salad intake all showed an upward trend over the five year period. Although both genders showed similar increases in intake, for all three food categories girls were found to be more likely to report consumption than boys (Johnson & Hackett, 2007).

Importantly, although the trend is heading in the right direction, it is still the case that currently 4 out of 5 children are not consuming recommended levels of fruit and vegetables. Interestingly, a majority of the children taking part in the Health Survey for England (63% of boys and 73% of girls) were correctly able to state that at least five portions of fruit and vegetables should be consumed per day, which suggests that a lack of health knowledge is not responsible for the low rates of fruit and vegetable consumption (Owen et al., 1997; NHS, 2009a; Yamamoto, Yamamoto, Yamamoto, & Yamamoto, 2005). The research also found that of the school meals studied, total fat and saturated fat intakes derived from those meals were greater than the recommended levels set out by the National Nutrition Standards in 2001 (NHS, 2009a). This corresponds with findings from the 2004 survey which indicated that of the food and drinks offered to children in schools, burgers, chips, soft drinks and cakes/muffins were the most popular choices, with the least popular being fruit, fruit juices, vegetables and salads (HSE, 2004; NHS, 2009a).

Typically the diets of children and adolescents are not in line with recommendations, comprising of too little fruit and vegetable intake (Umeh & Crabtree, 2006), too much saturated fat, and energy consumption greater than required (Birch & Fisher, 1998; Brug et al., 2008; Drewnowski, 1997). Adolescents' diets in particular are characterised by frequent snacking, skipping meals, overconsumption of junk foods and frequently low intake of milk, fruits and vegetables (Bassett, Chapman, & Beagan, 2008). Therefore energy dense, HFSS foods comprise a major part of the diet of young people and such a diet is putting children and adolescents at increased of weight gain, obesity and related co-morbidities.

As dietary composition is thought to track from childhood to adulthood, it is important to try to encourage healthier food choices in children before food choice tendencies become likely to be maintained for life (Lake, Mathers, Rugg-Gunn, & Adamson, 2006). Therefore it is useful to examine the factors, including television food advertising, that are thought to affect food choice in children.

1.4.4 Factors affecting food choice (see Figure 1-8)

Few researchers have focused on children's food choice, whereas there are an increasing number of studies looking at food choice in adolescents and adults. As a result, the factors affecting food choice in children are not yet understood, and our overall understanding is not sufficient to summarise knowledge of the relationship of these components to one another, and how this generates the process or the pathway towards the point of choice (Eartmans et al., 2001).

However, Nicklaus and colleagues (2005) did observe the food choices of more than 400 children aged 2-3 years at a day care centre. It was found that the variety of foods chosen did decrease between 2 and 2.5 years of age, but by 3 years food choices were stable and focussed on preferred foods (Nicklaus, Boggio, Chabanet, & Issanchou, 2005). It has also been suggested that children begin to express numerous self-care activities between the ages of 3-8 years, one of these activities is food choice, and these choices are stable by the time the child is 9-11 years old (Kennedy, 2000). After 11 years of age, young people begin to demonstrate more autonomy over their food choice decisions, which is often reflected in the lack of apparent nutritionally balanced food behaviour by consumers in this age group (Hamilton-Ekeke & Thomas, 2007). Other authors contend that this switch to food autonomy occurs much earlier, with one in five six to seven year olds claiming to mainly or jointly (with parents) decide what to eat (Strachan & Pavie-Latour, 2008).

Contento et al., (2006) found that the primary food choice criteria for adolescents were taste, familiarity/habit, health, dieting, and 'fillingness'. However, they did identify some personal decision making rules such as "trade-offs" among choice criteria within a meal (e.g. taste being paramount for core items and health for secondary items), as well as between meals with peers (taste) and family (health) and also in negotiation patterns with family members (food autonomy versus family requirements) (Contento, Williams, Michela, & Franklin, 2006).

Although eating and food choice appear to be simple concepts, they are actually complex behaviours which are determined by a multitude of factors and their interactions (Köster, 2009). At a societal level, numerous social, cultural and economic factors can be considered as contributors to the development, maintenance and modification of dietary patterns (Fotopoulos, Krystallis, Vassallo, & Pagiaslis, 2009). At an intra-individual level, differences can be ascribed to physiological and psychological factors, acquired food preferences and knowledge, which are distinct from the interpersonal/social factors such as family and group influences that may also be food choice determinants (Eartmans et al., 2001).

Hamilton-Ekeke & Thomas (2007) assert that children's awareness of food and diet is influenced by numerous different but interrelated factors, including culture, socio-economic factors, parental influence, peer-group pressure, the media and nutrition education received at school. Richards & Smith (2007) similarly suggest that personal determinants of food choice for children and adolescents include food preference, taste, sensory perceptions, and weight concerns; whereas environmental factors include family, peers, preparation time, school and the media. Parental influence on food choice is undoubtedly strong in the early years, when the majority of a children's accessibility to food and choice for consumption is either mediated or entirely determined by the primary caregiver (Douglas, 1998; Scaglioni, Salvioni, & Galimberti, 2008). Bower and Sandall (2002) found that amongst primary school children, taste/preference was reported as the main reason for choice but that parental influence was also considered to be important. Nevertheless, between the ages of 5 and 8 years parents are typically the most important influence (Warwick, McIlveen, & Strugnell, 1999), but after 8 years of age other influences become more important, these include peer group pressure and the media (Bower & Sandal, 2002; Owen et al., 1997; Hamilton-Ekeke & Thomas, 2007; Körtzinger, Neale, & Tilston, 1994).

Feunekes et al., describe social influences on food choice as being "influences that one or more subjects have on the eating behaviour of others, either direct or indirect, either conscious or unconscious", and the authors also suggest that such an influence is exerted even when eating alone due to the attitudes and habits developed over time and via previous social interactions (Fuenkes, de graaf, Meyboom, & van Staveren, 1998). Within an adolescent sample, it was found that intake of 76 – 94% of foods was significantly correlated with parental intake, suggesting that a high level of parental influence still remained in this age group (Fuenkes et al., 1998). However, whilst intake of fat was not correlated between adolescents and their peers, intake of specific items (particularly snack foods) was highly associated (Fuenkes et al., 1998).

Jaeger (2006) contends that the media and, more specifically, branding should be considered as important factors in food choice, but acknowledges that these aspects of food choice have not received the research attention they deserve outside of the marketing literature. The US Institute of Medicine report on food marketing to children stated that of the various environmental influences, none has been able to assume a central socializing role for young people as rapidly and comprehensively as the media (IOM, 2005). Television is known to influence the attitudes, behaviours, and values of viewers (Byrd-Bredbenner, 2002; Nash, Pine, & Messer, 2009). Therefore, television viewing and the resulting exposure to food advertising (Hamilton-Ekeke & Thomas, 2007; St-Onge, Keller, & Heymsfield, 2003) and branding (Jaeger, 2006; Just & Payne, 2009) have been proposed as potentially important factors in influencing food choice decisions. The influence of television, television advertising and branding on food preference and food choice is the primary focus of this thesis and will now be discussed.

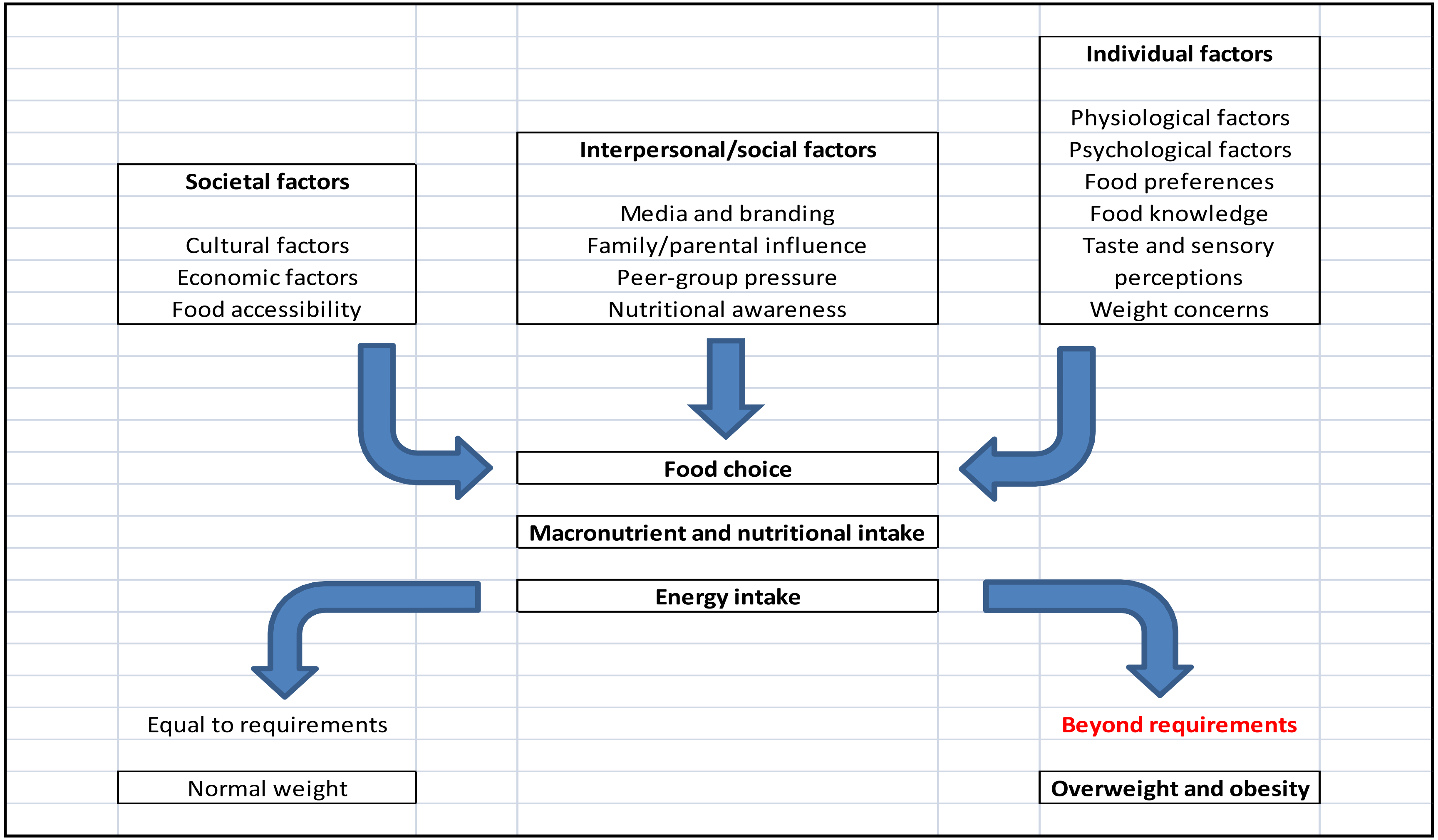


Figure 1-8 Key societal, interpersonal/social and individual factors affecting young people's food choice decisions, which determine if an individual's macronutrient and overall energy intake is conducive to energy balance or imbalance.

1.5 Television Viewing and Food Advert Exposure

1.5.1 Television viewing and obesity

For more than 20 years television has frequently been purported to have detrimental effects on health, particularly for children, including reduced academic performance, violent behaviour, and perhaps most notably poor nutrition/diet and increased risk of obesity (AAP, 2001). Given that television is a pervasive source of entertainment, particularly amongst children and adolescents, this is of concern. Children spend more time watching television than taking part in any other form of activity except sleeping (Byrd-Bredbenner, 2002; Christakis, Ebel, Rivara, & Zimmerman, 2004). In the UK, children between the ages of 4-15 years watch an average of 17.2 hours of television per week (Ofcom, 2004). In addition, it has been reported that 71% of 8-11 year olds and 75% of 12-15 year olds have a TV set in their bedroom (Ofcom, 2006), a factor that has been associated with an even greater risk of overweight (Dennison, Erb, & Jenkins, 2002).

The first study to link high television viewing with a greater risk of overweight and obesity was carried out in 1985 by Dietz & Gortmaker (see Table 1-1). In a sample of over 6,000 children, significant associations were found between time spent watching television and the prevalence of obesity, such that obesity prevalence was shown to increase by 2% for each additional hour of television viewed (Dietz & Gortmaker, 1985). Since that time, much additional evidence has been gathered to support this relationship in childhood and also extending into adulthood. Importantly, it has even been shown that television viewing in childhood can independently predict increased adult body mass index, which is suggestive of a causal link (Viner & Cole, 2005).

Andersen et al.'s study (1998) found that boys and girls who watched 4 or more hours of television per day had greater body fat and a greater BMI than those who watched less. Additionally, Dennison et al., (2002) found that not only was the amount of time spent viewing television related to the prevalence of overweight, but that the presence of a television in a child's bedroom increased their weekly viewing by 4.8 hours and further strengthened the risk of overweight. One study suggested that greater than 60% of overweight incidence amongst children and adolescents in the US could be attributed to television viewing (Gortmaker et al., 1996). The effects appear to persist into adulthood, as it has been show that television viewing hours were positively associated with both energy intake and body mass index in women aged 20 – 45 years (Jeffery & French, 1998). This relationship has also been demonstrated in adult males (Tucker & Friedman, 1989) although not all studies have found an effect (see Table 1-1).

Crucially, the balance of literature suggests that the association between television viewing and obesity remains significant even when other potential confounding variables such as socioeconomic status, familial tendency to overweight (Hancox & Poulton, 2006) and, critically, levels of physical activity (Eisenmann, Bartee, Smith, Welk, & Fu, 2008; Epstein et al., 2008) are taken into account. Therefore, it is not simply the case that television viewing is linked to obesity because it is a sedentary activity, displacing physical activity and thus lowering overall energy expenditure, rather the association appears to be due to the effects of television viewing on energy intake.

Paper	Participants, design and location of study	Relevant Measures	Key findings	Potential confounders accounted for
Adachi-Mejia et al., (2007) Int J Obes	2343 children (9-12y) Cross-sectional (US)	Parent report of TV in bedroom, BMI z-score	TV in bedroom ↑ BMI z-score and risk of overweight	Socio-demographics, physical activity, frequency of TV viewing, movie watching, internet use
Andersen et al., (1998) JAMA	4063 children and adolescents (8-16y) Cross-sectional, national survey (US)	Child report of hours of TV viewed per day, BMI, body fatness	>4 hrs TV viewed per day ↑ body fat and BMI compared to <2 hrs per day	Physical activity
Bernard et al., (1995) JADA	144 children (9-11y, >12y) Cross-sectional (Canada)	24 hour food recall, TV viewing questionnaire, BMI	Association between diet and overweight (9-11y only) Trend for association between TV viewing and overweight	N/A
Buijzen et al., (2008) J Children & Media	234 children (4-12y) Cross-sectional, household diary-survey (Netherlands)	Parent report of 4 day food diary, weight & height, TV viewing	Television viewing biggest predictor of children's weight status in regression model (younger children only when results stratified by age)	Parental weight status, family income, outdoor playing time
Carvalhal et al., (2006) Eur J Public Health	3365 children (7-9y) Cross-sectional (Portugal)	Parent report of TV viewing, BMI	Sig. association between hours of TV viewing and overweight in boys only TV viewing ↑ prevalence of obesity, highest prevalence for children watching 4-6 hours daily	Physical activity
Crespo et al., (2001) Arch Pediatr Adolesc Med	4069 children and adolescents (8-16y) Cross-sectional, national survey (US)	Child report of TV viewing, height & weight	Prevalence of obesity highest among children watching >4 hrs per day Television viewing hours associated with obesity in girls	Age, race/ethnicity, family income, physical activity, energy intake
Davison et al., (2006) J Pediatr	169 children (7, 9 and 11y) Cross-sectional and longitudinal (US)	Height & weight, % body fat, parent report of TV viewing per day	No sig. cross-sectional associations found TV viewing >2 hrs per day at 7, 9, and 11 y associated with ↑ risk of overweight, higher BMI, and % body fat.	Lean mass
Dennison et al., (2002) Pediatrics	2761 pre-school children (1-5y) Cross-sectional (US)	Parent report of TV viewing, TV in bedroom, BMI	TV viewing significantly related to prevalence of overweight Children with a TV in their bedroom more likely to be overweight	Age, gender, parental educational attainment, race/ethnicity As above, plus TV/video viewing hours per week, maternal BMI

Dietz & Gortmaker (1985) Pediatrics	6965 children in two cycles (6-11y) Cross-sectional, and prospective national survey (US)	Triceps skinfold thickness, parental and self-reports TV viewing	↑ TV viewing ↑ prevalence of obesity (>85th percentile) and superobesity (>95th percentile) Prevalence of obesity ↑ 1.2-2.9% for each additional hour of TV viewed	Past history of obesity, socio-economic characteristics of family
Dubois et al., (2008) Public Health Nutr	1549 children (4-5y) Cross-sectional analysis performed on data from longitudinal study (Canada)	24h dietary recall, TV viewing, height & weight	No significant differences in mean BMI between children viewing >3 or <3 hrs TV daily Eating snacks while viewing ↑ BMI and associated with poorer dietary quality	N/A
DuRant et al., (1994) Pediatrics	191 children (3-4y) Observational (US)	TV viewing, body composition measurements	TV viewing not associated with body composition	Physical activity
Eisenmann et al., (2008) Int J Obes	13600 adolescents (14-18y) Cross-sectional (US)	Self-report height and weight, TV viewing, physical activity	Moderate and high TV viewing ↑ odds of overweight regardless of activity level in girls ≤1hr TV viewing per day did not ↑ odds of overweight regardless of activity level	Age, ethnicity
Epstein et al., (2008) Arch Pediatr Adolesc Med	70 children (4-7y) Randomised controlled trial (US)	Intervention to reduce TV viewing and computer use versus control group	Intervention group ↓ TV viewing & computer use, BMI z-score and energy intake compared to control ↓ TV viewing mediated changes in BMI z-score, associated with change in energy intake but not physical activity	Socio-economic status
Francis et al., (2003) Obesity Res	173 children (5, 7, 9y) Longitudinal (US)	Parent report of TV viewing, 24h dietary recall, child weight status, parental weight status	In families where neither parent was overweight, TV viewing only significant predictor of BMI increase over time	Family income

Gortmaker et al., (1996) Arch Pediatr Adolesc Med	746 children and adolescents (10-15y) Cross-sectional and longitudinal (US)	TV viewing, weight status	Strong dose-response relationship between prevalence of overweight in 1990 and hrs of TV viewed Odds of overweight 4.6x greater if >5 TV viewed per day TV viewing ↑ incidence of overweight developing over 4 year period	Previous overweight, maternal overweight at baseline, socioeconomic status, household structure, ethnicity, maternal and child aptitude test scores
Gortmaker et al., (1999) Arch Pediatr Adolesc Med	1295 children (11, 13y) Randomised controlled trial (US)	School based intervention for 2 years including a focus on decreasing TV viewing	↓ prevalence of obesity in girls in intervention group versus controls Intervention ↓ TV hrs, ↑ fruit & veg consumption ↓ TV hrs predicted obesity change	Baseline obesity
Hancox & Poulton, (2006) Int J Obes	1037 children (3, 15y) Longitudinal (New Zealand)	Parent report of weekly TV viewing between 5-11y, self-report 13-15y, weight and height at each age	BMI and prevalence of overweight sig. associated with TV viewing hrs	Parental BMI, socioeconomic status
Hernández et al., (1999) Int J Obes	712 children and adolescents (9-16y) Cross-sectional (Mexico)	Self-report TV viewing, height, weight, triceps skinfolds	Odds ratio of obesity 12% higher for each hour of TV viewed per day	Age, gender, town of residence, perception of mother's weight status
Jackson et al., (2009) Am J Clin Nutr	89 children (2-6y) Cross-sectional (UK)	Body composition, parent completion of lifestyle questionnaire	Sig. positive association between fat mass and TV viewing Each hr TV associated with extra 1kg body fat	Physical activity, total energy expenditure, age, gender
Jago et al., (2005) Int J Obes	149 children (3-4, 6-7y) Prospective cohort (US)	Height and weight, observed TV viewing & diet	TV viewing positively associated with BMI in year 3 TV viewing a significant predictor of BMI	Baseline BMI, physical activity, diet
Kaur et al., (2003) J Pediatr	2223 adolescents (12-17y) Prospective cohort (US)	Self-report height, weight & TV viewing	↑ TV viewing ↑ BMI z-score Adolescents viewing TV >2hr per day twice as likely to be overweight at follow up than those viewing <2 hrs	Ethnicity

Lasserre et al., (2007) Obesity	5207 children (12-13y) Cross-sectional (Switzerland)	Height and weight, self-report TV viewing and diet	Overweight strongly associated with high TV viewing but not computer gaming time	N/A
Leatherdale & Wong (2008) Int J Pediatr Obes	25416 adolescents (14-17y) Cross-sectional (Canada)	Self-report height, weight, screen time per day (inc. TV viewing)	In males, underweight associated with ↑ screen time In females, overweight associated with ↑ screen time	N/A
Lowry et al., (2002) J School Health	15349 adolescents (14-17) Cross-sectional (US)	Self-report TV viewing, height and weight	>2 hrs TV per day associated with overweight	Physical activity, fruit and veg consumption
Lumeng et al., (2006) Arch Pediatr Adolesc Med	1016 children (3, 4.5y) Cross-sectional and longitudinal (US)	BMI, parent report of TV viewing	>2 hrs TV per day associated with ↑ risk of overweight at 36 and 54 months Exposure at 36 months not a predictor of overweight at 54 when co-variates included	Gender, ethnicity, maternal marital status, education, age, depressive symptoms, exposure to educational television
McMurray et al., (2000) Obes Res	2389 adolescents (10-16y) Cross-sectional (US)	BMI, skinfold thickness	↑ TV hrs on school and non-school days ↑ BMI in females; and viewing on non-school days ↑ BMI in males, effect lost when ethnicity and socio-economic status included	Physical activity
Proctor et al., (2003) Int J Obes	106 children (4y, 11y) Longitudinal (US)	Parent report of TV viewing, BMI, triceps skinfolds, sum of 5 skinfolds	TV viewing independent predictor of change in BMI, triceps and sum of 5 skinfolds throughout childhood	Baseline body fat, physical activity, % calories from fat, total caloric intake, parents' BMI and education.
Robinson (1999) JAMA	192 children (809y) Randomised controlled trial (US)	6 month school-based intervention to reduce TV viewing etc. vs control group	Compared to control, intervention group ↓ BMI, skinfold thickness, waist circumference, waist-hip ratio, cardio-respiratory fitness	N/A
Saelens et al., (2002) Dev Behav Pediatr	169 children (6-12y) Prospective cohort (US)	Parent and child report of TV viewing, BMI, TV in bedroom, TV sets in house	TV hrs related to BMI at time 1 (6y) At time 2 (12y) <2 hrs TV per day associated with lower BMI z-score	Gender, ethnicity, maternal education

Schneider et al., (2007) Obesity	194 adolescents (14-17y) Cross-sectional (US)	% body fat, BMI, TV viewing	Interactive media use associated with % body fat and BMI	Cardiovascular fitness, physical activity
Tremblay & Willms (2003) Int J Obes	7216 children (7-11y) Cross-sectional (Canada)	Parent report of TV viewing, BMI	TV watching ↑ risk of overweight (by 17-44%) and obesity (by 10-16%)	Age, gender
Utter et al., (2003) JADA	4746 adolescents (14-16y) Cross-sectional (US)	TV viewing, food frequency questionnaire, BMI	TV viewing positively associated with BMI	Age, race/ethnicity, socio-economic status
Vandewater & Huang (2006) Arch Pediatr Adolesc Med	1483 children and adolescents (6-19y) Cross-sectional (US)	TV viewing, weight status	↑ Odds of overweight with ↑ TV viewing for children with at least 1 obese parent	Parental obesity, family income-needs ratio, education of household head, race
te Velde et al., (2007) BMC Public Health	12538 children (11y) Cross-sectional (Netherlands)	Parent report of TV viewing, height and weight	High TV viewing ↑ risk of overweight	Physical activity, family educational level
Vicente-Rodríguez et al., (2008) Nutrition	1960 adolescents (13-18.5y) Cross-sectional (Spain)	Self-report TV viewing, BMI, skinfolds thickness, % body fat	Overweight risk ↑ 15.8% for each hr of TV viewing	Physical activity
Viner & Cole (2005) J Pediatr	14875 individuals (5, 10, 30y) Prospective cohort (UK)	TV viewing, BMI z-score	TV viewing at weekends predicted ↑ BMI at 30y Each additional hr TV viewed on weekends at 5y ↑ risk of adult obesity by 7%	Gender, socioeconomic status, parental BMI, birth weight
Wells et al., (2008) Int J Obes	4452 adolescents (10-12y) Cross-sectional (Brazil)	TV viewing, BMI, body fatness	TV viewing associated with ↑ BMI and skinfolds	Sleep duration, blood pressure

Table 1-1 Key features of studies investigating a link between television viewing and obesity in children and adolescents, to enable comparisons of the participant sample, location, measures used and main findings in the literature relevant to this thesis.

1.5.2 Television viewing and diet

Numerous studies have demonstrated that energy intake increases during television viewing (see Table 1-2). Blass et al., (2006) found that significantly more energy-dense food was eaten when watching television than when listening to classical music. Specifically, Crespo et al., (2001) found that girls who watched 5 or more hours of television a day consumed an extra 732 kJ (175 kcal) per day on average compared to those watching 1 hour or less of television daily. Wiecha et al., (2006) found an even bigger increase in intake to be associated with each additional hour of television viewing per day. It is clear that the cumulative effect of even a small daily increase in kcal intake could contribute to a positive energy balance, and therefore this could at least partially explain the demonstrated relationship between television viewing and obesity.

Typically, increases in caloric intake associated with television viewing are chiefly due to increases in the consumption of foods that are both energy dense and low in nutrients (Davison, Marshall, & Birch, 2006)(i.e. HFSS), so television viewing is associated with poor overall diet quality. The amount of time spent viewing television has been found to be predictive of unhealthy conceptions about food and poor eating habits generally (Signorielli & Lears, 1992; Woodward et al., 1997). Several studies have found that television viewing was inversely associated with intake of fruit and vegetables (Boynton-Jarrett et al., 2003; Coon, Goldberg, Rogers, & Tucker, 2001) or with individuals deriving more of their daily energy intake from HFSS foods (Coon et al., 2001; Miller, Taveras, Rifas-Shiman, & Gillman, 2008).

Furthermore, eating whilst watching television (whether eating snacks in front of the television or having television viewing as part of the meal time routine) has been shown to affect food choice and caloric intake. Marquis et al., (2005) showed that eating in front of the television was positively associated with children's general consumption of a number of items including French fries, salty snacks, ice cream, confectionery, pastries, sweetened cereals, fruit beverages and soft drinks. It has been suggested that children in particular consume a substantial proportion of their daily energy whilst watching television, 20% and 25% for weekdays and weekend days respectively (Matheson, Killen, Wang, Varady, & Robinson, 2004), therefore television viewing could have a significant impact on both the types of food items selected and the overall level of consumption.

Paper	Participants, design and location of study	Relevant Measures	Key findings	Potential confounders accounted for
Blass et al., (2006) Phys & Behav	20 undergraduate students Cross-sectional, experimental (US)	Food intake watching TV vs listening to a symphony	Kcal intake ↑ 36% for pizza & 71% for macaroni & cheese watching TV vs control, also faster eating rate	Water intake
Boynton-Jarrett et al., (2003) Pediatrics	548 children (11, 13y) Prospective cohort (US)	TV viewing, intake of fruit and veg at baseline and after 19mths	Each hr of TV viewing ↓ fruit & veg intake (-0.16 servings/day at baseline and -0.14 servings/day at follow up)	Physical activity, frequency of 'sit down' dinners, % fat intake
Coon et al., (2001) Pediatrics	91 children (9-11y) Cross-sectional (US)	Parent report of TV viewing at mealtimes, 24hr dietary recall	Children with high TV use during meals ↑ kcal intake from meats, pizza, salty snacks, soda and ↓ from fruit, veg & juice	Socio-economic status, parents scores of nutritional knowledge, attitudes and norms
Epstein et al., (2005) Am J Clin Nutr	16 adolescents (12-16y) Cross-sectional, experimental (US)	3 phases; baseline, increased sedentary behaviours (inc TV viewing) & decreased sedentary behaviours 24h dietary recall	Energy intake ↓ when sedentary behaviours ↓ including ↓ fat intake by 295kcal/day. No changes observed in intake when sedentary behaviours ↑	Gender
Kremers et al., (2007) Appetite	383 adolescents (12-16y) Cross-sectional (Netherlands)	Self-report TV viewing, sugar-sweetened beverage consumption	↑ TV viewing ↑ sugar-sweetened beverage consumption	N/A
Marquis et al., (2005) Can J Diet Prac Res	534 children (10y) Cross-sectional (Canada)	Self-report eating while viewing TV, food frequency questionnaire	Eating in front of the TV positively correlated with general intake of energy-dense foods inc confectionery and soft drinks & negatively correlated with raw veg consumption	N/A
Martin et al., (2009) Am J Clin Nutr	48 adults (19-54y) Cross-sectional, Experimental (US)	Food intake in 4 conditions; control, reading, watching TV with food and non-food adverts, watching TV with no adverts	Energy and macronutrient intake did not differ between conditions Memory for adverts associated with body weight and energy intake only when viewing TV	Gender

Matheson et al., (2004) Am J Clin Nutr	91 children (7-9y) Cross-sectional (US)	Child report 24h dietary recall, eating while viewing TV	17-26% total energy intake consumed while watching TV Fat content of foods consumed with or without TV did not differ but less soft drink, fast food and fruit & veg eaten with TV on	BMI
Miller et al., (2008) Int J Pediatr Obes	1203 children (3y) Cross-sectional (US)	Parent report food frequency questionnaire, TV viewing	Each hr TV viewing associated with ↑ intake of sugar-sweetened beverage, fast food, red & processed meat, total energy intake, % energy from trans fat; ↓ intake of fruit & veg, calcium & fibre	Mother's socioeconomic status, parental BMI, child's age, gender, race/ethnicity, BMI z-score, sleep duration, breast-feeding duration
Ortega et al., (1996) Nutr Res	60 adolescents (15-17y) Cross-sectional (Spain)	5 day food record, TV viewing	TV viewing >2hrs per day associated with ↓ fruit, veg, fibre & vitamin C	N/A
Snoek et al., (2006) J Adolesc Health	10087 adolescents (11-16y) Cross-sectional, national study (Netherlands)	TV viewing, snacking, eating behaviour questionnaire	Snacking positively associated with TV viewing, stronger in adolescents scoring high on external and (boys only) emotional eating	N/A
Stroebele & Castro (2004) Appetite	76 undergraduate students (22y) Cross-sectional (US)	7 day diet diaries, weight, height, eating while viewing TV	↑ meal frequency, ↓ between-meal intervals on eating with TV days, ↓ meal size but overall ↑ energy intake	Week day, time of day
Taveras et al., (2006) Obesity	240 children (2-6y) Cross-sectional (US)	Parent report TV viewing, fast food intake	Each hr TV viewing ↑ likelihood of fast food intake	Parental age, race/ethnicity, household income, time constraints, healthy food availability, child's age, gender
Temple et al., (2007) Am J Clin Nutr	30 children (9-12y) Cross-sectional, experimental	2 experiments; habituation-related stimuli followed by food intake, then TV exposure followed by food intake	TV viewing associated with ↑ energy intake TV viewing can dishabituate eating/disrupt the development of habituation	Subjective hunger ratings
Thomson et al., (2006) Obes Rev	613 university students Internet survey (Canada)	TV viewing, snack consumption, snacking while viewing TV, BMI	Hrs TV associated with ↑ energy-dense snack intake, ↑ BMI For each hr TV viewed, participants 2.2x more likely to report snacking	N/A

			while viewing	
Van den Bulck & Van Mierlo (2004) Appetite	2546 adolescents (13-17y) Cross-sectional (Belgium)	TV viewing, food frequency questionnaire	Daily energy intake while viewing TV equals 19% of average allowance 1hr TV equals consumption of 653kcal	Year of study, gender
Vereecken & Maes (2006) Soz Praventiv Med	1031 adolescents (12-14y) Cross-sectional (Belgium)	24hr dietary recall, food questionnaire	↑ TV viewing ↑ consumption of white bread, sweetened soft drinks, savoury snacks, confectionery ↑ TV viewing ↓ consumption of fruit, water, milk, brown bread	Gender, socio-economic status, day of week
Wiecha et al., (2006) Arch Pediatr Adolesc Med	548 adolescents (11-13y) Prospective observational (US)	Baseline and 19mth follow up of diet, TV viewing	Each hr TV viewed ↑ intake by 167kcal	N/A

Table 1-2 Key features of studies investigating a link between television viewing and diet in children and adolescents, to enable comparisons of the participant sample, location, measures used and main findings in the literature relevant to this thesis.

Food advertising has often been proposed as a candidate for the association between television viewing and adiposity. In an interesting study, Lobstein & Dibb (2005) found that there was a significant and positive correlation between the prevalence of overweight amongst school children and the number of adverts for sweet or fatty foods (HFSS) broadcast per 20 hours of children's television. Critically, it was also found that prevalence of overweight negatively correlated with the number of healthy foods advertised over the same period of time (Lobstein & Dibb, 2005). A recent study by Zimmerman & Bell (2010) showed that there was a significant association between commercial viewing in 1997 and BMI z-score in 2002 for children aged 0-6 years. This association was robust even when exercise and eating while viewing were taken into account, which supports the assertion that the link between TV viewing and obesity is not due to the former being a sedentary activity, rather it indicates that it is advertising that is associated with obesity (Zimmerman & Bell, 2010). In addition to this, there is now a considerable body of evidence from experimental studies to suggest that food advertising on television does impact upon food preferences, choices and consumption.

1.5.3 Food advertising on television

A food advertisement (advert) can be defined as "a commercial advertisement featuring a food, beverage, or nutritional supplement that is meant to be ingested directly or have its flavours extracted by chewing (e.g. gum)" (Abbatangelo-Gray, Byrd-Bredbenner, & Austin, 2008).

1.5.3.1 The extent of food advertising on television

Despite technological innovations such as the internet, television remains one of the most powerful sources of communication we have (Abbatangelo-Gray et al., 2008). Perhaps unsurprisingly therefore, across the globe, television is still the primary medium used for advertising food and drink products (Henderson & Kelly, 2005; Story & French, 2004; Eagle, Bulmer, De Bruin, & Kitchen, 2004), comprising approximately 75% of all advertising spend in the UK in recent years (Hastings et al., 2003). It has been estimated that for every US$1 the WHO spends on promoting healthy nutrition, US$500 is spent by the food industry promoting HFSS processed foods (Escalante de Cruz, Phillips, & Saunders, 2004). In the UK in 2003, Nestle alone spent £43 million promoting breakfast cereals and chocolate, Kellogg spent £30 million promoting their cereals and Coca-Cola funded their soft drink advertising with £26 million (Escalante de Cruz et al., 2004). In the US, $1 billion is spent annually on youth-oriented media advertising, particularly on television (Story & French, 2004).

Although both the nature and extent of such advertising varies between countries, studies have shown that typically the majority of adverts broadcast are for unhealthy, HFSS products (see Table 1-3). Batada et al., (2008) found that in a sample of US television, approximately half of the adverts were for food, the vast majority of which were for foods or beverages containing high levels of fat, sodium or added sugars or were low in nutrients. In Greece, it was found that 'healthy' food categories, as recommended for frequent consumption as part of the Mediterranean diet pyramid, were the least advertised items and the less healthy options were the most advertised (Batrinou & Kanellou, 2009). Chapman et al., (2006) studied a sample of Australian television in which 81% of the food adverts identified were for unhealthy products including fast food, takeaways, chocolate and confectionery items. A smaller study in New Zealand classified nearly 70% of the food adverts broadcast as being for HFSS foods (Jenkin, Wilson, & Hermanson, 2009).

A number of researchers have attempted to specifically examine the television food advertising that children will be exposed to by focusing their analyses on certain time periods (e.g. after school viewing or Saturday morning programming), particular channels designed to appeal to children (dedicated children's channels) or around particular programmes popular with children (Ramirez-Ley et al., 2009; Story & Faulkner, 1990; Powell, 2007; Neville, Thomas, & Bauman, 2005; Powell, Szczypka, & Chaloupka, 2007; Stitt & Kunkel, 2008; Wilson, Signal, Nicholls, & Thomson, 2006). Batada & Wootan (2007) examined the nutritional quality of the foods advertised on the channel Nickelodeon in the US, stated as "the most-watched children's television station, with 47 of the top 50 children's programs". The authors identified that all but 20 food adverts analysed were for foods deemed to be of low nutritional quality (Batada & Wootan, 2007). A further US study found that food adverts were shown more frequently around Saturday programming and on children's networks than on networks targeting a more general audience (Bell, Cassady, Culp, & Alcalay, 2009). It was also noted that the majority of food adverts were for items with high levels of sugar or fat, and that the appearance of adverts for fruit or vegetables was rare (Bell et al., 2009).

Similarly, Harrison & Marske (2005) examined food adverts aimed at general and child audiences and identified that the diet represented in the adverts exceeded dietary recommendations for fat and salt. A Bulgarian study showed that although 'only' a third of adverts broadcast during children's programmes were for food, virtually all of those adverts were for HFSS foods (Galcheva, 2008). Interestingly, this study also found a significant difference between the food groups advertised around different children's programmes, such that adverts for confectionery were mainly shown during movies directed at children, whereas snack food and soft drink adverts were more likely to be associated with animation programmes or other children's shows (e.g. music, sports, pets) (Galcheva, 2008).

Some authors have also taken a longitudinal approach in order to study the trends in food advertising over time. Byrd-Bredbenner & Grasso (2000) observed that the number of adverts broadcast (all categories, not just food) increased significantly between 1971 and 1998 but that the hourly rate for food adverts did not change significantly over that time period. Kelly and colleagues (2007) examined samples of Australian television and noted that there was a reduction in overall HFSS food advertising over the period 2002 to 2006, but in 2006 the rate of HFSS food adverts during children's viewing times was greater than that of adult viewing times, particularly in and around the most popular programmes for children.

There have been few studies providing a comparison of television food advertising between countries. However, an international comparative study was carried out by Consumers International (CI) in 1996, whereby television adverts on children's television were monitored in 13 countries (Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Netherlands, Norway, Sweden, UK and the US). This study found that food advertising comprised the largest category of advertised products to children in the vast majority of countries, and that confectionery, breakfast cereals (typically containing added sugar) and fast food restaurants overall accounted for over half of all food advertisements (Consumers International, 1996). This study also identified a lack of advertising of healthier food products, with adverts for fruits and vegetables virtually non-existent. Food advertising ranged from 84% of all advertisements (Netherlands) to 12% (Sweden). In addition, it was revealed that Australia, the UK and the US had the most food adverts shown during the study period (Consumers International, 1996). Recently, a more comprehensive international comparative study was completed which examined 192 hours of television from 11 countries (Australia, Brazil, Canada, China, Germany, Greece, Italy, Spain, Sweden, US and our own laboratory in the UK), for a total sample of 2,496 hours broadcast between October 2007 and March 2008 (Kelly et al., 2010). The three commercial channels most popular with children in each country were selected for inclusion, and the results indicated that internationally food adverts accounted for between 11% and 29% of all adverts broadcast and overall food was the second most frequently advertised product, after channel promotions (Kelly et al., 2010). Non-core foods (defined as those items relatively high in undesirable nutrients and/or energy) comprised 53% to 87% of all food advertisements shown (Kelly et al., 2010). It was also found that the rate of non-core food advertising was typically higher during children's peak viewing times (the broadcast periods where the highest numbers of children were watching) than during non-peak viewing times, with the UK data following this pattern (Kelly et al., 2010).

Given the vast amounts of published data addressing this topic, literature relating specifically to the UK is lacking. This will be addressed in Chapter 6. However, in 1998, Lewis and Hill reported that of the adverts that were broadcast half were for food products. 60% of these food adverts were for breakfast cereals and confectionery/snacks (Lewis & Hill, 1998), however as this study is now 12 years old the relevance of these data is limited. More recently, Morgan and colleagues (2009) examined UK children's television from an oral health perspective, and concluded that over a third of food advertising time was devoted to high-sugar products such as sweetened dairy items (e.g. yoghurts), confectionery, sugared cereals (breakfast cereals and snack bars), baked goods (cakes and biscuits) and drinks (sweetened hot chocolate and carbonated beverages). Sixsmith & Furnham (2010) conducted the most recent analysis of British television from a single channel (ITV). The authors concluded that of the food adverts that were aimed at children 77.1% were for 'unhealthy' foods compared to 22.9% featuring healthy foods, whereas in adverts not specifically aimed at children the difference was reduced to 55.8% unhealthy relative to 44.2% healthy foods.

In addition, as part of their international study, Consumers International (1996) carried out a nutritional analysis of the foods advertised to children on UK television, and found that over 60% were products high in fat, 50% were high in sugar and over 60% were high in salt. Overall, 95% of the UK food adverts were for

HFSS foods, and, as the previously mentioned studies have suggested, this was a fairly consistent pattern found across the countries studied.

The UK sample from the Kelly et al. study (2010) comprised 9,799 adverts overall, of which 1461 were for food. The most advertised product categories were food and channel promotions (each accounting for 15% of all adverts) followed by toys (9.5% of all adverts) (Kelly et al., 2010). Of the food adverts broadcast the most frequent items appearing were low fat dairy products, fast food items, high fat spreads and sauces, full cream dairy products, breakfast cereals with added sugar and/or low fibre and confectionery (Kelly et al., 2010).

The available literature on this topic has several limitations that impact negatively upon the generalisations that can be drawn from these data. Even within the limited sample of studies that focus on the UK, most were conducted prior to the implementation of regulations to limit HFSS food advertising to children (see section 1.5.4) so it is questionable how applicable these findings are to the current food advertising landscape. In addition, researchers have typically examined only a single terrestrial channel which fails to take into account that children's viewing patterns are fragmented across a multitude of channels and viewing platforms. Furthermore, as mentioned previously, the study samples are often restricted to just children's dedicated airtime e.g. immediately post-school or Saturday morning broadcasting. As a majority of children's viewing is outside this dedicated airtime, these types of studies do not accurately reflect viewing patterns or children's actual exposure to promotional messages. Also, samples of television are often small (less than 100 hours) and recorded on a single date or across a narrow range of dates, which do not take into account the potential for fluctuations in food advertising trends across the year and limit the generalisations that can be made. With such small sample sizes, these studies typically rely on descriptive data, with little attention paid to inferential statistics or the potential for within-sample comparisons (e.g. between channels or viewing times). Finally, there is a lack of published data relating to the nature or content of television food advertising which may determine the strength of the persuasive power possessed by the advertising messages (see the next section, 1.5.3.2). All of these limitations are described in more detail in section 6.1.1, and are addressed in the study presented in Chapter Six.

Overall, it is clear that the foods advertised reflect a dietary pattern that would be associated with increased risk of obesity and is not in line with recommended nutritional guidelines (WHO, 2003b).

Paper	Design and location of study	Relevant Measures	Key findings
Abbatangelo-Gray et al., (2008) J Nutr Educ Behav	95 hrs Spanish-language TV & 72 hrs English-language TV (US)	812 FA; health and nutrient content claims of FA	Spanish-language TV had significantly ↑ FA containing nutrition info and health claims compared to English-language TV
Batada & Wootan (2007) Am J Prev Med	Foods advertised in various media by Nickelodeon in autumn 2005 (US)	652 TV adverts; % adverts for food, food types	168 TV adverts were for food (26%), of which 88% were foods of poor nutritional quality e.g. sugary cereals, fast food restaurants
Batada et al., (2008) JADA	27.5 hrs children's Saturday morning TV in May 2005 (US)	572 TV adverts; % adverts for food, food types	281 TV adverts were for food (49%), most frequently breakfast cereal & cereal bars 91% FA were for HFSS items, 74% ft cartoon characters, 26% ft giveaways
Batrinou & Kanellou (2009) Nutr Food Sci	Comparison of food advertising expenditure inc TV and the recommended diet in 2005 (Greece)	Analysis of expenditure versus recommended intake by food categories	Healthy foods recommended by Mediterranean diet pyramid (cereals, fruit, veg) were least advertised, less healthy products (dairy, high sugar) were most advertised
Bell et al., (2009) J Nutr Ed Behav	Comparison of FA on Saturday mornings and weekday afternoons on English-language networks with Spanish networks in 2005/6 (US)	1130 adverts from 12 networks; % adverts for food, appeals, claims	226 TV adverts were for food (20%), ↑ frequency on Saturday morning & children's networks 70% FA ↑ sugar/fat, only 1.7% FA for fruit & veg 25% FA for fast food
Byrd-Bredbenner (2002) Family Cons Sci Res J	Ads broadcast in 1993 (11.5 hr) & 1999 (9.5 hr) during top-rated Saturday morning children's programming (US)	FA content compared to dietary recommendations & advertising guidelines	378 FA in 1993 (23% by time), 385 in 1999 (26% by time) Mean FA per hour ↑ 12% between time points 69% and 78% adverts were FA respectively ↑ fat & ↑ sugar foods most frequent FA
Byrd-Bredbenner & Grasso (2000) Nutr Food Sci	Content of food adverts in 1971, 1977, 1988, 1992 and 1998 (US)	373 FA; hourly rate of FA, food types	Hourly rate of adverts ↑ by 1.4/hr/year but rate of FA unchanged, FA for fast food and cakes/candy/cookies most frequent, FA for dairy/fruit&veg/protein foods practically nil
Chapman et al., (2006) Health Promo Int	645 hr of 3 free-to-air commercial channels in 2005 (Australia)	10593 adverts; % adverts for food, food categories	3287 FA (31%), 81% of FA were for unhealthy/'non-core' foods (25% of all adverts) 4 non-core FA/hr v 1 core FA/hour
Chesnutt & Ashraf	279 hrs children's and primetime	3236 adverts; % of adverts	2345 adverts broadcast during children's TV

(2002) Community Dent Health	TV, analysed from an oral health perspective (UK)	for food, food types	(72.5%), of which 62.5% were FA v 18.4% in primetime 73.4% of FA during children's TV were for products detrimental to oral health
Childs & Maher (2003) Br Food J	Children's commercials broadcast in the after-school period on 5 TV networks (US)	215 adverts, 90 unduplicated; % adverts for food, use of gender in adverts	46% of adverts were FA Male voice-overs, male as dominant product user and main character most prevalent in FA > non-FA aimed at children
Consumers International (1996)	Comparison of food advertising in 13 countries in Jan – Mar 1996	20 hrs children's programming for each country; % adverts for food, food types	FA largest category of advertised products Confectionery, breakfast cereals most frequent FA, healthy FA very rare
Doolittle & Pepper (1975) J Broadcasting	Advertising on 3 major networks on a Saturday morning in 1974 (US)	146 adverts; % adverts for food, persuasive appeal	124 adverts (84.9%) were FA, 59 (40.4%) for breakfast items, 27 (14.5%) for sweets Product enjoyment most frequent persuasive appeal for FA
Ederle et al., (2009) JADA	107 hrs TV analysed for changes in FA on major networks between 1971-2008 (US)	531 FA for 2008; food type, rate of adverts	Significant change across 4 decades on rate of total adverts per hr & type of FA (fast-food, bread/cereal/pasta, soft drinks, confectionery)
Folta et al., (2006) J Nutr Ed Behav	31 hrs school-age children's TV programming in 2003 (US)	987 adverts; % food adverts, depictions of physical activity, use of persuasive techniques	35% were FA, mainly breakfast cereals (27%; containing 33-47% added sugar) and fast food meals (19%) 48.6% FA contained depictions of physical activity, and most used persuasive techniques were fun, taste, being cool & happiness
Furnham et al., (1997) Sex Roles	4 days of Saturday and Sunday morning programming in UK and US in 1993	82 adverts, 67 unduplicated; gender roles, product types	55% UK and 30% US adverts were FA, with snack foods and breakfast cereals most frequent Male voice-overs & central figures more prominent
Galcheva et al., (2008) Arch Dis Child	41.5 hrs children's TV programming from 3 national networks in 2007 (Bulgaria)	371 adverts; % adverts for food, food types, themes used	124 (33.4%) adverts were FA, with 96.8% for unhealthy foods (HFSS) mainly snacks, candy and soft drinks 57% FA aimed at children, using taste, physical qualities of the product and premium appeals

Gantz et al., (2007) Kaiser Family Foundation	1600 hrs of TV from 13 most popular networks in 2005 (US)	40152 adverts; coded for 35 variables including product type, persuasive appeal, target audience, use of premiums	8854 (22.1%) were FA, food was the largest product category (34% candy & snacks, 28% cereals, 10% fast food) Taste (34% all adverts) and fun were most common persuasive appeals, 16% FA ft premiums
Harrison & Marske (2005) Am J Pub Health	40 hrs of child and general audience programming in 2003 (US)	1424 adverts; % adverts for food, food types, character attributes	426 (29.9%) of adverts were FA, of which 83% were for fast foods and sweets Character body size was unrelated to eating behaviour
Henderson & Kelly (2005) J Nutr Educ Behav	101.5 hrs prime-time TV on 5 national networks in 2003, comparison of FA on general market and African-American television (US)	3062 adverts; % adverts for food, food types, nutritional claims	553 (18%) of adverts were FA, top 5 advertisers of food were all fast food companies 15.7% of FA made a nutritional claim Greater % of FA during African-American shows
Jenkin et al., (2008) Pub Health Nutr	Applying UK nutrient profiling model to 60 hrs popular after-school TV in 2007 (New Zealand)	1893 adverts; % for food, food types as per model	483 (25.5%) were FA; according to the model 66% were HFSS foods, 28% non-HFSS (and for a narrow range of food groups, no fruit or veg)
Kelly et al., (2007) Pub Health Nutr	357 hrs of TV from 3 free-to-air commercial channels in 2006, comparison with 2002 data (Australia)	9991 adverts; % adverts for food, food types, persuasive appeals, characters, TV viewing periods	2621 (26.2%) of adverts were FA, no. FA did not vary between children's and adults TV time but children's TV ft ↑ % HFSS foods (fast-food, confectionery, dairy, breads) Overall HFSS adverts ↓ since 2002
Kelly et al., (2008) Health Promo Int	714 hrs of TV from 3 free-to-air commercial channels in 2006/7 (Australia)	20201 adverts; % adverts for food, food types, persuasive appeals, characters	5090 (25.5%) of adverts were FA, of which 56.4% were non-core foods, 21.4% of FA contained promotional characters (54.3% non-core), 7.3% ft premium offers (84.5% non-core)
Kelly et al., (2010) Am J Pub Health	Comparison of food advertising in 10 countries in 2008	58890 adverts; % adverts for food, food types, persuasive appeals, characters, TV viewing periods	Overall 17% of adverts were FA, 14.9% in UK Overall 66% adverts for non-core foods, 56% in UK Fast food, confectionery, and low fat dairy most advertised products overall ↑ food adverts in UK during peak v non-peak children's viewing times Overall 15% FA ft premium offers and 24% ft

			characters
Kotz & Story (1994) JADA	52.5 hrs of Saturday morning children's TV from 5 networks (US)	997 adverts; % of adverts for food, food types	564 (56.5%) of adverts were FA, of which 43.6% were in the 'fats, oils & sweet food group' Most frequently advertised product was high sugar breakfast cereals
Kunkel & Gantz (1992) J Comm	604 hrs children's TV from 7 different broadcasters (networks, cable & independent) in Feb-Mar 1990 (US)	10325 adverts; product categories, themes, disclaimers	5090 (49.3%) of adverts were FA 22.4% of all adverts were for breakfast cereals, 18.4% snacks/drinks, 5.7% fast food, 2.8% healthy foods Fun/happiness was most frequent theme (26.6% of all adverts), then taste (18.8%)
Lewis & Hill (1998) Int J Obes	91 hrs children's TV on 4 terrestrial and satellite channels in Jan-Feb 1996 (UK)	828 adverts; % adverts for food, themes	Food largest product category, 49.4% of all adverts Cereals and confectionery/snacks comprising 60% of FA, with animation, story format, humour and emotional appeals prevalent
Morgan et al., (2009) Pub Health Nutr	503 hrs of children's TV on 4 most popular commercial channels in 2006 (UK)	Advertising time devoted to product categories	6.3% of total advert time (38.4% of FA time) for high sugar products, incl. Sweetened dairy, confectionery, cereals, drinks, baked goods
Neville et al., (2005) Health Promo Int	390 hrs of children's TV from 15 stations + 346h of confectionery & fast-food adverts in 2002 (Australia)	% adverts for food, % of FA for HFSS foods, TV viewing periods	31.3% of adverts were FA, 8.2 FA/hr Weekday afternoons had ↑ % of FA (37%) HFSS foods accounted for ~55% of all FA 20.3% of fast food & 22.3% of confectionery adverts were broadcast during children's viewing hours
Powell et al., (2007) Am J Prev Med	Food advertising around 170 top-rated shows by 12-17 yr olds from network, cable and syndicated TV stations in 2003/4 (US)	238,353 adverts; % of adverts for food, food types, % FA around shows popular with African-American v white adolescents	19.6% of non-program time was promotions for food & related products, % FA greater for African-Americans Most frequent FA were fast food (23%), sweets (22%) and beverages (17%)
Powell et al., (2007) Arch Pediatr Adolesc Med	Food advertising around 170 top-rated shows by 2-11 yr olds from network, cable and syndicated TV stations in 2003/4 (US)	224083 adverts; % adverts for food, food types, % FA around shows popular with African-American v white adolescents	36.4% of product advertising time was for FA Similar findings for both races Cereal most frequent food product (27.6% of FA), with fast food (12%) and snacks (8.3%)

Ramírez-Ley et al., (2009) J Pub Health	235 hrs of children's TV from 2 local & 3 national channels (Mexico)	8299 adverts; % adverts for food, target audience, food types	1831 (22%) of adverts were FA 50% of FA aimed at children, of adverts for potato chips 97% were aimed at children, 89% of desserts, 77% of juices and 73% sugared cereals
Roberts & Pettigrew (2007) Int J Advertising	28.5 hrs children's TV from 2 commercial stations (Australia)	950 adverts; % adverts for food, food types, persuasive appeals, themes	212 (22.3%) of adverts were FA of which 72.2% were HFSS Fantasy, fun, & humour were most used appeals Themes evident incl. grazing, denigration of core foods, exaggerated health claims, implied inability of foods to enhance mood
Rodd & Patel (2005) Br Dental J	41 hrs children's TV from 1 terrestrial commercial channel in 2003 (UK)	984 adverts; % of adverts for food, food types	342 (34.8%) of adverts were FA, of which 95.3% had ↑ sugar/acid content Of FA, most frequently advertised were pre-sugared breakfast cereals (26.3%), confectionery (23.7%) and non-carbonated soft drinks (18.1%)
Sixsmith & Furnham (2010) Health Promo Int	45 hrs television from 1 commercial channel, comparison of FA aimed at children and adults in 2008 (UK)	87 unduplicated FA, 35 aimed at children, 52 adult-focused; food types, claims, characters	↑ % of FA aimed at children were for HFSS foods compared to adult-targeted adverts 28.6% of children's FAs contained cartoons/cartoon character compared to 1.9% for adult-targeted adverts
Stitt & Kunkel, (2008) Health Comm	51 hrs children's TV from 8 networks (broadcast & cable) in 2005 (US)	1209 adverts; % of adverts for food, persuasive appeals, characters	557 (46.1%) of adverts were FA, of which fats/sweets were 38.7% (breads/cereals 34.3%), fast food (20.8%) Fun/happiness appeal most common (47.3% of FA), taste (17.6), uniqueness (12.2%) 18.7% FA included a website address, 42.2% ft a BE character & 9.7% ft a licensed character
Story & Faulkner (1990) Am J Pub Health	Food advertising around 15 top-ranked sitcom or drama shows in 1988 (US)	261 adverts; % of adverts for food, persuasive appeals	91 (35%) of adverts were FA, primarily fast food, only 3 adverts were for fruit, none for veg Good taste and food being 'fresh and natural' most used appeals
Taras & Gage (1995) Arch Pediatr Adolesc	6 national networks and 1 local network, children's TV (US)	% of adverts for food, food types	21.3 adverts per hour, of which 47.8% were FA

Med			HFSS foods accounted for 91% of FA, adverts for processed foods ↑ but cereals and sweets less than previous data
Temple & Steyn (2008) Nutrition	49.5 hr children's TV in 2006 (South Africa)	408 adverts; % of adverts for food, food types	69 (16.9%) adverts were FA, of which 55% were poor nutritional value (fast food, sugared breakfast cereals, sweets, soft drinks) and 42% were better nutritional value
Wicks et al., (2009) J Advertising	Food advertising on 7 broadcast networks & 2 cable networks in 2004-6, comparison of adverts targeted at children, general & mature audiences (US)	3893 FA; disclaimers, food types, appeals	Pizza/fast food most advertised (27.9% of FA), sweets (15.2%), breakfast foods (14.4%) 49.9% of FA had a disclaimer, more dual-modality disclaimers and emotional appeals used in child-targeted adverts Taste (33.1%) & mood alteration (14.5%) most common persuasive appeals overall
Wilson et al., (2006) Prev Med	155 hrs of children's TV from 2 free-to-air channels in 2005, compared to 1997 and Australian data (New Zealand)	% of adverts for food, food type	42% of adverts were FA in 2005 compared to 29% in 1997, with the majority being foods high in fat and/or sugar (74.7%) Similar pattern to Australia

Note: FA = food advertisements, HFSS = high in fat, sugar and/or salt, BE = brand equity, ft = featured/featuring

Table 1-3 Key features of studies analysing the content of television food advertisements, to enable comparisons of the country of broadcast, sample size, features investigated and main findings in the literature relevant to this thesis.

1.5.3.2 The nature of television food advertising to children – marketing strategies

Advertisers are believed to use particular persuasive techniques to appeal to children and young people (such as the use of appeals, promotional characters, celebrity endorsement and giveaways) (Committee on Communications, 2006), and such techniques do affect the popularity of the advert with children (Nash et al., 2009). However, relatively few studies have addressed this aspect of television food advertising; content analyses tend to focus on analysing the nature of the product rather than the nature of the message promoting the product (Schor & Ford, 2007).

However, some studies have examined advertising techniques. In 1974, Doolittle & Pepper examined 49 separate 'commercial announcements' (CA) broadcast on a Saturday morning in the US (all products, not just food). The authors sought to identify the 'buying rationale' for each CA, defined as the reason for purchasing a product (the reason with the most emphasis) as provided by the advertisers. Five major buying rationales were isolated; product enjoyment (featuring in 75% of confectionery adverts and over half of the adverts for snack foods), product superiority (found in 40% of breakfast food adverts), promotions (used in nearly 20% of all CAs, which in all cases were breakfast foods), pleasing product association (the primary rationale in 80% of meal food CAs, typically involving identifying with an animated character) and personal advancement (featuring in 1% of the sample, all of which were for breakfast foods) (Doolittle & Pepper, 1975).

Nearly 20 years later, Kunkel & Gantz (1992) examined over 10,000 adverts broadcast during children's programmes on US television. The principal persuasive strategy or 'primary appeal' of each advert was recorded, and the findings showed that taste/flavour/smell was the most frequently used appeal in cereal/breakfast adverts (46.6%) and adverts for snacks/drinks with added sugar (36.8%). The most prevalent theme overall (all products, not just food) was identified as fun/happiness and this was also the most used theme for fast food adverts (71.9%) (Kunkel & Gantz, 1992). It is also interesting to note that the fun/happiness theme was also the most frequent appeal used to advertise healthy food products (46.7%) and appeals based on the beneficial health/nutritional aspects of the food item were rarely seen (6.1%) (Kunkel & Gantz, 1992).

More recently, Folta et al., (2006) noted that in food and beverage adverts targeted at school aged children, foods were typically associated with fun and good times (75% of food adverts), pleasant taste (54.1%), being ‘hip’ or ‘cool’ (43.2%), and feelings of happiness (43.2%). In an interesting and thorough study, Galcheva (2008) noted that approximately 57% of the food adverts aired around children’s programmes were directly aimed at children (assessed using the age of the actors and the wording of verbal appeals), with 27% directed at a general audience and the remaining 16% to adults. Furthermore, in this study both the product information provided to children in food adverts and the appeals used were investigated. In the food adverts examined, children were typically informed of the food’s taste (68.5% of food adverts), physical qualities (48%), novelty (29%), composition and content (25%), and the presence of premiums/prizes (24%) whereas information about pricing was rarely included (3.2%) (Galcheva, 2008). Additionally, it was found that the most common appeals used to advertise foods around children’s programmes were taste (76%), fun/happiness (50%), singing and dancing (32%), celebrities (24%), love emotions (19%), pleasure while consuming the food (12%) and action/adventure/sport (11%) (Galcheva, 2008). Some data are also available for Australian television. Roberts & Pettigrew (2007) examined 212 food adverts shown during 28.5 hours of children’s programming and coded the prevalence of different appeals used. The most popular appeal identified was ‘fantasy’ which was present in 57% of the adverts, followed by fun, humour, taste, and action/adventure (Roberts & Pettigrew, 2007). It was also noted that there seemed to be a heavy reliance on premium offers (such as free toys or competitions) to market foods to children, appearing in approximately one third of all food adverts, and celebrity endorsement which featured in 17% of the food adverts (Roberts & Pettigrew, 2007). Kelly et al., (2008) found that premium offers and promotional characters were used in 21.4% and 7.3% of food adverts respectively, but that this was significantly higher during peak versus non-peak children’s viewing times and the majority of adverts using these techniques were for non-core foods.

Again, data emanating from the UK are limited; this will be addressed in Chapter 6. Lewis & Hill (1998) assessed the use of appeals in their study, investigating adverts broadcast on UK television during children’s viewing times (weekday afternoons and weekend mornings) and classifying the appeals used into three categories; verbal appeals (e.g. "tastes great"), product appeals (e.g. the product is presented as being superior to other brands), and emotional appeals (e.g. fun/happiness, peer acceptance). The findings indicated that food adverts were significantly more likely to feature a number of these appeals than other categories of advertisement, namely animation, a story format, humour and the emotional appeal of fun/happiness/mood alteration (Lewis & Hill, 1998). The authors also suggest that because many overweight and obese young people experience low levels of self-esteem or confidence, such individuals may be more vulnerable to the use of emotional appeals that suggest an opportunity for personal enhancement (Lewis & Hill, 1998). Sixsmith & Furnham (2010) found that food adverts specifically aimed at children were more likely to make health claims, include 'scientific information', be fantasy-based, and to feature cartoon characters and male central figures than adverts not aimed at children.

Behavioural outcomes such as purchasing requests (see section 1.5.3.4.3) are thought to be modified by advertising techniques such as premium offers (Hastings et al., 2003). McDonald's Happy Meals have been purported to be one of the most successful marketing strategies in history, with the inclusion of a free toy and frequent character licensing/movie tie-ins (discussed in more detail in relation to branding, in section 1.5.3.3).

It has been suggested that children naturally focus their attention on techniques such as animation and visual effects, and that emotional appeals do distract children from other aspects of adverts, for example nutritional disclaimers or product information (Wicks, Warren, Fosu, & Wicks, 2009). As children enjoy watching adverts and engage with them it is likely that the marketing strategies stated above do have persuasive power (Hastings et al., 2003). Both the nature and extent of food advertising on the UK television channels most popular with children and adolescents will be investigated in Chapter 6.

1.5.3.3 Branding

1.5.3.3.1 The branding of food

Branding is a critical aspect of advertising, particularly for children and young people; and the majority of child-oriented food advertisements take a branding approach (Connor, 2006). Indeed, advertising recall, liking and brand identification are the top three criteria often used to assess advertising quality

(Newstead & Romaniuk, 2010). The concept of branding can be defined as “an advertising method designed to establish recognition and positive associations with a company name or product, with the goal of creating lifelong customers” (Connor, 2006).

Television advertising is thought to be very effective at building strong brands (Heath, 2009). The term ‘brand’ can be defined as “a name, term, sign, symbol, design, or a combination of these, that identifies the goods or services of one seller or group of sellers and differentiates them from those of the competition” (Chang & Liu, 2009). Of all commodities, food is one of the most highly branded items, with over 80% of US grocery items being branded (Story & French, 2004). This level of branding of food products lends itself well to major advertising campaigns, and food manufacturers carry out advertising activity with the aim of building brand awareness and brand loyalty as there is a belief that brand preference precedes purchase behaviour (Story & French, 2004). Brand preference is thought to be developed through a number of associations fostered between the brand and the consumer, such as ‘need association’ (repeatedly linking the product with a particular need, thus linking the two concepts in the consumer’s mind via conditioning) and ‘behaviour modification’ (conditioning consumers to buy the brand by the manipulation of cues and rewards) (Alreck, 1999).

1.5.3.3.2 Children as targets for branding activity

Children are extremely important targets for branding activity; they have independent spending power but also exert considerable influence over family purchases. Food and drink purchases are the categories over which children have been shown to have particular influence (Søndergaard & Edelenbos, 2007). In addition, children are also seen as “teenage and adult shoppers of the future” so that any brand loyalty that is fostered at a young age may reward the food company with a lifetime of sales, potentially worth $100,000 to a retailer (Escalante de Cruz et al., 2004).

Children certainly appear to be receptive to branding activity; brand recognition begins at a very young age. It has been suggested that at around six months of age, whilst children are only producing simple speech sounds such as ‘ma-ma’, they are already beginning to form mental images of corporate logos and brand representations (Escalante de Cruz et al., 2004; Lindstrom, 2004; McNeal & Ji, 2003). Other authors contend that this occurs at around the age of two years, particularly when cartoon or cartoon-related characters are used, e.g. Tony the Tiger or Ronald McDonald (Connor, 2006). Younger children are thought to pay more attention to simple cues such as the McDonald's golden arches logo, as they can process such images quickly and holistically and it does not overwhelm their limited linguistic skills (Wicks et al., 2009).

Even at two years of age children are already being targeted directly by cereal manufacturers in their television adverts (McNeal & Ji, 2003). It is generally agreed that by mid-childhood children have a very high level of recognition for brand logos (Kanner, 2006), 88% of 9-11 year olds were correctly able to recognise at least 16 out of 20 brand logos (Kopelman, Roberts, & Adab, 2007). Between middle childhood and adolescence understanding of branding develops, such that brands are no longer considered purely according to observable concrete aspects of a certain product, but on a more abstract, conceptual level whereby brand image relations to social status, prestige and group affiliation become more important (Chaplin & John, 2005).

1.5.3.3.3 Branding activity aimed at children

There are numerous examples of food branding activity used to appeal to children. Brand licensing is prevalent in children's programming, such that children begin to associate a programme or its characters with a particular brand to the extent that the programme itself becomes an advertisement for that food (Linn & Golin, 2006). This is not only the case with programming, indeed the release of each new movie aimed at young people is typically accompanied by a raft of product tie-ins. Following the release of the SpongeBob Squarepants™ movie in 2004, the character name was associated with and used to promote numerous food products, and concurrently Burger King offered SpongeBob toys and watches at its restaurants (Linn & Golin, 2006). Indeed, fast food companies often attract children by including toy giveaways with children's meals, providing playgrounds at their outlets and opening restaurants in locations that are frequented by children (Sahud, Binns, Meadow, & Tanz, 2006). It has been estimated that in children's airtime, 42% of HFSS commercials featured animation and 28% featured a product tie-in (Ofcom, 2004).

Numerous brands use characters and celebrities in their promotions and on product packaging, and their presence is believed to assist with generating brand identity and facilitating a brand-consumer relationship (Lawrence, 2003). This can be in the form of brand licensed characters (such as SpongeBob Squarepants™ as mentioned above) whereby the character has been created for an animated programme or movie and is then licensed by brands to appear in their promotions; or brand equity characters which are created for the sole purpose of promoting a product or brand (Garretson & Niedrich, 2004). Many of these associations have been built up over generations, for example, Snap, Crackle and Pop™ have been used to promote Kellogg's Rice Krispies® since 1928, and Tony the Tiger has been the character for Kellogg's Frosties since 1951 (Lawrence, 2003). Both children and adults like these characters and show trust and respect for them (Ülger, 2009), but it is not clear whether there is a link between children's awareness of brand equity character and product associations and their self-reported food preferences. This will be addressed in Chapter 4.

A celebrity endorser can be defined as “a famous person who uses public recognition to recommend or co-present with a product in an ad” (Lear, Runyan, & Whitaker, 2009). The US Institute of Medicine notes that celebrity endorsements, such as Britney Spears advertising Pepsi® and Christina Aguilera endorsing Coca-Cola®, have been used in order to link a brand to a certain age group or fan base (IOM, 2005). In the UK, former International footballer Gary Lineker, now a TV sports presenter, has been endorsing the promotional campaign for Walkers Crisps since 1995, during which time the brand won an award for being the ‘consumer's favourite in the food and drink category’ (British Broadcasting Association, 2004).

Product placement in television programming, such as the appearance of Coca-Cola in each episode of American Idol, is one of many contentious branding activities but is effective in ensuring that children are exposed to brands in as many situations as possible (Linn & Golin, 2006). There are also several other branding avenues used to reach child and adolescent audiences such as internet advergaming (Pempek & Calvert, 2009), viral marketing, product, programme and event sponsorship, mobile phone advertising, advertising within schools and point-of-sale marketing (Lindstrom, 2004) so that both the frequency and intensity of children's exposure to branding messages is unprecedented (Linn, 2004).

1.5.3.3.4 The effects of branding activity aimed at children

In response to such ubiquitous branding activity, brand loyalty is already beginning to be established by two or three years of age, as it has been found that before they are even able to read, some children have already begun to make requests specifically for named branded products (Escalante de Cruz et al., 2004). The brand of an item has been stated as one of six key factors that drive children's purchasing decisions, alongside fun, taste, peer-pressure, status and packaging (BHF, 2008).

Research evidence suggests that children over the age of two have the capacity to recognise, classify and evaluate brand or product alternatives and actually express these preferences in letters to Santa (Macklin, 1994). Good recall and recognition of brands is assumed to denote positive attention and memory of advertising activity, and thus can be taken to imply that any an advert or a brand is generating persuasive power (Curlo & Chamblee, 1998). Indeed, brand preference and purchase intention relies on the consumer being able to both recall the brand making the claim and also identify the products associated with that brand at the point of purchase (Curlo & Chamblee, 1998).

Recall and recognition have been demonstrated to be different constructs, as when children were asked to mention a brand name (recall) 2-3 year olds were only able to recall one out of twelve brands whereas when asked to select the correct brand from a number of visual options (recognition) the success rate rose to eight out of twelve (Valkenburg & Buijzen, 2005). Recognition is believed to develop earlier than recall because less cognitive processing is required (Valkenburg & Buijzen, 2005). It is thought that both are required for sophisticated purchase decisions whereby brands can be identified, evaluated and selected in a multitude of retail environments and contexts (Valkenburg & Buijzen, 2005). Research suggests that indeed children do develop relationships with brands, with demonstrable brand name recall and information retrieval about previous brand experience, a relationship that is influenced by both peers and the mass media (Ji, 2002).

Both the use of brand characters and celebrity endorsers have been shown to increase children's enjoyment, attention for and engagement with advertising and to improve attitudes towards the product being promoted (Lawlor, 2009; Arnett & Terhanian, 1998; Neeley & Schumann, 2004).

1.5.3.3.5 Branding and eating behaviour

Brand logo recognition ability has also been found to be associated with some aspects of eating behaviour. It was found that children with a greater ability to recognise food brand logos were more likely to have high levels of snacking on crisps, and low snacking of biscuits, as well as demonstrating better food knowledge in terms of knowing what food items are healthy and which are unhealthy (Kopelman et al., 2007).

Findings from our own research have indicated that following food advert exposure, correct recall of adverts is significantly related to the subsequent number of food items selected (Halford et al., 2008a). Furthermore, it was found that obese children correctly recognised a greater number of food adverts than normal weight children, and this recognition was positively correlated with the amount of food consumed subsequently (Halford, Gillespie, Brown, Pontin, & Dovey, 2004). Additionally, recognition of food adverts was related to BMI in 5 – 7 year old children (Halford, Boyland, Hughes, Oliveira, & Dovey, 2007) which is supportive of other studies linking brand recognition and weight status (Arredondo, Castaneda, Elder, Slymen, & Dozier, 2009).

Celebrity endorsements are effective at increasing children’s preferences for the product being promoted (Ross et al., 1984) although research in this area is extremely limited. Furthermore, the association of known and liked brand characters with a food has been shown to influence the likelihood of children agreeing to eat that food, and increase willingness towards tasting a novel healthy food (Kotler, 2007). Children are more likely to select a product if the packaging includes a cartoon character than a similar product without the character (Ülger, 2009). Also, the ability of children to recognise an association between a character and a product was shown to be a predictor of developing favourable attitudes towards the product (DiFranza et al., 1991; Fischer, Schwartz, Richards, Jr., Goldstein, & Rojas, 1991). Characters are thought to add to the persuasive appeal of an advert and therefore brands have been criticised for using characters to manipulate children’s food choices (Which?, 2005). Indeed, in a recent study, children were significantly more likely to prefer the taste of and choose foods that featured popular cartoon characters (such as Shrek and Dora the Explorer) compared to the same foods without the characters; demonstrating for the first time the effect of licensed characters on taste preference and product choice (Roberto, Baik, Harris, & Brownell, 2010). However, the use of characters has also been shown to help encourage healthier food choices. When Winnie the Pooh was used to promote satsumas, sales increased to 250,000 bags per week nationwide (Which?, 2007a).

Although it has been stated that children who recognise characters, logos and slogans from adverts are more likely to select those products and brands (Batada & Borzekowski, 2008), little is known about the relationship between advert recognition or brand character recognition and children's food preferences, these issues are addressed in Chapters 3 and 4 respectively.

In summary, it is a reasonable hypothesis that food advertising and branding activity may be having an influence over children's behaviour, discussed in the next section.

1.5.3.4 The effects of television food advertising

It is logical to assume that food manufacturers are spending extremely large sums of money on advertising campaigns because they are an effective means of promoting sales (Henderson & Kelly, 2005). Therefore, this suggests that exposure to advertising has an effect on behaviour. For children and young people this can be considered in terms of actual purchase behaviour, but also purchase-influencing behaviour (or 'pester power'). There is considerable evidence that food preferences, choices and requests are modified by food advert exposure and branding, resulting in purchase or purchase-influencing behaviour being altered in favour of the advertised product (Resnik & Stern, 1977). A summary of the potential process behind these effects is shown in Figure 1-9.

1.5.3.4.1 Effects on food preference, brand preference and choice

In one of the earliest studies on this topic, Goldberg et al., (1978b) showed that children's choice of foods reflected their experimental television food advert exposure. Children who had viewed adverts for highly sugared foods were more likely to opt for sugared items (both those advertised and those not appearing in the adverts), whereas children who had viewed public service announcements with a pro-nutrition message selected more fruit and vegetables. Stoneman & Brody (1981) noted that children who had been exposed to television food adverts showed a greater preference for foods in the same class as the advertised foods compared to the children in the television control condition. Further, Gorn and Goldberg (1982) found that children who viewed daily candy commercials were more likely to select candy than fruit as an afternoon snack.

In recent times, surprisingly few authors have addressed this issue. The effect of food advertising exposure on children's food preferences is the focus of Chapter 3.

However, Borzekowski & Robinson's (2001) much cited randomized, controlled trial showed preschool children a videotape of a cartoon either with or without embedded commercials, and then asked the children to identify their food preferences from pairs of similar products, one of which had been shown in the commercials. Children who had seen the videotape with the embedded commercials were significantly more likely to select the advertised product than children who had not seen the commercials (Borzekowski & Robinson, 2001). This is supportive of earlier studies indicating that exposure to food promotions had a significant impact on food preferences in the direction of the advertised food (Stead, McDermott, & Hastings, 2007).

More recently, Robinson et al., (2007) reported that children preferred the taste of food and drink items displaying the McDonald's branded packaging to identical products in matched, but unbranded, packaging. This was true even of items that were not available for purchase at McDonald's at the time, such as carrot sticks (Robinson, Borzekowski, Matheson, & Kraemer, 2007). Interestingly, it was also found that children with a greater number of television sets in their homes were more likely to prefer the taste of the products in McDonald's branded packaging (Robinson et al., 2007). In adults, ratings of hedonic liking for a product were significantly different between blind and informed conditions of the taste test, indicating that brand information may play an important role in liking (Di Monaco, Cavella, Di Marzo, & Masi, 2004). Overweight children have also been shown to be particularly responsive to food branding (Forman, Halford, Summe, MacDougall, & Keller, 2009), indeed the effect of branding on food preferences has also been shown to be related to weight status (Halford et al., 2008b).

Halford et al., (2008a) demonstrated that following exposure to non-food advertisements overweight and obese children showed a significantly greater preference for branded items than normal weight children, however following food advertisements these weight status differences were not apparent. This suggests that television food advertisement exposure can produce an obesogenic food preference response in normal weight children that is typically found in overweight and obese children (Halford et al., 2008a). This will be investigated further in Chapter 3.

1.5.3.4.2 Effects on food consumption

Hitchings & Moynihan (1998) interviewed 9-11 year olds regarding their recall of food advertisements and obtained three-day food diaries to ascertain consumption. Parents of the children were also interviewed to establish the food requests that had been received. A significant positive association was found between the food advertisements recalled and the foods consumed, particularly for soft drinks, crisps and savoury snacks (Hitchings & Moynihan, 1998). Four out of the ten of the most requested food items were amongst the ten most frequently recalled television food advertisements (Hitchings & Moynihan, 1998).

More recently, Halford et al., (2004) exposed 9-11 year old children to eight food or eight non-food advertisements followed by the same cartoon in a within-participant, randomized study. Following viewing, children's consumption of sweet and savoury, high and low fat snack foods was measured. Exposure to food advertising increased food intake in all children (Halford et al., 2004). This finding was later replicated in 5-7 year old children (Halford et al., 2007). Interestingly, a further study demonstrated that not only did food advertising exposure produce a substantial and significant increase in caloric intake (of high fat and/or sweet energy-dense snacks) in all children, but also that this increase in intake was largest in the obese children (Halford et al., 2008b). This suggests that overweight and obese children are more responsive to food promotion, and that such promotion specifically stimulated the intake of energy-dense snacks (Halford et al., 2008b).

Buijzen et al., (2008) found that children's exposure to food advertising was significantly related to their consumption of both advertised brands and generic energy dense product categories. In a recent study, Anschutz et al., (2009) found that food intake was higher following food commercials in boys but not girls, although the authors suggest that this may have been due to the girls suppressing their natural responses to the commercials due to socio-cultural pressures.

An Australian survey study showed that heavier TV use and more frequent viewing of commercial television were independently associated with more positive attitudes towards junk food; heavier TV use was also independently related to higher self-reported junk food consumption (Dixon, Scully, Wakefield, White, & Crawford, 2007). However, advertisements for healthier food products have also been shown to have an impact. Both Dixon et al., (2007) and Beaudoin et al., (2007) found that adverts for nutritious foods promoted positive attitudes and beliefs concerning these foods. Bannon & Schwartz (2006) demonstrated that children who were exposed to videos containing nutritional messages were more likely than children who had not seen the nutritional messages to select apples rather than crackers for a snack. Also, following a three year campaign in Western Australia promoting fruit and vegetable intake, consumption increased by half a serving of fruit per day and a third of a serving of vegetables per day (Chapman, Kelly, King, & Flood, 2007).

1.5.3.4.3 Effects on purchase and purchase-influencing behaviour

It is increasingly recognised that children are a lucrative market for advertisers to target, given that they are reported to independently spend over $6 billion annually for goods and services, and to directly influence another $130 billion of spending in family and household purchases, as well as possessing an indirect influence over an additional $130 billion spending (Macklin, 1994). Children have a developing role as independent consumers, as their access to income has risen markedly in recent years (Schor & Ford, 2007). The largest product category for children's purchases is sweets, snacks and beverages, which accounts for a third of children's total expenditure (Schor & Ford, 2007). Furthermore, in an international study greater than 50% of parents interviewed stated that children are an important factor in influencing their purchasing decisions, and it was frequently reported that 'child's demand' was their primary reason for buying a product (Escalante de Cruz et al., 2004).

Numerous studies have reported similar increases in purchase requests made by children in response to food advertising, particularly increased requests for advertised products (McDermott, O'Sullivan, Stead, & Hastings, 2006; Arnas, 2006; Bridges & Briesch, 2006; Buijzen & Valkenburg, 2000; Chamberlain, Wang, & Robinson, 2006), and Chapter 5 uses a novel paradigm to explore this phenomenon.

Hastings et al., (2003) agree that there is strong evidence that food promotion influences children's food purchase-related behaviour, defined as behaviour intended to influence parents' food purchases. As far back as 1976, it was reported that the hours of commercial television children watched each week correlated significantly with purchasing-influencing attempts made to their parent while food shopping (Galst & White, 1976). Brody et al., (1981) also noted that, in their study, children who watched a cartoon embedded with food commercials made more requests for the advertised foods in a subsequent artificial shopping environment than the children who had watched the cartoon with no commercials. Furthermore, an association has been found between the frequency of requests for products and both the number of television viewing hours and also the intensity of the advertising campaign for those products (Donkin, Tilston, Neale, & Gregson, 1992). Using a novel paradigm, Pine & Nash (2002) reported that children who watched more commercial television not only requested more items overall, but specifically requested more branded products than the children who watched less. It has also been shown elsewhere that children are brand-oriented in their request behaviour (O'Cass & Clarke, 2001). Recent studies exploring the relationship between television advertising exposure and food brand requests are lacking, therefore a modified replication of the Pine & Nash (2002) study is the basis of Chapter 5.

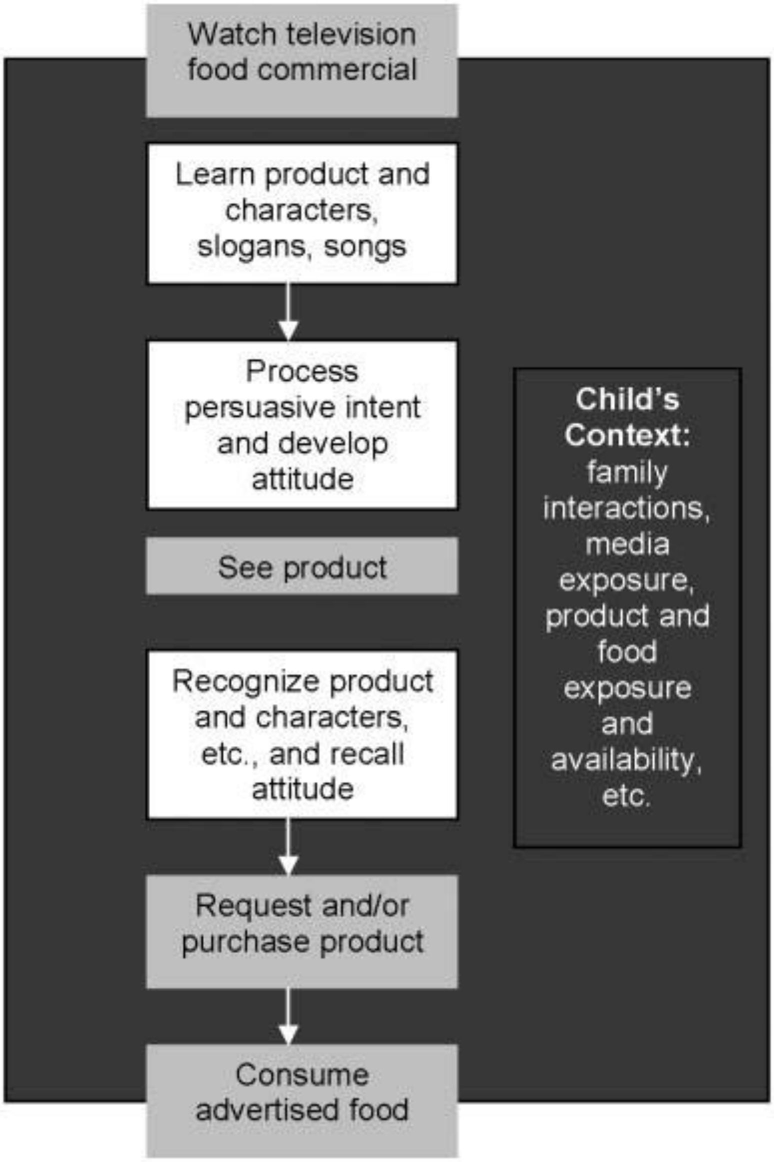


Figure 1-9 An illustration of the potential process occurring in children between food advert exposure and consumption of the advertised food (from Batada & Borzekowski (2008)).

Several systematic reviews of the literature have summarised the existing evidence on this topic. Hastings et al., (2003)'s well cited review concluded that food promotion "is having an effect, particularly on children's preferences, purchase behaviour, and consumption". Importantly, this report stated that the effect of food advertising is occurring at both a brand and category level (Hastings et al., 2003). That is, in addition to causing individuals to switch from one sweetened carbonated beverage brand to another, advertising could also cause increased overall consumption of such beverages (Garde, 2008) - although this conclusion has been criticised as not being well-founded (Ambler, 2006). Perhaps unsurprisingly food and marketing companies also refute this point, claiming that only brand choices are affected by promotional activity (Kopelman et al., 2007; Harris, Pomeranz, Lobstein, & Brownell, 2009). The Hastings report also states that “the advertised diet contrasts sharply with that recommended by public health advisors, and themes of fun and fantasy or taste, rather than health and nutrition, are used to promote it to children. Meanwhile, the recommended diet gets little promotional support” (Hastings et al., 2003). The debate over the effects of food advertising on children’s diets has not been limited to the academic literature; scrutiny has also been applied by international advisory bodies such as the WHO and the IOM and special interest groups such as the Kaiser Family Foundation (Stead et al., 2007). A report by the World Health Organisation and the Food and Agriculture Organisation of the United Nations acknowledged that the promotion of energy-dense foods is a ‘probable’ cause of increasing prevalence of overweight and obesity in children worldwide (WHO, 2003b). The IOM reviewed 155 studies of food advertising and its effects on children, and concluded that exposure to television advertising is associated with adiposity in children aged 2-11 years (IOM, 2005).

A report commissioned by the Office of Communications (Ofcom) concluded that television advertising has a “modest direct effect as well as a larger indirect effect on children’s food and drink preferences” (Livingstone, 2004). However, it is also recognised that to attribute more than a ‘modest direct effect’ to food advertising is extremely difficult as it is seemingly unfeasible to be able to identify and eliminate all other possible variables (Escalante de Cruz et al., 2004). Carrying out studies in lifelike situations are virtually impossible, and observational studies are complicated by numerous known and potential confounders (Veerman, Van Beeck, Barendregt, & Mackenbach, 2009). Nevertheless, the evidence base for this effect is sufficient for one author to surmise that from one in seven to one in three obese children in the US may not have developed obesity if advertising for unhealthy foods had been removed from television (Veerman et al., 2009).

1.5.3.5 Individual differences in response to food advertising

Although, as discussed, considerable evidence exists to demonstrate that food advertising has an effect on children’s preferences and choice, little is known about the mechanism for this effect and therefore how individual differences in response can be explained. It is assumed that the pathway between advert exposure and purchase or purchase-influencing behaviour involves a number of factors, which are not yet fully elucidated.

Batada & Borzekowski (2008) propose that initially following exposure, the child processes information about the product and the advert (e.g. the characters, slogans and songs used), which may or may not affect attitudes about the product or brand. Following subsequent exposures the child may have recall or recognition experiences which reinforce the attitudes formed, influencing whether or not the child attempts to make a purchase or encourage a parent to do so on their behalf (Batada & Borzekowski, 2008). However, this is a simplification as this pathway occurs in, and is affected by, a child's context which supplies numerous potentially important variables such as interactions with parents/siblings, exposure to other media sources and other advertising avenues, exposure to both advertised and novel products and brands in retail outlets, at home, school and other settings among many other factors (Batada & Borzekowski, 2008). Such other factors may include, but not be limited to, the immediate physiological state of the individual e.g. hunger/thirst levels or even mood (Mela, 2001), but also other long-term mediating factors operating at both an intrinsic and extrinsic level. Potentially important intrinsic variables could be an individual's genotype (potentially related to their food preference profile), or eating style (e.g. levels of restrained, emotional and external eating, as measured by such tools as the Dutch Eating Behaviour Questionnaire for Children, DEBQ-C (van Strien & Oosterveld, 2008)). Similarly, extrinsic variables may be exerting an influence over children's responses, such as the level of parental control over feeding (both affecting a child's sense of food choice autonomy and their tendency to focus on external cues to determine intake), food availability, and experience of, or susceptibility to, peer influence (Hill, 2002). Few researchers have addressed these issues; however other factors have attracted some research attention, namely the roles of cue responsiveness and media literacy in mediating between advert exposure and food preference, brand preference and eating behaviours in children.

1.5.3.5.1 Cue responsiveness

It has been suggested that food adverts act as cues for food consumption, and that exposure to such cues may act to promote food intake and related behaviours (Harris, Bargh, & Brownell, 2009). Certainly external stimuli are known to be able to provoke eating even in the absence of nutritional need (Rogers, 1999). This explanation could account for differential effects of food adverts on children's preferences and choice due to individual variation in food cue responsiveness (Carnell, Haworth, Plomin, & Wardle, 2008).

For example, Schacter's externality theory of obesity (1971) contends that obese individuals are more influenced by external stimuli than lean people are. In support of this, obese individuals have been found to have more appetitive responses to food cues in a number of studies. In a sample of 3 – 5 year old children, it was found that adiposity was positively associated with the subscale of the Child Eating Behaviour Questionnaire (CEBQ) that assesses 'food cue responsiveness' (Carnell & Wardle, 2008). In addition, obese children have been shown to increase their food intake by more than normal weight children do in response to food cues (Jansen et al., 2003). Temple et al., (2007) found that obese children as young as 8 years of age habituated more slowly to food-related stimuli than normal weight children did. Furthermore, it has also been demonstrated that obese children display increased dorsolateral prefrontal cortex activation in response to food stimuli whereas normal weight children show activation in other brain areas following food cue exposure (Davids et al., 2010). As the prefrontal cortex is believed to be involved with cognitive behaviour, monitoring inhibitory control, self-regulation and self-control, it is thought that activation in this area may highlight the conflict potential of food stimuli for obese children who find food cues highly salient but also know that they may gain weight by consuming the items (Davids et al., 2010).

These findings are supported by studies in adults. Epstein et al., (1996) reported that obese women displayed a significantly slower decline in salivation (a measure of appetite) than non-obese women following repeated exposure to food cues. Castellanos et al., (2009) noted that obese individuals self-reported higher levels of responsiveness to external food cues than normal weight individuals. Interestingly, in this study it was shown that when fasted, both normal weight and obese individuals display visual attention bias towards food cue images (versus non-food controls) but in the fed condition, this bias was maintained in the obese group only (Castellanos et al., 2009). This reinforces the idea that situational factors relating to appetite (i.e. hunger state) are important considerations when assessing response to food advert exposure.

Obese adults were also found to have significantly higher metabolic activity in those brain regions relating to mouth, lip and tongue sensation (involved in the sensory processing of food) which could act to increase their sensitivity to the rewarding properties of food (Wang et al., 2002). Davis et al., (2007) contends that aspects of our obesogenic environment (such as food marketing) can 'exploit' individuals with a high sensitivity to reward. This trait is often accompanied by an enhanced preference for energy-dense foods, therefore food cues such as adverts can readily increase temptation to overconsume (Davis et al., 2007). The reinforcing value of food (taken as an objective measure of a person's motivation to eat) has been found to be greater in the obese than in normal weight individuals, which is thought to be related to reduced dopamine signalling activity in the brain (Epstein & Leddy, 2006).

Overall, research findings indicate that food cues are highly salient stimuli (Harris et al., 2009), particularly for obese individuals (Davids et al., 2010) or any individual experiencing high state hunger (Castellanos et al., 2009), and also when the cues represent high calorie foods (Schur et al., 2010). Food cue responsiveness could be one potential mediating factor in the relationship between food advert exposure and effects on food preference and choice.

1.5.3.5.2 Media Literacy

The degree of media literacy a child has may partially mediate their response to food advertising. It has been suggested that younger children may be more susceptible to advertising than older children, adolescents or adults because they lack the cognitive development required in order to be able to understand the persuasive intent of adverts. If young children are not able to understand the persuasive intent of advertising then there are question marks over their ability to carry out critical judgement of the messages (Oates, Blades, Gunter, & Don, 2003) and therefore some authors believe that children are being unfairly exploited by marketers (Andersen, Tufle, Rasmussen, & Chan, 2008; Pomeranz, 2010).

In order to be able to judge the purpose of an advert, children must first be able to distinguish between programming and advertising content (Ali, Blades, Oates, & Blumberg, 2009). There is some debate over the age at which this occurs. Bijmolt et al., (1998) purports that at 5 – 8 years of age a majority of children are able to recognise the distinction between programming and advertising if the response format is non-verbal. This is a representative finding of several, but not all (Oates et al., 2003; Oates, Blades, & Gunter, 2002) studies which have shown that by the age of 7 or 8 most children are able to distinguish adverts from television programmes (Buijzen & Mens, 2007). Younger children may be able to make the distinction, but they may be basing their assessment on factors such as the length of the advert compared to a programme, their conclusion may be more easily confused by the presence of a cartoon character which blurs the line between advert and programme content, and they also may find it more difficult to verbalise their understanding (Oates et al., 2003; Oates et al., 2002; Pine, 2003). There is also a small body of evidence to suggest that younger children lack the cognitive development to discriminate between a premium offer and an advertised product, which has implications for the effects of adverts featuring such offers (Carruth, Skinner, Moran, & Coletta, 2000).

It has been demonstrated that as children age they do become progressively more critical of advertising and sceptical of claims made (D'Alessio, Laghi, & Baiocco, 2009). Indeed, high levels of awareness that the purpose and intention behind advertising was to promote and increase sales have been shown in 10 – 12 year old children (Dorey & McCool, 2009). Further, a recent study demonstrated age-related differences in the aspects of adverts children considered most important (Priya, Baisya, & Sharma, 2010), whereby younger children’s (5-9y) attitudes towards the adverts were based primarily on entertainment and brand icons, whereas aspiration and credibility were paramount in the attitude formation of older children (9-11y).

It is also not fully elucidated whether an understanding of the intent of advertising actually provides children with the purported ‘cognitive defences’ required to counteract or resist their persuasive nature (Brucks, Armstrong, & Goldberg, 1988; Livingstone & Helsper, 2006). The development of such cognitive defences relies upon acquiring the information processing skills necessary for children to be able to readily apply this knowledge during instances of exposure to advertising (Buijzen & Mens, 2007). It is possible that this is not obtained until the age of 12 or older (Moore & Moschis, 1978), and even at this stage a persuasive message, advert or advertised product can still be highly appealing to the child (Buijzen & Mens, 2007). However, findings have indicated that once an older child (10 – 12 years) has attributed a degree of persuasive intent to an ad, that child is less likely to believe the claims, reports reduced liking of the advert and is less likely to desire the products advertised (Robertson & Rossiter, 1974;

Rozendaal & Buijzen, 2009). Some media literacy programmes have been carried out in a few countries, but have not been sufficiently evaluated as to their effect on children's critical understanding of advertising (Matthews, 2008).

1.5.4 Regulation of television food advertising to children

The television landscape has changed considerably over the 30 years during which research into the effects of television advertising has been conducted. The proliferation of digital transmission and availability of numerous delivery systems (cable, satellite, wireless services) means vastly increased numbers of channels, and children now have access to more age-targeted programming than ever before (Desrochers & Holt, 2007). Concerns over the potential increases in children's exposure to advertising as a result of this, as well as increasing research evidence to support a link between food advertising and obesity, has led to changes in the regulation of television food advertising to children in the UK.

1.5.4.1 Timeline for and summary of regulatory changes

Prior to 2003, the UK Food Standards Agency (FSA) commissioned a review to examine the extent and nature of food promotion to children and to assess what effect, if any, this food promotion has on their knowledge, preferences and behaviour. The resulting report (Hastings et al., 2003) concluded that "food promotion is having an effect, particularly on children's preferences, purchase behaviour and consumption" and importantly, that "this effect is independent of other factors and operates at both a brand and category level". In December 2003, the Secretary of State for Culture, Media and Sport asked the UK's independent regulator of television services (Ofcom) to consider proposals for strengthening the rules on television advertising of food aimed at children. As a response, Ofcom conducted further research into the role that advertising plays in influencing children's consumption of HFSS foods. The report from this research was published in July 2004, and concluded that "advertising has a modest direct effect on children's food choices and a larger but unquantifiable indirect effect on children's food preferences, consumption, and behaviour" (Livingstone, 2004). As a result, Ofcom acknowledged that although obesity is a multi-factorial disease, evidence exists to suggest that "proportional and targeted action in terms of rules for broadcast advertising" was needed to address this issue (Ofcom, 2007a). Ofcom carried out public consultations during 2005 and 2006, and produced a report detailing the new legislation on 22nd February 2007 (Ofcom, 2007a).

The regulations cover two categories; scheduling restrictions and content rules. The scheduling restrictions apply to food and drink products that are assessed as being high in fat/sugar and/or salt (HFSS) by the FSA's nutrient profiling scheme. Ofcom assert that advertisements for HFSS products must not be shown in or around programmes specifically made for children under 16 years of age (including pre-school children), and it was further stated that for clarity this would mean the removal of all HFSS advertising from dedicated children's channels (Ofcom, 2007a). For all channels other than dedicated children's channels this legislation came into force in two phases; Phase 1) with effect from 1st April 2007 HFSS adverts were not permitted in or around programmes made for children or that were likely to be of particular appeal to children aged 4-9, and Phase 2) with effect from 1st January 2008, HFSS adverts were not permitted in or around programmes likely to be of particular appeal to children aged 4 – 15 years (Ofcom, 2007a). For dedicated children's channels, during Phase 1 they were required to scale back all HFSS advertising to 75% of 2005 levels, and during Phase 2 this was extended to 50% of 2005 levels. Full implementation (total removal of all HFSS advertising) from dedicated children's channels was enforced from 1st January 2009 (Ofcom, 2007a).

The revised content rules apply to all food and drink advertising to children regardless of when it is scheduled. In brief, the rules state that adverts must not: encourage poor nutritional habits or an unhealthy lifestyle, encourage children to make purchase requests, condone or encourage excessive consumption, disparage good dietary practice, condone or encourage damaging oral health practices, but that adverts must be accurate with regards to nutrition/health claims (Ofcom, 2007a). Two further sections of the content rules are of particular relevance to this thesis, those relating to promotional offers and the use of characters and celebrities. It is stated that promotional offers should not be targeted directly at pre-school or primary school children, and that adverts should not encourage children to consume a product purely to take advantage of a promotional offer, nor should excessive purchase or consumption (e.g. in order to complete a set of collectable items) be encouraged (Ofcom, 2007a). Regarding the use of characters, two definitions are important. Ofcom state that licensed characters are "those characters that are borrowed equities and have no historical association with the product" (Ofcom, 2007a). An example of this would be the use of the movie character Shrek™ to market foods. Alternatively, brand equity characters are defined as "those characters that have been created by the advertiser and have no separate identity outside their associated product or brand" (Ofcom, 2007a), for example Tony the Tiger™ advertising Kellogg's Frosties®. The content rules state that licensed characters and celebrities popular with children may not be used in HFSS adverts targeted directly at pre-school or primary school children. This prohibition does not apply to brand-equity characters (Ofcom, 2007a).

1.6 Aims and Objectives

The aims of this thesis were to examine the short-term effects of television food advertising exposure on children's food preferences and choices, and investigate if there is a relationship between relative advertisement exposure and brand requests, awareness of brand equity characters, weight status and food preferences in children. It was also an aim to examine the current food advertising landscape on UK television, to provide the most extensive and detailed study to date of the nature and extent of food advertising broadcast following the introduction of regulations to limit children's exposure to these commercial messages.

Chapter 2 provides a detailed description of the materials, methods and measures used in this research. The chapter also considers the psychometric properties of the measures used, evaluating their reliability and validity. A clear rationale for use of these tools is provided.

Chapter 3 details an experimental study conducted as a replication of previous research (Halford et al., 2008a). The objectives of this study were to reaffirm findings relating to the short-term effects of television food advertising exposure on children's food preferences, particularly regarding weight status differences, in a much larger sample than studied previously. Also, to introduce additional novel measures relating to regular television viewing habits in order to investigate any effects relating to habitual food advert exposure.

Chapters 4 and 5 describe individual experimental studies focusing on the branding aspect of television food advertising. The objectives of Chapter 4 were to investigate if there is a relationship between habitual television viewing (a measure of relative advertisement exposure) and awareness of brand equity characters, and further, whether this awareness is related to weight status and food preferences. The objectives of Chapter 5 were to use a novel paradigm based on Pine & Nash (2002) to investigate whether a relationship exists between habitual television viewing (a measure of relative advertisement exposure) and food brand requests, and further, whether this is related to weight status and food preferences.

Chapter 6 details a systematic evaluation of the food advertising shown on the UK television channels most popular with children, assessing both the extent and nature of food advertising. This study offers more than a content analysis, providing comparisons of the type and frequency of foods advertised between specific channels, channel types, programme types, peak and non-peak children's viewing periods, as well as investigating the use of persuasive techniques and branding activity in food advertising.

Chapter 7 collates the original research findings from Chapters 3-6 and integrates them with the literature reviewed in the current chapter. The contribution of this research to current knowledge of this field is discussed and implications for future research are considered.

Chapter Two

2. Methodology

This research sought to add to the literature regarding the television advertising of food to children by utilising a number of innovative methodologies. The use of an established paradigm was enhanced by the inclusion of additional measures in Chapter 3, previous measures of brand awareness were expanded upon and combined with measures of food preference for the first time (Chapter 4), an original task was created through the adaptation of an interesting paradigm used in a novel way (in a food-related context) in Chapter 5 and the strengths of previous content analyses were combined into a single, comprehensive framework and applied systematically to assess the food advertising landscape on UK television more thoroughly than any other study to date (Chapter 6). This chapter describes the general research approach; the measures used in this research; and explains specific decisions made regarding the methodology employed in this thesis.

2.1 Participants

The research focused on the effects of food promotion on the dietary choices of children. Therefore, children of both genders across a range of ages were required to gain an accurate and representative finding. The number and age range of participants had to be limited due to the nature of the tools used, the children's comprehension of the study aims and purpose, as well as the obvious difficulties in accessing large numbers of pre-school children. Participants in this research (Chapters 3-5) were boys and girls aged 6-13 years (mean 9.3 ± 1.6 y). This is consistent with the target age range for this research based on previous studies showing effects of food advertising on preferences/caloric intake in 5-7 (Halford et al., 2007), 9-11 (Halford et al., 2008b; Halford et al., 2004) and 11-13 year old children (Halford et al., 2008a). However, as participant recruitment was based on opportunity sampling (see section 2.1.1) the specific age range of children taking part in individual studies was not controlled for and therefore the breadth of the participant age range varied between studies (whilst remaining 6-13 years overall). The majority of children were Caucasian, although ethnicity was neither recorded nor used as an exclusion criterion.

2.1.1 Participant Recruitment

The most straightforward means for contacting a sufficient number of children within the specified age range was to contact local primary and secondary schools. Participants were recruited from schools in the North West of England, UK (primarily Merseyside, but also Staffordshire, Cheshire and Lancashire). Recruitment was conducted through initial contact with head teachers, and parental contact was made via letters sent out by school administrative/teaching staff (see section 2.2.2 for a full description of the informed consent procedures). All documentation (e.g. study information) was ethically approved prior to use (see section 2.2). The class groups whose parents received the study documents were selected by the school as those who were available to take part in the research procedures at the time of the study (i.e. potentially excluding children in year groups who were occupied undertaking school assessments, rehearsing school performances, had recently taken part in similar research etc.). Therefore from each school an opportunity sample was recruited within the overall age range (6-13 years) specified as appropriate by previous research. As the recruitment of schools for participation in these studies was also carried out using a convenience sampling technique, this may have resulted in a bias towards the inclusion of schools with higher levels of motivation regarding healthy eating and lifestyle initiatives. This was not controlled for in the studies, however, as effects of food advertising exposure were found in these children from schools that are potentially highly motivated it is likely that the current research has under rather than over-estimated the magnitude of effect.

2.1.2 Body Mass Index and Weight Status

Standard measures of overweight and obesity in children use age- and gender-adjusted Body Mass Index (BMI). Participants' height was measured to the nearest 0.1cm using a stadiometer (SECA Leicester Portable Height Measure) and weight using recently calibrated weighing scales (SECA 770) to the nearest 0.1kg. BMI was then calculated as weight (kg)/height (m^2).

Using internationally recognised criteria for children, as recommended by the International Obesity Task Force (Cole et al., 2000), overweight and obesity were defined based on age- and gender-specific BMI cut-off points equivalent to adult BMIs of 25 kg/m^2 and 30 kg/m^2 respectively. Due to the small number of participants in the 'obese' weight category, overweight and obesity were combined within the statistical package PASW v.17 (SPSS Inc., Chicago, US) to create a dichotomous measure; 0 for normal weight and 1 for overweight/obese, to avoid significant disparity between group sizes.

BMI was also converted to an age- and gender-appropriate standard deviation score (BMI SDS) using 1990 reference standards for the UK (Cole et al., 1995) for use in correlations. This standardisation is required as BMI is subject to much variation during childhood and adolescence according to age and gender (related to differing growth patterns, weight gain, and changes in body composition) therefore calculating BMI SDS is the most accurate way of comparing BMIs in a group that is heterogeneous with regards to age and gender. For example, using the criteria outlined above (Cole et al., 2000) a BMI of 21.2 kg/m^2 would be classified as overweight for a 12 year old boy but normal weight for a girl of the same age. Furthermore, a BMI of 20.0 kg/m^2 would indicate obesity in 6 year old children, whereas a child aged 11 years would be considered normal weight with the same BMI.

Use of standardised scores rather than raw BMI values in addition to age- and gender-specific weight status categories ensures that these data are comparable to other international studies, and that interpretations based on statistical analyses of these data are valid and meaningful.

2.2 Experimental Ethics

Working with children provides the researcher with many ethical challenges, particularly over the recruitment process in general and the nature of informed consent in particular. The nature of ethical scrutiny depends as much on the age and the ability to give consent of a child as on the perceived risks in taking part in the study. All studies were ethically approved but some were dealt with within the School of Psychology while others were taken to one of the central University Committees.

Ethical approval for the study described in Chapter 3 was provided by the University of Liverpool School of Psychology Ethics system in 2004, and renewed yearly thereafter.

Ethical approval for the studies described in Chapters 4 and 5 was provided by the University of Liverpool Research Ethics Sub-Committee for Non-Invasive Procedures (Ref RETH000094, see Appendix 1).

2.2.1 Ethical Considerations

The University of Liverpool 'Code of Practice for Experiments with Human Volunteers' applies wherever the possibility exists that an experiment may introduce special hazards or intensify "everyday" hazards. This code was followed at all times during research for this thesis. However, the studies featuring human participants (Chapters 3 to 5) only carried extremely minimal risk as all study procedures took place in the child's normal school environment and all written tasks conferred no particular risk above and beyond normal everyday school tasks for the child. The only potential forseeable physical or psychological risk related to the use of stadiometers and weighing scales for height and weight measurements. The space available and positioning of these items was thoroughly checked to ensure safety and privacy, and both the researcher and a member of school staff was present at all times to weigh and measure each child individually. Testing would have beeen ended immediately if any children had shown signs of distress, but this did not occur at any stage. The previously recorded measurements of height or weight were not visible to the subsequent participant.

2.2.2 Informed Consent Procedures

The Head teacher (Gatekeeper) of each school provided informed consent (see Appendix 2a-c) for the study procedures (acting in loco parentis) before each experiment commenced. The studies took place during school hours and in the normal school environment, therefore the Head teachers were able to safeguard the interests of pupils and only give consent for research to proceed where they were satisfied that participation in the study would confer no risk to the child, physical or psychological, above and beyond a normal school day. In addition to the Head teacher, a named contact within each school (identified to oversee the running of the study) was also provided with all study information and contact details (email address and office telephone number) for the Principal Investigator (Dr Jason Halford) and the researcher (Miss Emma Boyland) so that they were able to ask questions at a later date if they wished.

These studies and the associated consent procedures complied fully with University of Liverpool's Policy Documents 'Draft Policy on Information

Governance in Research Involving Human Participants' and 'Draft Policy on Requesting Consent for Research Involving Human Participants'; prepared by the Department of Medicine and currently being considered by the University Council (www.liv.ac.uk/humantissues/; last accessed 25th June 2010). The 'Requesting Consent' document states that children are defined in the Human Tissue Act as those less than 18 years of age and they may consent to involvement in a research study if they are competent to do so.

From an experimental ethics perspective, children aged approximately 12 years and above are generally considered to be capable of understanding what a study involves and thus can give informed consent on their own behalf. For this research, all potential child participants undertook informed consent procedures, and those providing consent did so actively and individually. However as 12 years of age was towards the upper limit of the target age group for these studies (with the majority of participants being below this age) it was deemed appropriate to incorporate the additional level of security offered by providing parents of all potential participants with study information and giving them the opportunity to make their wishes regarding their child's participation known. These wishes were of course abided by, and children whose parents did not did not wish them to participate were not asked to, and were given alternative classroom based tasks to complete so as not to feel isolated from the study group.

2.2.2.1 Notifying Parents of the Study

Parents of potential participants for the study described in Chapter 3 were sent study information (Appendix 3) and were asked to sign and return a slip at the bottom of the letter if they did not wish for their child to take part in the study.

Parents of potential participants for the studies described in Chapters 4 and 5 were sent study information (Appendix 4) and were asked to sign and return a slip at the bottom of the letter if they were happy for their child to take part in the study.

2.2.2.2 Obtaining Informed Consent from the Children

All potential participants were given study information to read at least one week prior to the proposed study day, in order that they would have time to read the information and discuss it with their class teacher and parents if they wished. On study days, the study information was verbally explained to the children along with a further paper copy (Appendix 5a-c) and in a minimal pressure situation (small groups of children with the teacher present) they were given the opportunity to ask questions. It was made clear to the children that they had the right to withdraw from any part/all of the experiment without having to give a reason. Children who were reluctant to participate were not co-erced. Children who were happy to take part in the study were asked to sign the consent form (Appendix 5a-c) individually (i.e. to prevent a child having to indicate in the presence of others whether they were agreeing to participate or not), and those who did not wish to participate were given alternative tasks by the teacher. After the final experimental session of each study, the participants were thanked and the study's aims and objectives were explained.

2.2.3 Data Confidentiality

Participants were allocated a number on recruitment to each study and were not identified by name, initials or date of birth. Screening details and all study data in manual form were stored in a locked filing cabinet in a locked room. Electronic study data were stored on a PC with password protection and up-to-date anti-virus software. All Head teachers were offered a copy of the data gathered at their school, and if required this was provided in an anonymised way with no reference to individual participants.

2.3 Materials

In terms of ecological validity, studying the outcomes of participant exposure to normal stimuli in an entirely natural context is preferable for any researcher. However, there are inherent difficulties in using such methods in experimental designs to investigate children's food preference or intake responses to television food advertising, notably a lack of control over both the manipulation (confounding variables not accounted for) and measurement (data collection errors, underreporting) (Stubbs, Johnstone, O'Reilly, & Poppitt, 1998). The television advertising stimulus (described in section 2.3.1 below) and the brand character and product flashcard task (described in section 2.5.4) both used actual advertisements, characters, and products shown on television and both commonly available and familiar to UK consumers to ensure naturalistic experimental stimuli where possible. Furthermore, all studies with human participants (Chapters 3-5) took place in schools which could be considered to represent a good compromise between the artificiality of laboratory-based studies and the loss of methodological control inherent in epidemiological studies (Stubbs et al., 1998).

2.3.1 Television Advertising Stimuli

To assess the acute experimental effects of television food advertising exposure in Chapter 3, two television advertising stimuli were developed in line with those used in previous studies of this research group (Halford et al., 2007; Halford et al., 2008b; Halford et al., 2008a; Halford et al., 2004). Using PC-based DVD editing software (Nero 7, Nero AG, Germany) 10 food advertisements were placed onto a DVD followed by an episode of Scooby Doo on the same disc. This process was then repeated to insert 10 toy advertisements onto a DVD followed by the same Scooby Doo cartoon. Food and toy advertisements were selected from recordings of both children's and family programming on popular UK terrestrial and cable commercial channels, the first 10 adverts of each kind that were believed to be aimed at children and young people were selected for inclusion. The food adverts featured (in order of screening) were: Burger King Whopper burger; Nestlé Golden Nuggets; Iceland party snacks; Topps Juicy Drop Pops; Kellogg's cereal bars; Kentucky Fried Chicken Twister; McCain Home Fries; McDonald's Happy Meal; McVities Fruitsters biscuits; and Kellogg's CocoPops Mega Munchers. The toy advertisements featured (in order of screening) were: a Barbie doll; 'Don't Wake Dad' boardgame; Dr Who toy; Funky Furby; Garfield electronic game; Nsects toy; Optix memory game; Megablocks toy; Pop-Up Pirate game; and a Screwball Scramble boardgame set.

Each advert was approximately 30 seconds in length, for a total advertising exposure time of 5 minutes in each condition. As stated, the adverts were followed immediately on the same DVD by the same 20-minute episode of the cartoon Scooby Doo in each condition. The same episode was used on both DVDs to ensure that only the advert content varied between conditions. The toy and food adverts were not matched, and the nutritional content of the foods in the adverts was not analysed because the study was designed to examine the beyond-brand effects of typical television food advertising rather than specific effects relating to the types of products or brands shown.

2.4 Methods

Three experimental designs were used in this thesis to examine the effects of television food advertising on children's food preferences, choices, brand awareness and product request behaviour as well a further content analysis design to analyse the landscape of television food advertising on UK TV. The use of a variety of approaches is a strength of this thesis. Incorporating several different designs helps to increase the likelihood of capturing effects where they exist. Chapter 3 follows a series of published studies using similar paradigms (Halford et al., 2008a; Halford et al., 2007; Halford et al., 2008b; Halford et al., 2004) but the inclusion of an additional measure (a television viewing questionnaire) enabled the investigation of individual differences in response to add to current knowledge. After Chapter 3, Chapters 4 and 5 address related concepts but different issues, therefore the particular designs selected for use were deemed the most appropriate for this hypothesis-driven research. Broadening the approach by incorporating novel paradigms ensures the advancement of research in this area, and the use of such a flexible approach to the study of television food advertising and its effects provides a more complete picture than repeated use of similar study designs.

2.4.1 Experimental Designs with Human Participants

In the first study (Chapter 3), a mixed-measures design was employed. Experimental condition (toy or food advertisement exposure) was a within-subjects factor; all participants took part in both conditions and therefore acted as their own control. This allowed for a robust assessment of the effects of television advertisement exposure on the outcome measures specified. However, between-subject comparisons were carried out for weight status, BMI SDS and TV viewing level.

The studies described in Chapter 4 and 5 used a between-subjects design. This was most appropriate to address the aims of the studies. For Chapter 4, to assess the effect of habitual advertising exposure on children's knowledge of brand character-product associations requires between-subject comparisons of brand awareness, although some within-subject comparisons were conducted (e.g. total non-branded versus total branded food items selected on the food preference measures [see section 2.5.1]). For Chapter 5, to assess the effect of habitual advertising exposure on children's food product requests also necessitates between-subject comparisons of requests made, although again some within-subjects comparisons were made regarding food preferences.

2.4.2 Content Analysis

This element of the thesis (Chapter 6) systematically and comprehensively measured the extent and nature of television food advertising on the UK TV channels most popular with children and adolescents in 2008. The protocol for this research combined the best attributes of previous research in this field, notably that of Kelly et al., (2010) (based on Chapman et al., (Chapman, Nicholas, Banovic, & Supramaniam, 2006)) and The Australian Centre for Health Promotion (Australian Centre for Health Promotion, 2006) and used by our own laboratory to collect the UK data for that collaborative international study) and the Kaiser Family Foundation (Gantz, Schwartz, Angelini, & Rideout, 2007) . The merits and drawbacks of this approach are discussed in later chapters.

2.4.2.1 Television Sampling

Specific channels were selected on the basis of their popularity with children and young people aged 4-15 years (Thickett, 2007) and 5-16 years (Childwise, 2007).

Information regarding the channels most viewed by children was requested from the UK broadcast regulator, but Ofcom withheld the information requested under section 43 of the Freedom of Information Act (see Appendix 6). However, Ofcom did provide a presentation document (Thickett, 2007) that was already in the public domain (available through the Ofcom website) including tables and figures relating to the share of children's viewing of the different children's channels on all platforms, as well as levels of children's viewing across the day (see 2.4.2.3 Viewing periods). From this information it was ascertained that, of the dedicated children's channels, the following channels were most popular with children 4-15 years in multichannel homes (over 90% of homes in the UK): the Disney Channel, CBeebies, CBBC, Nickelodeon, Boomerang, CiTV, Cartoon Network and Jetix. Of these, three channels were not included in the sample: CBeebies and CBBC are non-commercial channels; and the Disney channel was also excluded from the study as it does not broadcast traditional food advertising, only television programme sponsorship (Gantz et al., 2007). Further, it was also stated that a proportion of children's viewing (18%) was devoted to terrestrial public service broadcasters (ITV1, Channel 4 and Channel Five) (Thickett, 2007) therefore these channels were also chosen for inclusion in the sample. Childwise's trends in children's TV viewing (2007) asserted that 96% of 5-16 year olds surveyed had watched satellite, cable, or digital TV in the preceding week. Therefore the remaining 6 channels chosen for inclusion were the most popular channels with 5-10 and 11-16 year old boys and girls available through these platforms (Smash Hits, MTV, Sky One, Sky Sports One, E4 and The Hits (rebranded as 4Music during the study period)) (Childwise, 2007).

Recordings for each channel we made on one weekday and one weekend day every month between January and December 2008. Where possible national holidays, large sporting competitions, special events and low rating (i.e. holiday) periods were avoided. To minimise the effects of advertising variation across days of the week, weekday recordings were always made on Tuesdays or Thursdays. Weekend recordings were made on Saturdays or Sundays. Television was recorded from 06:00 to 22:00 hours on test days. Therefore, for each channel 24 samples were obtained (12 weekdays and 12 weekend days) of 16 hours each, with two exceptions. Firstly, the sample for one day of recording for Sky One (a Thursday in June) is limited to 9.5 hours (6am – 3.30pm) due to recording errors. Secondly, CiTV only broadcasts from 6am-6pm therefore samples for this channel only cover 12 hours.

2.4.2.2 Definition of Programme and Non-programme Content

Non-programming content was defined as "any content not directly related to the programme being aired at that time" (Gantz et al., 2007). Items considered to be part of programming and therefore not included in the recording of non-programming content were: opening and closing credits, closed captioning acknowledgements, brief sponsorship announcements (e.g. 'Mars Planets sponsors Friends'), and promotions for content to appear later in the same programme (Gantz et al., 2007). Longer messages relating to upcoming episodes of the programme were coded as advertisements if they were at least 10 seconds long and provided some description of the programme or series rather than merely flashing up an image or a brief statement relating to that programme. Typically, the distinction between programming and non-programming content was clear with no coding ambiguities.

2.4.2.3 Coding of Non-programme Content (Advertisements)

The full coding scheme is provided in Appendix 7.

Channel, day of the week, and time of day

For every item of non-programming content, the following information was recorded: the channel it was broadcast on, the day of the week, the starting time of the programme and the time of day. The time of day was coded by half hour time segments, e.g. 06:00 - 06:29 hours was coded as time slot 1, 06:30 – 06:59 was coded as time slot 2 etc.

Programme type

Every item of non-programming content (advertisement) was also coded for both the name and type of programme it was embedded in or adjacent to. The type of programme was coded as one of 15 categories: comedy, drama, movie, soap opera, music/music video, news/commentary, talk shows, reality, sports, entertainment/variety, documentary, game, children's, infomercial or other (Kelly et al., 2010; Gantz et al., 2007). Children's shows were defined as any program designed to appeal primarily to children under the age of 12 years (Gantz et al., 2007).

Viewing periods

Children's television viewing periods were classified in two ways.

Firstly, peak children's viewing times were defined as viewing periods where the number of children watching television (on all analysed channels combined) is greater than a quartile of the maximum child audience rating for the entire day (Kelly et al., 2010). These viewing periods were ascertained, using data on the TV viewing trends of 4 – 15 year old children published in Appendix 3 of an Ofcom report (Ofcom, 2004), as 17:30-22:00hrs on weekdays and 19:00–21:00hrs on weekend days. All other viewing times were designated 'non-peak'.

Secondly, high and low children's viewing times were assigned from the same data (Ofcom, 2004) but with the use of less stringent criteria. Time periods were defined as 'high children's viewing periods' where the proportion of children watching television visibly peaked, between 07:30–09:00hrs and 15:00–22:00hrs on weekdays and 08:00–22:00hrs on weekend days. All other viewing times were designated 'low'.

Advertisement position (between or within)

Advertisements were coded as either within (0) or between (1) programming, with the content aired between programmes coded as being associated with the preceding programme.

Type of product or service

Every advertisement was coded for the type of product or service represented. The categories used for this variable were: food/drink; clothes/shoes; education; entertainment (e.g. music, video, films, entertainment parks); financial (e.g. building societies, banks, insurance, pensions); household cleaners/detergents (e.g. washing up liquid, washing powders, cleaning fluids); household equipment (e.g. electrical appliances); motoring (e.g. cars and petrol); pet products (e.g. pet food), pharmaceutical (e.g. medications, breath fresheners); public service announcements/community service announcements (general); public service announcements (sponsored by food companies); publishing (e.g. magazines, books, newspapers); retailing/mail order (e.g. catalogues); toiletries (e.g. soap, hair shampoo, cosmetics, nappies, sanitary protection); toys; travel/transport/holidays; utilities (e.g. telephone, gas, electricity); channel promotions (e.g. promotions for other programmes on that channel or associated channels); and other (Kelly et al., 2010; Gantz et al., 2007).

2.4.2.4 Coding of food advertisements

Each food advertisement was further coded for: the type of food represented; the use of promotional characters; celebrities; premium offers; and persuasive appeals; physical activity depiction; the use of specific health claims; the use of disclaimers; the primary target of the food advert; and the inclusion of directions to a website (Gantz et al., 2007; Kelly et al., 2010).

Type of food

This research utilised a simple descriptive content analysis method, with observation categorisation of food items into relatively healthy or unhealthy items (Gantz et al., 2007; Kelly et al., 2010).

For all food advertisements, a brand name (e.g. Kellogg’s) was recorded and a thorough description of the product was entered (e.g. chocolate coated rice grain breakfast cereal). Furthermore, as food advertising was the central component of this research, each food product was categorised as one of 3 major food groups (core/healthy, non-core/unhealthy and miscellaneous foods) and then specifically as one of 28 food categories.

Core foods, defined as those foods that are required daily to meet nutrient requirements, included: breads (including high fibre, low fat crackers, rice, pasta and noodles); low sugar/high fibre breakfast cereals (<20g sugar/100g and >5g dietary fibre/100g); fruits and fruit products (without added sugar); vegetables and vegetable products without added sugar; low fat/reduced fat milk, yoghurt, custard (<3g fat/100g) and cheese (<15g fat/100g); meat and meat alternatives (not crumbed or battered, including fish, legumes, eggs, nuts, nut products excluding those sugar coated or salted); core foods combined (including frozen meals with <10g fat/serving, soups with <2g/100g fat, sandwiches, mixed salads; low fat savoury sauces with <10g fat/100g), baby foods (excluding milk formulae); and bottled water (including mineral and soda water).

Non-core items, defined as those that provide nutrients and/or energy in excess of requirements, included: high sugar/low fibre breakfast cereals (>20g sugar/100g or <5g dietary fibre/100g); crumbed/battered meat and meat alternatives (e.g. fish fingers, frozen meals with >10g fat/serving); cakes (including muffins, sweet biscuits, high fat savoury biscuits, pies and pastries); snack foods (including chips, savoury crisps, extruded snacks, popcorn, snack bars, muesli bars, sugar sweetened fruit and vegetable products, and sugar coated nuts); fruit juice and fruit drinks; frozen/fried potato products (excluding packet crisps); full cream milk (including yoghurt, custard, dairy desserts with >3g fat/100g, full fat/25% reduced fat cheese and their alternatives); ice cream and iced confection; chocolate and confectionery (including regular and sugar-free chewing gum and sugar); fast food restaurants/meals (including pizzas, burgers, 'healthy' alternatives from fast food restaurants); high fat/sugar/salt spreads (including yeast extracts, oils, high fat savoury sauces with >10g fat/100g, meal helpers such as stocks and tomato paste, soups with >2g fat/100g); sugar sweetened drinks (including soft drinks, cordials, electrolyte drinks and flavour additions e.g. Milo); and alcohol.

Miscellaneous foods included: vitamin and mineral supplements; tea and coffee; supermarkets advertising mostly non-core foods; supermarkets advertising mostly core foods; generic supermarket ads (or those not clearly advertising core or non-core items); and baby/toddler milk formulae.

If more than one food product was shown in the advertisement, the most dominant one was coded. If equal attention was given to a number of products, the product that was shown first was assessed for that commercial (Kelly et al., 2010). When necessary, information required to correctly classify advertised products was obtained by consulting company websites or the ingredients labels on product packaging.

Promotional characters and celebrities

Every food advertisement was coded for the inclusion of promotional characters and celebrities (1 for character/celebrity featured and 0 for none featured), and to count for this variable the character/celebrity had to be noticeably featured or in the foreground of the advert (Gantz et al., 2007). A further variable was coded specifically categorising celebrities as an entertainment celebrity, sportsperson, business leader, politician or other (Gantz et al., 2007). An additional variable was coded to record whether the promotional character used was a brand equity character ("characters which are created for the sole purpose of promoting a product or brand" (Garretson & Niedrich, 2004) such as Tony the Tiger representing Kellogg's Frosties) or a licensed character (where the character has been created for an animated programme or movie and is then licensed by brands to appear in their promotions such as Shrek, previously used to advertise Kellogg's Frosties).

Premium offers

Food advertisements were assessed for the use of premium offers (including giveaways, competitions, contests, vouchers and rebates) to promote foods (Gantz et al., 2007; Kelly et al., 2010).

Persuasive appeals (primary and secondary)

The primary persuasive appeal of each food advertisement was coded as one of 17 options as used by the Kaiser Family Foundation (Gantz et al., 2007) and previously by Kunkel & Gantz (1992). The appeals coded were: quantity; convenience; taste; health/nutrition; energy; price; unique/new product; fun; general superiority; peer status/sex appeal; premium/contest; weight loss/diet; choices/options offered; enjoyment/satisfaction; product information; corporate information; or other. If a food advertisement did not use health/nutrition or energy as a primary appeal, use of either of these as a secondary appeal was recorded.

Depiction of physical activity

A variable was coded to indicate whether food advertisements depicted physical activity or a physically active lifestyle through the use of human characters (whether real or animated). As defined by the Kaiser Family Foundation (Gantz et al., 2007), to be coded as depicting physical activity the character(s) needed to be engaged in purposeful physical activity, i.e. not merely walking slowly or simply moving about. The movement was required to be reasonably prominent i.e. in the foreground or featuring in a number of shots.

Specific health claims

The use of health claims, whether verbal or textual, was coded for each food advertisement. Where more than one claim was made, the first mentioned health claim was used. 15 health claim categories were used: low fat/fat free; sugar free; no added sugar/less sugar; low calorie/light; low carbohydrate; organic; natural ingredients/all natural/no preservatives/nothing artificial; provides essential nutrients (including protein, calcium, potassium, vitamins, antioxidants); wholegrain/whole wheat; fibre/bran; heart healthy; low cholesterol; diet; baked; (Gantz et al., 2007) or part of an individual's "five a day".

Disclaimers

Every food advertisement was also studied for the use of disclaimers, both verbal and textual. Five categories of disclaimer were used: part of a balanced/complete/nutritious breakfast or meal; part of a balanced/healthy diet; not a substitute for a real meal; enjoy in moderation; or other (Gantz et al., 2007).

Primary target of food adverts

Categorising food advertisements in terms of the specific target audience the advert was aimed at was a subjective decision, determined by the broad content of the advert. The age of the actors in the advert, the channel it was broadcast on, and the nature of the persuasive appeal were all considered as determinants of the intended target audience. Target audiences were coded as: children and/or teens; teens and adults; adults (20-64y); older adults (65+y); and all ages (Gantz et al., 2007).

Direction to website in food adverts

This variable was used to indicate whether a company website was mentioned/website address flashed up on the screen during food advertisements, if this occurred then that advert was coded as directing the viewers to the company's website (Gantz et al., 2007).

2.4.2.5 Coding procedure

As a single researcher undertook all coding, no inter-coder reliability measurements were required. However, prior to coding data for the study described in Chapter 6, the coding scheme was studied intensively and for practice purposes a small sample (2 hours) of television was recorded and coded. The coding was reviewed by the researcher a week later and as no discrepancies were found, coding was considered to be consistent and accurate so assessment of study recordings commenced.

Television was recorded using Toshiba LCD colour televisions (model 15VL63B) and Samsung DVD-HR753 DVD recorders. Recordings were made initially onto the hard disk drive of the DVD recorder, and then copied onto DVD discs for coding and storage. Coding was initially recorded on Excel (Microsoft Corporation, US) spreadsheets with clearly labelled variables.

2.5 Measures

For the research questions addressed by this thesis, assessments of food preference, choice, television viewing habits, advertisement recognition and brand awareness were required (the dependent variables). This section describes the variety of relevant measures used in this thesis, including considerations of the strengths and weaknesses of each task.

As these measures were all self-report by the child participants, it is important to state that children were guided through all measures question by question/item by item to increase the completion rate and accuracy. The class teacher ensured silence during the completion of the measures so that children were not colluding or influencing each other’s responses. Further details are provided in Appendix 19.

2.5.1 Food Preference and Choice Measures

This thesis relied on self-report measures to assess food preferences in the study population; this introduced a potential source of bias into the study design. The use of food diaries or observation methods may have been more accurate, but these techniques are expensive and time consuming and so would have impacted negatively on the sample size studied. Furthermore, such methods also must incorporate the children’s parents into the data collection process, which would have introduced arguably and even greater source of social acceptability bias than the children themselves (Kopelman et al., 2007).

Procedures involving the tasting and ranking of food items have often been used to assess food preference (Coldwell, Oswald, & Reed, 2009; Fieldstone, Zipf, Schwartz, & Berntson, 1997; Grimm, Harnack, & Story, 2004) and such methods have been shown to generate reliable results in very young children (Birch et al., 1990; Birch & Sullivan, 1991). However, while this design is appropriate for studies with a laboratory setting (where foods can be prepared in a standardised way), it is less applicable to studies with older children where procedures need to be school-based in order for reasonable sample sizes to be tested (Guthrie, Rapoport, & Wardle, 2000). In non-laboratory studies, the most appropriate options are questionnaire-based tools as used by several authors (Breen et al., 2006; Bauer et al., 2009; Black, 2009; Duffy et al., 2007) including self-report measures completed by children (Cooke & Wardle, 2005). However it is difficult to compare the reliability of various methods used due to differences between the tasks (e.g. food frequencies, Likert scales, food pairing) which may vary in difficulty, and the foods used (there is likely to be variation in the stability of food preferences for different items) (Guthrie et al., 2000).

Of the questionnaire styles, Hill & Blundell (1982) purport that a simple checklist is the most effective method for measuring food preference changes as well as their relative prevalence. One study did assess the test-retest reliability of this type of method in 5 year old children; and found correlations between 0.52-0.72 for the same foods rated twice with a one week interval (Guthrie et al., 2000). Hill & Blundell (1986) state that “measurements of food preference by means of a carefully devised checklist or forced choice procedure represent useful and valid tools".

Although specific reliability and validity data are not available for the food preference measures used in the current study, they have been shown to be sensitive to the effects of interventions in both children (Halford et al., 2008a) and adults (Blundell et al., 2005; Larsen et al., 2010; Blundell et al., 2006). The above cited studies also used the food choice tool adopted for Chapter 3, although effects of the manipulation on food choices were not seen in children when this measure was used (Halford et al., 2008a). This may be an artefact of the different foods involved and the different response format required. However, although this may also suggest a lack of sensitivity for this measure, it could indicate that the forced choice may be measuring a different aspect of motivation to eat than the food preference measures and therefore further exploration of this tool is warranted.

2.5.1.1 The Leeds Food Preference Measure (LFPM; Appendix 8)

The Leeds Food Preference Measure (LFPM) is a food preference checklist that was first described by Blundell & Rogers (1980). It was developed in order that subjectively perceived changes in specific macronutrient (carbohydrate and protein) preferences following pharmacological manipulations could be recorded. In its original format, the questionnaire consisted of a "menu" of 30 basic food items (15 high protein and 15 high carbohydrate) whose nutritional composition could be readily identified by the participants (Blundell & Rogers, 1980). The measure was found to be extremely sensitive, whereby at a very low dose of fenfluramine for which no measureable effects on food intake or subjective hunger were found, selectively reduced preferences for carbohydrate-rich items were identified by this tool (Blundell & Rogers, 1980; Hill & Blundell, 1982). Furthermore, changes in food preferences reported using a similar checklist were found to alter based on the nutritional value of food consumed (Hill & Blundell, 1982). A modified version of the LFPM (containing 10 high carbohydrate, 10 high protein and 10 low energy density items) used by Hill & Blundell (1986) was found to correlate with subsequent total intake at a free-selection meal at 0.86, protein items with protein consumed (0.76) and carbohydrate items with carbohydrate consumed (0.48). In that study it was found that the food preference measure was sensitive to both the participants' state of food deprivation or repletion, and the nutrient content of the meal consumed (Hill & Blundell, 1986).

The version of the LFPM used in this thesis was described by Hill et al., (1987), and used by Halford et al., (2008a) in a previous study in this age group. The LFPM used is a checklist of 32 non-branded food items. The participant is required to mark next to an item if they would like to eat it at that particular moment, and participants are instructed to consider each item individually and not on the basis of constructing a meal. The list comprises 8 high fat items (e.g., a large chocolate bar; mean fat content 67.5% of total energy), 8 high carbohydrate (CHO) items (e.g., a medium size bowl of fried rice; mean CHO content 71.0% of total energy), 8 high protein items (e.g., a roast chicken breast; mean protein content 67.6% of total energy), and 8 low energy density items (e.g., a small green salad; mean energy 105 kJ/25kcal). Within the categories of high carbohydrate, high fat and low energy density foods there were equal numbers of sweet and savoury foods; in the high protein category there were only savoury foods (Hill, Leathwood, & Blundell, 1987). The items were selected from commercially available foods in the UK and portioned so that all items had similar energy content (750-920kJ/180-220kcal) (Hill et al., 1987).

The LFPM is scored individually for each participant to determine the number of items selected from each macronutrient category (e.g., high fat, maximum score of 8) and the total number of items selected (maximum of 32). When this checklist was adapted for use in North America, it showed good internal consistency (Cronbach's alpha) for the four macronutrient categories (high protein [0.76], high carbohydrate [0.72], high fat [0.64] and low energy density [0.57]) and high test-retest reliability (Brisbois-Clarkson, McIsaac, Goonewardene, & Wismer, 2009).

2.5.1.2 The Adapted Food Preference Measure (AFPM; Appendix 9)

The AFPM was adapted from the LFPM by Hill as part of his PhD thesis (Hill, 1987), to enable preferences for branded foods with different macronutrient compositions to be ascertained (Halford et al., 2008a).

It is a similar checklist to the LFPM, again requiring the participant to place a mark next to an item if they would like to eat it at that moment. However, unlike the LFPM, this measure lists branded food items (well known brands in the UK were chosen). As high protein and low energy density food items do not tend to be branded, the AFPM comprises only 16 items of which 8 are high fat (e.g., a portion of McDonald's fried nuggets), and 8 are high CHO (e.g., 2 pieces of Warburton's bread). Again, the scoring determines the number of items selected from each macronutrient category and the total number of items selected (maximum of 16).

2.5.1.3 Food Choice Measure – the Leeds Forced Choice Test (LFCT; Appendix 10)

A popular method for quantifying food choice decisions is by the use of a forced choice procedure, whereby participants are given two food options and are required to choose one of them. This allows relative preference scores to be calculated for food types (i.e. the number of times that one nutritional/macronutrient type is selected over another) (Hill & Blundell, 1982).

The LFCT is a photographic food choice tool developed by Le Noury as part of her PhD thesis (Le Noury, 2003). The measure has been used previously in a similar paradigm to Chapter 3 (Halford et al., 2008a). It comprises 30 fixed pairs of photographs, each photograph displaying a single non-branded food item. The participant is required to choose which of the two foods they would most like to eat (A or B). Four categories of food are represented, varying along dimensions of both sweetness and fattiness (important factors relating to overconsumption (Blundell & Macdiarmid, 1997; Blundell & Finlayson, 2004): high fat sweet (HFSW), high fat savoury (HFSAV), low fat sweet (LFSW), and low fat savoury (LFSAV). Each category includes 5 common UK food items, each appearing three times: e.g. a jam doughnut (HFSW), a portion of cheese (HFSAV), a portion of marshmallows (LFSW), and a portion of boiled potatoes (LFSAV). The measure includes an equal number (5) of the various combinations of the four categories and was scored to derive variables for relative macronutrient preference (high fat – low fat) and relative sensory preference (sweet – savoury) in each condition.

2.5.2 Television Viewing Questionnaires

There is not yet a gold standard for measuring exposure to media such as TV (Parvanta et al., 2010). Previous studies have used either self-report measures or direct observation but it is yet unclear whether one measure is superior to the other (Bryant, Lucove, Evenson, & Marshall, 2006). Although direct observation techniques are considered to be more objective, they are rarely utilised outside very small studies due to the labour- and cost-intensive nature of this type of measurement (Bryant et al., 2006). Furthermore, the reliability and validity of this method is not guaranteed as variation in inter-rater reliability and difficulty coding participant behaviour contribute to errors (Bryant et al., 2006). The use of direct observation was not financially or methodologically feasible for this research, therefore self-report measures were considered to be the most appropriate tool for measuring TV watching in this population. Self-report instruments (tools exclusively designed to assess TV viewing) used by previous researchers have been shown to have test-retest reliability between $r = 0.58$ (Armstrong, Sallis, Alcaraz, Kolody, & McKenzie, 1998) and $r = 0.94$ (Robinson & Killen, 1995).

The questionnaires were developed by the researcher for this thesis, and as such were similar to those used by other investigators, but relatively unsophisticated and of unknown validity. For the study described in Chapter 3, attempts were made to obtain parental validation of the child's self-report measure (see Appendix 11) despite suggestions that parents tend to underreport their children's viewing (Bryant et al., 2006). However due to poor response rates (less than 10%) these data were not reported, and for the subsequent studies (described in Chapters 4 and 5) this parental validation was discarded in favour of developing a potentially more robust measure for the children to complete.

2.5.2.1 Habitual Television Viewing Questionnaire (HTVQ)

The 24-item Habitual Television Viewing Questionnaire (HTVQ, Appendix 12) was designed to ascertain participant's habitual television advertising exposure by measurement of their television viewing habits. The HTVQ was self-administered by the participants (when instructed by the researcher) and featured the recall frame of a 'typical' day as is most often used for tools of this kind (Bryant et al., 2006). The questionnaire clearly states that it is addressing television broadcasting and not the viewing of DVDs or computer games through the television; this was also verbally reiterated to the children before questionnaire completion. The HTVQ asked the children to report the number of hours of television they view per day, what time of day this viewing takes place and the type of channels viewed (i.e. to give an indication of their relative exposure to commercial or non-commercial broadcasting). The measure also asked children to report on their access to television (i.e. the number of television sets in the house, whether or not they have a set in their bedroom, the existence of any parental viewing restrictions) and whether they have subscriber only (e.g.

cable/satellite) television in their home. Children were also asked to report on their purchase request behaviour, any eating while viewing habits and any other activities they take part in during the week that would restrict their television viewing time (e.g. homework or sports).

The questionnaire used a quantitative response format where appropriate in which participants recorded their TV viewing on a ratio scale anchored by time (e.g. 1-2 h d^{-1}, 3-4 h d^{-1} etc). Average weekly viewing was then calculated by multiplying daily viewing by 7. For analysis, participants were further categorised into high and low TV viewers by virtue of a median split of the entire data set.

2.5.2.2 Revised Habitual Television Viewing Questionnaire (HTVQ-R)

Although children of this age group appeared to be capable of comprehending and completing the HTVQ, a revised version (HTVQ-R) was developed for use in the studies described in Chapters 4 and 5 in an attempt to improve the accuracy of the data collected (Appendix 13). In addition, the length of the original questionnaire was considered to be fairly demanding for some of the children and therefore the HTVQ-R contained just 16 items. Participants had seemed unsure of the existence of any parental restrictions regarding their television viewing, and had difficulty in reporting those restrictions where they existed, therefore this element of the HTVQ was not incorporated into the revised version. The individual items included were also refined to be hypothesis-driven for the studies described in 4 and 5, for example a measure of viewing style was included (i.e. co-viewing with parents versus viewing alone). The HTVQ-R considered weekday and weekend day viewing separately as this is more accurate, taking into account the differences in viewing between school and non-school days, and is more typical of the literature (Bryant et al., 2006). Average weekly time spent viewing television was calculated by weighting the sum of the weekend and week days. Again, for analysis participants were further categorised into high and low TV viewers using a median split of the full data set.

2.5.3 Advertisement Recognition Task

The term ‘recognition’ in this context, as distinct from recall, refers to a child’s ability to select the correct option from a number of visual cues provided. This type of measure has been used previously in the literature to assess children’s advertisement recognition following exposure to advert stimuli (Valkenburg & Buijzen, 2005; Halford et al., 2004; Halford et al., 2007). This task was designed to assess children's ability to identify the adverts they had been exposed to during the experimental manipulation (either 10 toy adverts in the control condition, or 10 food adverts in the experimental condition). For the control (toy advert) condition, children were each given a list of 20 toy items (see Appendix 14a) in their study packs, on which they were asked to circle the items that had appeared in the advertisements they had just been shown. Similarly, in the experimental (food advert) condition, the children were each given a list of 20 food items (see Appendix 14b) and were asked to circle the items that had appeared in the advertisements they had just seen. Responses were marked as the number of adverts correctly and incorrectly recognised in each condition.

2.5.4 Flashcard Task (FT)

As the literature relating to brand character/product recognition and identification is so limited, particularly studies of food brands, there are no published, well validated tools for conducting measurements of such awareness. However, previous studies have used flashcard type tasks whereby the image of a product logo or brand character is presented to a child and either verbal or written responses are recorded (DiFranza et al., 1991; Kopelman et al., 2007; Batada & Borzekowski, 2008). These studies have demonstrated that children typically have high levels of brand logo and character recognition. Therefore it was considered that including both brand character and product stimuli within the task, i.e. asking children to match, for example, an image of Tony the Tiger with an image of the Kellogg's Frosties product packaging (similar to the method used by DiFranza et al., (1991) to match Joe the Camel with the image of a cigarette packet), would likely result in a ceiling effect within the data whereby most children were able to correctly match all products. The use of a single stimulus on each flashcard (i.e. either a brand character *or* a product image, similar to the methods utilised by Kopelman et al., (2007) and Batada & Borzekowski (2008)) required both recognition of the character or product and an element of information processing to retrieve the brand/product knowledge required. As this is more of a challenge than a simpler image matching process, a greater range of responses (and therefore more useful data) would be expected to be gathered. Furthermore, such a task removes the possibility that children are matching logos/characters with associated brands on a merely visual basis, i.e. matching colours, style and text font rather than reporting a true known association, therefore the single image type task is a better measure of actual brand awareness.

Of the two studies whose single image flashcard task focused exclusively on food brands, one used a verbal response method (Batada & Borzekowski, 2008) and the other required a written response (Kopelman et al., 2007). There are limitations with both types of response format. If a child is required to give a verbal response they may feel unduly pressured to answer and may not feel able to take their time to consider their response, in addition to this is the obvious time requirement introduced by the use of such an individual test procedure for each child with a single researcher undertaking the study. Use of a written response format removes these pressures and time constraints but introduces the additional element of the child's intelligence or literacy skill affecting the reporting of results. It was considered that a written format was the most appropriate method to use for the current research, with steps taken to minimise the potentially confounding effects of the child's reading and writing skills or intelligence on the results by supervising the group of participants at all times (teaching staff and the researcher), accepting all recognisable spellings of characters and products (including phonetics), and adjusting the analysis to account for literacy errors (see section 2.5.4.3).

The brand characters and products selected were those found to appear most frequently in UK television food advertising on the channels most popular with children (assessed as part of preliminary analysis of television recordings for Chapter 6); therefore it was believed that all images could be expected to be culturally appropriate and reasonably familiar to the children.

2.5.4.1 Product Image Flashcard Task (PI-FT)

This task was designed to investigate children's brand awareness by determining their ability to identify which brand equity character promotes the product shown in the flashcard stimulus. Ten brand product image flashcards were shown one by one, in a set order: Kellogg's Rice Krispies; Nestlé MilkyBar; McDonald's fries; Kellogg's Frosties; Bassett's Liquorice Allsorts; Honey Monster Foods' Sugar Puffs; Kellogg's Cocopops; Kentucky Fried Chicken; Nestlé's Golden Nuggets; and Nesquik milkshake powder (Appendix 15a). Children were shown the images collectively as a class group, and were asked to individually write down the name of the brand character associated with that product on the form provided (Appendix 15b).

2.5.4.2 Brand Character Flashcard Task (BC-FT)

This task was designed to investigate children's brand awareness by determining their ability to identify which product the brand equity character shown in the flashcard stimulus promotes. Ten brand character image flashcards were shown one at a time, in a set order: Golden Vale's Mr Strings; Nestlé's BuzzBee, Intersnack UK Limited's Pom Bears; Mars' Red and Yellow M&Ms; Weetabix Food Company's Prof Weetos; Kraft Foods' Moo the Dairylea Cow; Proctor & Gamble's Mr Pringle; Unilever's The Animal; Nestlé's Chip the Wolf; and Haribo's Haribo Boy (Appendix 16a). Again, children were shown the images collectively as a class group, and were asked to individually write down the name of the branded product that character promotes on the form provided (Appendix 16b).

2.5.4.3 Coding Responses to the Flashcard Tasks

Responses to the flashcard tasks were categorised as correct, partially correct and incorrect/not identified. Identification scores were calculated using both a moderate measure in which partially correct responses were categorised as correct, and a more conservative measure in which partially correct responses were categorised as incorrect. Therefore for each child, three scores were entered onto the data sheet for the PI-FT (each to a maximum of 10): total number of brand characters identified correctly (conservative measure); total number of brand characters identified correctly or partially correctly (moderate measure); and total number of brand characters incorrectly identified/not identified. A further three were entered for each child for the BC-FT (again each to a maximum of 10): total number of products identified correctly (conservative measure); total number of products identified correctly or partially correctly (moderate measure); total number of products incorrectly identified/not identified. Further details are provided in Appendix 20.

2.6 Statistical Analysis

The variety of statistical tests used in this thesis reflects the range of outcome variables generated by this research. The most appropriate analyses were adopted for each variable and all are described below and in the relevant chapters.

Data analysis was performed using PASW v.17 for Windows (SPSS Inc., Chicago, US). Z-score analysis (determining how far each individual score is from the entire distribution's mean) was used to identify outliers; a score outside the range of -3 to +3 would have been considered an outlier and removed from the data set, however this did not occur.

Prior to analysis, all data were tested for the assumptions for parametric data analysis. Normality of distribution was statistically assessed by the examination of skewness and kurtosis.

For normally distributed data (Chapter 3), homogeneity of variance (using Levene's F-test or Box M-test) and covariance (Mauchly's test of sphericity) were assessed, and if violations were found, multivariate tests (MANOVA) were adopted for those variables. If all assumptions for parametric analysis were met, within-subjects and mixed-measure analyses of variance (ANOVA) and bivariate correlations (Pearson's *r*) were used. Where appropriate, post-hoc planned t-tests were carried out to identify the location of significant differences (with Bonferroni adjustments for multiple comparisons). Two-tailed comparisons were used and statistical significance was taken at the 0.05 level unless otherwise stated. Due to issues of multi-collinearity, food choice data from the LFCT (see section 2.5.1.3) were converted to variables for relative macronutrient preference (high fat – low fat) and relative sensory preference (sweet – savoury) in each condition.

Where data were not normally distributed (Chapters 4-6), non-parametric analyses for related samples (Friedman's ANOVA) and independent samples (Kruskal-Wallis tests) were performed. Wilcoxon Signed Rank tests and Mann-Whitney U tests were used where appropriate to identify the location of significant differences (with Bonferroni adjustments for multiple comparisons). Non-parametric correlational analyses were conducted using Spearman's *r*. Two-tailed comparisons were used and statistical significance was taken at the 0.05 level unless otherwise stated.

For chapter 6, data from recorded television advertising were originally entered into Excel 2007 spreadsheet (Microsoft Corporation, US). These data were then converted into an PASW data sheet (SPSS Inc., Chicago, US). Data for each recording sample (i.e. each 16 hour recording, a single day for a single channel) was then summarised to provide frequency data for 272 variables specified in a new PASW data sheet. These variables included the total number of adverts in that recording, the total number of food adverts, the percentage of food adverts that were for core foods, non-core foods and miscellaneous foods, the percentage of food adverts that were broadcast during peak and non-peak children's viewing times etc. These data were then analysed using PASW v17.

Chapter Three

3. An experimental study of the effect of television food advertising on food preferences and choice in children of differing weight status.

3.1 Introduction

Despite considerable debate regarding the effects of food promotion on children's food preferences, few recent studies have addressed this issue. Early studies showed that exposure to television food advertisements (adverts) has an effect on children's reported food preferences, whereby children are more likely to select the high fat, sugar or salt items over healthier alternatives after viewing them (Stoneman & Brody, 1981; Goldberg, Gorn, & Gibson, 1978a; Goldberg, Gorn, & Gibson, 1978b). This work indicated that this line of research has merit and is worth further investigation. However, the early studies were typically conducted in the US around 30 years ago. Therefore, there is a limited capacity to generalise from such studies to UK children and to the current television landscape, which has changed beyond recognition with the market penetration of cable and satellite systems offering a multitude of, often age-targeted, channels. In addition, those initial studies did not seek to investigate the variation in responses to food adverts, but it is possible that individual differences may provide clues as to the mechanism behind these advertising effects.

Following initial studies that demonstrated effects of television food advert exposure on actual food consumption (Halford et al., 2004; Halford et al., 2008b; Halford et al., 2007), our own research group recently used a similar paradigm to carry out pilot work examining effects on self-reported food preferences (Halford et al., 2008a). These studies all included a measure of weight status, to enable exploration of one potential variable that may mediate the relationship between exposure and response. In the 2008 study, (Halford et al., 2008a) children aged 11-13 years were exposed to ten food adverts and ten toy adverts followed by the same cartoon in a within-subjects, counterbalanced design. Subsequent to exposure, children completed food preference (the Leeds Food Preference Measure [LFPM] and Adapted Food Preference Measure [AFPM], see sections 2.5.1.1 and 2.5.1.2) and food choice measures (Leeds Forced Choice Test [LFCT], see section 2.5.1.3), as well as an advertisement recall task. It was found that following exposure to food adverts, normal weight (NW) children selected more branded and more non-branded foods than in the toy advert (control) condition.

Specifically, the normal weight children selected a greater number of high fat items (branded and non-branded), branded high carbohydrate (CHO) items, total branded, total non-branded items, and total food items in the food advert condition relative to the control condition. In addition, the overweight and obese (OW/OB) children showed a greater preference for branded food items than did the NW children in the control condition, but did not display between-condition differences in food preferences. Therefore, the food advert exposure in the NW children resulted in that group reporting food preferences similar to those of the OW/OB children in both conditions. There was also a significant and positive correlation between the ability of the OW/OB children only to recall which food adverts they had seen and the number of food items selected in the food advert condition (Halford et al., 2008a).

Interestingly, the findings suggest that not only did food advert exposure have an effect on food preferences in children, but also that there were weight status differences in children's preferences for branded food items. The association between advert recall and food preference in the OW/OB group only is also consistent with previous data; with one explanation for this being that attention to external food cues may influence food-related behaviours (Halford et al., 2004; Schacter, 1971). However, no measure of television viewing was taken, so it is not possible to establish if the levels of food advert recall in OW/OB children were related to either attentional bias or enhanced responsiveness, or their habitual advertising exposure (i.e., greater familiarity with the adverts or increased awareness of brands).

A further limitation is that this was a pilot study with a small sample size: only 37 children took part, including only 13 OW/OB children, constraining the number of possible between-group comparisons and also the generalisability of the findings to the wider population.

The current study was designed to re-examine the effects of food advert exposure on children's food preferences and choices whilst addressing the limitations of the Halford et al., (2008a) study. The inclusion of a measure of television viewing (as a proxy measure for habitual advertising exposure) is an important improvement to previous studies. Television viewing has been repeatedly linked to increased risk of obesity (Dietz & Gortmaker, 1985; Gortmaker et al., 1996; Andersen, Crespo, Bartlett, Cheskin, & Pratt, 1998), independently of numerous other factors such as socioeconomic status, familial tendency to overweight, and levels of physical activity (Hancox & Poulton, 2006; Eisenmann et al., 2008). There is evidence that high levels of television viewing are associated with poor dietary habits, including increased overall energy intake (Crespo et al., 2001), unhealthy conceptions about food (Signorielli & Lears, 1992), reduced consumption of fruit and vegetables (Boynton-Jarrett et al., 2003), and increased and more frequent consumption of energy-dense snack foods (Coon et al., 2001). Importantly, it has also been found that there was a significant and positive association between commercial television viewing exposure in 1997 and children's BMI z-scores five years later (Zimmerman & Bell, 2010). The relationship was robust even when potentially confounding variables, such as exercise levels and eating whilst viewing television, were taken into account (Zimmerman & Bell, 2010). This finding provides further evidence that the link between television viewing and obesity is related to food advert exposure.

3.1.1 Aims

The aim of this study was to replicate the previous pilot work studying the acute experimental effects of television food advert exposure on children's food preferences, food choices and advert recognition ability (a measure of basic familiarity with, and attention to, food cues) but in a much larger sample of children to re-examine the effects and increase the potential for generalisation of the findings. A key aim was to conduct the study in a sample size sufficient to enable a more thorough re-examination of the weight status effects found in previous studies (Halford et al., 2008b; Halford et al., 2008a). The present study is the first to investigate whether levels of television viewing (and so, habitual advertising exposure) is important to individual differences in response to food adverts.

3.1.2 Hypotheses

Based on previous findings, it was hypothesised that:

H1: There would be differences in the food preferences of normal weight (NW) children and overweight/obese (OW/OB) children in the toy advert (TA) condition.

H2: All children would select more food items from the Leeds Food Preference Measure (LFPM) and Adapted Food Preference Measure (AFPM) following

Food Adverts (FA) compared to TA but the difference would be greatest in the OW/OB group.

H3: All children would select more high fat items from the LFPM, AFPM and Leeds Forced Choice Test (LFCT) following FA compared to TA.

H4: There would be a relationship between BMI standard deviation score (SDS) and level of TV viewing.

H5: High TV viewers would select more branded items from the AFPM in both conditions than low TV viewers.

H6: All children would correctly recognise more FA than TA, but OW/OB children would correctly recognise a greater number of FA than NW children.

H7: There would be a relationship between level of TV viewing and the number of adverts correctly recognised in both conditions.

3.2 Methods

See also Chapter 2.

3.2.1 Recruitment and Ethics

Participants for this study were recruited from 7 primary and middle schools in the North West of England, UK. Informed consent was gained from Head teachers to carry out research in their school, and for the proposed method for gaining consent from parents. Parents were sent a letter detailing the study, and were required to return a slip at the bottom of the letter if they did not wish for their child to take part in the study. Consent was also gained from each child before commencing the study; the children were given the opportunity to ask questions and it was made clear that they could withdraw from the study at any time without having to give a reason. The parents of 4 children refused to give consent for their child to participate. No child refused to give their consent to participate, however 4 children (all female) did not wish to be weighed or measured. Ethical approval for this study was provided by the University of Liverpool School of Psychology Ethics system in 2004, and renewed yearly thereafter.

3.2.2 Participants

A total of 306 participants were recruited onto this study. However, due to absences from school on test days (because of illness or other reasons unrelated to the study procedure), only 281 participants aged 6-13 years (mean age 9.5 ± 1.9) completed both conditions. Only data from these 281 participants were included in the analyses. No outliers were identified (all z-scores fell within the range -3 to +3), so no individuals were removed from the data set for analysis. This was an opportunity sample; however, the age range is similar to that of Halford et al., (2004) where the effect of television food advert exposure on actual intake of foods was shown for the first time.

Raw BMI measurements ranged from 12.3 to 27.0 kg/m^2 (mean 17.9 ± 3.0 kg/m^2) in this sample, and using criteria outlined in section 2.1.2, two weight status groups were defined; normal weight (NW) and overweight and obese (OW/OB). As there were only 52 OW and 17 obese children, a single OW/OB group (n = 69) was created to ensure that comparisons with the NW group (n = 208) did not violate the assumptions of parametric analysis with regard to disparity in group sizes. Tables 3-1 and 3-2 show demographic (age) and anthropometric (BMI) characteristics of the completing participants and the proportion of children in each weight status group and in each TV viewing group.

Table 3-1

Participant characteristics by weight status groups (where n = 277 this is due to weight/height data not being available for 4 participants) (mean ± SEM).

	Normal weight (*n* = 208, 75.1%)	Overweight/Obese (*n* = 69, 24.9%)	**All (*n* = 281)**
Age (y, mean ± SEM)	9.5 ± 0.1	9.4 ± 0.2	**9.5 ± 0.1**
Gender	113 m, 95 f	33 m, 36 f	**146 m, 135 f**
BMI (kg/m^2, mean ± SEM)	16.6 ± 0.1	21.9 ± 0.3	**(*n* = 277) 17.9 ± 0.2**

Table 3-2

Participant characteristics by TV viewing groups ([high/low, high TV viewing was taken as 21 hours/week or more based on a median split of the entire sample]; where n = 277 this is due to weight/height data not being available for 4 participants) (mean ± SEM).

	Low TV viewing (< 21 hrs/week) (*n* = 139)	High TV viewing (> 21 hrs/week) (*n* = 142)	**All (*n* = 281)**
Age (y, mean ± SEM)	9.8 ± 0.2	9.3 ± 0.2	**9.5 ± 0.1**
Gender	75 m, 64 f	71 m, 71 f	**146 m, 135 f**
	(*n* = 137)	(*n* = 140)	***(n = 277)***
BMI (kg/m^2, mean ± SEM)	17.5 ± 0.2	18.3 ± 0.3	**17.9 ± 0.2**
	(*n* = 137)	(*n* = 140)	***(n = 277)***
Weight status	112 NW (81.8%) 25 OW/OB (18.2%)	96 NW (68.6%) 44 OW/OB (31.4%)	**208 NW** **69 OW/OB**

There were no significant differences in the proportion of male and female participants either within individual schools, or within the entire sample. See also Appendix 18 for breakdown of participant characteristics by age.

There were no significant differences in the proportion of male and female participants in each weight status category. The proportion of normal weight (75.1%), and overweight and obese children (24.9%) in the sample is approximately consistent with current levels of adiposity in the UK and in the North West of England region specifically (HSE, 2007).

3.2.3 Data Collection and Confidentiality

Data were collected between December 2006 and July 2007 (see Appendix 17). All documents pertaining to the study were kept secured in lockable cabinets, and all electronic data were stored on a password- and virus-protected computer. Participant codes were used so that individual children were not identifiable from the study materials.

3.2.4 Design

This study was a mixed measures, counterbalanced design with two conditions; control (toy advert exposure (TA)) and experimental (food advert exposure (FA)). A two-week time lapse between conditions was enforced to reduce demand characteristics. Counterbalancing was utilised to minimise order effects.

3.2.4.1 Independent variables

The main independent variable was the experimental manipulation of the television advertising exposure, i.e., food adverts versus toy (control) adverts. In addition, measures of weight status and levels of television viewing were incorporated as additional independent variables. Therefore, the specific independent variables were:

1. Advertisement exposure (toy or food, see section 3.2.5)
2. Weight status (NW or OW/OB, see section 2.1.2)
3. BMI SDS (age- and gender-appropriate standard deviation score, see section 3.2.7)
4. Level of TV viewing (assessed by the Habitual Television Viewing Questionnaire (HTVQ), see section 2.5.2.1).

3.2.4.2 Dependent variables

The effects of the experimental manipulation and differences in participant characteristics (weight status category, BMI SDS and level of TV viewing) were assessed by measuring changes in food preference and food choice. Therefore the specific dependent variables were:

1. Preference for non-branded food items (assessed by the LFPM)
2. Preference for branded food items (assessed by the AFPM)
3. Food choice (assessed by the LFCT).

4. Advertisement recognition.

3.2.5 Materials

All television adverts were recorded to DVD from both children's and family programming on popular terrestrial and cable commercial channels between October and December 2006. The 10 products featuring in the adverts shown for each condition are in Table 3-3 (in order of screening).

Table 3-3 – Products Featured in TV Adverts Shown in Both Conditions

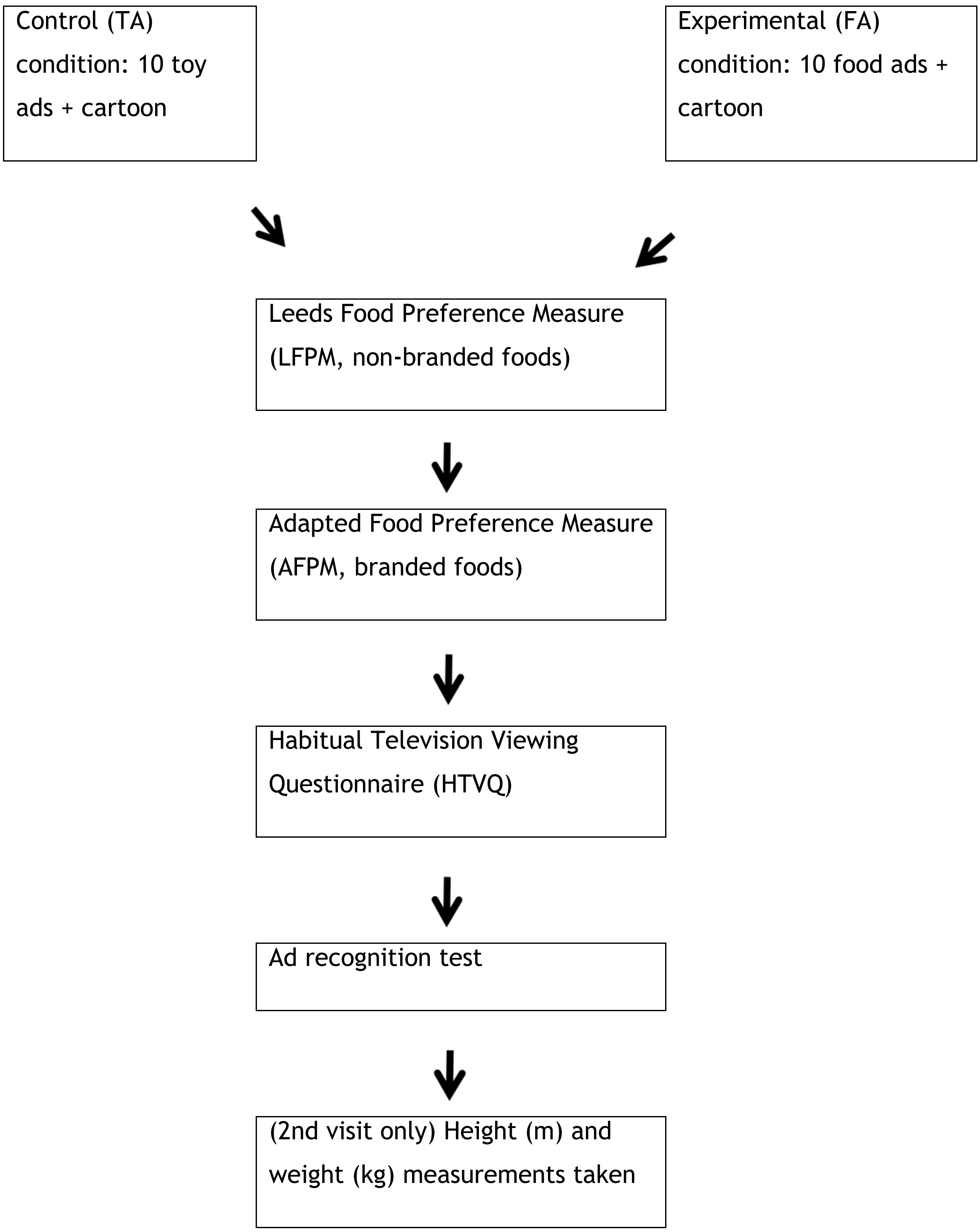
Control (Toy Advert) Condition	Experimental (Food Advert) Condition
Barbie doll	Burger King Whopper burger
'Don't Wake Dad' boardgame	Nestle Golden Nuggets
Dr Who toy	Iceland Party Snacks
Funky Furby	Topps Juicy Drop Pops
Garfield electronic game	Kellogg's Cereal Bars
Nsects toy	Kentucky Fried Chicken (KFC) Twister
Optix Memory Game	McCain Home Fries
Megablocks toy	McDonald's Happy Meal
Pop-Up Pirate game	McVities Fruitsters biscuits
Screwball Scramble boardgame	Kellogg's Coco Pops Mega Munchers

Each advert was approximately 30 seconds in length, for a total advertising exposure time of 5 minutes in each condition. The adverts were followed immediately on the same DVD by the same 20-minute episode of the cartoon Scooby Doo in each condition. The same episode was used to ensure that only the advert content varied between conditions. The toy and food adverts were not matched, and the nutritional content of the foods in the adverts was not analysed.

3.2.6 Procedure (see Figure 3-1)

On test days, children were shown a DVD in their classrooms. For the control condition, children viewed the DVD containing 10 toy adverts followed by a Scooby Doo cartoon. For the experimental condition, children viewed the DVD containing 10 food adverts followed by the same Scooby Doo cartoon. On both occasions, immediately following viewing, children were given two food preference measures (LFPM and AFPM, Section 2.5.1.1 and 2.5.1.2), a food choice measure (LFCT, Section 2.5.1.3) and an advert recognition measure (Section 2.5.3) to complete individually. At the first visit only, children's age in years and months was ascertained and children were given an additional measure (HTVQ, Section 2.5.2.1) to complete. At the second (final) visit only, children's height (m) and weight (kg) measurements were taken. Children were individually weighed and measured without shoes, and with a member of school staff present at all times.

Figure 3-1 The experimental procedure



3.2.7 Statistical Analysis

All data collected adhered to the assumptions for parametric data therefore Analysis of Variance (ANOVA) and relevant post hoc paired or independent t-tests were used. Where homogeneity of variance was not found, multivariate tests (MANOVA) were adopted for that variable. All comparisons were two-tailed and significance was taken at $p < 0.05$ with Bonferroni adjustments for multiple comparisons. Analyses were completed using PASW v17.0 for Windows (SPSS Inc., Chicago, US).

Using internationally recognised criteria for children, as recommended by the International Obesity Task Force (Cole et al., 2000), overweight and obesity were defined based on age- and gender-specific BMI cut-off points equivalent to adult BMIs of 25 kg/m^2 and 30 kg/m^2 respectively. For use in analyses, BMI was converted to an age- and gender-appropriate standard deviation score (BMI SDS) using 1990 reference standards for the UK (Cole et al., 1995).

Data regarding the high protein and low-energy items of the LFPM were removed from analysis when direct comparisons were made between the LFPM and the AFPM i.e. total branded versus total non-branded items (to ensure both measures included a total of 16 items). Due to issues of multi-collinearity food choice data from the LFCT were converted to variables for relative macronutrient preference (high fat – low fat) and relative sensory preference (sweet – savoury) in each condition.

Weekly television viewing hours were calculated from the HTVQ. The number of hours of television each child watched on a typical weekday was ascertained and multiplied by 7 to indicate a week's viewing. This is a conservative calculation that may actually underestimate total weekly viewing, as children will typically have more free time to spend watching television on weekend days, compared to Monday-Friday when they are attending school during the day.

Results are reported as mean ± SD unless otherwise stated.

3.3 Results

Table 3-4 displays the mean selection of branded and non-branded food items (by macronutrient type) on the food preference measures (LFPM & AFPM), the mean selection of items (by sweetness and fat level) on the food choice measure (LFCT) and mean advertisement recognition scores for the NW children and the OW/OB children. Table 3-5 provides the means for the same variables for the low TV viewing and the high TV viewing groups.

Table 3-4 The effects of weight status and advertisement condition on food preferences, food choice, and advertisement recognition (mean ± SD)

Variable	Control (TA) Condition				FA Condition			
	NW	OW/OB	All		NW	OW/OB	All	
LFPM								
Non-branded CHO	4.0 ± 2.3	3.8 ± 1.9	3.9 ± 2.2		4.3 ± 2.0	4.3 ± 2.0	4.3 ± 2.0	***
Non-branded Fat	4.3 ± 2.0	4.1 ± 2.0	4.2 ± 2.0		4.8 ± 1.8	4.4 ± 2.1	4.7 ± 1.9	***
Non-branded Protein	2.4 ± 2.4	2.5 ± 2.4	2.4 ± 2.3		2.8 ± 2.4	2.8 ± 2.5	2.8 ± 2.4	
Non-branded Low Energy	3.7 ± 2.2	3.4 ± 2.1	3.6 ± 2.2		3.9 ± 2.1	3.6 ± 2.3	3.8 ± 2.1	
Total Non-branded (exc. Protein & Low Energy)	8.3 ± 3.7	7.8 ± 3.5	8.1 ± 3.7		9.1 ± 3.4	8.7 ± 3.7	8.9 ± 3.5	
Total Non-branded (inc. Protein & Low Energy)	14.4 ± 6.9	13.5 ± 6.3	14.1 ± 6.7		15.7 ± 6.4	15.0 ± 6.7	15.5 ± 6.4	***
AFPM								
Branded CHO	3.9 ± 2.4	3.7 ± 2.1	3.9 ± 2.3		4.3 ± 2.1	4.2 ± 2.1	4.2 ± 2.1	***
Branded Fat	4.6 ± 2.3	4.5 ± 2.1	4.5 ± 2.2		4.9 ± 2.2	4.9 ± 2.2	4.9 ± 2.2	***
Total Branded	8.5 ± 4.3	8.1 ± 3.9	8.4 ± 4.2		9.1 ± 3.8	9.1 ± 3.8	9.1 ± 3.7	***
LFPM & AFPM Combined								
Total CHO (branded + Non-branded)	7.9 ± 4.3	7.5 ± 3.7	7.8 ± 4.1		8.6 ± 3.8	8.4 ± 3.9	8.5 ± 3.8	
Total Fat (branded + Non-branded)	8.9 ± 3.8	8.5 ± 3.8	8.8 ± 3.8		9.7 ± 3.6	9.3 ± 4.1	9.6 ± 3.7	
Total Foods	22.8 ± 10.3	21.7 ± 9.9	22.5 ± 10.2		24.8 ± 9.3	24.1 ± 10.1	24.6 ± 9.5	
LFCT								
High Fat Savoury (HFSAV)	6.1 ± 2.3	6.1 ± 2.7	6.1 ± 2.4		6.2 ± 2.3	6.5 ± 2.5	6.2 ± 2.3	
High Fat Sweet (HFSW)	8.1 ± 2.9	8.2 ± 2.8	8.1 ± 2.9		8.1 ± 2.9	8.5 ± 2.9	8.2 ± 2.9	
Total High Fat	14.2 ± 3.1	14.3 ± 3.1	14.3 ± 3.1		14.3 ± 3.1	15.0 ± 3.0	14.4 ± 3.1	
Low Fat Savoury (LFSAV)	6.2 ± 3.2	6.1 ± 2.8	6.1 ± 3.1		6.0 ± 2.9	6.1 ± 2.9	6.1 ± 2.9	
Low Fat Sweet (LFSW)	8.7 ± 2.8	8.6 ± 2.8	8.7 ± 2.8		8.5 ± 2.6	8.3 ± 2.3	8.4 ± 2.5	
Total Low Fat	14.8 ± 3.2	14.6 ± 3.1	14.7 ± 3.1		14.5 ± 3.1	14.3 ± 3.0	14.5 ± 3.1	
Total Savoury	12.3 ± 4.0	12.2 ± 4.0	12.3 ± 4.0		12.2 ± 3.9	12.5 ± 3.6	12.3 ± 3.8	

Notes: * Denotes a between-condition difference in all children; * $p < 0.05$, *** $p < 0.001$. TA = Toy advert condition, FA = Food advert condition, NW = Normal weight, OW/OB = Overweight and obese, CHO = carbohydrate, LFPM = Leeds Food

Preference Measure, AFPM = Adapted Food Preference Measure, LFCT = Leeds Forced Choice Test.

Table 3-5 The effects of TV viewing level and advertisement condition on food preferences, food choice, and advertisement recognition (mean ± SD)

Variable	Control (TA) Condition				FA Condition		
	Low TV	High TV	All		Low TV	High TV	All
LFPM							
Non-branded CHO	3.6 ± 2.3	4.2 ± 2.1	3.9 ± 2.2		4.0 ± 1.9	4.5 ± 2.1	4.3 ± 2.0
Non-branded Fat	3.8 ± 1.9	4.7 ± 1.9	4.2 ± 2.0		4.3 ± 1.9	5.0 ± 1.9	4.7 ± 1.9
Non-branded Protein	2.1 ± 2.2	2.8 ± 2.4	2.4 ± 2.3		2.5 ± 2.3	3.0 ± 2.5	2.8 ± 2.4
Non-branded Low Energy	3.6 ± 2.2	3.6 ± 2.2	3.6 ± 2.2		3.8 ± 2.1	3.9 ± 2.2	3.8 ± 2.1
Total Non-branded (exc. Protein & Low Energy)	7.4 ± 3.7	8.8 ± 3.5	8.1 ± 3.7		8.4 ± 3.3	9.5 ± 3.5 ‡‡	8.9 ± 3.5
Total Non-branded (inc. Protein & Low Energy)	13.0 ± 6.4	15.2 ± 6.9	14.1 ± 6.7		14.7 ± 5.8	16.3 ± 6.9	15.5 ± 6.4
AFPM							
Branded CHO	3.4 ± 2.3	4.3 ± 2.3	3.9 ± 2.3		3.8 ± 2.0	4.6 ± 2.0	4.2 ± 2.1
Branded Fat	4.0 ± 2.2	5.1 ± 2.1	4.5 ± 2.2		4.3 ± 2.2	5.5 ± 2.0	4.9 ± 2.2
Total Branded	7.3 ± 3.9	9.4 ± 4.1	8.4 ± 4.2		8.1 ± 3.5	10.1 ± 3.7†† ‡‡‡	9.1 ± 3.7
LFPM & AFPM Combined							
Total CHO (branded + Non-branded)	7.1 ± 4.1	8.4 ± 4.0	7.8 ± 4.1		7.9 ± 3.6	9.1 ± 3.8	8.5 ± 3.8
Total Fat (branded + Non-branded)	7.7 ± 3.8	9.8 ± 3.6	8.8 ± 3.8		8.7 ± 3.6	10.4 ± 3.6	9.6 ± 3.7
Total Foods	20.3 ± 9.6	24.6 ± 10.3	22.5 ± 10.2		22.7 ± 8.6	26.4 ± 10.0	24.6 ± 9.5
LFCT							
High Fat Savoury (HFSAV)	5.9 ± 2.3	6.4 ± 2.5	6.2 ± 2.4		6.3 ± 2.2	6.2 ± 2.5	6.2 ± 2.3
High Fat Sweet (HFSW)	8.1 ± 2.9	8.1 ± 2.9	8.1 ± 2.9		8.0 ± 2.8	8.4 ± 2.9	8.2 ± 2.9
Total High Fat	14.0 ± 3.0	14.5 ± 3.2	14.3 ± 3.1		14.2 ± 2.9	14.6 ± 3.2	14.4 ± 3.1
Low Fat Savoury (LFSAV)	6.3 ± 2.8	5.9 ± 3.2	6.1 ± 3.1		6.2 ± 2.8	6.0 ± 3.0	6.1 ± 2.9
Low Fat Sweet (LFSW)	8.7 ± 2.4	8.7 ± 3.1	8.7 ± 2.8		8.6 ± 2.4	8.2 ± 2.7	8.4 ± 2.5
Total Low Fat	14.9 ± 3.1	14.6 ± 3.2	14.7 ± 3.1		14.8 ± 3.1	14.1 ± 3.0	14.5 ± 3.1
Total Savoury	12.2 ± 3.6	12.3 ± 4.5	12.3 ± 4.0		12.4 ± 3.6	12.2 ± 4.0	12.3 ± 3.8
Total Sweet	16.8 ± 3.5	16.7 ± 4.4	16.7 ± 4.0		16.6 ± 3.7	16.6 ± 3.9	16.6 ± 3.8
Advertisement Recognition							
Number of ads correctly recognised	7.4 ± 1.8	7.6 ± 1.8	7.5 ± 1.8		7.8 ± 1.5	7.8 ± 1.5	7.8 ± 1.5

Note: † Denotes a within-condition, within-TV viewing group, brand level difference; †† $p < 0.01$.

‡ Denotes a within-condition, between-TV viewing group difference; ‡‡ $p < 0.01$, ‡‡‡ $p < 0.001$.

<u>H1: There would be differences in the food preferences of NW children and OW/OB children in the TA condition.</u>

Regarding the food preferences in the TA (control) condition, a three-way mixed ANOVA with macronutrient (high fat/high CHO) and branding (branded/non) as within-subjects factors and weight status (NW/OWOB) as a between-subjects factor was performed. There was a significant main effect of macronutrient ($F(1, 275) = 22.606$, $p < 0.001$) and an interaction between macronutrient and branding ($F(1, 275) = 5.961$, $p = 0.015$).

In the TA condition, all children selected a greater number of high fat items (branded and non-branded) than high CHO items (branded and non-branded) (8.8 ± 3.8 v 7.8 ± 4.1; $t(280) = 5.351$, $p < 0.001$). More specifically, all children selected significantly more branded high fat than branded high CHO items (4.5 ± 2.2 v 3.9 ± 2.3; $t(280) = 2.951$, $p = 0.003$) and more non-branded high fat than non-branded high CHO items (4.2 ± 2.0 v 3.9 ± 2.2; $t(280) = 5.919$, $p < 0.001$).

However, there were no significant weight status interactions with macronutrient ($p = 0.834$), brand ($p = 0.866$), or macronutrient and brand ($p = 0.720$). The food preferences of NW children did not significantly differ from the OW/OB children in the TA condition, therefore H1 is not supported.

The ANOVA model above was re-run for the food preferences reported in the FA condition. Again, a main effect of macronutrient ($F(1, 275) = 22.968$, $p < 0.001$) and an interaction between macronutrient and branding ($F(1, 275) = 7.006$, $p = 0.009$) were found. In the FA condition, all children selected a greater number of high fat items (branded and non-branded) than high CHO items (branded and non-branded) (9.6 ± 3.7 v 8.50 ± 3.8; $t(280) = 5.905$, $p < 0.001$). More specifically, all children selected significantly more branded high fat than branded high CHO items (4.9 ± 2.2 v 4.2 ± 2.1; $t(280) = 6.097$, $p < 0.001$) and more non-branded high fat than non-branded high CHO items (4.7 ± 1.9 v 4.3 ± 2.0; $t(280) = 3.449$, $p = 0.001$). However, as with the TA condition, there were no significant weight status interactions with macronutrient ($p = 0.655$), branding ($p = 0.307$) or macronutrient and branding ($p = 0.185$).

H2: All children would select more food items from LFPM and AFPM following Food Adverts (FA) compared to Toy/Control Adverts (TA) but the difference would be greatest in the OW/OB group.

Mean number of food items selected from the LFPM in both the FA and TA conditions are shown in figure 3-2, and the AFPM in figure 3-3.

Regarding the selection of non-branded food items, a three-way mixed ANOVA with advert condition (toy/food) and macronutrient (high protein/high fat/high CHO/low energy density) as within-subjects factors and weight status (NW/OWOB) as a between-subjects factor was performed. Significant main effects of advert condition ($F(1, 275) = 11.678$, $p = 0.001$) and macronutrient ($F(3, 825) = 61.523$, $p < 0.001$) were found.

In support of H2, all children selected more non-branded items from the LFPM following FA compared to TA (15.5 ± 6.4 v 14.1 ± 6.7; $t(280) = 4.145$, $p < 0.001$). Post-hoc paired t-tests showed that children selected significantly more non-branded CHO (4.3 ± 2.0 v 3.9 ± 2.2; $t(280) = 3.444$, $p = 0.001$), and non-branded fat (4.7 ± 1.9 v 4.2 ± 2.0; $t(280) = 4.102$, $p < 0.001$) items following FA compared to TA. Although mean values indicated that children had also selected more non-branded protein and low energy density items in the FA condition compared to TA, these differences were not statistically significant ($p = 0.012$ and $p = 0.029$ respectively, with significance taken at $p < 0.008$ due to adjustments for multiple comparisons). There was no interaction between advert condition and weight status ($p = 0.919$) therefore this does not support the prediction in H2 that the difference would be greatest in the OW/OB group.

Bivariate correlations were performed between BMI SDS and food preference data, which revealed a very weak but significant negative association between BMI SDS and the number of non-branded low energy density items selected in the toy condition ($r = -0.129$, $n = 277$, $p = 0.032$). As this was the only significant correlation there was no rationale for re-categorising the children into different weight status groups (e.g. quartiles) and reanalysing these data.

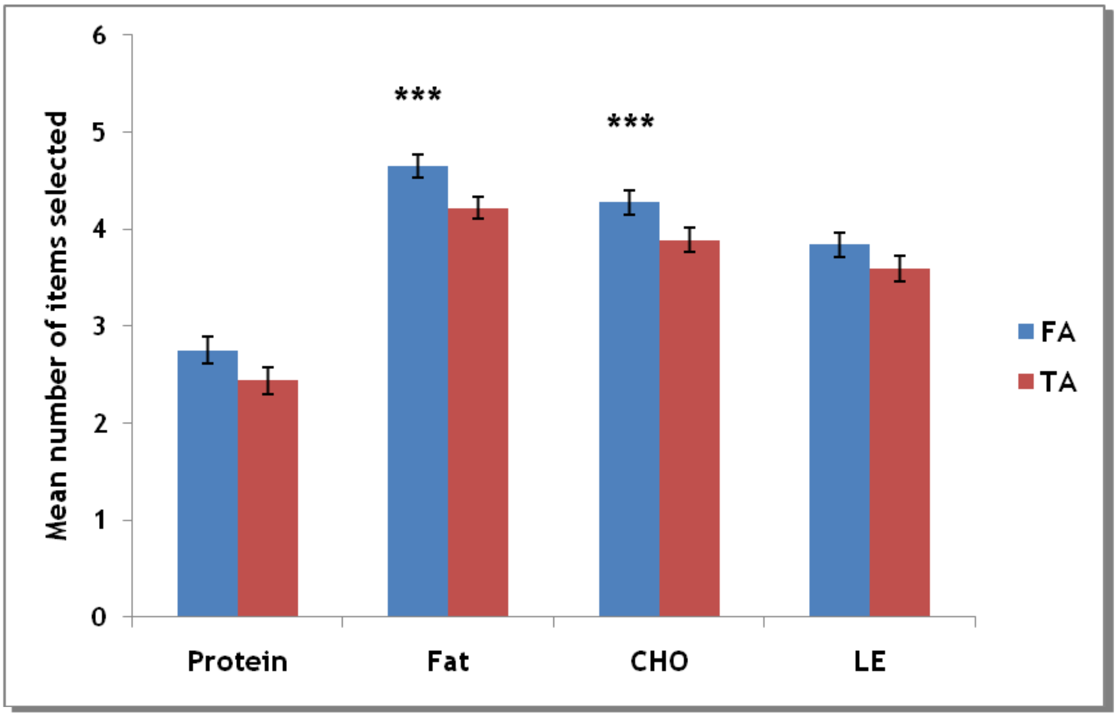


Figure 3-2 **Mean (±SEM, indicated by the error bars) numbers of items selected in each condition by macronutrient (high protein, high fat, high carbohydrate and low energy density).**

Note: *** $p < 0.001$ indicates a significantly greater number of items selected in FA compared to TA.

Regarding the selection of branded food items, a further three-way mixed ANOVA with advert condition (toy/food) and macronutrient (high fat/high CHO) as within-subjects factors and weight status (NW/OWOB) as a between-subjects factor found a significant main effect of advert condition ($F(1, 275) = 16.534$, $p < 0.001$) and of macronutrient ($F(1, 275) = 37.998$, $p < 0.001$).

In support of H2, all children selected more branded items from the AFPM following FA compared to TA (9.1 ± 3.7 v 8.4 ± 4.2; $t(280) = 4.190$, $p < 0.001$). Post-hoc paired t-tests showed that children selected significantly more branded CHO (4.2 ± 2.1 v 3.9 ± 2.3, $t(280) = 3.387$, $p = 0.001$) and branded fat (4.9 ± 2.2 v 4.5 ± 2.2, $t(280) = 3.765$, $p < 0.001$) items following FA compared to TA. However, again there was no interaction between advert condition and weight status ($p = 0.471$), therefore the prediction of a weight status difference in H2 is not supported by these data.

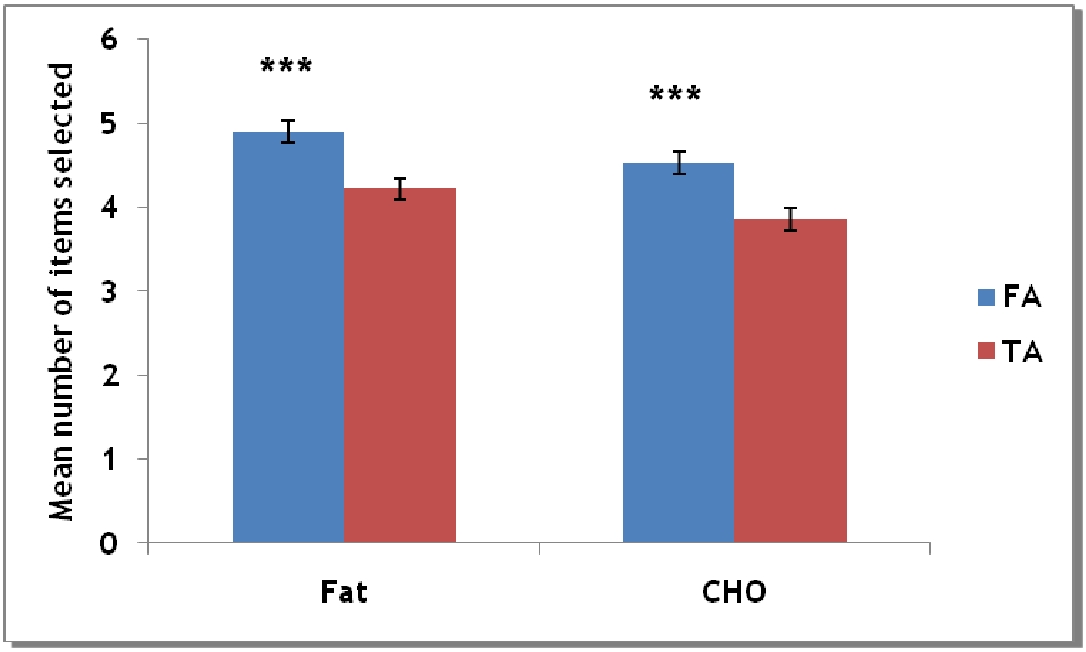


Figure 3-3 Mean (±SEM, indicated by the error bars) numbers of items selected in each condition by macronutrient (high fat, high carbohydrate).

Note: *** $p < 0.001$ indicates a significantly greater number of items selected in FA compared to TA.

Furthermore, a four-way mixed ANOVA was performed with advert condition (toy/food), macronutrient (high fat/high CHO) and branding (branded/non) as within-subjects factors and gender (male/female) as a between-subjects factor. The main effects of advert condition and macronutrient, and the interaction between macronutrient and branding have already been discussed. In addition, there were no significant interactions between condition and gender, or branding and gender.

There was, however, a significant interaction between macronutrient and gender ($F(1, 279) = 4.712$, $p = 0.031$) and a three-way interaction between macronutrient, brand and gender. Follow up independent t-tests revealed that female participants showed a greater preference for CHO items overall (17.3 ± 6.6 v 15.2 ± 7.7, $t(279) = 2.427$, $p = 0.016$) and specifically a greater preference for non-branded CHO items in both conditions (8.8 ± 3.5 v 7.6 ± 3.8, $t(279) = 2.757$, $p = 0.006$) than the male participants did.

H3: All children would select more high fat items from LFPM, AFPM and LFCT following FA compared to TA.

The data above also lend support to H3. All children selected more non-branded high fat items from the LFPM and more branded high fat items from the AFPM following FA compared to TA.

With regards to food choice, There was no main effect of advert condition on relative macronutrient (fat) preference (p=0.091), nor any interaction with weight status (p=0.483) or TV viewing level (p=0.931). There was no significant difference between children's choice of high fat versus low fat food items in either the food (p=0.901) or toy (p=0.147) conditions.

There was also no main effect of advert condition on relative sensory (sweet) preference (p=0.432), nor any interaction with weight status (p=0.504) or TV viewing level (p=0.343). However, all children selected more sweet than savoury items in both the food advert (16.6±3.8 v 12.3±3.8; $t(280)=10.416$, $p<0.001$) and toy advert (16.7±4.0 v 12.3±4.0; $t(280)=9.791$, $p<0.001$) conditions.

H4: There would be a relationship between BMI standard deviation score (SDS) and level of TV viewing.

An independent t-test showed that BMI SDS was significantly higher in the high TV viewing group than the low TV viewing group (0.76 ± 1.3 v 0.37 ± 1.1; $t(275) = 2.669$, $p = 0.008$). A bivariate correlation between the number of hours of TV viewed per week and BMI SDS revealed a significant positive relationship between the two variables ($r = 0.121$, n = 277, $p < 0.05$). However, this is an extremely weak correlation: only 1.5% of the variance in TV viewing hours can be attributed to BMI SDS in this sample.

H5: High TV viewers would select more branded items from the AFPM in both conditions than low TV viewers.

See Table 3-5 for the means relating to the food preference selections by low and high TV viewing groups.

A four-way mixed ANOVA was performed with advert condition (toy/food), macronutrient (high fat/high CHO) and branding (branded/non) as within-subjects factors and TV viewing (high/low, high TV viewing was taken as 21 hours/week or more based on a median split of the entire sample) as a between-subjects factor. The main effects of advert condition and macronutrient, and the interaction between macronutrient and branding have already been discussed following the similar ANOVA models used in hypotheses 1-3 so these results will not be commented on further.

However, there was also a significant interaction between branding and TV viewing ($F(1, 279) = 7.049$, $p = 0.008$). Subsequent independent t-tests showed that high TV viewers selected significantly more branded items (19.4 ± 7.4 v 15.4 ± 6.8; $t(279) = 4.776$, $p < 0.001$) and significantly more non-branded items (18.3 ± 6.4 v 15.8 ± 6.2; $t(279) = 3.384$, $p = 0.001$) than low TV viewers overall. Furthermore, the selection of branded versus non-branded items selected overall (both conditions) did not differ significantly for low TV viewers, but high TV viewers selected significantly more branded than non-branded items (19.4 ± 7.4 v 18.3 ± 6.4, $t(141) = 3.113$, $p = 0.002$). These data are in support of H5.

Further analyses on food preference data from each advert condition were conducted to explore this finding further. For the TA condition, a three-way mixed ANOVA was performed with macronutrient (high fat/high CHO) and branding (branded/non) as within-subjects factors and level of TV viewing (high/low) as a between-subjects factor. The main effects of macronutrient ($F(1, 279) = 28.650$, $p < 0.001$) and the interaction between macronutrient and branding ($F(1, 279) = 6.536$, $p = 0.011$) have been discussed previously. There were no significant interactions between TV viewing level and macronutrient ($p = 0.078$), branding ($p = 0.126$) and macronutrient and branding ($p = 0.846$). Therefore, high TV viewers did not differ from low TV viewers in their reported food preferences in the TA condition, and there was no significant difference between preferences for branded and non-branded foods by either group in this condition.

Regarding food preferences in the FA condition, a repeat of the above ANOVA revealed the previously discussed main effect of macronutrient ($F(1, 279) = 34.806$, $p < 0.001$) and macronutrient by branding interaction ($F(1, 279) = 5.858$, $p = 0.016$) but in addition, an interaction between branding and TV viewing was also found ($F(1, 279) = 8.566$, $p = 0.004$).

Subsequent t-tests demonstrated that in the FA condition, high TV viewers selected significantly more branded items than non-branded items (high fat and high CHO) (10.1 ± 3.7 v 9.5 ± 3.5; $t(141) = 3.044$, $p = 0.003$). Also, high TV viewers selected significantly more branded items (10.1 ± 3.7 v 8.1± 3.5; $t(279) = 4.609$, $p < 0.001$) and non-branded items (9.5 ± 3.5 v 8.4 ± 3.3; $t(279) = 2.684$, $p = 0.008$) than low TV viewers in this condition. Therefore, the overall food preference differences between high TV viewers and low TV viewers, and the greater preference shown by high TV viewers for branded items over non-branded items was the result of differences evident in the FA condition only.

A series of bivariate correlations were performed to further examine the relationship between weekly TV viewing hours and food preferences. See Table 3-6.

Table 3-6 Significant correlations between the number of hours of TV viewed per week and food preference variables (n = 281).

Variable	Condition	Pearson Correlation	Sig. (2-tailed)
Non-branded items	**TA**		
NB protein	TA	$r = 0.119$	$p = 0.046$
NB fat	TA	$r = 0.243$	$p < 0.001$
NB CHO + fat	TA	$r = 0.191$	$p = 0.001$
Total NB (inc. protein & LE)	TA	$r = 0.153$	$p < 0.010$
Branded items	**TA**		
B CHO	TA	$r = 0.195$	$p < 0.001$
B fat	TA	$r = 0.312$	$p < 0.001$
Total B (CHO + fat)	TA	$r = 0.284$	$p < 0.001$
Totals	**TA**		
Total CHO (B + NB)	TA	$r = 0.166$	$p = 0.005$
Total fat (B + NB)	TA	$r = 0.307$	$p < 0.001$
Total foods (B + NB)	TA	$r = 0.216$	$p < 0.001$
Non-branded items	**FA**		
NB CHO	FA	$r = 0.130$	$p = 0.029$

NB fat	FA	$r = 0.218$	$p < 0.001$
NB CHO + fat	FA	$r = 0.195$	$p = 0.001$
Total NB (inc. protein & LE)	FA	$r = 0.140$	$p = 0.019$
Branded items	**FA**		
B CHO	FA	$r = 0.206$	$p < 0.001$
B fat	FA	$r = 0.304$	$p < 0.001$
Total B (CHO + fat)	FA	$r = 0.296$	$p < 0.001$
Totals	**FA**		
Total CHO (B + NB)	FA	$r = 0.183$	$p = 0.002$
Total fat (B + NB)	FA	$r = 0.288$	$p < 0.001$
Total foods (B + NB)	FA	$r = 0.215$	$p < 0.001$
Totals	**Both**		
Total B fat	Both	$r = 0.333$	$p < 0.001$
Total NB fat	Both	$r = 0.260$	$p < 0.001$
Total B CHO	Both	$r = 0.218$	$p < 0.001$
Total NB CHO	Both	$r = 0.130$	$p = 0.029$
Total B	Both	$r = 0.311$	$p < 0.001$
Total NB	Both	$r = 0.215$	$p < 0.001$

Note: NB = non-branded, B = branded, CHO = carbohydrate, LE = low energy density.

All correlations above are significant and positive. They are also weak, with *r* values ranging from 0.119 (number of non-branded protein items selected in TA condition) to 0.333 (number of branded fat items selected in both conditions). These values indicate that weekly TV viewing hours account for between 1% and 11% of the variance in these variables.

H6: All children would correctly recognise more FA than TA, but OW and OB children would correctly recognise a greater number of FA than NW children.

A two-way mixed ANOVA with advert condition (toy/food) as a within-subjects factor and weight status (NW/OWOB) as a between-subjects factor found that there was a significant main effect of advert condition ($F(1,279) = 5.916$, $p = 0.016$).

Post-hoc paired t-tests showed that children correctly recognised more FA than TA (7.8 ± 1.5 v 7.5 ± 1.8; $t(279) = 2.432$, $p = 0.016$) supporting H6. However, there was no interaction with weight status ($p = 0.142$) therefore this does not support the prediction in H6 that OWOB children would correctly recognise a greater number of FA than NW children. Furthermore, a bivariate correlation demonstrated no significant relationships between BMI SDS score and the number of adverts correctly recognised in the FA condition ($p = 0.129$) nor the TA condition ($p = 0.808$) therefore this does not support H6.

The ANOVA model was also re-run with gender (M/F) as the between-subjects factor. The main effect of condition has already been discussed above, and there was no significant interaction between condition and gender ($F(1, 278) = 1.607$, $p = 0.206$).

H7: There would be a relationship between level of TV viewing and the number of adverts correctly recognised in both conditions.

Further bivariate correlations revealed that there was no significant relationship between TV viewing hours per week and the number of adverts correctly recognised in the FA condition ($p = 0.929$). In the TA condition, the correlation between TV viewing hours per week and number of adverts correctly recognised was approaching significance but again, only represents an extremely weak relationship between the variables ($r = 0.114$, $n = 281$, $p = 0.057$). Therefore H7 is not supported.

3.4 Discussion

As hypothesised, all children selected more branded and non-branded food items on the food preference measures following exposure to food adverts compared to when they viewed toy (control) adverts. This effect of food advertising exposure is consistent with previous studies, both those focusing on food preferences (Halford et al., 2008a; Gorn & Goldberg, 1980; Gorn & Goldberg, 1982) and food consumption (Halford et al., 2004; Halford et al., 2008b; Halford et al., 2007). For both branded and non-branded foods, the between-condition difference reflected the increased selection of high fat and high CHO foods (observed increases in the selection of high protein and low energy density foods following FA exposure were found to be not statistically significant).

Importantly, the food items listed on the food preference measures were not the same as the items featured in the food adverts (although the brand McDonald's did appear in both an advert and the AFPM, the food items represented were not the same – a Happy Meal™ and chicken nuggets respectively). Therefore these findings provide further evidence that food advertising does not just alter brand choice in favour of the advertised brand but seems to affect more generic food selection patterns, particularly in favour of the 'obesity-promoting' foods. This finding goes against the industry assertion that only brand choices are affected by advertising (Harris et al., 2009). This effect is also in accordance with conclusions drawn by Hastings et al., (2003) following a review of the literature, that the effects of food advertising on children's preferences is occurring at both a brand and a 'beyond brand' or 'category' level.

Food adverts do not simply affect brand choice; they also influence general food selection. Although the between-condition differences were statistically significant, they were also small. However, over time, small changes in preference towards high fat and CHO foods may contribute to a persistent positive energy balance and hence weight gain and obesity.

These data are consistent with previous work from Buijzen et al., (2008) who found that children's habitual exposure to food advertising was significantly related to their consumption of both advertised brands and generic energy dense product categories. That study included a parental report of children's television viewing behaviour in their regression model, but direct comparisons were not made between the responses of children who habitually watched high amounts of television (and, therefore, could be assumed to have had greater cumulative exposure to food advertising messages) and those children who watched less television.

The current study was able to demonstrate that whilst reported food preferences did not differ between TV viewing groups in the TA condition, in the FA condition high TV viewers selected significantly more branded and non-branded items than the low TV viewers. High TV viewers also selected more branded than non-branded food items in the FA condition, an effect not seen in the TA condition. Therefore, children who watched relatively high amounts of television appeared to differ from low television viewers in terms of their response to food advertising exposure. Viewing television food adverts enhanced high TV viewers' preference for branded foods, and increased reported preferences for all food items (branded and non-branded) relative to the low TV viewing group. This suggests that a child's level of habitual exposure to food advertising may play a role in determining their 'susceptibility' to advertising messages, and these findings indicate that the food preferences of children who have viewed greater amounts of television are more affected by exposure to food advertising. That the high TV viewers showed greater preferences for high fat and carbohydrate food items following food advert exposure than toy advert exposure is consistent with previous studies that link television viewing with increased consumption of energy-dense foods (Davison et al., 2006). In addition, the finding that BMI SDS was significantly higher in the high TV viewing group than the low TV viewing group is consistent with previously reported links between TV viewing and obesity (Epstein et al., 2008) although no conclusions can be drawn about causality from this study.

Food advert exposure did not have a significant effect on food choice, neither along the dimension of fattiness nor sweetness. This is consistent with previous studies (Halford et al., 2008a) and may reflect the lack of sensitivity of this tool in the current paradigm. As differences in food preference were detected but not food choice, this is likely to be indicative of the different motivations involved. The food choice tool features both implicit and explicit processes which may better reflect liking rather than wanting (i.e. trait rather than state preferences).

With regards to the recognition task, all children were able to correctly recognise more of the food adverts than the toy adverts. This suggests that children do particularly enjoy and engage with food adverts which is consistent with previous findings (Hastings et al., 2003). As good recognition is thought to denote positive attention to adverts (Curlo & Chamblee, 1998), the results also seem to indicate that children do engage more with food related than non-food related stimuli and this effect was seen to be independent of weight status, BMI SDS or television viewing habits.

There was no relationship between the level of TV viewing (and therefore habitual advertising exposure) and ability to correctly recognise the adverts. This suggests that the high TV viewing children's increased selection of branded food items in the FA condition (relative to both the low TV viewing children and their own preferences in the TA condition) is not due to greater habitual exposure to those adverts and therefore increased brand familiarity and awareness. Rather, the data suggest that the high TV viewers are more prone to the food advertising messages than low TV viewers. This is the first study to demonstrate that children's susceptibility to television food advertising is affected by their habitual television viewing habits; this may have important implications for the design of effective intervention programmes.

Previous studies have reported weight status effects regarding food advert recognition ability. Halford et al., (2004) found that obese children correctly recognised a greater number of food adverts than normal weight children, and also that this recognition was positively associated with the amount of food subsequently consumed. Other research has also found relationships between recognition and BMI (Halford et al., 2007; Arredondo et al., 2009). The current study does not support these weight status differences. However, it is possible that this reflects a failure to control for hunger state in this study. Research has shown that when children are in a fasted condition, both normal weight and obese individuals show a bias towards food stimuli compared to non-food controls (Castellanos et al., 2009). However, in the fed state, this bias was maintained in the obese children only (Castellanos et al., 2009). The time of day was neither controlled for (as participation was organised around other school activities), nor recorded in this study. Therefore, it is potentially the case that the children were often participating whilst experiencing high levels of hunger so that a bias towards food-related stimuli (measured as greater recognition of food adverts compared to toy adverts) was evident in all children. Future studies should ensure that children participate whilst in the fed state to minimise any effects relating to hunger levels, or include a measure of appetite to ensure that hunger is accounted for in the analyses.

Alternatively, these results could be explained by Moreno & Rodriguez (2007)'s theory of a 'settling point' in the dietary behaviour of obese children. The authors contend that following a period of time in which these children have been in positive energy balance and therefore gaining weight, obese children then reach a 'settling point' or 'steady state' whereby their dietary behaviour does not differ from their lower weight counterparts (Moreno & Rodriguez, 2007). This is one potential explanation for the finding of this study, contrary to that of Halford et al., (2008a), that the food preferences of the NW children did not significantly differ from those of the OW/OB children in the TA condition. If it is the case that dietary risk factors for obesity can be temporary (only evident during the period of weight gain) (Moreno & Rodriguez, 2007), then the lack of weight status differences in response to food adverts found in the current study could be due to the obese children having reached such a 'steady state'. This may have implications for further research investigating the effects of food adverts on children's food preferences; it may be useful to identify groups of weight-gaining children as well as obese children in order to examine this potential explanation further.

3.4.1 Summary

The key findings of this study:

- Exposure to television food advertising did affect children's food preferences.
- Following food advert exposure, all children selected more branded and non-branded fat and CHO items compared to the TA condition.
- NW and OW/OB children did not differ in their food preferences or their response to food advertising.

- The children in the high TV viewing group had a significantly higher mean BMI SDS than the low TV viewing group.
- The food preferences of children who watched relatively high amounts of TV were more affected by food advert exposure than low TV viewers.
- In the FA condition, high TV viewing children selected a greater number of branded food items compared to both the TA condition and low TV viewers.
- Children correctly recognised a greater number of food adverts than non-food adverts.

Chapter Four

4. An experimental study to investigate the relationship between commercial television viewing (a measure of relative advertisement exposure), and awareness of brand equity characters, food preferences and weight status in children.

4.1 Introduction

The previous chapter described a study in which, following food advert exposure, children selected more items from self-reported food preference measures than they did following toy advert exposure. Differences in the food preferences of high TV viewers compared to low TV viewers were only evident following the experimental food advert exposure. In addition, after viewing food adverts children correctly recognised a significantly greater number of the adverts (from a list containing 10 adverts they had seen and 10 they had not) than they did following toy adverts. A good ability to recognise food adverts suggests positive attention to and enjoyment of these promotion messages (Hastings et al., 2003; Curlo & Chamblee, 1998) relative to other types of adverts. It has not yet been elucidated what aspect of food advertising contributes to this effect, however, one feature of advertising that is more common in food promotion than other product adverts is the use of brand equity characters.

Brand equity characters are those characters which are created for the sole purpose of promoting a product or brand and thus have no context or identity beyond their association with that product or brand. Examples include Snap, Crackle and Pop who are used to promote Kellogg's Rice Krispies and Quicky the Nesquik Bunny who promotes Nesquik's chocolate milkshakes. They are distinct from licensed characters, whereby a character has been created for an animated programme or movie and is then licensed by brands to appear in their promotions (Garretson & Niedrich, 2004). Examples of licensed characters include Scooby-Doo™ appearing on packaging for Green's Cookie Snack Kit and Shrek the Third featuring on packs of Kellogg's Frosties (Which?, 2007a).

The use of licensed characters to promote foods to children was prohibited in July 2007 by the UK Office of Communications (Ofcom)'s content rules governing television food advertising to children (Ofcom, 2007a). In contrast, the use of brand equity characters was not covered by the regulations, as the regulator believed that to ban such characters would inflict far more damage to the 'value of brands' than the restrictions on licensed characters (Ofcom, 2007a). Brand equity characters are used to represent, promote and embody the values of brands, and often appear on product packaging, at sponsored events, on printed promotions as well as in television advertising (Lawrence, 2003; IOM, 2005). Marketers use brand characters to encourage the development of a brand-consumer relationship in children, as the presence of brand characters is believed to increase advert saliency and brand/product appeal (Lawrence, 2003). These are important aspects in the development of brand awareness and loyalty (IOM, 2005).

Previous research has demonstrated that brand characters increase children's enjoyment, attention for and engagement with advertising, and improve attitudes towards the product being promoted (Lawlor, 2009; Arnett & Terhanian, 1998; Neeley & Schumann, 2004; Nash et al., 2009). Indeed, the adverts reported to be most popular among 7-12 year old children are often those that are principally intended for an adult audience but feature characters that appeal to children such as the Budweiser® Frog adverts or the Flat Eric™ campaigns for Levi® jeans (Lawrence, 2003). The presence of a brand character is crucial to children's brand recognition, and studies have shown that children are effective at recognising brand characters. For example Ronald McDonald, used in McDonald's promotions internationally in more than 25 languages, is recognised by 96% of American children (Enrico, 1999). Furthermore, in a critical study, Fischer et al., (1991) found that more than 90% of 6 year old children were able to correctly match the character 'Joe Camel' with the correct product, a cigarette packet.

The pathway between children's exposure to food advertising featuring brand characters and their consumption of an advertised product is likely to involve several elements. These are thought to include learning and processing information about the brand characters to inform the development of attitudes towards the product, and then later recognising the product, the characters and recalling the attitudes formed, all of which may be considered in any purchase or consumption decision (Batada & Borzekowski, 2008). Studies have shown that if a child is able to recognise an association between a character and a product, that ability has predictive value for the likelihood of that child developing favourable attitudes towards the product (DiFranza et al., 1991). Children who recognise characters, logos, and slogans from ads have been shown to be more likely to select those products and brands (Batada & Borzekowski, 2008). In one of only two studies to date to specifically examine the impact of characters on children's food choice, Kotler (2007) found that children were more likely to indicate that they would consume foods with well-known television characters (Sesame Street) on them than foods with either unknown characters or no characters at all. Also, children were more willing to actually taste healthy foods when the known character was associated with those foods (Kotler, 2007). Further, Roberto et al., (2010) demonstrated that young children (4-6 years) were significantly more likely to report greater taste preference for and select foods with popular cartoon character (e.g. Shrek and Dora the Explorer) images on than the same foods without the characters. Therefore, as characters are believed to make a significant contribution towards the persuasive appeal of an advert, it has been suggested that the use of such characters is an attempt by brands to manipulate the food choices of children (Which?, 2005).

To date, few studies have specifically focused on recognition of only food characters. In an interesting study, Batada & Borzekowski (2008) studied children's recognition of ten US cereal characters; those advertising Honey Nut Cheerios, Fruit Loops, Lucky Charms, Rice Krispies, Raisin Bran, Trix, Corn Flakes, Cocoa Puffs, Frosted Mini Wheats and Cheerios. It was found that contrary to predictions, overweight children recognised fewer characters than normal weight children. However, a positive association between the number of television sets in the child's household and the child's ability to recognise characters was found, although no relationship with actual viewing time was identified (Batada & Borzekowski, 2008). As the authors concede, the small sample size for the study (58 children) limited the analyses that could be conducted with the between-group variables (i.e. weight status and television use) as any such comparisons would have been lacking in statistical power. In addition, only characters associated with cereal products were featured in this study, whereas typically brand characters are featured on a wide range of food products aimed at children.

Brand logo recognition ability has been found to be associated with some aspects of eating behaviour. It was found that children with a greater ability to recognise food brand logos were more likely to have high levels of snacking on crisps, and low snacking of biscuits, as well as demonstrating better food knowledge in terms of knowing what food items are healthy and which are unhealthy (Kopelman et al., 2007). However, no studies have specifically examined if there is a relationship between children's awareness of the brand characters used in television food advertising and their preferences for branded and non-branded foods. It is logical to assume that children who are better able to recognise brand characters and the products they promote are those children who have had the most habitual exposure to food advertising (i.e. have higher levels of television viewing). As there are known associations between television use and overweight and obesity in children (Dennison et al., 2002), it is also reasonable to predict that overweight/obese children will have higher levels of television viewing than normal weight children (a positive association between TV viewing hours per week and BMI SDS was found in the previous chapter) and thus will show better food brand character and product recognition ability. Furthermore, a good recognition memory for brand characters and their associated products suggests that the child has not only been exposed to food advertising, but also paid attention to and engaged with the advertising sufficiently to build up such associations and perhaps to develop brand identification. Therefore, this may indicate that food advertising, and the brand aspect in particular, is a salient stimulus for those children and thus they may be expected to show a greater preference for branded foods than children who demonstrate poorer recognition of brand characters and products.

The majority of foods that are branded and include a brand character as part of their promotional activity are foods high in fat, sugar and/or salt (HFSS). For example, the Haribo boy promotes Haribo products including Kiddie's Supermix which are very high in sugar (containing 63.4 grams of sugar per 100 grams of product); and Intersnack's Pom Bear crisps are high in fat (28.2 grams per 100 grams) and saturates (15.1 grams per 100 grams) and consistently feature the Pom Bear cartoon brand equity character (Which?, 2007a). Therefore, given that brand characters are typically used to promote energy-dense foods to children, it is important to establish if the use of brand characters is a particularly strong contributor to the persuasive power of food advertising.

The current study will be the first to investigate both children's recognition of brand equity characters that represent a range of food product types, and also their recognition of a range of product types promoted by brand equity characters as featured in television food advertising in the UK. This will provide a novel assessment of the children's recognition and awareness of branded products, and their known associations with brand characters. This study will use both product and character stimuli; following viewing a product image (e.g. a cereal packet) children will be asked to name the brand equity character associated with that product (Product Image Flashcard Task, PI-FT), whereas following viewing of a brand character image (e.g. Mr Pringle) children will be asked to name the product advertised by that character (Brand Character Flashcard Task, BC-FT). The Batada & Borzekowski (2008) study demonstrated that the use of flashcards was a valid and useful measure to determine children's recognition of brand characters.

Further, in the previous chapter, the use of food preference measures demonstrated that television food advertising for energy-dense foods has detrimental effects on children's food preferences and therefore could contribute towards an unhealthy diet and the development of obesity. This study, examining if brand characters are part of this effect, will assist with our understanding of how food advertising works, and aid the design of effective measures to limit the negative health effects of such advertising. The findings may be useful for informing future regulation regarding the use of brand equity characters in television food advertising to children.

4.1.1 Aims

The aims of this study were to use novel measures to examine children's recognition of brand equity characters and awareness of the products they promote (covering a range of branded food products), and to assess any differences in this recognition ability that may be related to levels of TV viewing (a proxy measure for habitual advertising exposure) or weight status. Further aims were to conduct the first study to investigate if there was a relationship between children's recognition of brand equity characters and products, and their preferences for branded food items; and to re-examine the self-reported food preferences of high and low habitual TV viewers.

4.1.2 Hypotheses

Based on previous findings, it was hypothesised that:

H1: High TV viewers would correctly identify a greater number of products (from characters, BC-FT) and characters (from products, PI-FT) than low TV viewers.

H2: High TV viewers and low TV viewers would not differ in their food preferences in the absence of experimental television food advert exposure.

H3: OW/OB children would correctly identify a greater number of products (from characters, BC-FT) and characters (from products, PI-FT) than NW children.

H4: There would be a positive relationship between BMI SDS and number of characters (PI-FT) and products (BC-FT) correctly identified.

H5: There would be a positive relationship between both the number of characters (PI-FT) and the products (BC-FT) correctly identified and the number of branded food items selected on the AFPM.

H6: There would be a positive relationship between both the number of characters (PI-FT) and the products (BC-FT) correctly identified and the number of TV sets in the child's household.

4.2 Methods

See also Chapter 2.

4.2.1 Recruitment and Ethics

Participants for this study were recruited from 5 schools in the North West of England, UK. Informed consent was gained from Head teachers to carry out research in their school, and for the proposed method for gaining consent from parents. Parents were sent a letter detailing the study, and were required to return a slip at the bottom of the letter if they were happy for their child to take part in the study. Consent was also gained from each child before commencing the study; the children were given the opportunity to ask questions and it was made clear that they could withdraw from the study at any time without having to give a reason. Ethical approval for this study was provided by the University of Liverpool Research Ethics Sub-Committee for Non-Invasive Procedures (Ref RETH000094, see Appendix 1).

4.2.2 Participants

Data were collected between January and March 2008 (see Appendix 17). 226 participants aged 7-11 years (mean age 9.2 ± 1.3 years) took part in the study (109 male, 117 female). No outliers were identified (all z-scores fell within the range -3 to +3) so no individuals were removed from the data set for analysis. This was an opportunity sample; however, the age range is similar to that of Halford et al., (2004) and the study detailed in the previous chapter.

Raw BMI measurements ranged from 12.5 to 34.5 kg/m^2 (mean 18.0 ± 3.4 kg/m^2) in this sample, and using criteria outlined in 2.1.2, two weight status groups were defined; normal weight (NW), and overweight and obese (OWOB). Tables 4-1 and 4-2 show demographic (age) and anthropometric (BMI) characteristics of the completing participants and the proportion of children in each weight status group and in each TV viewing group.

Table 4-1 Participant Characteristics by weight status groups (mean ± SEM).

	Normal weight (*n* = 141, 62.4%)	Overweight/Obese (*n* = 51, 22.6%)	**All (*n* = 226)**
Age (mean ± SEM)	9.2 ± 0.1y	9.4 ± 0.2y	**9.2 ± 0.1y**
Gender	72 m, 69 f	19 m, 32 f	**109 m, 117 f**
BMI (mean ± SEM)	16.4 ± 0.1 kg/m^2	22.4 ± 0.4 kg/m^2	**(*n* = 192) 18.0 ± 0.2 kg/m^2**

Note: Height and weight data were not available for 34 participants (see 4.2.5).

Table 4-2 Participant characteristics by TV viewing groups (mean ± SEM).

	Low TV viewing (< 24.5 hrs/week) (*n* = 107)	High TV viewing (> 24.5 hrs/week) (*n* = 110)	**All (*n* = 226)**
Age (mean ± SEM)	9.4 ± 0.1 y	9.1 ± 0.1 y	**9.2 ± 0.1 y**
Gender	42 m, 65 f	63 m, 47 f	**109 m, 117 f**
	(*n* = 97)	(*n* = 88)	**(*n* = 192)**
BMI (mean ± SEM)	18.3 ± 0.4 kg/m^2	17.7 ± 0.3 kg/m^2	**18.0 ± 0.2 kg/m^2**
Weight status	(*n* = 97) 69 NW (71.1%) 28 OW/OB (28.9%)	(*n* = 88) 66 NW (75.0%) 22 OW/OB (25.0%)	**(*n* = 192) 141 NW (73.4%) 51 OW/OB (26.6%)**

Note: TV viewing data were not available for 9 participants (height and weight data were not available for 2 of these participants). Height and weight data were not available for a further 32 participants (see 4.2.5). See also Appendix 18 for breakdown of participant characteristics by age.

There were no significant differences in the proportion of male and female participants either within individual schools or within the entire sample. There also were no significant differences in the proportion of male and female participants in each weight status category. The proportion of normal weight (62.4%), overweight and obese children (22.6%) in the sample is slightly lower than but approximately consistent with current levels of adiposity in the UK and in the North West of England region specifically (HSE, 2007).

4.2.3 Data Collection and Confidentiality

Data were collected between January and March 2008. All documents pertaining to the study were kept secured in lockable cabinets, and all electronic data were stored on a password- and virus-protected computer. Participant codes were used so that individual children were not identifiable from the study materials.

4.2.4 Design

This study was a between-subjects design with a single study day at which all measures were completed.

4.2.4.1 Independent variables

Measures of weight status and television viewing were incorporated as independent variables. Therefore, the specific independent variables were:

1. Weight status (NW/OWOB, see section 2.1.2).
2. Age
3. BMI SDS (age- and gender-appropriate standard deviation score, see section 4.2.6).
4. Level of TV viewing (assessed by the revised Habitual Television Viewing Questionnaire (HTVQ-R), see section 2.5.2.2).
5. Number of TV sets in the child's household (assessed by the revised Habitual Television Viewing Questionnaire (HTVQ-R), see section 2.5.2.2).

4.2.4.2 Dependent variables

The effects of the differences in participant characteristics (weight status category, BMI SDS, level of TV viewing, TV sets in household) were assessed by measuring brand recognition and food preferences. Therefore the specific dependent variables were:

1. Ability to identify brand characters from product images (assessed by the Product Image Flashcard Task [PI-FT]).
2. Ability to identify products from brand character images (assessed by the Brand Character Image Flashcard Task [BC-FT]).
3. Preference for non-branded food items (assessed by the LFPM).
4. Preference for branded food items (assessed by the AFPM).

4.2.5 Procedure (see Figure 4-1)

On the test day, children were collectively shown the 10 product flashcards (PI-FT) followed by the 10 character flashcards (BC-FT) (see section 2.5.4) one at a time in their classrooms, in a fixed order as shown in Table 4-3 below. The children were asked to individually write down the name of the brand equity character associated with the product (for the PI-FT) or the name of the product associated with that brand equity character (for the BC-FT) (see Table 4-3).

Table 4-3 - Items of the Product Image Flashcard Task (PI-FT) and Brand Character Flashcard Task (BC-FT) (In Order of Appearance)

PI-FT Brand equity characters to be identified (associated products shown on flashcards)	BC-FT Products to be identified (brand equity characters shown on flashcards)
[1] Snap, Crackle & Pop (Kellogg's Rice Krispies)	[A] Golden Vale's Cheestrings (Mr Strings)
[2] The MilkyBar Kid (Nestlé MilkyBar)	[B] Nestlé Honey Nut Cheerios (BuzzBee)
[3] Ronald McDonald (McDonald's fries)	[C] Intersnack UK Ltd Pom Bear crisps (Pom Bears)
[4] Tony the Tiger (Kellogg's Frosties)	
[5] Bertie Bassett (Bassett's Liquorice Allsorts)	[D] Mars M&Ms (Red M&M & Yellow M&M)
[6] Honey Monster (Honey Monster Foods' Sugar Puffs)	[E] Weetabix Food Company's Weetos (Prof Weetos)
[7] Coco the Monkey (Kellogg's Cocopops)	[F] Kraft Foods Dairylea (Moo the Dairylea cow)
[8] Colonel Sanders (Kentucky Fried Chicken)	[G] Proctor & Gamble Pringles (Mr Pringle)
[9] Pete and Pardner (Nestlé's Golden Nuggets)	[H] Unilever Peperami (The Animal)
[10] Quicky the Bunny (Nesquik milkshake powder)	[I] Nestlé Cookie Crisp (Chip the Wolf)
	[J] Haribo (Haribo boy)

Participants were then given two food preference measures (LFPM & AFPM) (see section 2.5.1.1 and 2.5.1.2), and the HTVQ-R (see section 2.5.2.2) to complete.

Children's age in years and months was ascertained and children's height (m) and weight (kg) measurements were taken. Children were individually weighed and measured without shoes, and with a member of school staff present at all times. Due to time constraints, height and weight measurements were not obtained at one school (34 participants). In addition, 9 participants did not fully complete the HTVQ-R and therefore could not be allocated to a TV viewing group.

Figure 4-1 The experimental procedure

10 product flashcards (PI-FT)

↓

10 brand character flashcards

(BC-FT)

↓

Leeds Food Preference Measure (LFPM, non-branded foods)

↓

Adapted Food Preference Measure (AFPM, branded foods)

↓

Revised Habitual Television Viewing Questionnaire (HTVQ-R)

↓

Height (m) and weight (kg) measurements taken

4.2.6 Statistical Analysis

Data from the FT did not adhere to the assumptions for parametric data (normality of distribution) therefore non-parametric analysis was performed. All comparisons were two-tailed and significance was taken at $p < 0.05$ (with Bonferroni adjustments for multiple comparisons). Analyses were completed using PASW v17.0 for Windows (SPSS Inc., Chicago, US).

Using internationally recognised criteria for children, as recommended by the International Obesity Task Force (Cole et al., 2000), overweight and obesity were defined based on age- and gender-specific BMI cut-off points equivalent to adult BMIs of 25 kg/m^2 and 30 kg/m^2 respectively. For use in analyses, BMI was converted to an age- and gender-appropriate standard deviation score (SDS) using 1990 reference standards for the UK (Cole et al., 1995).

Data regarding the high protein and low-energy items of the LFPM were removed from analysis when direct comparisons were made between the LFPM and the AFPM e.g. total non-branded versus total branded items selected (to ensure both measures included a total of 16 items).

Responses to the FT were categorised as correct, partially correct and incorrect. Identification scores were calculated using both a moderate measure in which partially correct responses were categorised as correct, and a more conservative measure in which partially correct responses were categorised as incorrect. Further details are provided in Appendix 19. Where use of the moderate versus the conservative measure did not alter the results of the analyses, the moderate approach was adopted and reported (i.e. reference to correct responses is inclusive of those partially correct). However, for one analysis, use of the conservative measure did have an effect on the results and therefore, as specifically stated in the text, the results for both approaches were reported.

For clarity, all descriptive data, tables and figures represent mean values but statistical significance was identified using non-parametric analyses which use median values.

4.3 Results

Participating children were able to correctly identify on average 2.3 (± 1.9 SD) characters following viewing of the food product flashcard (PI-FT), with the correct responses ranging from 0 (51 children) to 8 (2 children) characters. Children were able to correctly or partially correctly identify a mean of 6.1 (± 2.6 SD) characters from the product stimulus, ranging from 0 (6 children) to 10 (16 children). The most well known character was Coco the Monkey (Kellogg's), with 184 children (81.4%) able to provide some or the entire character name after viewing a flashcard depicting a box of Kellogg's Cocopops. The least well known character was the Honey Monster (Honey Monster Foods) with only 86 children (38.1%) able to provide a correct or partially correct character name after being shown the food product promoted by that character (Sugar Puffs) (see Figure 4-2).

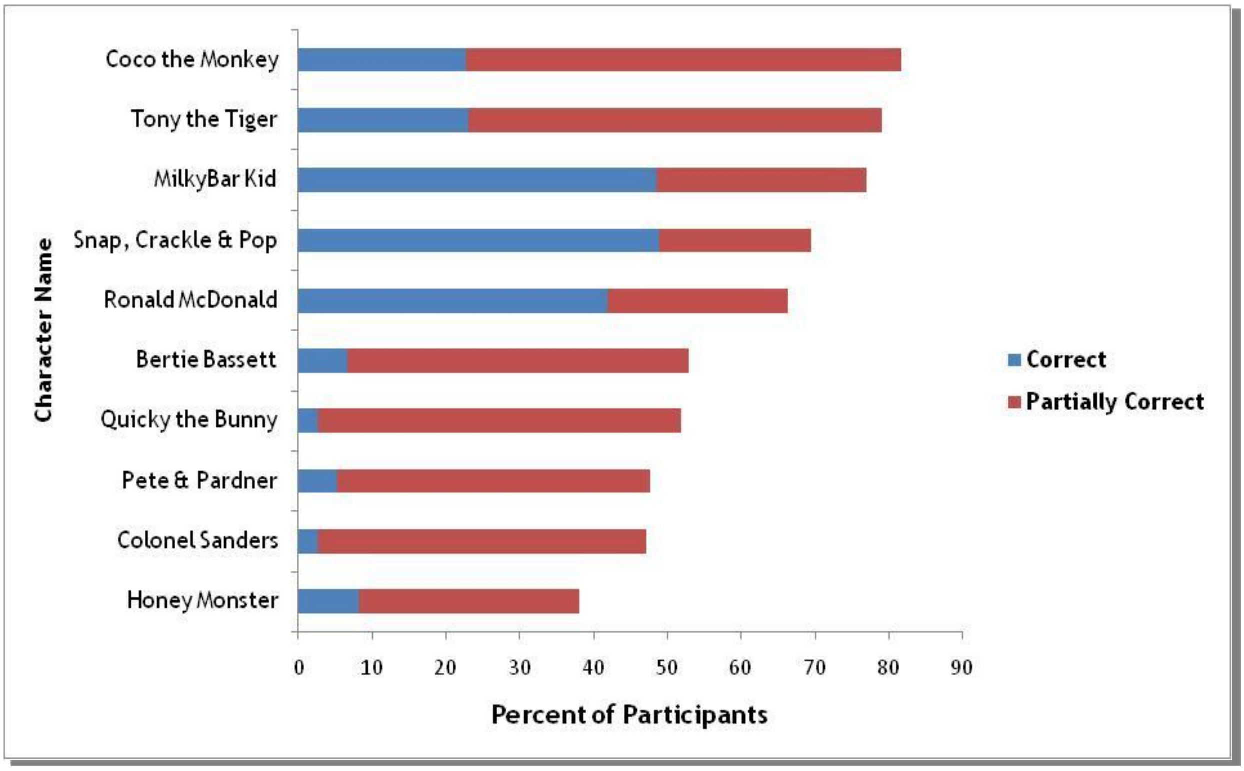


Figure 4-2 Proportion of participants correctly and partially correctly identifying each character from the product flashcard

Participating children were able to correctly identify a mean of 6.2 (± 2.5 SD) products following viewing of the brand equity character flashcard (BC-FT), with the correct responses ranging from 0 (3 children) to 10 (13 children). Children were able to correctly or partially correctly identify a mean of 7.9 (± 2.1 SD) products from the character stimulus, ranging from 1 (2 children) to 10 (57 children). The most well known product was Cheestrings (Golden Vale), with 217 children (96.0%) able to provide some or the entire product name after viewing a flashcard depicting the brand character 'Mr Strings'. The least well known product was Weetos (Weetabix Food Company) with only 122 children (54.0%) able to provide a correct or partially correct product name after being shown the brand equity character associated with that product (see Figure 4-3).

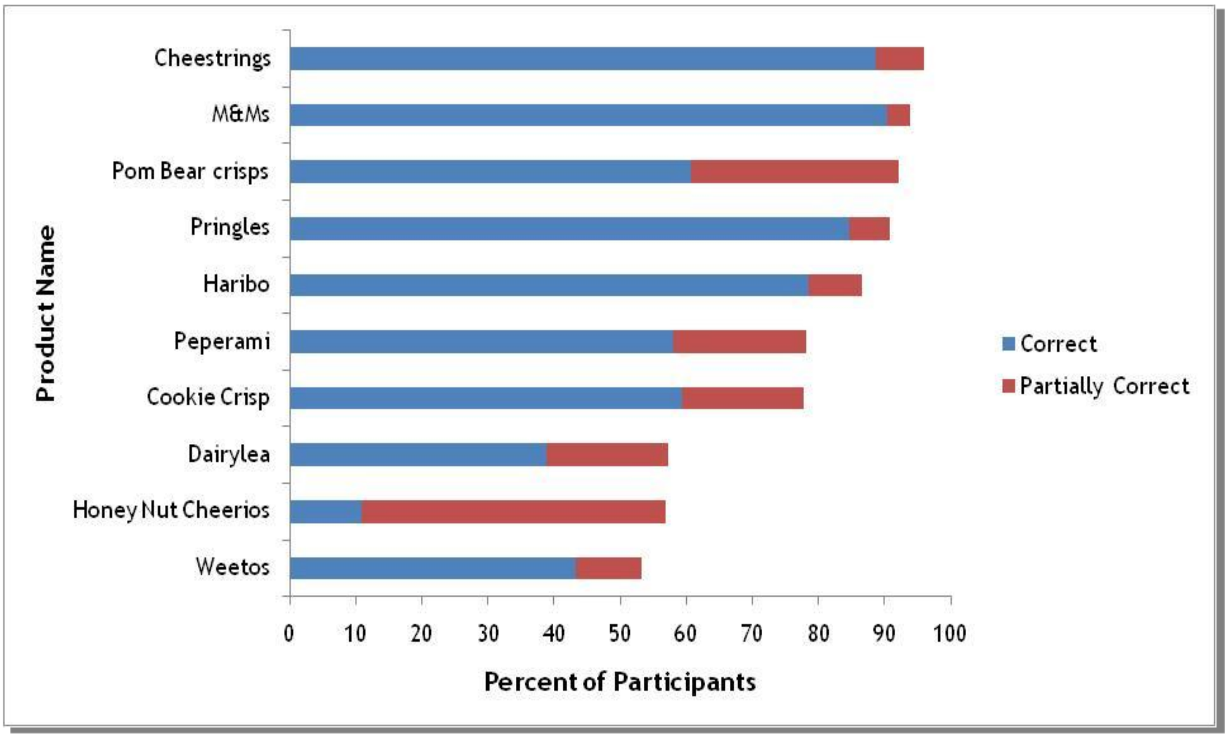


Figure 4-3 Proportion of participants correctly and partially correctly identifying each product from the brand equity character flashcard

H1: High TV viewers would correctly identify a greater number of products (from characters, BC-FT) and characters (from products, PI-FT) than low TV viewers.

With regard to the identification of characters from the PI-FT, Kruskal-Wallis tests showed that the number of characters correctly (H(1) = 0.023, p = 0.880) and incorrectly/not identified (H(1) = 0.039, p = 0.843) was not significantly affected by the child's level of TV viewing (high/low, high TV viewing was taken as 24.5

hours/week or more based on a median split of the entire sample) (see Table 4-4). Similarly, the number of products correctly ($H(1) = 2.813$, $p = 0.093$) and incorrectly/not identified ($H(1) = 1.545$, $p = 0.214$) from the BC-FT was not significantly affected by the child's level of TV viewing (see Table 4-5).

There were no significant correlations between TV viewing level (high/low) and the number of characters identified correctly ($r_s(217) = -0.010$, $p = 0.880$) or incorrectly/not identified ($r_s(217) = 0.013$, $p = 0.843$) from the PI-FT; or products identified correctly ($r_s(217) = -0.114$, $p = 0.094$) or incorrectly/not identified ($r_s(217) = 0.085$, $p = 0.215$) from the BC-FT. However, contrary to predictions, there was a significant and negative (although weak) correlation between the number of hours of TV the children reported watching per week and the number of products identified correctly ($r_s(217) = -0.136$, $p = 0.046$). Therefore, these findings do not support H1. If children's level of TV viewing is used as a proxy measure for their level of habitual advertising exposure, these data suggest that despite an increased level of advertising exposure in the high TV viewing group, these children were not significantly better at identifying products (with some evidence that their performance was actually poorer for this aspect of the task) from the brand equity characters associated with that product (and vice versa) than the children with lower levels of habitual advertising exposure.

Table 4-4 The effects of TV viewing level and weight status on character identification using the product image flashcard task (PI-FT) (overall mean ± SD)

Variable	TV Viewing		Weight Status		
	Low TV	High TV	NW	OW/OB	All
Character Identification (PI-FT)					
[1] Kellogg's Rice Krispies					
Correct (Snap, Crackle and Pop)	54	53	72	31	111
Partially Correct	23	22	32	7	47
Incorrect	30	35	37	13	68
[2] Nestlé MilkyBar					
Correct (The MilkyBar Kid)	53	58	73	28	111
Partially Correct	37	21	38	13	62
Incorrect	17	31	30	10	53
[3] McDonalds					
Correct (Ronald McDonald)	46	48	61	25	96
Partially Correct	31	23	37	10	56
Incorrect	30	39	43	16	74
[4] Kellogg's Frosties					
Correct (Tony the Tiger)	30	21	35	14	53
Partially Correct	59	62	78	22	125
Incorrect	18	27	28	15	48
[5] Bassett's Liquorice Allsorts					
Correct (Bertie Bassett)	10	5	12	3	15
Partially Correct	49	53	69	23	105
Incorrect	48	52	60	25	106
[6] Honey Monster Food's Sugar Puffs					
Correct (Honey Monster)	10	8	12	3	19
Partially Correct	30	35	41	18	67
Incorrect	67	67	88	30	140
[7] Kellogg's Cocopops					
Correct (Coco the Monkey)	25	26	33	13	52
Partially Correct	59	68	84	27	132
Incorrect	23	16	24	11	42
[8] Kentucky Fried Chicken					
Correct (Colonel Sanders)	4	2	3	3	6
Partially Correct	39	55	63	20	100
Incorrect	64	53	75	28	120
[9] Nestlé Golden Nuggets					
Correct (Pete and Pardner)	8	4	6	6	12
Partially Correct	38	53	62	21	94
Incorrect	61	53	73	24	120
[10] Nesquik					
Correct (Quicky the bunny)	2	3	3	1	6
Partially Correct	58	49	82	21	110
Incorrect	47	58	56	29	110
Overall mean					
Correct	2.5 ± 2.0	2.1 ± 1.8	2.4 ± 1.9	2.7 ± 2.0	2.3 ± 1.9
Partially Correct	6.2 ± 2.4	6.1 ± 2.8	6.4 ± 2.6	6.1 ± 2.6	6.1 ± 2.6
Incorrect	3.8 ± 2.5	3.9 ± 2.8	3.7 ± 2.6	3.9 ± 2.6	3.9 ± 2.6

Table 4-5 The effects of TV viewing level and weight status on product identification using the brand character flashcard task (BC-FT) (overall mean ± SD)

Variable	TV Viewing		Weight Status		
	Low TV	High TV	NW	OW/OB	All
Product Identification (BC-FT)					
[A] Golden Vale's Mr Strings					
Correct (Cheestrings)	99	95	125	44	200
Partially Correct	5	10	11	4	17
Incorrect	3	5	5	3	9
[B] Nestlé's BuzzBee					
Correct (Honey Nut Cheerios)	15	10	20	5	25
Partially Correct	49	52	71	23	105
Incorrect	43	48	50	23	96
[C] Intersnack UK Ltd's Pom Bears					
Correct (Pom Bear Crisps)	69	66	91	29	138
Partially Correct	33	35	41	20	71
Incorrect	5	9	9	2	17
[D] Mars' Red & Yellow M&Ms					
Correct (M&Ms)	102	96	129	47	204
Partially Correct	3	4	6	2	8
Incorrect	2	10	6	2	14
[E] Weetabix Food Company's Prof Weetos					
Correct (Weetos)	54	44	69	24	99
Partially Correct	10	10	18	4	23
Incorrect	43	56	54	23	104
[F] Kraft Food's Moo the Dairylea Cow					
Correct (Dairylea)	47	41	63	20	89
Partially Correct	15	25	25	7	41
Incorrect	45	44	53	24	96
[G] Proctor and Gamble's Mr Pringle					
Correct (Pringles)	94	91	119	45	191
Partially Correct	3	9	7	3	14
Incorrect	10	10	15	3	21
[H] Unilever's Animal					
Correct (Peperami)	66	63	91	31	133
Partially Correct	18	24	27	10	44
Incorrect	23	23	23	10	49
[I] Nestlé's Chip the Wolf					
Correct (Cookie Crisp)	67	62	86	33	133
Partially Correct	20	18	27	10	42
Incorrect	20	30	28	8	51
[J] Haribo's the Haribo Boy					
Correct (Haribo)	91	87	120	40	180
Partially Correct	6	9	8	4	17
Incorrect	10	14	13	7	29
Overall mean					
Correct	6.6 ± 2.3	6.0 ± 2.6	6.5 ± 2.5	6.2 ± 2.5	6.2 ± 2.5
Partially Correct	8.1 ± 1.9	7.7 ± 2.1	8.2 ± 1.9	7.9 ± 1.9	7.9± 2.1
Incorrect	1.9 ± 1.9	2.3 ± 2.1	1.8 ± 1.9	2.1 ± 1.9	2.2 ± 2.1

Note: * $p < 0.05$ indicates a significant difference between TV viewing groups.

H2: High TV viewers and low TV viewers would not differ in their food preferences in the absence of experimental television food advert exposure.

Contrary to prediction, Kruskal-Wallis tests revealed that there was a significant difference between high and low TV viewers in terms of their food preferences. The mean selection of branded and non-branded food items (by macronutrient type) on the food preference measures (LFPM & AFPM) by TV viewing level and weight status are shown in Table 4-6.

Table 4-6 The effects of TV viewing level and weight status on food preferences (mean ± SD)

Variable	TV Viewing			Weight Status		
	Low TV	High TV		NW	OW/OB	All
LFPM						
Non-branded CHO	3.5 ± 2.0	4.5 ± 2.2**		3.8 ± 2.2	4.0 ± 2.0	4.0 ± 2.2
Non-branded Fat	3.8 ± 1.9	4.9 ± 2.0**		4.2 ± 2.1	4.3 ± 2.0	4.4 ± 2.0
Non-branded Protein	2.6 ± 2.2	3.4 ± 2.4		2.6 ± 2.3	3.3 ± 2.2	3.0 ± 2.4
Non-branded Low Energy	3.1 ± 1.9	3.6 ± 2.4		3.3 ± 2.2	3.3 ± 2.0	3.4 ± 2.2
Total Non-branded (exc. Protein & Low Energy)	7.3 ± 3.4	9.4 ± 3.9***		8.0 ± 3.9	8.3 ± 3.4	8.3 ± 3.8
Total Non-branded (inc. Protein & Low Energy)	13.0 ± 6.4	16.3 ± 7.7**		13.9 ± 7.5	14.9 ± 6.5	14.7 ± 7.3
AFPM						
Branded CHO	3.5 ± 2.0	4.8 ± 2.3***		3.9 ± 2.2	4.2 ± 2.2	4.1 ± 2.3
Branded Fat	4.3 ± 2.1	5.5 ± 2.0***		4.7 ± 2.1	4.7 ± 2.1	4.9 ± 2.2
Total Branded	7.7 ± 3.7	10.3 ± 4.0***		8.5 ± 4.0	8.8 ± 4.0	9.0 ± 4.1
LFPM & AFPM Combined						
Total CHO (branded + Non-branded)	6.9 ± 3.7	9.3 ± 4.1***		7.7 ± 4.1	8.2 ± 4.0	8.1 ± 4.1
Total Fat (branded + Non-branded)	8.1 ± 3.7	10.4 ± 3.8***		8.8 ± 4.0	9.0 ± 3.9	9.2 ± 3.9
Total Foods	20.7 ± 9.6	26.6 ± 11.3***		22.4 ± 11.0	23.7 ± 10.1	23.7 ± 10.9

Note: Due to Bonferroni corrections ** p<0.003 (equivalent to p<0.01), ***p<0.001 reflecting between TV viewing group differences.

Looking at the results of the LFPM, high TV viewers selected significantly more non-branded high CHO (H(1) = 11.776, p = 0.001) and high fat (H(1) = 17.692, p < 0.001) items but not high protein (H(1) = 5.921, p = 0.015) or low energy density items (H(1) = 1.319, p = 0.251) than low TV viewers (significance taken at p < 0.0125 due to corrections). High TV viewers also selected significantly more non-branded items than low TV viewers overall from the LFPM, both when the protein and low energy items are excluded (H(1) = 16.743, p < 0.001) and included in the analysis (H(1) = 9.444, p = 0.002).

Regarding the AFPM, the high TV viewers selected significantly more branded high CHO ($H(1) = 17.534$, $p < 0.001$), and high fat items ($H(1) = 19.761$, $p < 0.001$), as well as more branded items overall ($H(1) = 20.694$, $p < 0.001$) than the low TV viewers. Examining the two food preference measures combined, high TV viewers chose significantly greater numbers of carbohydrate items (non-branded and branded; $H(1) = 16.735$, $p < 0.001$), fat items (non-branded and branded; $H(1) = 21.133$, $p < 0.001$) and total items (non-branded and branded; $H(1) = 14.372$, $p < 0.001$) than low TV viewers.

Furthermore, there were significant and positive associations found between the level of TV viewing (high/low) and the selection of both branded and non-branded items from the food preference measures (see Table 4-7).

Table 4-7 Significant correlations between level of TV viewing (high/low) and the selection of branded items from the AFPM and non-branded items from the LFPM.

Variable	Spearman Correlation	Sig. (2-tailed)
Non-branded items		
NB protein	$r_s = 0.166$	$p = 0.015$
NB CHO	$r_s = 0.233$	$p = 0.001$
Total NB (exc. protein & LE)	$r_s = 0.287$	$p = 0.002$
Total NB (inc. protein & LE)	$r_s = 0.209$	$p = 0.002$
Branded items		
B CHO	$r_s = 0.285$	$p < 0.001$
B fat	$r_s = 0.302$	$p < 0.001$
Total B (CHO + fat)	$r_s = 0.310$	$p < 0.001$
Totals		
Total CHO (B + NB)	$r_s = 0.278$	$p < 0.001$
Total fat (B + NB)	$r_s = 0.313$	$p < 0.001$
Total foods (B + NB)	$r_s = 0.258$	$p < 0.001$

These data are not in support of H2.

H3: OW/OB children would correctly identify a greater number of products (from characters, BC-FT) and characters (from products, PI-FT) than NW children.

Further Kruskal-Wallis tests found that the number of characters correctly ($H(1) = 0.561$, $p = 0.454$) and incorrectly/not identified ($H(1) = 0.480$, $p = 0.489$) from the PI-FT was not significantly affected by the child's weight status (NW/OWOB) (see Figure 4-4). Additionally, the number of products correctly ($H(1) = 1.047$, $p = 0.306$) and incorrectly/not identified ($H(1) = 1.047$, $p = 0.306$) from the BC-FT was also not significantly affected by the child's weight status (see Figure 4-5).

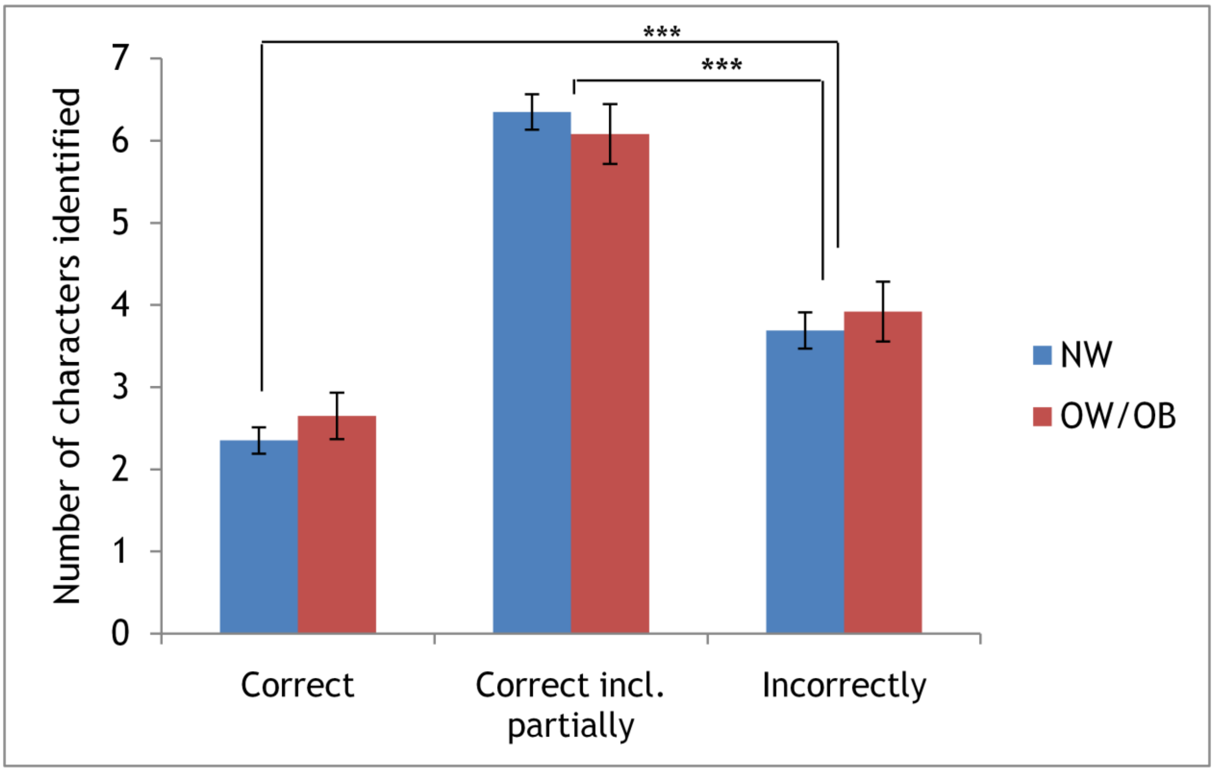


Figure 4-4 Mean (±SEM, indicated by the error bars) numbers of brand equity characters correctly and incorrectly/not identified from product images (PI-FT) by weight status group (normal weight/overweight and obese).

Note: *** $p < 0.001$.

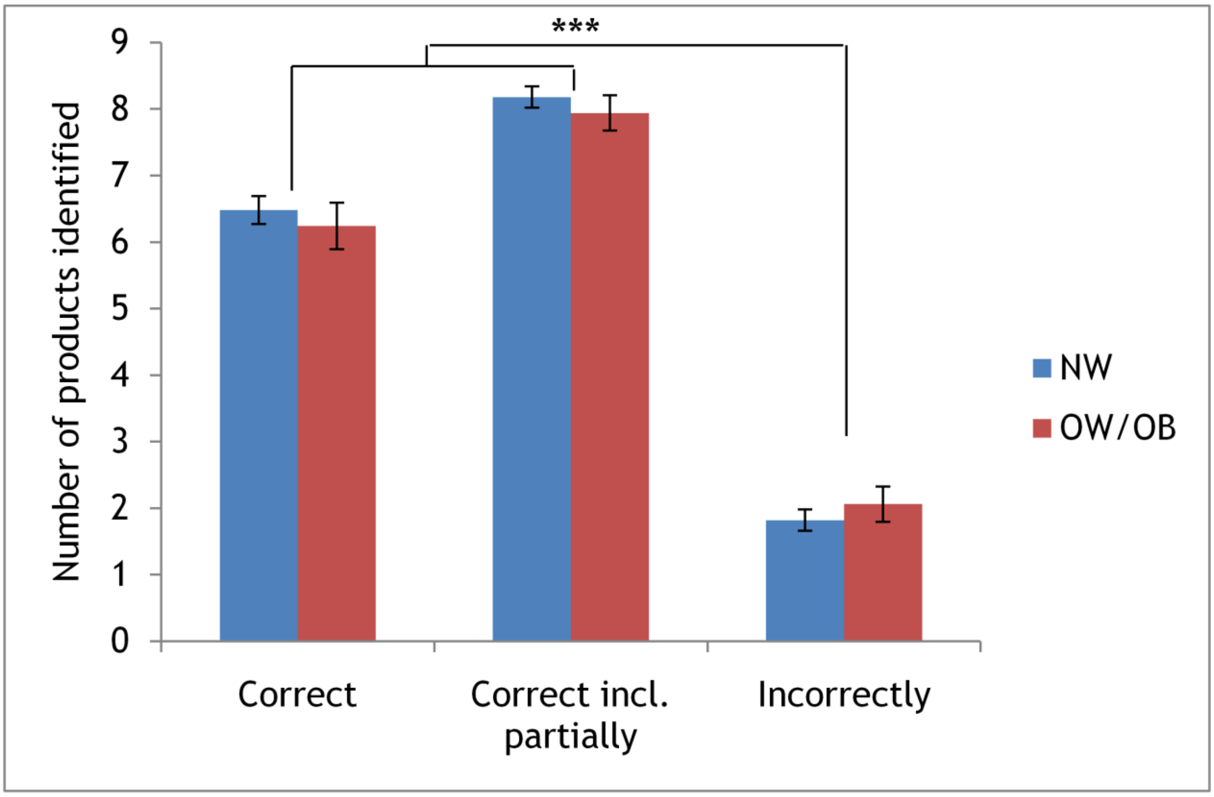


Figure 4-5 **Mean (±SEM, indicated by the error bars) numbers of products correctly and incorrectly/not identified from brand equity character images (BC-FT) by weight status group (normal weight/overweight and obese).**

Note: *** p < 0.001.

In addition, there were no significant correlations between weight status and the number of characters correctly ($r_s(192) = -0.054$, $p = 0.455$) or incorrectly/not identified ($r_s(192) = 0.050$, $p = 0.490$) from the PI-FT; or the number of products correctly ($r_s(192) = -0.046$, $p = 0.528$) or incorrectly/not ($r_s(192) = 0.074$, $p = 0.308$) identified from the BC-FT. The children in the OW/OB group correctly identified a similar number of characters and products to the NW group, and the number of characters and products incorrectly/not identified was also similar between the weight status groups. Therefore, these findings do not support H3.

Overall, all participants correctly identified more products than they incorrectly/did not identify ($T = 828.00$, $z = -11.840$, $r = -0.79$, $p < 0.001$). Also, all participants correctly identified more products than characters ($T = 1360.50$, $z = -9.964$, $r = -0.66$, $p < 0.001$), and the children incorrectly identified/did not identify significantly fewer products than characters (T = 1492.00, z = -9.778, r = -0.65, p < 0.001). Use of the moderate versus the conservative approach to coding the FT responses did not affect the outcome of these analyses.

However, when examining the character identification data (PI-FT) specifically, use of the conservative approach did affect the results relative to the use of the moderate approach. When including partially correct responses as correct (moderate approach), participants correctly identified a greater number of characters than they incorrectly/did not identify (T = 5176.00, z=-5.825, r=-0.39, p < 0.001). However, when using the conservative approach (partially correct responses *not* included as correct), the results indicated that the participants were incorrect/unable to identify a greater number of characters than they correctly identified (T = 5451.50, z = -5.462, r = -0.36, p < 0.001).

There were no significant differences identified between the NW and the OW/OB children's food preferences. The two weight status groups were not significantly different in their selection of non-branded high protein (p = 0.052), high CHO (p = 0.491), high fat (p = 0.707), low energy density (p = 0.904) or total items from the LFPM whether high protein and low energy density items were excluded (p = 0.523) or included (p = 0.326). The selection of branded high CHO (p = 0.483), high fat (p = 0.931) or total items (p = 0.737) from the AFPM was also not significantly affected by weight status.

H4: There would be a relationship between BMI SDS and number of characters (PI-FT) and products (BC-FT) correctly identified.

Non-parametric bivariate correlations showed that there was no relationship between BMI SDS and the correct (r_s(192) = 0.053, p = 0.462) or incorrect/non (r_s(192) = -0.047, p = 0.516) identification of characters from the PI-FT; or the correct (r_s(192) = 0.035, p = 0.628) or incorrect/non (r_s(192) = -0.035, p = 0.628) identification of products from the BC-FT. This is consistent with the previous finding that character and product identification did not differ between weight status groups. H4 is also not supported. In addition, there was no significant relationship between BMI SDS and level of TV viewing in this sample (r_s(185) = -0.036, p = 0.624).

H5: There would be a relationship between both the number of characters (PI-FT) and the products (BC-FT) correctly identified and the number of branded food items selected on the AFPM.

With regards to branding, non-parametric bivariate correlations found that there was no relationship between the number of branded foods selected on the AFPM and the correct ($r_s(226) = -0.025$, $p = 0.702$) or incorrect/non ($r_s(226) = -0.065$, $p = 0.331$) identification of characters from the PI-FT; or the correct ($r_s(226) = -0.039$, $p = 0.555$) or incorrect/non ($r_s(226) = 0.039$, $p = 0.555$) identification of products from the BC-FT. The children who selected the most branded items on the food preference measure were no more able to correctly identify brand characters/products than the children who selected fewer branded items. Therefore H5 is not supported by these data.

Regarding preferences for non-branded items, there was no significant relationship between the total number of foods selected on the LFPM and the correct ($r_s(226) = -0.030$, $p = 0.650$) or incorrect/non ($r_s(226) = -0.032$, $p = 0.628$) identification of characters from the PI-FT; or the correct ($r_s(226) = -0.052$, $p = 0.436$) or incorrect/non ($r_s(226) = 0.077$, $p = 0.250$) identification of products from the BC-FT.

H6: There would be a relationship between both the number of characters (PI-FT) and the products (BC-FT) correctly identified and the number of TV sets in the child's household.

There were no significant correlations between the number of TV sets children reported having in their houses and their ability to correctly ($r_s(223) = -0.117$, $p = 0.080$) or incorrectly/not ($r_s(223) = 0.121$, $p = 0.071$) identify characters from the PI-FT; nor correctly ($r_s(223) = 0.028$, $p = 0.682$) or incorrectly/not ($r_s(223) = 0.028$, $p = 0.682$) identify products from the BC-FT. There were also no significant differences, dependent upon the relative 'level' of TV sets in the childrens' houses (high/low, high number of TV sets was taken as 4 or more based on a median split of the entire sample), on ability to correctly ($H(1) = 1.230$, $p = 0.267$) or incorrectly/not ($H(1) = 1.070$, $p = 0.301$) identify characters; or correctly ($H(1) = 0.074$, $p = 0.786$) or incorrectly/not ($H(1) = 0.681$, $p = 0.409$) identify products. These data are not in support of H6.

In addition, there was no relationship between the age of the participant and the total number of weekly TV hours viewed ($r_s(217) = -0.119$, $p = 0.081$). However, there was a very weak but significant and positive correlation between the number of television sets children reported having in their houses and the total number of TV hours viewed weekly ($r_s(215) = 0.151$, $p = 0.027$).

There was a significant difference in product identification found to be related to the age of the participants (see Figure 4-6). Using Mann-Whitney U tests with age as the grouping variable (older/younger, older children categorised as being above 9.1 years of age based on a median split of the entire sample), it was found that the older children correctly identified a greater number of products (from the character stimuli on the BC-FT) ($U = 2433.5$, $r = -0.53$, $p < 0.001$) and incorrectly/did not identify fewer products ($U = 2515.0$, $r = -0.52$, $p < 0.001$) than younger children. More specifically, this pattern held for the correct identification of Honey Nut Cheerios ($U = 4766.0$, $r = -0.22$, $p = 0.001$), Pom Bear ($U = 4142.0$, $r = -0.33$, $p < 0.001$), M&Ms ($U = 5204.0$, $r = -0.27$, $p < 0.001$), Weetos ($U = 3551.0$, $r = -0.41$, $p < 0.001$), Dairylea ($U = 3708.0$, $r = -0.37$, $p < 0.001$), Pringles ($U = 4695.0$, $r = -0.33$, $p < 0.001$), Peperami ($U = 3085.5$, $r = -0.49$, $p < 0.001$), Cookie Crisp ($U = 3978.0$, $r = -0.35$, $p < 0.001$) and Haribo ($U = 4663.5$, $r = -0.031$, $p < 0.001$) but not Cheestrings ($U = 5723.0$, $p = 0.066$). These data are supported by the finding that the child's age was significantly and positively correlated with the total number of products identified correctly ($r_s(226) = 0.644$, $p < 0.001$), and negatively associated with products incorrectly/not identified ($r_s(226) = -0.621$, $p < 0.001$).

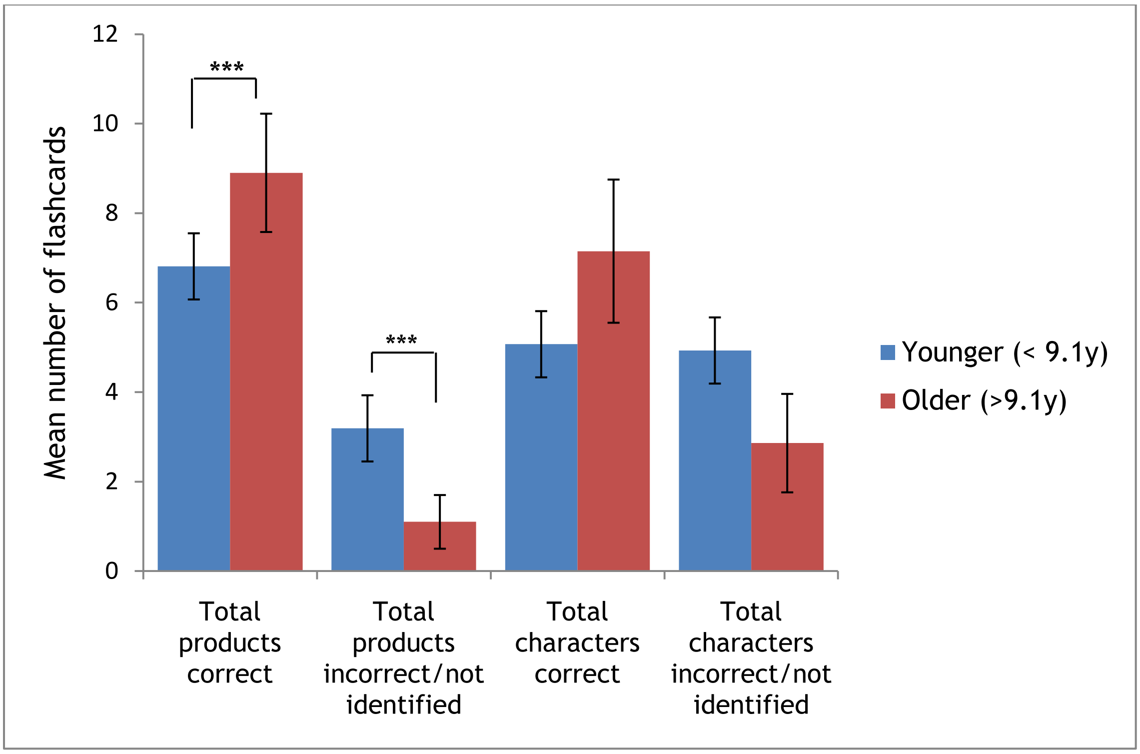


Figure 4-6 Mean (±SEM, indicated by the error bars) numbers of products correctly and incorrectly/not identified from brand equity character images (BC-FT) and characters correctly and incorrectly/not identified from product images (PI-FT) by age group (younger/older; based on a median split).

Note: *** $p < 0.001$.

Additionally, although there was a trend approaching significance for older children to correctly identify a greater number of characters (from product stimuli on the PI-FT) ($U = 5440.0$, $p = 0.055$), there was no significant difference between the older and younger children in their incorrect/non-identification of characters ($U = 5567.5$, $p = 0.097$). However, the data demonstrate that there are significant and positive correlations between the age of the participant and the number of characters correctly identified ($r_s(226) = 0.466$, $p < 0.001$) and negative associations with the number of characters incorrectly/not identified ($r_s(226) = -0.459$, $p < 0.001$).

4.4 Discussion

This is the first study to investigate if there is a relationship between children's awareness of brand equity characters (and the products they promote), and their food preferences, and additionally to provide an examination of the potential role of weight status and television use in such a relationship. It is also a novel aspect of this study to have included a range of brand characters representing a number of branded products in different food categories.

Children in this study were able to correctly recognise, on average, 6.2 products and correctly/partially correctly recognise a mean of 7.9 products from a brand equity character stimulus (BC-FT). Although participants were only able to correctly name a mean of 2.3 brand equity characters, they were able to correctly/partially correctly identify 6.1 characters when presented with an image of the branded product (PI-FT). This suggests that overall children have a high level of familiarity with branded food items and their advertising, featuring brand equity characters. The children were better able to identify products from characters than vice versa, although the difference was reduced dramatically when partially correct character names were included as correct. These findings perhaps reflect the fact that full character names (whilst often appearing on websites, packaging, or other forms of product merchandise) are not always explicitly stated in television adverts and therefore may not be as well known as product names. Furthermore, as brand equity characters have very little 'personality' or substance beyond their role as a brand promotion tool, particularly when compared to licensed characters or celebrity endorsers, this may mean that the impact of brand equity characters in television advertising is limited to adding visual appeal, humour, colour and activity to the advert, without communicating aspects of a wider brand identity to the children. Therefore, brand equity characters may serve a similar function to that of brand logos and other packaging details, being used superficially by children for visual recognition rather than being processed as part of the formation of brand associations and identification.

Given that correct responses were found to range from 0 – 10 (for product identification) and 0 – 8 (for character identification), this suggests that these FT tasks were a sensitive enough measure to identify individual differences in children's brand character and product identification ability. In addition, there were no significant differences between boys and girls in terms of product and character identification (results not reported) which indicates that the stimuli were equally appropriate for both genders. However, there were age-related differences in the FT results. This may indicate that the older children had experienced greater cumulative exposure to television food advertising and therefore branding activity (regardless of habitual TV viewing levels) which could have led to more developed brand awareness. This is one explanation for the finding that older children were better able to identify products from a brand character stimulus than younger children, and that increasing age was associated with better brand character identification from a product stimulus. These findings are consistent with previous work whereby the number of recognised cereal characters increased with increasing school grade level (Batada & Borzekowski, 2008). However, the possibility remains that the tasks were too cognitively demanding for the younger children. Although allowances were made during the coding of the PI-FT and the BC-FT responses for poor spelling to ensure that literacy skills did not overly affect the results, perhaps these findings indicate that this task is more suitable for 9-11 year old children than younger age ranges.

Contrary to predictions, children with higher levels of habitual advertising exposure (high TV viewers) were not significantly better at identifying brand equity characters (from the products they promote), or identifying products (from the brand equity characters used in their television advertisements) than children with lower levels of advertising exposure. Given that the results show the mean correct response rate to be 79% for product identification and 61% for character identification (including partially correct answers as correct), this indicates that overall marketing activity (including television food advertising) is effective at creating awareness of brand characters and known associations with products. This is one of the principal aims of food promotion, as previous research demonstrates that if children are able to recognise a brand character they are more likely to choose products of that brand (Batada & Borzekowski, 2008). Furthermore, if children recognise an association between a brand character and a product then they are more likely to develop positive attitudes towards the product (DiFranza et al., 1991).

However, as there was also no significant relationship found between brand character and product identification ability and the selection of branded food items on the AFPM, the children in this study who displayed more brand awareness did not show a particular preference for brands or branded products. This is inconsistent with the findings of Batada & Borzekowski (2008) and DiFranza et al., (1991), but may indicate that a raised level of brand awareness needs to occur over time and to develop into favourable attitudes towards the brand, or into feelings of brand identification, before this results in the likelihood of a child selecting a particular product being effectively increased. As there is thought to be a process from initial character exposure, to repeated exposure over time via cumulative television viewing, to later possible changes in food preferences and weight gain; perhaps experimental, cross-sectional studies of this size are not the most suitable design with which to identify the effects of these factors. Another explanation is that the 16 branded items present on the AFPM did not allow the participating children to fully express their branded food preferences. By their nature, food preference measures cannot include a comprehensive list of all branded foods the children may potentially show a preference for and therefore such measures place some constraints on the children's expression of food preferences.

As there were no significant differences between high and low TV viewers in brand character or product identification, this suggests that perhaps children are likely to be aware of and remember a certain subset of brand characters only, rather than demonstrating a cumulative increase in knowledge of brand characters over time. The particular characters that are 'chosen' to be known and recognised may be related to their personal liking of the characters, or result from increased familiarity of brands and characters that are particularly popular (and therefore discussed) within their peer group. Alternatively, it may also relate to the limited information a child can process and retain about brand equity characters, as they do not have relevance or associations beyond that of the brand or product, compared to the featuring of licensed characters or celebrity endorsers who have pre-existing and known outside associations to bring to the product promotion to aid the development of brand identification.

Another simpler explanation is that some food products are more frequently advertised on television than others (this will be addressed in Chapter 6), and so it might be the case that even low TV viewers have had significant exposure to some brand characters (e.g. Coco the Monkey that was relatively well recognised) whereas other products are not advertised so frequently so that even high TV viewers are not necessarily familiar with the brand equity character (e.g. the Honey Monster that was relatively poorly recognised).

A further explanation is that some brand characters may feature more prominently in television food advertising than others, or may be used more effectively when featured, so that familiarity and recognition is achieved after fewer exposures than for characters that play a more minor role in the advertising strategy or are less effectively used. Future research should further investigate why some brand characters and products are generally better recognised than others, and also to explore potential reasons (other than TV viewing levels) for some children to recognise more food brand characters and products than others (e.g. differences in the level of either overall engagement with food advertisements or in specific attentional bias regarding the use of brand characters).

Although high and low TV viewers did not differ in their FT results, they did differ in terms of their food preferences. High TV viewers (those with greatest habitual exposure to television advertising) selected more high CHO and high fat items (both branded and non) than low TV viewers. The previous study of this thesis (Chapter 3) also found that high TV viewers selected a greater number of branded items and non-branded items than the low TV viewers, however these food preference differences were evident following television food advertisement exposure only and not in the control (toy advert) condition. This may suggest that exposure to the brand character and product images during the FT task acted as a food cue or stimulus in a similar way to viewing food adverts on television, producing a similar food preference response in high TV viewing children compared to low TV viewers. This could explain why food preference differences between the TV viewing groups were apparent in this study even in the absence of actual food advert exposure.

Additionally, whilst these data are not indicative of increased habitual exposure to television food advertising affecting preference for branded foods specifically, they are consistent with previously published data whereby experimental exposure to television food adverts (relative to following toy advert exposure) increased preference for (Halford et al., 2008a) and intake of (Halford et al., 2004; Halford et al., 2008b; Halford et al., 2007) a range of foods with a ‘beyond-brand’ or ‘category’ effect. This effect was not seen for the low energy dense food items, which is also consistent with previous studies showing that increased television viewing is particularly associated with increases in the consumption of foods that are both energy dense and low in nutrients (Davison et al., 2006). Furthermore, it is also partially consistent with previous findings whereby, from the range of foods available, intake of low fat savoury items only was unaffected by food advert exposure (Halford et al., 2004; Halford et al., 2008b) although in this study between TV viewing group differences were also not seen for the high protein items.

In this study, there were no significant differences between normal weight and overweight and obese children in terms of their character and product identification ability or food preferences. Similarly, there was no relationship between flashcard identification ability and BMI SDS. This is in contrast to previous work by Batada & Borzekowski (2008) who found weight status differences in cereal brand character recognition, although not in the expected direction. Batada & Borzekowski (2008) do not report whether the overweight children were higher television viewers than the normal weight children in their study, however the difference may be explained by the lack of an association between BMI SDS and TV viewing in this sample. This is inconsistent with the previous study of this thesis (Chapter 3) whereby a weak but significant and positive correlation was found between BMI SDS and television viewing. Higher levels of TV viewing have consistently been associated with increased BMI and obesity risk in the literature (Dennison et al., 2002; Dietz & Gortmaker, 1985). Previous studies have shown that overweight and obese children correctly recognised a greater number of food ads than normal weight children (Halford et al., 2004). It is logical to assume that any relationship between weight status or BMI and the recognition of brand characters or products would be based on greater television viewing, and therefore advert exposure, in the overweight and obese children rather than being related to the weight status *per se*.

Another finding that is inconsistent with the Batada & Borzekowski (2008) study is that there was no significant relationship between the number of TV sets in the child's household and the child's brand character and product recognition ability. It stands to reason that such a relationship would be explained by greater numbers of television sets being related to increased television viewing. Therefore, as there was only a weak association between number of TV sets and total hours of TV viewed weekly this suggests that either children were unable to accurately report the number of TV sets in their household, or that in this sample, increasing numbers of sets did not necessarily equate to greater overall TV viewing. It is reasonable to postulate that in a typical household, beyond the presence of a TV in key family rooms (e.g. the living room and the kitchen) and the child's bedroom, the presence of a television in other rooms of the house (e.g. siblings' or parents' bedrooms) may not have a significant effect on a child's overall TV viewing habits.

This study found significant differences in reported food preferences between TV viewing groups, as high TV viewers selected a greater number of branded and non-branded products than the low TV viewers. Also, it was found that the correct identification of products (BC-FT) was greater than that of characters (PI-FT) overall. In addition, older children were better able to identify product names (BC-FT) than younger children, with brand character identification ability (PI-FT) also increasing with age. Differences between results related to the use of conservative versus moderate forms of analysing flashcard task data highlight the importance of accounting for both types of analysis in future studies of this kind.

However, this study did not find a relationship between brand equity character or product identification (aspects of brand awareness) and reported preferences towards branded food items. As this was a novel study, the lack of findings may indicate that it was not sufficiently powered to identify significance, or that contrary to predictions, no such relationship between brand awareness and preference for branded foods exists. This study also has some limitations that should be addressed. It may be more appropriate and useful for future studies to examine such effects over time, allowing for cumulative exposure to brand characters and product promotions to have an impact, using longitudinal prospective cohort designs. In addition, in this study brand awareness was only measured using identification ability relating to 20 character and product stimuli. Whilst character and product associations are an important aspect of brand awareness, it may be that measuring just one dimension of branding (and only including 20 brands) does not allow all children to fully express their brand knowledge and awareness. Therefore, the next study addresses this limitation by using a novel measure to assess brand awareness/engagement with brands that allows the child to respond freely and without restrictions to pre-assigned brands.

4.4.1 Summary

The key findings of this study:

- Overall, children were better able to correctly identify product names from brand character stimuli than vice versa.
- Older children (9.1-11 years) were better able to correctly identify product names than younger children (7-9.1 years), and increasing age was positively associated with increasing correct brand character identification.
- There were no significant differences in brand character and product identification ability by weight status, BMI SDS, TV viewing level or number of television sets in the child's household.
- There was no relationship between brand character and product identification ability and self-reported branded or non-branded food preferences.
- There was no significant association between BMI SDS and level of television viewing.
- High television viewers (with higher habitual food advertising exposure) selected more branded and non-branded products from the food preferences measures than low television viewers.

Chapter Five

5. An experimental study to investigate the relationship between commercial television viewing (a measure of relative advertisement exposure), and brand requests, food preferences and weight status in children.

5.1 Introduction

Children have the potential to influence considerable economic activity in the retail market. Young people are important targets for food marketers as not only do they possess independent spending power, but they also have significant direct and indirect influences over family and household purchasing decisions via purchasing requests (or 'pester power') (Macklin, 1994). Indeed, today's young people have been described as the "richest and most influential generation in history" (Lindstrom, 2004).

Children are believed to have an increasing role as independent consumers as their access to income has risen markedly in recent years (Schor & Ford, 2007). Between 2003 and 2004, average weekly pocket money for children aged 5-18 years in the UK increased from £5.79 to £7.82, a rise estimated to be 23 times the rate of inflation (Kay, 2004). This has since risen to £8.68 per week (Office of National Statistics, 2009), and from pocket money alone British children have a spending power of more than £70 million a year (Kay, 2004). The largest product category for children's purchases is sweets, snacks and beverages, which accounts for a third of children's total expenditure (Schor & Ford, 2007). Connor (2006) purports that a majority of child-oriented advertisements for such products take a branding approach, with a view to the creation of lifelong customers rather than just an immediate sale. This is a potentially valuable strategy given that brand loyalty can be influenced in children as young as two, and that each lifetime consumer may be worth $100,000 to a retailer (Lindstrom, 2004).

Children also have a significant influence on their parents' purchasing decisions. In an international study, greater than 50% of parents interviewed stated that children are an important factor in influencing their purchasing decisions, and it was frequently reported that 'child's demand' was their primary reason for buying a product (Escalante de Cruz et al., 2004). It has been estimated that in up to 80% of brand decisions, children aged 8-14 (so called 'tweens') control the final purchase decision even when the brand is aimed at adults (Lindstrom, 2004).

Children can attempt to influence parental spending by making purchase requests, which can include asking, grabbing or pointing at an item or putting an item in the shopping basket (Galst & White, 1976). Research evidence suggests that exposure to television food advertising has an effect on children's purchase requests, typically an increase in the number of requests and the likelihood of requesting the advertised products (Buijzen & Valkenburg, 2000; McDermott et al., 2006; Arnas, 2006; Bridges & Briesch, 2006; Chamberlain et al., 2006).

In one of the first studies on this topic, Ward & Wackman (1972) asked mothers of 5-12 year old children to complete a survey reporting on the frequency of their child's purchase-influencing attempts for 22 products. These products were allocated to several categories; relevant foods (those often consumed by children e.g. breakfast cereals), less relevant foods (those more appropriate for adults e.g. coffee), durables for children's use (e.g. toys and games), toiletries, and other products (e.g.automobile related items, household cleaners). It was found that children's purchase-influencing attempts varied in frequency according to product type, whereby such attempts were most frequently found to be for 'relevant foods' followed by 'durables for children's use'. Within the category 'relevant foods', children in this study made the most frequent requests for breakfast cereals, followed by snack foods, candy, soft drinks and Jell-o (jelly). The mothers' time spent watching television was positively related to purchase influence attempts, which may suggest that joint parent-child or family viewing (and therefore the child's exposure to television advertising) was a factor in any increasing frequency of purchase requests made.

In another early study, Galst & White (1976) accompanied children and their mothers to the supermarket and carried out direct observation of the purchase-influencing attempts made. 81% of the attempts were for food items, predominantly grain products (mainly cereals and cookies; 25.9% of foods requested), dairy products (ice-cream, yoghurt and cheese, 11.2%) and sugar and sweet items (candy and other, 10.4%). The authors noted the correspondence between the most frequent requests being for sweetened cereals and snack foods and those items dominating children's TV commercials, although only 8% of all items requested (not just food) were verbally requested by brand name. Parental report of children's habitual television viewing was also obtained, and it was found that the hours of commercial television children watched each week correlated significantly with purchasing-influencing attempts made to their parent while food shopping (Galst & White, 1976). Given that no such association was evident for non-commercial viewing time, this provides support for the notion that television food advertising exposure influences purchase requests.

Furthermore, Brody and colleagues (Brody, Stoneman, Lane, & Sanders, 1981) randomly assigned mothers and their 3-5 year old children to one of three conditions; mother-child or child-only viewing of a television cartoon with embedded food commercials, or mother-child viewing of the same programme with no embedded commercials. The children's subsequent requests for foods were then studied in an artificial shopping environment (in which all advertised products – branded candy bars, salty snack chips, chocolate drink mix and grape jelly - were available alongside similar non-advertised alternatives). Children who watched the cartoon embedded with food commercials, either alone or with their mother, made more requests for the advertised foods than the children who had watched the cartoon with no commercials (Brody et al., 1981). In addition, Donkin et al., (1992) found an association between the frequency of requests for products and both the number of television viewing hours (although this effect was very small) and also the intensity of the advertising campaign for those products.

The studies above provide evidence of a positive association between habitual commercial television viewing and the frequency of purchase-influencing attempts (of which a majority are for foods). Whilst correlations do not imply causality, the reported effects of acute, experimental food advertisement exposure include increased requests for advertised products relative to control groups. Furthermore, Chamberlain et al., (2006) were able to show that after adjusting for requests at baseline and socio-demographic variables (ethnicity and sex), both total screen media exposure and total TV viewing hours at baseline were significant predictors of future requests for advertised food/drink products. Therefore it appears that media exposure can be defined as a risk factor for future food requests. Supportive evidence is provided by Robinson et al., (2001) who were able to show that, following an 18-lesson, 6 month classroom-based intervention to reduce television, videotape and videogame use, children in the intervention group were significantly less likely to make toy requests than the control group even when adjusting for baseline requests, gender and age. Reduced television viewing, specifically, in these children was associated with a reduction in self-reported product requests (Robinson, Saphir, Kraemer, & Arady, 2001). In their comprehensive review of the literature, Hastings et al., (2003) concluded that there is strong evidence to suggest that food promotion influences children's food purchase-related behaviour (defined as behaviour intended to influence parents' food purchases).

However, the literature relating to individual differences in children's request behaviour is extremely limited. Weight status differences in food intake (Halford et al., 2008b; Halford et al., 2007) and preference (Halford et al., 2008a) responses to television food advertising exposure have been observed. When combined with the age-related differences in brand character identification found in the previous study of this thesis, and the suggestion that cognitive development (as it relates to media literacy) may be important in a child's susceptibility to advertising messages (Livingstone & Helsper, 2006; Rozendaal & Buijzen, 2009), it is clear that individual differences should be taken into account as determinants of children's response to food advertising for all aspects of eating and eating-related behaviours. Therefore, the investigation of such differences is crucial to our increased understanding of the mechanism behind commercial advertising effects on food requests in children.

There is some literature to suggest that gender and age play a role in product requests. It has been purported that boys are more persistent in their requests for advertised products than girls are (Buijzen & Valkenburg, 2000; Valkenburg, 2000) although the data cited to support these assertions (Ward & Wackman, 1972; Sheikh & Moleski, 1977) may have been misinterpreted. Pine et al., (2007), however, report that in their study girls requested proportionally more advertised toys (those that had featured in advertising campaigns broadcast prior to the study based on a content analysis) than boys. The authors also noted that 37.6% of adverts analysed were for products aimed specifically at girls compared to 25.6% for boys, suggesting that girls were particularly targeted with toy advertising during that period. Therefore there are not yet sufficient data to support a directional hypothesis but preliminary findings suggest that gender may play a role in purchase request behaviour.

Some evidence exists to indicate that younger children make more product requests than older children (Sanft, 1986; Bridges & Briesch, 2006). Ward & Wackman (1972) found that purchase influencing attempts across all categories decreased with age but that parental yielding to these requests increased, therefore the authors concluded that for older children fewer requests may be needed to get the desired effect (purchase of a desired product). Furthermore, Buijzen & Valkenburg (2000) found that 7-8 year olds were more likely than 11-12 year olds to nominate a brand product that they had been experimentally exposed to as their favourite Christmas gift, suggesting that advert exposure has more influence on the product requests of younger children. These findings are interesting and worthy of further investigation.

The previous chapters of this thesis detail studies which demonstrate the acute experimental effects of food advertisement exposure, and investigate the relationship between exposure to brand stimuli and immediate subsequent self-reported food preferences. A weakness of both of these study designs, and the few recent studies of purchase requests in the literature, is that they do not replicate the time delay that typically occurs between viewing a television advertisement, or being exposed to branding activity, and the opportunity for a child to select a food item or make a purchase request. O'Cass and Clarke (2001) used an interesting paradigm that overcame this methodological weakness, by studying children's requests in letters written to Father Christmas. The emphasis of their study was on request strategies rather than the specific items requested, but it was found that children were brand-orientated in their request behaviour as 44.8% of the items requested were branded products.

Pine & Nash (2002) expanded on this by incorporating measures of children's television viewing hours and viewing style (i.e. co-viewing with parents) into the design. In their study, children who watched greater amounts of commercial television requested a greater number of items from Father Christmas, and specifically a greater number of branded items than children with less commercial television exposure. Furthermore, there was a positive association between watching television alone and the number of requests made on the Christmas list, with the possible interpretation that children are more susceptible to advertising when there is no adult present to mediate or assist with their understanding of the persuasive intent of commercial messages (Pine & Nash, 2002).

However, to date, no studies have used a list design to study children's food requests. Therefore, the principal aim of this study was to build upon the work of O'Cass & Clarke (2001)and Pine & Nash (2002) by adapting the list for Father Christmas into a shopping list task, which, when combined with measures of habitual television viewing, will provide a novel examination of the effects of habitual advertising exposure on children's food product requests. As the literature on which this study methodology was based is extremely limited, an unavoidable element of risk was involved in the use of a novel adaptation to a relatively untested measure. Nevertheless, as the preparation of a shopping list ensures that the children are not restricted in terms of the types of foods or brands available (so that a full range of food product requests can be expressed) the use of such a paradigm may be a useful addition to our knowledge of purchase request behaviour.

Although such a design goes further than simply assessing product recall or brand awareness, a purchase intention or purchase-influencing behaviour does rely on the child being able to recall the brand and the item associated with that brand that was featured in the promotional activity they had been exposed to (Curlo & Chamblee, 1998). Children do develop relationships with brands, and are able to demonstrate brand name recall and information retrieval about brands they have experienced (Ji, 2002). As good recall ability is associated with a positive attention for and engagement with advertising activity, a purchase request for a product reflects that the advertisement has had persuasive power and influence over a child's product choice (Curlo & Chamblee, 1998). Therefore, as with brand character recognition in the previous chapter, greater recall ability (as determined by the product requests made) may indicate that food advertising, and the brand aspect in particular, is a salient stimulus for those children and thus they may be expected to show a greater preference for branded foods than children who demonstrate poorer recall of desired brands and food items. As overweight and obese children have been shown to be more responsive to food promotion (Halford et al., 2008b) and branding (Forman et al., 2009) than normal weight children, it is logical to suggest that overweight and obese children may make more requests overall and specifically more requests for branded items than children in the normal weight category.

In addition, previous studies of children's food requests have typically been conducted by a researcher witnessing the child and their parent food shopping at a supermarket-type shop. Whilst such designs have obvious ecological validity, in such a scenario it is possible that the child's purchase request behaviour may be affected by the presence of the researcher, the range of items available in that particular outlet, or the cost of items relative to the family's usual level of income and expenditure. The current study uses a novel method for assessing food product requests that ensures the child is not restricted to items only available at a certain shop, or to items that they consider to be affordable, therefore the full range of potential food purchase requests can be made. The data produced by a new study design may inform future research in this area as part of the evaluation process regarding the most reliable, valid and effective methods to study the influence of exposure to television food advertising messages on children's food product requests.

McDermott et al.,'s (2006) systematic review of the literature concluded that food advertising does lead to purchase request behaviours, which result in a greater likelihood of parents purchasing energy-dense food products that are associated with obesity. Data relating to individual differences, such as those relating to age, gender, weight status, and viewing style, are extremely limited and warrant this additional investigation. Given that purchase requests for advertised items often leads to both parent-child conflict (Atkin, 1978; Linn, 2004) and undermines parents attempts to encourage healthier food choices (McDermott et al., 2006), an understanding of the relationship between television food advertising exposure and food product requests is useful in order to limit the detrimental impact that food promotional activity has on children's diets.

5.1.1 Aims

The aims of this study were to use a novel paradigm to examine children's food purchase requests, and to assess any differences in the requests made that may be related to levels of TV viewing (a proxy measure of habitual advertising exposure), weight status, gender or age. A further aim was to examine if there was a relationship between children's purchase requests and their preferences for branded food items.

5.1.2 Hypotheses

Based on previous findings, it was hypothesised that:

H1: High TV viewers (as assessed by the HTVQ-R) would request more branded items on their shopping lists than low TV viewers.

H2: High TV viewers and low TV viewers would not differ in their food preferences in the absence of either experimental television food advert or related promotional character exposure.

H3: Overweight and obese children would request more items overall, and specifically more branded items, on their shopping lists than the normal weight children.

H4: There would be a positive association between the number of branded items requested on the shopping list and the number of branded items selected on the AFPM.

H5: There would be a positive association between the total number of items requested on the shopping list (branded and non-branded) and the number of items selected on the food preference measures (LFPM and AFPM).

H6: There would be a relationship between television viewing style (e.g. watching alone or co-viewing) and the number of requests made.

H7: Gender would have an effect on the number of items and proportion of branded items requested on the shopping list.

H8: Younger children would request more items on the shopping list than older children.

5.2 Methods

See also Chapter 2.

5.2.1 Recruitment and Ethics

Participants for this study were recruited from 5 schools in the North West of England, UK. Informed consent was gained from Head teachers to carry out research in their school, and for use of the 'opt-in' method for gaining consent from parents. Parents were sent a letter detailing the study, and were required to return a slip at the bottom of the letter if they were happy for their child to take part in the study. Consent was also gained from each child before commencing the study; the children were given the opportunity to ask questions and it was made clear that they could withdraw from the study at any time without having to give a reason. Ethical approval for this study was provided by the University of Liverpool Research Ethics Sub-Committee for Non-Invasive Procedures (Ref RETH000094, see Appendix 1).

5.2.2 Participants

172 participants aged 7-11 years (mean age 9.1 ± 1.5) took part in the study (93 male, 79 female). No outliers were identified (all z-scores fell within the range -3 to +3) so no individuals were removed from the data set for analysis. This was an opportunity sample; however, the age range is similar to that of Halford et al., (2004) and the studies detailed in the previous chapters.

Raw BMI measurements ranged from 11.5 to 29.4 kg/m^2 (mean 18.2 ± 3.3 kg/m^2) in this sample, and using criteria outlined in section 2.1.2, two weight status groups were defined; normal weight (NW), and overweight and obese (OW/OB). Tables 5-1 and 5-2 show demographic (age) and anthropometric (BMI) characteristics of the completing participants and the proportion of children in each weight status group and in each TV viewing group.

Table 5-1 Participant Characteristics

	Normal weight (*n* = 119, 69.2%)	Overweight/Obese (*n* = 53, 30.8%)	All (*n* = 172)
Age (mean ± SEM)	9.0 ± 0.1y	9.3 ± 0.2y	9.1 ± 0.1y
Gender	68 m, 51 f	25 m, 28 f	93 m, 79 f
BMI (mean ± SEM)	16.6 ± 0.2 kg/m^2	21.9 ± 0.4 kg/m^2	18.2 ± 0.3 kg/m^2

Table 5-2 Participant characteristics by TV viewing groups (mean ± SEM).

	Low TV viewing (< 28.5 hrs/week) (*n* = 83)	High TV viewing (> 28.5 hrs/week) (*n* = 88)	**All (*n* = 172)**
Age (mean ± SEM)	9.3 ± 0.2 y	8.8 ± 0.2 y	**9.1 ± 0.1 y**
Gender	44 m, 39 f	48 m, 40 f	**93 m, 79 f**
BMI (mean ± SEM)	18.2 ± 0.3 kg/m^2	18.2 ± 0.4 kg/m^2	**18.2 ± 0.3 kg/m^2**
Weight status	63 NW (75.9%) 20 OW/OB (24.1%)	55 NW (62.5%) 33 OW/OB (37.5%)	**119 NW (69.2%)** **53 OW/OB (30.8%)**

Note: Complete TV viewing data were not provided by 1 participant.

See also Appendix 18 for breakdown of participant characteristics by age.

There were not significant differences in the proportion of male and female participants either within individual schools or within the entire sample. There were not significant differences in the proportion of male and female participants in each weight status category. The proportion of normal weight (69.2%), and overweight and obese children (30.8%) in the sample is approximately consistent with current levels of adiposity in the UK and in the North West of England region specifically (HSE, 2007).

5.2.3 Data Collection and Confidentiality

Data were collected between March and June 2008 (see Appendix 17). All documents pertaining to the study were kept secured in lockable cabinets, and all electronic data were stored on a password- and virus-protected computer. Participant codes were used so that individual children were not identifiable from the study materials.

5.2.4 Design

This study was a between-subjects design with a single study day where all measures were completed.

5.2.4.1 Independent variables

Measures of weight status and television viewing were incorporated as independent variables. Therefore, the specific independent variables were:

1. Weight status (NW/OWOB, see section 2.1.2)
2. Gender (Male/Female)
3. Age
4. Level of TV viewing (assessed by the revised Habitual Television Viewing Questionnaire (HTVQ-R), see section 2.5.2.2).
5. TV viewing style (assessed by the revised Habitual Television Viewing Questionnaire (HTVQ-R), see section 2.5.2.2).

5.2.4.2 Dependent variables

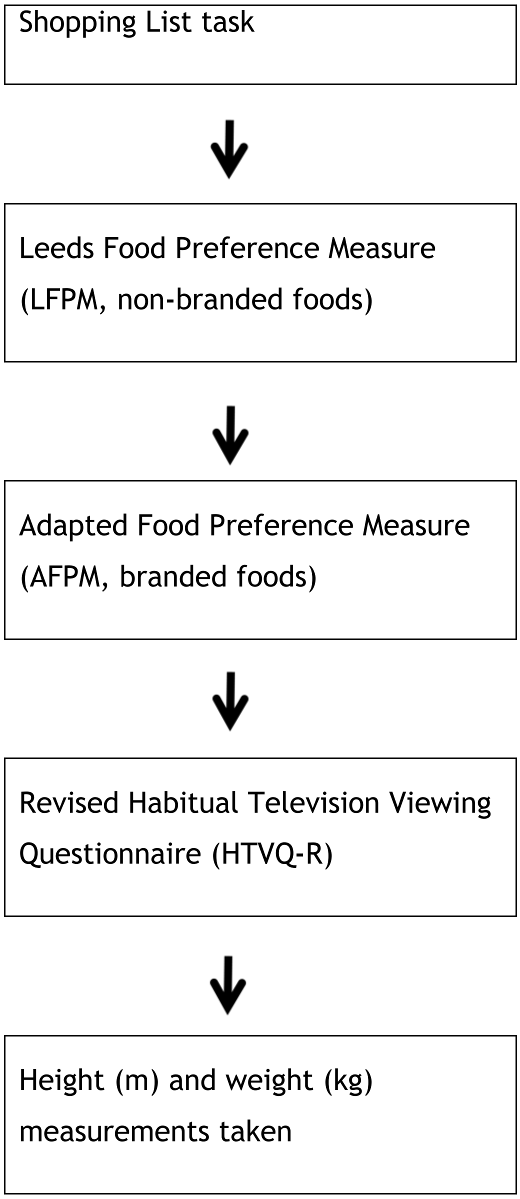
The effects of the differences in participant characteristics (weight status category, gender, age, level of TV viewing, TV viewing style) were assessed by measuring brand requests and food preferences. Therefore the specific dependent variables were:

1. Branded food purchase requests (assessed by the shopping list task)
2. Non-branded food purchase requests (assessed by the shopping list task)
3. Preference for non-branded food items (assessed by the LFPM)
4. Preference for branded food items (assessed by the AFPM).

5.2.5 Procedure (see Figure 5-1)

On the test day, children were first asked to complete the shopping list task. For this task children were asked to make a shopping list of all the foods they would like to eat. The children were told not to consider where the food items would be bought from or how much they cost so that their requests would not be constrained by real-life considerations such as availability, convenience or cost. Following this, the children were asked to complete two food preference measures (LFPM & AFPM), and the HTVQ-R. Children's age in years and months was ascertained and children's height (m) and weight (kg) measurements were taken. Children were individually weighed and measured without shoes, and with a member of school staff present at all times.

Figure 5-1 The experimental procedure



5.2.6 Statistical Analysis

Data from the shopping list task did not adhere to the assumptions for parametric data (normality of distribution) therefore non-parametric analysis was performed. Data from all other measures did adhere to the assumptions for parametric data therefore Analysis of Variance (ANOVA) and relevant post hoc paired and independent t-tests were used. Where homogeneity of variance was not found, multivariate tests (MANOVA) were adopted for that variable. All comparisons were two-tailed and significance was taken at $p < 0.05$ (with Bonferroni adjustments for multiple comparisons). Analyses were completed using PASW v17.0 for Windows (SPSS Inc., Chicago, US).

For use in analyses, BMI was converted to an age- and gender-appropriate standard deviation score (SDS) using 1990 reference standards for the UK (Cole et al., 1995). Data regarding the high protein and low-energy items of the LFPM were removed from analysis when direct comparisons were made between the LFPM and the AFPM e.g. total non-branded versus total branded items selected (to ensure both measures included a total of 16 items).

For clarity, all descriptive data, all tables and figures represent mean values but statistical significance for the shopping list task was identified using non-parametric analyses which use median values.

5.3 Results

The children in this study self-reported watching 0-8 hours of television on a typical weekday (mean 3.4 ± 2.3 hours) and 0-31 hours of television during a typical weekend (mean 15.0 ± 11.8 hours), for total weekly viewing hours ranging from 0-74 hours per average week (mean 31.9 ± 21.2 hours). Of the 169 children to correctly complete the relevant question of the HTVQ-R (98.3% of total sample), 137 (81.1%) had access to satellite/cable television at home compared to just 32 (18.9%) with terrestrial channels only. Of the 103 children to correctly complete the relevant question (59.9% of total sample), 33 (32.0%) reported usually watching television alone, 19 (18.4%) usually viewed TV with a parent, 37 (21.5%) typically watched TV with a sibling and 14 (8.1%) with a friend.

H1: High TV viewers would request more branded items on their shopping lists than low TV viewers.

Regarding the first hypothesis, a Mann Whitney U test found that the number of branded items requested on the shopping lists was not significantly affected by the children's level of TV viewing (U = 3542.500, z = -0.370, r = 0.03, p = 0.712) (see Figure 5-2). If the child's level of TV viewing is taken as a proxy measure for their level of habitual advertising exposure, this finding suggests that the children who had previously been exposed to greater amounts of advertising messages did not request more branded items than children with less exposure to advertising. This does not support H1.

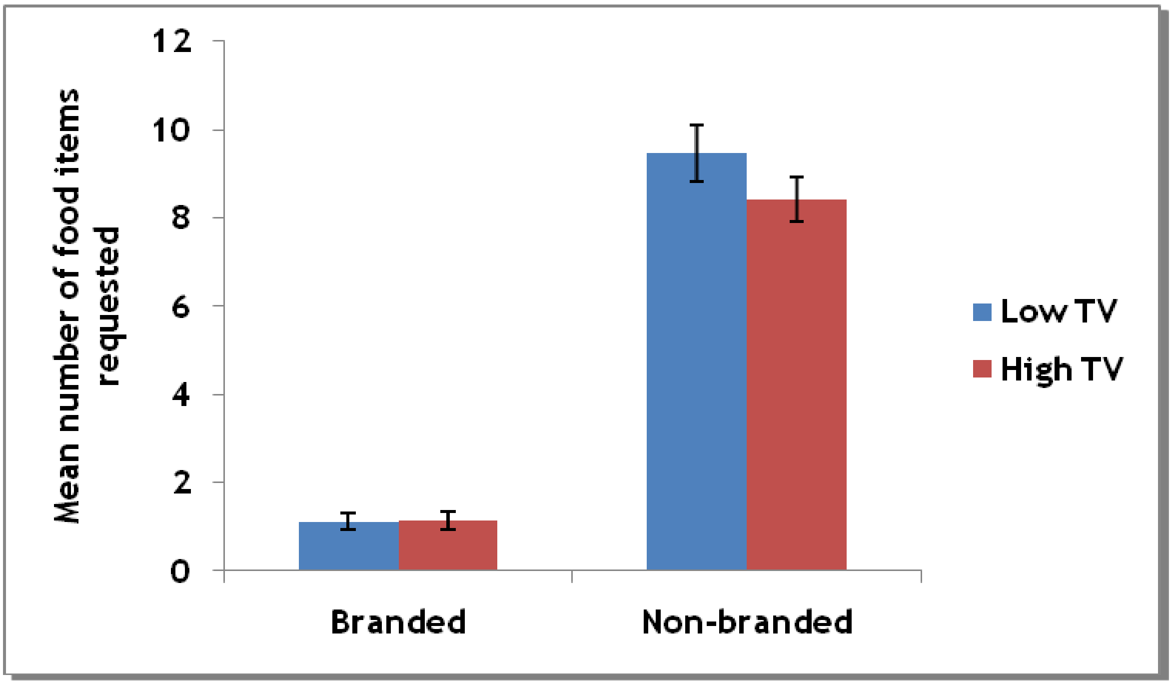


Figure 5-2 Mean (±SEM, indicated by the error bars) numbers of branded and non-branded items requested on the shopping list by level of habitual TV viewing (low/high, by median split).

However, it was found that children who had access to satellite/cable television in their homes did request more branded items on their shopping list (1.33 ± 2.01 v 0.59 ± 1.54; U = 1551.500, z = -2.792, r = 0.21, p = 0.005) and more items overall (10.75 ± 6.78 v 7.94 ± 5.24; U = 1548.000, z = -2.590, r = 0.20, p < 0.01) than children who only had access to terrestrial channels. This was not due to increased viewing in those children as there was no relationship between access to satellite/cable television and weekly television viewing hours (r_s (168) = -0.080, p = 0.304).

<u>H2: High TV viewers and low TV viewers would not differ in their food preferences in the absence of either experimental television food advert or related promotional character exposure.</u>

Contrary to this prediction, there were differences between high and low TV viewers in terms of their preferences for branded foods (see Table 5-3). With significance taken at $p < 0.006$ due to corrections, high TV viewers selected significantly more branded high fat items (6.17 ± 1.72 v 5.19 ± 2.03; U = 2619.000, z = -3.241, r = 0.25, p = 0.001), and total branded items (11.66 ± 3.22 v 10.05 ± 3.55; U = 2701.000, z = -2.951, r = 0.23, p = 0.003) than low TV viewers. There were no significant differences in reported preference for non-branded foods between TV viewing groups, but due to the differences regarding branded foods only, high TV viewers also selected a significantly greater total number of items (30.65 ± 8.08 v 26.90 ± 8.74; U = 2771.000, z = -2.725, r = 0.21, p = 0.006) than low TV viewers.

Overall, children selected a greater number of high fat than high carbohydrate items (11.0 ± 3.4 v 10.2 ± 3.5; T = 3396.50, z = - 3.766, $p < 0.001$) and specifically a greater number of branded high fat over branded high carbohydrate items (5.7 ± 1.9 v 5.2 ± 1.9; T = 1994.00, z = -4.368, $p < 0.001$). No such difference was seen for the selection of non-branded high fat and carbohydrate items (5.3 ± 1.8 v 5.0 ± 1.9; T = 3761.00, z = -2.246, p = 0.025 with significance taken at $p < 0.02$ due to corrections).

Table 5-3 The effects of TV viewing level on food preferences (mean ± SD)

Variable	TV Viewing		
	Low TV	High TV	All
LFPM			
Non-branded CHO	4.7 ± 1.8	5.3 ± 1.9	5.0 ± 1.9
Non-branded Fat	5.0 ± 1.8	5.5 ± 1.7	5.3 ± 1.8
Non-branded Protein	3.3 ± 2.3	3.8 ± 2.5	3.6 ± 2.4
Non-branded Low Energy	3.9 ± 2.1	4.4 ± 2.0	4.2 ± 2.0
Total Non-branded (exc. Protein & Low Energy)	9.7 ± 3.2	10.8 ± 3.1	10.3 ± 3.2
Total Non-branded (inc. Protein & Low Energy)	16.9 ± 5.8	19.0 ± 5.6	18.0 ± 5.8
AFPM			
Branded CHO	4.9 ± 1.9	5.5 ± 1.9	5.2 ± 1.9
Branded Fat	5.2 ± 2.0	6.2 ± 1.7**	5.7 ± 1.9†††
Total Branded	10.1 ± 3.6	11.7 ± 3.2*	10.9 ± 3.5
LFPM & AFPM Combined			
Total CHO (branded + non-branded)	9.6 ± 3.4	10.7 ± 3.5	10.2 ± 3.5
Total Fat (branded + non-branded)	10.2 ± 3.5	11.7 ± 3.1	11.0 ± 3.4†††
Total Foods	26.9 ± 8.7	30.7 ± 8.1*	28.9 ± 8.7

Note: Due to Bonferroni corrections * $p<0.006$ and ** $p<0.002$ (equivalent to $p<0.05$ and $p<0.01$ respectively) reflect between TV viewing group differences. ††† $p<0.001$ reflects overall differences in macronutrient preference.

H3: Overweight and obese children would request more items overall, and specifically more branded items, on their shopping lists than the normal weight children.

A further Kruskal-Wallis analysis showed that the weight status of the child (NW/OWOB) had no significant effect on the overall number of items requested on the shopping list (U = 2898.500, z = -0.922, r = 0.07, p = 0.357), nor more specifically the number of branded (U = 3046.000, z = -0.358, r = 0.03, p = 0.721) or non-branded (U = 3029.500, z = -0.412, r = 0.03, p = 0.680) items listed (see Figure 5-3). However, there was a significant but weak positive correlation between BMI SDS and the number of branded items requested on the shopping list (r_s (172) = 0.204, p < 0.01). This is in partial support of H3, there is some evidence of a relationship between a child's age- and gender-specific BMI SDS and their requests for branded items, but this relationship is not evident when the analysis uses weight status categorisation (whether categorised with OW and OB together or separately, see Figure 5-3).

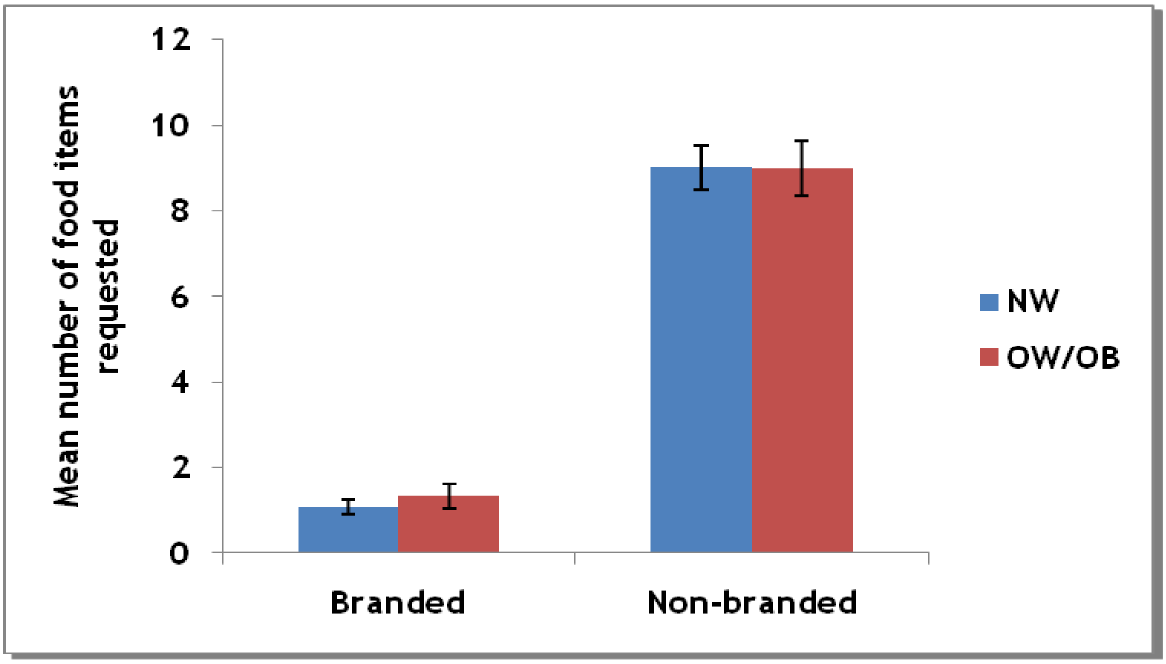


Figure 5-3 Mean (±SEM, indicated by the error bars) numbers of branded and non-branded items requested on the shopping list by weight status group (normal weight/overweight and obese).

In addition, there was no significant association between children's BMI SDS and number of hours of TV watched on weekdays (r_s (172) = 0.137, p = 0.075), on weekend days in a typical week (r_s (171) = 0.016, p = 0.837), or in a typical week (r_s (171) = 0.080, p = 0.298).

Further, there were no significant differences between weight status groups regarding their selection of non-branded high protein (p = 0.882), high CHO (p = 0.563), high fat (p = 0.825), low energy density (p = 0.901) or total non-branded items (p = 0.830) from the LFPM; nor their selection of branded high CHO (p = 0.210), high fat (p = 0.731), or total branded items (p = 0.358) from the AFPM.

<u>H4: There would be a relationship between the number of branded items requested on the shopping list and the number of branded items selected on the AFPM.</u>

With regards to branding, a non-parametric bivariate correlation showed that there was no relationship between the number of branded items requested on the shopping list and the number of branded items selected on the AFPM ($r_s(172) = 0.048$, $p = 0.535$). These data do not support H4.

<u>H5: There would be a relationship between the total number of items requested on the shopping list (branded and non-branded) and the number of items selected on the food preference measures (LFPM and AFPM).</u>

A further non-parametric bivariate correlation found that there was no significant relationship between the total number of items requested on the shopping list (both branded and non-branded) and the number of items selected on the food preference measures (LFPM and AFPM) ($r_s(172) = 0.107$, $p = 0.162$). However, there were significant but weak positive correlations found between the number of non-branded food items requested on the shopping list and both the number of non-branded high carbohydrate items selected on the LFPM ($r_s(171)= 0.210$, $p < 0.01$) and the total number of non-branded items selected on the LFPM ($r_s(171) = 0.152$, $p < 0.05$). H5 is not supported by these data.

<u>H6: There would be a relationship between television viewing style (e.g. watching alone or co-viewing) and the number of requests made.</u>

A Kruskal-Wallis test revealed that there was no significant difference between children who typically watched television alone and those who usually watched with a parent, sibling, or friend, in terms of the number of branded products ($H(3) = 3.975$, $p = 0.264$), non-branded products ($H(3) = 5.960$, $p = 0.114$) or the total number of items requested on the shopping list ($H(3) = 3.492$, $p = 0.322$). There were also no significant correlations between the child's viewing style (typically alone or co-viewing with a parent, sibling or friend) and the number of branded items ($r_s(103)= 0.018$, $p = 0.859$), non-branded items ($r_s(103)= 0.140$, $p = 0.158$) or the total number of items requested on the shopping list ($r_s(103)= 0.126$, $p = 0.204$). Therefore H6 is not supported by these data.

H7: Gender would have an effect on the number of items and specifically the number of branded items requested on the shopping list.

Mann-Whitney U tests revealed that there were no significant differences between boys and girls in terms of the number of non-branded food items (U = 3592.000, z = -0.251, r = -0.01, p = 0.802) or total items requested on the shopping list (U = 3585.000, z = - 0.273, r = -0.02, p = 0.785). Regarding the number of branded food items selected on the shopping list, there was a trend towards boys requesting a greater number of branded items than girls although the difference was very small (1.40 ± 2.13 v 0.90 ± 1.653; U = 3112.000, z = - 1.881, r = 0.14, p = 0.060 with significance taken at p < 0.0167 due to the Bonferroni correction). Therefore these data do not support H7.

There were no differences between the genders in terms of self-reported food preferences (with significance taken at p < 0.006 due to corrections). Boys and girls did not differ in terms of their selection of non-branded high protein (p = 0.028), non-branded high CHO (p = 0.501), non-branded high fat (p = 0.176), non-branded low energy density (p = 0.142) total non-branded items (p = 0.722), branded high CHO (p = 0.451), branded high fat items (p = 0.021) and total branded items (p = 0.096).

H8: Younger children would request more items on the shopping list than older children.

There were significant differences in the results of the shopping list task dependent upon age (younger/older children, older children taken as 8.67 years or more based on a median split of the entire sample). Mann-Whitney U tests showed that older children requested significantly more branded products (2.01 ± 2.39 v 0.33 ± 0.62; U = 1780.000, z = -6.404, r = 0.49, p < 0.001), non-branded products (11.12 ± 6.28 v 6.88 ± 3.35; U = 2094.500, z = -4.925, r = 0.38, p < 0.001) and total products (13.13 ± 7.55 v 7.21 ± 3.44; U = 1761.000, z = -5.946, r = 0.45, p < 0.001) than the younger children. Therefore the findings are in the opposite direction to those predicted by H8.

Regarding food preferences, age did not have a significant effect on the selection of non-branded high protein (p = 0.299), non-branded high CHO (p = 0.663), non-branded high fat (p = 0.052), total non-branded items (p = 0.142), branded high

CHO ($p = 0.560$), branded high fat ($p = 0.089$), total branded items ($p = 0.205$) or total food items ($p = 0.135$) on the food preference measures. However, the younger children did select significantly more non-branded low energy items than the older children (4.66 ± 1.84 v 3.67 ± 2.12; $U = 2683.500$, $z = -3.142$, $r = 0.24$, $p = 0.002$).

5.4 Discussion

Contrary to the hypotheses, children's level of TV viewing did not have a significant effect on the number of branded food items requested on the shopping list. Therefore, despite greater cumulative exposure to commercial food promotion, high TV viewers did not request more branded foods than low TV viewers. This is in contrast to the findings of Galst & White (1976) and Donkin et al., (1992), possibly reflecting differences between the study samples and the populations they were derived from, as well as the different methodologies used. In the Galst & White study (1976) the children were US based and were aged 3-11 years, therefore the younger children would differ from the participants in the current study regarding their level of cognitive development, and would be expected to have different experience of television food advertising and food culture than the children in the current study. Donkin et al., (1992) studied UK children in the same age range as this study but found, although significant, only a weak association between TV viewing hours and the number of requests for branded products ($r = 0.029$), suggesting that other variables must also have been involved in this effect.

However, in this study children who had access to cable or satellite television in their homes did request more branded items and more items overall than children who could only access terrestrial channels at home. Given that children with cable/satellite access did not watch more television overall, this finding may be indicative of the advertising landscape (in terms of the number of adverts broadcast, the proportion of adverts shown that are for food products, the types of food products promoted etc) being different between satellite and terrestrial channels (this will be addressed in chapter 6). Alternatively, it may be representative of those children generally being aware of a greater number of brands, products and product types due to the greater variety of channels (and so advertising) they are exposed to during TV viewing.

Pine & Nash (2002) found that access to cable or satellite television did not influence the Christmas requests of 99 UK children aged 3.8 to 6.5 years. The inconsistency between the two studies may relate to the products being requested, it is possible that toy advertising does not differ in frequency or brand representation between terrestrial television and cable/satellite channels whereas food advertising may be more variable (see chapter 6). Alternatively, the contrast in study findings may relate to the different age ranges of children studied (3-6 years compared to 7-11 years in the current study), as, in addition to differences in cognitive development, there are thought to be changes in viewing patterns throughout childhood. Younger children typically spend more time viewing child-specific programming, whereas older children's viewing is less confined to children's airtime and usually encompasses a greater proportion of commercial television (Ofcom, 2007b). Therefore all children in the current study would be expected to have been exposed to a greater number of commercial messages than those of Pine & Nash (2002) due to both viewing patterns and the effects of cumulative exposure, with those with access to cable/satellite television likely to have additionally viewed a greater variety of brands and food adverts by virtue of the number of different channels available to them.

Also contrary to predictions, overweight and obese children did not request more branded products or more products overall on their shopping list than the normal weight children. However, there was a significant and positive correlation between BMI SDS and the number of branded items requested. This suggests that the study may be underpowered to detect a difference between weight status categories in terms of branded items requested, and indeed a power analysis based on the group means indicates that 339 participants would be needed to reach significance for this effect. Nevertheless, the significant and positive correlation between BMI SDS and requests for branded items, although weak, is tentatively consistent with the findings of previous studies whereby overweight and obese children displayed a greater magnitude of response to food advertising and branding (Halford et al., 2008b; Forman et al., 2009). Further research to investigate whether overweight and obese children make a greater number of product requests to their parents than their normal weight counterparts is warranted, and an examination of the proportion of these requests that result in actual purchase and consumption would be useful in order to explore this finding further.

There were no weight status differences in self-reported food preferences found in this study which is consistent with the findings of the previous two chapters, but is inconsistent with the findings of Halford et al., (2008a). This will be considered in chapter 7. In addition, there was no significant association between children's BMI SDS and children's TV viewing hours whether specifically on weekdays, weekend days or across a typical week. This may partially explain the lack of a relationship between weight status and product requests, as any association would be expected to be related to overweight and obese children habitually watching greater amounts of television (Dietz & Gortmaker, 1985; Andersen et al., 1998; Crespo et al., 2001) and therefore being exposed to more food advertising rather than their adiposity level per se.

There were significant differences between the high and low TV viewers with regards to their self-reported food preferences. High TV viewers (those with greatest habitual exposure to television advertising) showed a greater preference for branded foods, specifically the high fat items, than the low TV viewers. This is inconsistent with the findings of the previous two studies (chapters 3 and 4) when such differences were only seen following food-related stimuli (either TV adverts or the brand character and product flashcard task). It is possible that merely thinking of foods, as was required for the shopping list task, was enough of a stimulus to produce a food preference response similar to that of post-food advert or brand character/product exposure. However, in the current study, the difference between TV viewing groups was only evident for branded high fat foods. This may indicate a specific (rather than a beyond-brand or category) effect of television food advertising, whereby high TV viewers had experienced greater exposure to high fat food advertising in particular (the nature of foods advertised to young people on UK television will be addressed in the next chapter) and therefore expressed a greater preference for those items.

That there were no differences between the TV viewing groups regarding non-branded high fat food preference suggests that this finding is not simply indicative of innate preferences for palatable high fat foods being enhanced by food advertising exposure, but perhaps also that high television viewers have more developed brand relationships (due to greater familiarity with the brand and awareness of brand representations) or place more importance in the brand of a food product than children with less habitual advertising exposure. No such differences were seen for branded versus non-branded high carbohydrate items however, which may indicate that the brands featured on the food preference questionnaire for the high carbohydrate category (Asda, Spud-U-Like, Warburtons, Fox's, Princes, Uncle Ben's) were not as familiar to the children as those for the high fat foods (Nestlé, McDonald's, Cadbury, Sayers, Walkers, Dairy) although Mr Kipling and Heinz featured on both lists. This is supported by the finding that, in the entire sample, branded high fat items were chosen more frequently than branded high carbohydrate items whereas no such macronutrient preference difference was found for the non-branded items. However, if it is the case that the study is underpowered, further research is required to determine the nature and robustness of this effect.

In contrast with the findings of Sanft (1986), older children made more product requests overall and specifically more requests for branded and non-branded products than the younger children. Although no such differences were seen between TV viewing groups, the significantly greater number of branded product requests made by older children compared to younger children may reflect the effects of cumulative exposure to food advertising regardless of their current levels of habitual television viewing. However, this does not explain the observed differences in the requests for non-branded items between the two age groups.

Sanft (1986) suggested that the age differences in product requests observed were related to the level of attention children pay to food advertisements. It was purported that younger children are more likely to pay full attention to the commercial messages, with this attention level declining with increasing age (Sanft, 1986). However, the results of the current study do not support this assertion. The contrasting findings may reflect differences in the television landscape between the 1980s and today, as numerous television channels are now targeted at specific age groups therefore the programming and commercial content might be expected to be better able to hold the attention of the older children in the viewing audience. The older children would also be expected to find a written task based on product recall easier to complete than younger children due to their greater cognitive ability. Another explanation is that changes in the food landscape may be responsible; with increasing numbers of food brands and products widely available often in one place (i.e. a supermarket) parents may rely on older children to assist with item selection to make the family shopping trip more efficient, therefore those children may be more familiar with the concept of expressing product requests. Indeed, Buijzen et al.,

(2008) state that older children's preferences are increasingly taken into account by parents when making family purchases. Furthermore, this finding may reflect expected increases in 'self-care' activities in children aged 9-11 years (Kennedy, 2000).

That older children made more product requests than younger children in this study is also interesting when considered alongside the concept of media literacy. It is purported that an understanding of the persuasive intent of commercial messages may provide children with cognitive defences against the effects of such exposure (Livingstone & Helsper, 2006; Rozendaal & Buijzen, 2009). However the greater number of purchase requests made by older children (expected to have higher levels of media literacy than the younger children) in the current study is incongruent with the notion that these children are less affected by food advertising exposure.

The age of the child did not have an effect on all food preferences expressed, but the younger children did show a greater preference for non-branded low energy density items than the older children. This is surprising, given that in the food preference measure this category of food items is represented by predominantly fruit and vegetable items, and such foods are typically less preferred by younger children due at least part to expressions of neophobia (Benton, 2004). However the presence of both 'yoghurt' and 'strawberry' options in this category may have appealed to younger children due to the sweet taste, and because of their potentially greater familiarity with such items compared to other featured products such as 'gammon' and 'pickled onions'.

In contrast to the findings of Pine & Nash (2002), children's viewing style had no significant effect on product requests. Children who reported watching television alone did not differ in the overall number of product requests, or the more specifically the number of branded or non-branded products requested, compared to the children whose television viewing was normally alongside a parent, sibling or friend. This indicates that the presence of another person (whether they are a parent and thereby assumed to be more media literate than the child; or a friend or sibling who may or may not differ from the child in terms of media literacy) does not mediate the effects of television food advertising on children. This is supported by the findings of Brody et al., (1981) that, in an experimental study, no parents attempted to counterinfluence the effects of the commercials they viewed with their children by providing additional information (e.g. nutritional facts) or pointing out inaccuracies present in the advert. However, there were also no significant differences between boys and girls in terms of their product requests which is inconsistent with the assertions of Buijzen & Valkenburg (2000), Valkenburg (2000) and Pine et al., (2007) so taken together, these findings may suggest that the methodology used in the current study was problematic.

In contrast with predictions, there were also no associations between the number of branded items or overall items requested on the shopping list and the foods selected on the food preference measures. There were, however, significant and positive correlations between the number of non-branded food items requested on the shopping list and the number of non-branded high carbohydrate and total non-branded items selected on the LFPM. It would be expected that children would show a preference for and request the items they liked most, and therefore such associations are in line with predictions. The significance of these correlations suggests that the shopping list task has potential as a measure of the food products children desire but the weakness of the relationships may provide more evidence for a lack of statistical power in this study, certainly it is worth exploring whether further significant differences would be evident if the power of the study were increased. However, not observing a correspondence between the shopping list task and the food preference measures regarding branded food items as well as the lack of some findings that were seen in other studies may indicate that there is a methodological problem with this study, i.e. that the use of a shopping list paradigm is not a suitable measure of children's product requests.

This is the first study to use such a design to examine children's food requests although a related task has been used successfully by other authors to examine toy requests (O'Cass & Clarke, 2001; Pine & Nash, 2002). As children in those studies were required to construct a letter to Father Christmas regarding their requests for Christmas presents, that task was likely to be familiar to the children. The children in the current study were less likely to be familiar with preparing a shopping list as this would typically be done by a parent; therefore the task may have been less effective at elucidating their true requests. Furthermore, although when administering the shopping list task it was made clear to the children that they were not to take consideration of where the food items would typically be bought from (i.e. a fast food outlet, a restaurant, a supermarket, a sweet shop, a bakery etc) nor the price of the item, it is possible that children found it confusing to prepare a list of purchase intentions that included items from such different locations or of items that they consider not to be affordable or accessible for purchase. It is also possible that given the open-ended nature of the task and the lack of any prompts meant that the task was too demanding for children, particularly those with more limited literacy skills.

Children's ability to recall the full name of the food products (including the relevant brand) they wanted to request may also have been a limitation of this task, given that the number of branded items requested was extremely low across the entire sample. As children have previously been shown to be effective at recalling the brand names of products (Ji, 2002) and specifically the food advertisements they have been exposed to (Halford et al., 2008a), it may be that the time delay between exposure to television food advertising and the completion of the shopping list task in this case was too long for children to be able to spontaneously report the products they would like to request. It may be that exposure to the products, such as in a supermarket, is required as a prompt or reminder to the children after which they are able to identify the food items they want from the selection available. This situation would be more similar to a recognition task (used successfully in children as young as six years in chapter 3 of this thesis), as the children would need to be able to identify the product from the packaging and recognise that it was the product they had seen advertised. This is one explanation of the lack of findings in this study compared to others examining children's food product requests using observational measures in a shopping environment (Galst & White, 1976; Brody et al., 1981).

Whilst this study has strengths over that of Galst & White (1976) and Brody et al., (1981) as it recreates the time delay between advert exposure and product requests rather than assessing such requests after acute, experimental exposure to a selection of food advertisements, the lack of actual food product stimuli present limits the ecological validity of this design. Nevertheless, this study revealed differences between children with access to terrestrial television channels only compared to those with satellite or cable television broadcasting, whereby the latter made a greater number of requests for branded food items and therefore requested a greater number of items on their shopping lists overall. Furthermore, in the current study the older children requested significantly more branded, non-branded and overall items than the younger children. In addition, high TV viewers selected significantly more branded high fat items and total branded items from the food preference measures than the low TV viewers, an effect seen in the previous two chapters following food-related stimuli. These are interesting findings that merit further investigation, as increased understanding of the individual differences in food request behaviours and food preferences may be useful for informing attempts to limit the negative effects of television food advertising on children's diets.

5.4.1 Summary

The key findings of this study:

- The branded and non-branded food requests made by children were not affected by their level of TV viewing (a proxy measure for habitual television advertising exposure), TV viewing style, gender or weight status.
- Children with access to satellite television requested significantly more branded items and more items overall than children with only terrestrial channels at home.
- There was a significant, positive correlation between BMI SDS and requests for branded items.
- High TV viewers demonstrated a greater preference for branded high fat foods than the low TV viewers.
- There were weak, positive associations between children's non-branded food product requests and their self-reported preferences for non-branded high CHO items and non-branded items overall.
- Older children requested more branded, non-branded and overall items on their shopping lists than younger children.
- Younger children showed a greater preference for non-branded low energy density items than the older children.

Chapter Six

6. Food advertising to children on UK television in 2008

6.1 Introduction

In order to be able to accurately assess the role of food advertising in children's dietary behaviours, and to determine whether the current regulations regarding television food advertising to children are appropriate and effective, there is a need to increase our understanding of both the acute and cumulative effects of food advert exposure (the focus of Chapters 3-5) and to have a thorough knowledge of the current landscape with regard to food advertising to children on television. The latter was the purpose of the current chapter.

The findings discussed so far in this thesis add to our understanding of the effects of food advertising on children's food preferences, brand awareness, and product request behaviour. These data contribute to the growing research evidence demonstrating food advertising effects, from which systematic reviews have concluded that there is a relationship between food marketing and the obesity epidemic. In the US, the Institute of Medicine (IOM) reviewed 155 studies of food advertising and its effects on children, and concluded that "television advertising influences the food preferences, purchase requests, and diets at least of children under age 12 years, and is associated with the increased rates of obesity among children and youth" (IOM, 2005). Hastings et al., (2003)'s well cited review concluded that food promotion "is having an effect, particularly on children's preferences, purchase behaviour, and consumption". In addition, a report commissioned by Ofcom, the UK's broadcast regulator, stated that "advertising has a modest direct effect on children's food choices and a larger but unquantifiable indirect effect on children's food preferences, consumption, and behaviour" (Livingstone, 2004).

The proliferation of digital transmission and availability of numerous delivery systems (cable, satellite, wireless services) means vastly increased numbers of television channels, and children now have access to more age-targeted programming than ever before (Desrochers & Holt, 2007). Concerns over the potential increases in children's exposure to advertising as a result of this, as well as the increasing research evidence to support a link between food advertising and obesity, have led to changes in the regulation of television food advertising to children in the UK with the aim of reducing “the exposure of children to HFSS (foods high in fat/sugar and/or salt) advertising, as a means of reducing opportunities to persuade children to demand and consume HFSS products” (Ofcom, 2008).

The regulations state that adverts for HFSS products must not be shown in or around programmes specifically made for children under 16 years of age (including pre-school children), which includes the removal of all HFSS advertising from dedicated children’s channels (Ofcom, 2007a). For all channels other than dedicated children’s channels this legislation came into force in two phases; Phase 1) with effect from 1st April 2007 HFSS adverts were not permitted in or around programmes made for children or that were likely to be of particular appeal to children aged 4-9, and Phase 2) with effect from 1st January 2008, HFSS adverts were not permitted in or around programmes likely to be of particular appeal to children aged 4 – 15 years (Ofcom, 2007a). For dedicated children’s channels, there were three phases. During Phase 1 they were required to scale back all HFSS advertising to 75% of 2005 levels, and during Phase 2 this was extended to 50% of 2005 levels. Full implementation (total removal of all HFSS advertising from children’s channels) was enforced from 1st January 2009 (Ofcom, 2007a).

Revised content rules were also applied to all food and drink advertising to children regardless of when it is scheduled. In brief, the rules state that adverts must not: encourage poor nutritional habits or an unhealthy lifestyle, encourage children to make purchase requests, condone or encourage excessive consumption, disparage good dietary practice, condone or encourage damaging oral health practices, and that adverts must be accurate with regards to nutrition/health claims (Ofcom, 2007a). It is also stressed that promotional offers should not be targeted directly at pre-school or primary school children, and that adverts should not encourage children to consume a product purely to take advantage of a promotional offer, nor should excessive purchase or consumption (e.g. in order to complete a set of collectable items) be encouraged (Ofcom, 2007a).

Regarding the use of characters and celebrity endorsement, the content rules state that licensed characters (“those characters that are borrowed equities and have no historical association with the product”; Ofcom (2007a)) and celebrities popular with children may not be used in HFSS adverts targeted directly at pre-school or primary school children. This prohibition does not apply to brand-equity characters - "those characters that have been created by the advertiser and have no separate identity outside their associated product or brand" (Ofcom, 2007a).

Whilst the subject of food advertising to children and the nature of legislation that should be applied have attracted much interest from academia, consumer groups, and health organisations, the literature available to inform such discussions regarding the levels and content of television food advertising in the UK is extremely limited. Only a handful of authors have addressed these issues (Chestnutt & Ashraf, 2002; Lewis & Hill, 1998; Rodd & Patel, 2005; Morgan, Fairchild, Phillips, Stewart, & Hunter, 2009; Furnham, Abramsky, & Gunter, 1997; Sixsmith & Furnham, 2010) including two international comparative studies featuring the UK as one of the countries studied (Consumers International, 1996; Kelly et al., 2010) (see Table 1-11, Chapter 1).

6.1.1 Limitations of the literature

In addition to the limited number of studies providing UK data, the studies themselves have several limitations that restrict their usefulness as indicators of the nature and extent of food advertising children are exposed to on commercial television in the UK today.

Firstly, with the exception of Sixsmith & Furnham (2010) and Kelly et al., (2010) (whose recording periods were early November 2008 and October 2007-March 2008 respectively), the studies all report on television broadcast prior to the implementation of the Ofcom regulations. Given that Ofcom's own review of the impact of the regulations in 2008 concludes that children saw 34% less HFSS advertising and also saw fewer food and drink advertisements using techniques considered to be of appeal specifically to children in 2007/8 compared to 2005 (Ofcom, 2008), this suggests that the landscape following the introduction of scheduling and content rules differs sufficiently to warrant new research to give an accurate and up to date picture of food advertising on UK television. The current study was designed to address this gap, with recording taking place throughout 2008 (during phase 2 of the regulations when HFSS adverts were not permitted in or around programmes likely to be of particular appeal to children aged 4 – 15 years and dedicated children's channels were required to scale back all HFSS advertising to 50% of 2005 levels (Ofcom, 2007a)).

Secondly, the proliferation of multichannel television access in recent years (91% of households in 2008) has led to changes in children's viewing habits, such that their viewing has moved towards digital channels (which are allowed to show more advertising than the main commercial terrestrial channels) (Ofcom, 2008). Ofcom (2008) report that 41.0% of children's (4-15y) viewing in 2007/8 was spent on terrestrial channels, 28.0% on dedicated children channels, 6.6% on commercial spin-off channels (such as E4) and 20.1% on other digital commercial channels. Therefore, when considering children's exposure to television food advertising, content analyses must take into account the range and variety of channels children watch and not simply focus on a single terrestrial channel as has been the case with a several previous studies (Sixsmith & Furnham, 2010; Chestnutt & Ashraf, 2002; Rodd & Patel, 2005; Consumers International, 1996). To be a useful indication of television food advertising exposure, studies ideally need to incorporate examinations of a multitude of channels across the numerous available platforms (terrestrial, free-to-air digital channels, subscriber-only satellite and cable services) to better reflect viewing patterns in the population of interest (children and adolescents). Furthermore, examination of multiple channels enables comparisons to be made across both channels and channel types (genres), and as previous studies have not conducted terrestrial and satellite/cable channel comparisons it was a novel aspect of the current study to acquire the data for this.

Thirdly, many previous authors have sought to isolate just the commercial content that they believe children are exposed to by limiting their focus to only dedicated children's programming or specific times of day traditionally known as children's airtime (e.g. after school, Saturday morning) (Lewis & Hill, 1998; Rodd & Patel, 2005) and therefore do not examine programming or viewing times with a broader appeal. This is not the most effective study design as, although children's overall viewing time has remained relatively constant in recent years (15.9 hours a week for children 4-15y); over half (51.1%) of viewing was in adult airtime on commercial channels, with this proportion increasing to 59.8% of viewing for older children (10-15y) (Ofcom, 2008). This is an important consideration, as Ofcom (2008) purport that food and drink advertising spots have shifted to adult airtime, partly in response to the restrictions placed on food advertising during children's airtime. Indeed, the format of the current regulations has been criticised for focusing on dedicated children's programming (placing HFSS advertising restrictions based on the proportion of children in the viewing audience) rather than accounting for actual viewing patterns of children and adolescents (placing HFSS advertising restrictions based on the numbers of young people in the viewing audience) (Which?, 2006). As a result, because soap operas and general light entertainment shows - which are demonstrably the programmes most popular with children - are also popular with adults, the proportion of children in the audience are often not sufficient to 'trigger' the restrictions (Which?, 2008). Therefore it is logical to predict that the current study will demonstrate the impact of the regulations i.e. that the extent to which food advertising is shown in and around programming with broader appeal is greater than that surrounding child-specific programming.

In a 2002 study, it was found that during children's TV 62.5% of advertising time was devoted to foodstuffs, compared to 18.4% during primetime broadcasting (Chestnutt & Ashraf, 2002). Therefore, it is clear that examining only programming that is specifically directed at children may not be an accurate reflection of actual exposure to commercial messages by this age group. It is more useful for studies to capture food advertising across more expansive broadcast periods and then use viewing data to specifically evaluate food promotion during periods where large numbers of children are watching compared to periods with low numbers of child viewers, rather than make the seemingly false assumption that the television viewing of young people is restricted to programming targeted specifically at their demographic. Indeed, Kelly et al., (2010) were able to show that for the UK (as well as Brazil and Spain), the proportion of all advertisements that were for food was higher during children's peak viewing times (defined as periods where the child audience reaches at least a quartile of the maximum child audience – based on data for that day where available, or alternatively in terms of broader viewing patterns) compared to non-peak viewing times. This finding warrants further investigation in the current study.

Fourthly, previous content analyses have often recorded all programming for an entire study on a single date or across a narrow range of dates, with authors often basing their conclusions on very small samples of programming. These methods limit the generalisability of the data as they are only capturing a brief 'snapshot' of advertising at a single or limited point in time, they also do not allow for variations in food advertising over time to be examined. For example, Consumers International (1996) report on 20 hours (h) of programming during January-March

1996, Rodd & Patel (2005) report on 41 h of TV across July and August 2003, Sixsmith & Furnham (2010) analyse 45 h of television broadcast over 5 days in 2008, and Lewis & Hill (1998) studied 91h during January and February 1996; and although some studies do include slightly larger sample sizes of 192 h between October 2007 to March 2008 (Kelly et al., 2010), 279 h (Chestnutt & Ashraf, 2002), 503 h across a week in September 2006 (Morgan et al., 2009) these authors are still only providing a limited picture. Chestnutt & Ashraf (2002)'s did include a range of months in their study but interestingly did not state in their discussion whether or not differences across time had been found. Morgan et al., (2009) did note that the amount of advertising for confectionery and other high sugar products varied between school holiday and non-holiday periods, with the most time being devoted to high sugar product advertising being the week before Christmas. The current study aimed to address the limitations mentioned, using a sample size sufficiently large for the data to be considered representative of the food advertising broadcast during the year studied (2008) and analysing data from all 12 months so that any variations by month can be identified.

Fifthly, much of the published data are descriptive with authors rarely using inferential statistics, and therefore reports are lacking any/sufficient within sample comparisons. Although this is a useful approach providing an overall image of the food advertising landscape, treating a sample of television purely as a homogeneous group of data is not as useful as elucidating differences and identifying variation across a number of dimensions (channels, genres, programming, viewing times etc) so that interventions or policy options can be specifically applied where they are most needed rather than relying on generalisations across a potentially diverse sample of broadcasting. The current study will address this gap.

The final limitation of the literature on this topic is that data relating specifically to the content or nature of TV food advertising in the UK are extremely limited. Previous studies have typically focused on the extent of food promotion broadcast, that is the amount of advertising, the proportion of that advertising that is for food products, and the types of food products most frequently advertised. Such studies have shown that not only is food advertising prevalent on UK television but the majority of adverts are for less healthy or HFSS foods. As it has been suggested that the best remedy to the current financial might of an industry largely promoting unhealthy foods would be to engineer the shift of a sizeable portion of that advertising to the promotion of healthier food options (Stitt & Kunkel, 2008), the current balance of food types advertised is an important consideration for any study of this kind. Indeed, research evidence suggests that healthy food advertising can positively impact upon attitudes towards healthy foods (Dixon et al., 2007; Beaudoin, Fernandez, Wall, & Farley, 2007) and increase children's selection of such foods (Bannon & Schwartz, 2006; Chapman et al., 2007). Despite these promising data, the advertising of fruit, vegetable and other healthy products is either rare or non-existent in most countries studied including the UK (Consumers International, 1996). Given that a major concern of the regulators was to ensure that broadcasting revenues were not unduly impacted by the restrictions (Ofcom, 2008), increasing the representation of healthier dietary choices during programming and broadcast periods popular with children seems to be a pertinent and constructive goal for all stakeholders. The current study will investigate whether there is any evidence of a shift towards the advertising of healthier foods.

Previous studies certainly suggest that there is considerable room for improvement regarding both the proportion of advertising that is for food and the nutritional quality of the foods most frequently advertised. Lewis & Hill (1998) found that food was the most heavily advertised product in their television sample, accounting for 62.8% of the advertisements. Cereals and confectionery/savoury snacks were the most advertised products, amounting to 60% of the food adverts analysed. Several of the published studies have a dental health focus, and therefore report on the prevalence of advertising for foods with high sugar and/or acid content. Chestnutt & Ashraf (2002) found that of the 62.5% of advertising time that was devoted to foods during children's television, 73.4% depicted products deemed potentially detrimental to oral health due to the high sugar content. Rodd & Patel (2005)'s analysis revealed that 34.8% of adverts were for food/drink products, and it was also noted that 95.3% of the promoted products were potentially cariogenic or erosive. Morgan et al., (2009) report a slightly different picture, with only 16.4% of advertising time being devoted to food products, with sugared cereals found to be the most commonly advertised high sugar product, followed by sweetened dairy and confectionery items. The UK sample of the Consumers International (1996) study found that food was the most advertised category, accounting for 59% of all adverts studied, with toys the next most frequently appearing category (21% of adverts). Of the food adverts, confectionery was the most advertised product with an average of 55 adverts per

20 h of television broadcast, followed by breakfast cereals (32 adverts), and ready prepared foods (30 adverts). Further, of the 170 food adverts broadcast, 62% were high in fat (>30% of energy), 50% were high in sugar (>20% of energy) and 61% were high in sodium (>2.36g/10MJ). Overall it is clear that the advertised diet is not in line with recommendations (WHO, 2003b), with HFSS foods disproportionately represented, but it is also apparent that considerable variation exists between studies.

Although the literature provides useful data from which directional hypotheses regarding the extent of food advertising on television can be drawn for the current study, the amount of variation in key findings highlights the need for regular, systematic and comprehensive assessments of food advertising levels particularly given the introduction of regulations designed to govern this activity. Furthermore, if the current regulations have been effective in reducing children's exposure to HFSS food advertising, as suggested by the broadcast regulator in their review (Ofcom, 2008), differences should be apparent between the balance of healthy and non-healthy food adverts broadcast to children (i.e. periods when the child audience is greater) compared to those broadcast at other times. Moreover, dedicated children's channels could be expected to have broadcast proportionally less HFSS foods than other channel types during the study period due to the impact of restrictions designed ultimately to remove all HFSS advertising from such channels (albeit recording was carried out during phase 2, prior to full implementation of the rules).

6.1.2 Persuasive marketing techniques used to advertise food to children

In order to fully assess the impact of television food promotion on children's eating behaviours it is necessary to be aware of both the extent of food advertising and the nature (or content) of such advertising. To date, content analyses in the UK (and to some extent globally) have tended to focus on analysing the nature of the product rather than the nature of the message promoting the product (Schor & Ford, 2007). This message may include the use of persuasive marketing techniques such as featuring brand equity/licensed characters, celebrity endorsers, premium offers/contests, and persuasive appeals or other attributes of advertising such as the use of disclaimers, healthy claims, website promotion, and depictions of physical activity (Gantz et al., 2007). Hastings et al., (2003) purport that the development of promotional strategies and techniques by advertisers is becoming increasingly sophisticated, with strategies based on market research carried out to discern children's interests, motivations, values and beliefs.

The use of persuasive techniques is associated with greater attention and a greater likelihood of gaining an emotional response from a child viewer, therefore the nature of food adverts is a crucial element of the effectiveness of food advertising (Lewis & Hill, 1998). If we recognise that the influence of marketing techniques can be positive or negative, understanding how advertisers market foods to children so effectively that food-related behaviours are influenced is essential in order to focus on beneficial outcomes (Hastings et al., 2003) i.e. to inform the design of effective intervention programmes to encourage healthier dietary choices. Yet, the content of television food advertising in the UK is under researched, only 4 studies consider UK food advert content (Sixsmith & Furnham, 2010; Lewis & Hill, 1998; Furnham et al., 1997; Kelly et al., 2010). The current study will address this gap by examining the use of persuasive appeals, premium offers, promotional characters (including brand equity characters, licensed characters and celebrity endorsers) and website promotion; with statistical analysis of relationships across product types (healthy versus unhealthy) and across popular children's viewing times compared to periods with low child viewers.

6.1.2.1 Persuasive appeals

With regard to the use of persuasive appeals, Lewis & Hill (1998) reported that food adverts during children's airtime were significantly more likely to use animation, a story format, humour and to contain emotional appeals (such as fun/happiness/mood alteration) compared to non-food adverts aimed at children or adult-oriented food adverts. Furthermore, the authors suggested that because many overweight and obese young people experience low levels of self-esteem or confidence, such individuals may be more vulnerable to the use of emotional appeals that suggest an opportunity for personal enhancement (Lewis & Hill, 1998). Sixsmith & Furnham (2010) also identified that a significantly greater proportion of food adverts aimed at children featured 'fantasy-based' themes (48.6%) compared to food adverts for adults (15.4%). The use of animation and mixed formats (in terms of characterisation, animation and tone) is thought to indicate the "light or humorous" tone of food adverts aimed at children compared to food adverts targeted at adults, or children's non-food adverts (Hastings et al., 2003). Although data on persuasive appeals used in UK food advertising are so limited (to be addressed by the current study), a number of non-UK based studies have observed the use of fun as a persuasive technique frequently used in children's food adverts, with appeals based on taste, physical qualities of the product, product uniqueness, 'being cool' and happiness also noted (Folta, Goldberg, Economos, Bell, & Meltzer, 2006; Galcheva, 2008; Roberts & Pettigrew, 2007; Stitt & Kunkel, 2008; Wicks et al., 2009; Gantz et al., 2007). It has been suggested that children naturally focus their attention on techniques such as animation and visual effects, and that emotional appeals distract children from other aspects of adverts for example nutritional disclaimers or product information (Wicks et al., 2009). Hastings et al., (2003) conclude that appeals in children's food advertising do tend to focus on 'fun' and 'taste' rather than on health or nutrition, although Sixsmith & Furnham (2010) did find that a larger proportion of the child-oriented food adverts featured claims or disclaimers relating to health benefits compared to the non-child directed food adverts. As children enjoy watching adverts and engage with them it is likely that the marketing strategies stated above do have persuasive power (Hastings et al., 2003) and therefore further investigation of their use within a recent sample of UK television is required.

6.1.2.2 Premium offers/contests

Behavioural outcomes such as purchasing requests are also thought to be modified by advertising techniques such as premium offers (Hastings et al., 2003). For example, McDonald's Happy Meals have been purported to be one of the most successful marketing strategies in history, with the inclusion of a free toy as well as frequent character licensing/movie tie-ins (Sahud et al., 2006). There is some research evidence to suggest that, early in cognitive development, children are unable to discriminate between a premium offer and an advertised product, which has implications for the effects of adverts featuring such offers (Carruth et al., 2000).

A McDonald's television advertisement featuring a premium offer

Hastings et al., (2003) note that the use of premiums or competition prizes offering collectible items (e.g. toys) was a frequently used creative strategy amongst the studies reviewed. It was estimated that in children's airtime on UK television, 42% of HFSS commercials featured animation and 28% featured a product tie-in (Ofcom, 2004). Kelly et al., (2010) investigate the use of premium offers in UK food advertising, reporting that 8% of food adverts on commercial channels popular with children featured a premium offer. Of these, 4.5% were featured on adverts for healthy foods (namely low sugar, high fibre breakfast cereals and supermarket adverts promoting healthy foods), 47% for unhealthy foods (principally fast food, but also supermarkets advertising unhealthy products, high sugar/low fibre breakfast cereals and sugary drinks) and 48.5% for miscellaneous food items (e.g. generic supermarket adverts). Furthermore, globally a significantly greater proportion of food adverts with premium offers were broadcast during peak children's viewing periods compared to non-peak, which is logical given the apparent persuasive effects of such offers, although no difference was found for the UK sample (Kelly et al., 2010). Another study found that a larger proportion of the adult-oriented food adverts featured promotions/competitions compared to the adverts aimed at children (26.9% v 8.6%), although no distinction was made between promotions and price or value claims in their study (Sixsmith & Furnham, 2010). Further investigation of this variable in the current study will examine the use of premium offers in food advertising on the channels most popular with children, and will specifically identify if viewing time differences are evident with a larger sample size and a greater range of television channels studied.

6.1.2.3 Promotional characters and celebrity endorsers

Promotional characters (brand equity and licensed characters) as well as celebrity endorsers ("a famous person who uses public recognition to recommend or co-present with a product in an ad" (Lear et al., 2009)) are also used in food advertising as part of overall branding activity. Brand recognition is thought to be enhanced in young children when cartoon or cartoon-related characters e.g. Tony the Tiger or Ronald McDonald are used in advertising or on packaging (Connor, 2006). Characters are thought to add to the persuasiveness of an advert and as a result brands have been criticised for using characters to manipulate children's food choices (Which?, 2005). Children who recognise characters, logos and slogans from adverts are more likely to select those products and brands (Batada & Borzekowski, 2008). Both children and adults like these characters and show trust and respect for them (Ülger, 2009). Therefore character-based marketing is considered a good strategy particularly when targeting younger children who respond positively to and bond with age-appropriate characters (Hastings et al., 2003).

Tony the Tiger, a Kellogg's brand equity character featured in television advertisements for Frosties breakfast cereal

Mr Men, well known children's characters from books and cartoons licensed by McDonald's to appear in television advertisements promoting Happy Meals

For older children particularly, celebrity endorsements are believed to be effective at increasing children's preferences for the product being promoted (Ross et al., 1984; Hastings et al., 2003) although research evidence of this effect is extremely limited. It has been suggested that celebrities appearing in advertising enhance a products worth and increase sales for two reasons: 1) they heighten attention to adverts by virtue of the visual and aural cues associated with celebrity endorsement, and 2) the credibility celebrities have in their area of renown extends to the product/brand they are endorsing (Gantz et al., 2007).

Gary Lineker, former England footballer and current sports TV presenter, a celebrity endorser featuring on television advertisements for Walkers crisps

Few papers have examined the use of characters and celebrities in food advertising. Kelly et al., (2010) found that 28% of all UK food advertisements in their sample contained promotional characters (brand equity/licensed characters and/or celebrities). Further, 65% of the food adverts featuring promotional characters were for less healthy, HFSS foods, typically full cream dairy products, low fibre/high sugar breakfast cereals, fast food and snack foods, although promotional characters also featured on 25% of adverts for healthier foods including low fat dairy items. Again, similar to the results found for premium offers, globally the use of promotional characters was found to be greater during peak children’s viewing periods compared to non-peak although the opposite was found to be true for the UK sample specifically (Kelly et al., 2010). Sixsmith & Furnham (2010) found that only 8.6% of food adverts aimed at children contained celebrities, significantly less than those aimed at adults (28.8% featured celebrities). However, a US study found that although only 10% of food adverts studied included a celebrity endorser, at least one celebrity was more likely to appear in food adverts aimed specifically at children or teenagers (16% of food adverts) (Gantz et al., 2007). Overall, characters from children’s television programmes appeared on 11% of food adverts aimed at that age group (Gantz et al., 2007). To add to this literature, the current study will investigate the use of promotional characters and celebrities in television food advertising, identifying what types of food they are promoting and how their use varies between viewing times.

Despite some evidence to the contrary, it is logical to assume that advertisers would use the most effective marketing techniques, including premium offers, and character and celebrity endorsement of products, when the target audience (young viewers) is greatest in order to maximise the influence of the commercial message. Therefore, in the current study differences in the use of such tecnhiques would be expected to be greater during viewing times popular with children compared to those periods with low numbers of child viewers for both of these aspects of advert content.

6.1.2.4 Website promotion

It is believed that advertisers are increasingly using the internet to persuade users of the positive attributes and value of their product, and including the web address on a television advert is one way of promoting their website (Gantz et al., 2007). It has been noted that in the US, the majority of food brands that are heavily advertised to children on television are also promoted to them through food marketers' websites, so it is likely that website promotion during television food adverts will rise as the internet becomes increasingly more established as a platform for commercial food marketing (Moore & Rideout, 2007; Kaiser Family Foundation, 2006).

No previous studies have examined this phenomenon in UK television food advertising. However, in the US, one study found that 20% of food adverts aimed at children and adolescents pushed their website during the advert, including 59% of adverts for dine-in and delivery restaurants and 46% of prepared food adverts (e.g. for soups, pasta products, sandwich spreads etc) targeted at this age group (Gantz et al., 2007). Once they visit the site, evidence suggests that many food and beverage websites then direct advertising techniques at children and adolescents including encouraging 'advergaming' (a game in which the advertised product is part of the game) (Weber, Story, & Harnack, 2006) with 'brand immersion' as a key objective of these websites (Moore & Rideout, 2007). Very limited data exist regarding the effects of internet food advertising exposure or involvement in advergaming on food-related behaviours, however Pempek & Calvert (2009) were able to demonstrate that children who played an advergame featuring healthier products selected and consumed significantly more healthy snacks than those who played a less healthy version of the same advergame. This suggests that aspects of food websites do have persuasive power (with potential benefits for health food promotion), and therefore indicates that website promotion during television food advertising to children and adolescents is an important aspect to consider in the current study.

Examples of food brands that advertise on television and have websites featuring child-oriented advergames

The current study should provide the most comprehensive analysis of the current landscape of food advertising on UK channels popular with children and young people conducted to date, which may prove useful for evaluation of the Ofcom regulations as well as providing a benchmark/baseline against which future changes in television food advertising can be measured. As the Kaiser Family Foundation state “if we overestimate the presence of food marketing in children’s lives, or its role in their diets, we may place too much faith in marketing-oriented policy solutions; if we underestimate it, we may neglect important policy options" (Gantz et al., 2007).

6.1.3 Aims

The principle aim of the current study was to undertake the most detailed examination ever conducted of the extent and nature of food advertisements on the UK television channels most popular with children. It was aimed to expand upon previous content analyses with regard to the sample size of television involved, the range of channels studied, and the incorporation of inferential statistics to conduct comparisons along a number of dimensions including month of recording, viewing periods, food types, television access routes (cable/satellite/terrestrial) and channel types (genres). This is the first study in the UK to systematically and comprehensively examine both the amount of food advertising and the content of that advertising, in terms of persuasive appeals, use of promotional characters and celebrities, and website promotions. A further aim of this study was to provide an indication of the usefulness of the Ofcom regulations (2007a) to reduce exposure to HFSS food advertising by children and adolescents.

6.1.4 Hypotheses

Based on previous findings, it was hypothesised that:

Hypotheses relating to the extent of food advertising

H1: Food would be the most heavily advertised product.

H2: Breakfast cereals would be the most heavily advertised food product category, and fruit and vegetables the least advertised.

H3: There would be a significantly greater proportion of food adverts for non-core foods than core foods (see Section 6.2.2 and Table 6-2 for a full explanation of these terms).

H4: There would be a difference in the balance of core versus non-core food advertising between peak and non-peak children's viewing times.

H5: Dedicated children's channels would broadcast a lower proportion of non-core food advertisements than other channel types (relating to the impact of restrictions).

H6: There would be a greater proportion of food adverts around programmes aimed at general audiences (soap operas and entertainment shows specifically) (due to lack of regulations against these programmes) than programmes aimed at children.

H7: The types of foods advertised would vary by month of recording, with a greater proportion of non-core foods during months containing school holidays (e.g. August and December).

H8: Cable/satellite channels would show more advertising (food and non-food) than terrestrial channels.

Hypotheses relating to the <u>*nature*</u> *of food advertising*

H9: Promotional characters (including celebrities) would feature on a significantly greater proportion of adverts for non-core foods than core foods.

H10: Brand equity characters would be used to advertise foods more frequently than licensed characters (relating to the impact of restrictions).

H11: Brand equity/licensed characters, celebrities and premium offers would feature on a significantly greater proportion of adverts during peak children's viewing times than non-peak children's viewing times.

H12: Fun would be the most common persuasive appeal used to advertise foods to children.

H13: A significantly greater proportion of food advertisements with children as the primary target would direct the viewer to websites compared to the adverts with other age groups as the primary target.

6.2 Methods

See also Chapter 2.

6.2.1 Television Sampling

Television was recorded from 14 commercial stations broadcasting in the UK. These were ITV1, Channel 4, Channel 5 (all terrestrial channels, free-to-air subject to a license fee chargeable to all television owners), CiTV, Nickelodeon, Cartoon Network, Boomerang, Jetix, Sky Sports 1, Sky One, The Hits (rebranded as 4Music during the study period), Smash Hits, MTV and E4 (all subscriber-only satellite stations, but some also available through one-off payment systems such as Freeview). Take up of multichannel television on main sets reached 91% of households in 2008 with just over 60% of additional television sets (e.g. in children's bedrooms) also being converted to multichannel (Ofcom, 2008; Ofcom, 2009). Therefore, it was considered that the level of pay-tv penetration in the UK warranted the inclusion of non-terrestrial channels in this study. Specific channels were selected on the basis of their popularity with children and young people aged 4-15 years (Thickett, 2007) and 5-16 years (Childwise, 2007). Although frequently viewed by children, BBC 1 and BBC 2 were excluded from this study as they are not commercial channels and therefore do not carry adverts outside promotions for their own programmes. The Disney channel was also excluded from the study as it does not broadcast traditional food advertising, only television programme sponsorship (Gantz et al., 2007).

Television was recorded from 06:00 to 22:00 hours on test days, using Toshiba LCD colour televisions (model 15VL63B) and Samsung DVD-HR753 DVD recorders. Recordings were made initially onto the hard disk drive of the DVD recorder, and then copied onto DVD discs for coding and storage. Recordings for each channel we made on one weekday and one weekend day every month between January and December 2008 (see Appendix 17). Where possible national holidays, large sporting competitions, special events and low rating (i.e. holiday) periods were avoided. To minimise the effects of advertising variation across days of the week, weekday recordings were always made on Tuesdays or Thursdays. Weekend recordings were made on Saturdays or Sundays. For each channel 24 samples were obtained (12 weekdays and 12 weekend days) of 16 hours each, with two exceptions. Firstly, the sample for one day of recording for Sky One (a Thursday in June) is limited to 9.5 hours (6am – 3.30pm) due to recording errors. Secondly, CiTV only broadcasts from 6am-6pm therefore samples for this channel only cover 12 hours.

6.2.2 Coding

Each DVD was scanned for advertising content, and the nature of such content was coded according to the scheme outlined in Tables 6-1 (a full list of the coding criteria can be found in Appendix 7) and 6-2. As shown in Table 6-2, all food or drink items were coded as one of 28 categories that were each assigned to one of three overarching groups; core, non-core and miscellaneous items. Core items were defined as those foods/drinks that are required daily to meet nutrient requirements, non-core items are those foods/drinks that provide nutrients and/or energy in excess of requirements, and all other items were classified as miscellaneous (Kelly, Smith, King, Flood, & Bauman, 2007; Kelly et al., 2010). Where nutrition information was required (e.g. to identify the sugar content of breakfast cereals) this was obtained from manufacturers' websites or from product packaging. Programme sponsorship was not coded as an advertisement due to the variable nature of such commercial messages, ranging from the flash of a logo to a section of content almost equivalent to a standalone advert, therefore this study may actually underestimate children's brand exposure through television viewing.

All variables have previously been used in analyses of television advertisements, variables 1–16 by (Kelly et al., 2007; Kelly et al., 2010) and variables 17–25 by Gantz et al., (Gantz et al., 2007).

6.2.2.1 Children's Viewing Hours

Children's television viewing periods were classified in two ways.

Firstly, peak children's viewing times were defined as viewing periods where the number of children watching television (on all analysed channels combined) is greater than a quartile of the maximum child audience rating for the entire day (Kelly et al., 2010). These viewing periods were ascertained, using data on the TV viewing trends of 4 – 15 year old children published in Appendix 3 of an Ofcom report (Ofcom, 2004), as 17:30-22:00hrs on weekdays and 19:00–21:00hrs on weekend days. All other viewing times were designated 'non-peak'.

Secondly, high and low children's viewing times were assigned from the same data (Ofcom, 2004) but with the use of less stringent criteria. Time periods were defined as 'high children's viewing periods' where the proportion of children watching television visibly peaked, between 07:30–09:00hrs and 15:00–22:00hrs on weekdays and 08:00–22:00hrs on weekend days. All other viewing times were designated 'low'.

6.2.3 Statistical Analysis

These data did not adhere to the assumptions for parametric data (normality of distribution) therefore non-parametric analysis was performed. Friedman's ANOVA was used for related-sample (e.g. within channel) comparisons, with subsequent Wilcoxon Signed Rank tests to follow up significant findings. For independent-sample (e.g. between channels) comparisons, Kruskal-Wallis tests were used with subsequent Mann-Whitney U tests to follow up significant findings. All comparisons were two-tailed and significance was taken at $p < 0.05$ (with Bonferroni adjustments for multiple comparisons).

Table 6-1 A table to show a brief summary of the coding scheme used to classify all advertisements in terms of broadcast time and content of the advert: Variables 1-11 were coded for all advertisements, variables 12-25 were coded for food advertisements only

To be coded for ALL advertisements:		
Variable Number	Variable Name	Codes
1	Channel	Channel number (e.g. 1 = ITV)
2	Date	Format DD/MM/YY
3	Day	Day number (e.g. 1 = Tuesday)
4	Programme name	Programme in which the advertisement is shown (if advert is between programmes name the preceding programme)
5	Programme category	Category number (e.g. 1 = Comedy)
6	Starting time	Start time of the programme in 24hr clock format
7	Time slot	In half hour time periods (e.g. 6:00 = 1, 6:30 = 2)
8	Peak or non-peak children's viewing time	Peak = 1, non-peak = 0
9	High or non-high children's viewing time	High = 1, non-high = 0
10	Between or within programme	With programme = 1, between = 0
11	Advertised product type	Product number (e.g. 1 = Food & drink, 2 = Clothes/shoes etc.)
Additional coding to be completed for all FOOD advertisements only:		
12	Food product brand name	Manufacturer's name and brand name of product (e.g. McDonald's Big Mac or Cadbury's Fruit & Nut Chocolate)
13	Detailed description of food product	Detailed and thorough, sufficient information for nutritional content to be assessed (e.g. "Chocolate coated, cream-filled biscuit" rather than just "biscuit")
14	Food code	Food product categorised as one of 29 food categories shown in Table 6-2
15	Promotional characters	Food advertisements that contain cartoons (including branded characters such as Ronald McDonald) and celebrities = 1, without = 0
16	Premium offers	Food advertisements with premium offers (including giveaways, competitions, contests, vouchers and rebates) = 1, without = 0
17	Primary persuasive appeal	Main persuasive appeal used to market the food item (e.g. 1 = quantity, 2 = convenience)
18	Secondary appeal	If the food advertisement did not use health/nutrition as a primary appeal, note if either set of appeals is used as a secondary appeal (1 = health/nutrition, 2 = energy)
19	Physical activity depicted	Characters (real or animated) engaged in purposeful physical activity beyond casual walking or simply moving about in a reasonably prominent way, not in the background or a quick glimpse (Physical activity depicted = 1, none depicted = 2)
20	Health claims	Verbal or textual (e.g. 1 = low fat/fat free, 2 = sugar free)
21	Disclaimers	Verbal or textual (e.g. 1 = part of a balanced/complete/nutritious breakfast or meal, 2 = part of a balanced/healthy diet)
22	Celebrities	Type of celebrity (e.g. 1 = entertainment celebrity, 2 = sportsperson)
23	Brand equity/licensed character	Type of character (e.g. 1 = brand equity characters e.g. Coco the Monkey, 2 = licensed character e.g. Shrek)
24	Primary target	Intended target audience (e.g. 1 = children and/or teens, 2 = teens and adults)
25	Direction to website	Verbal or textual reference to the company website = 1, none = 0

Table 6-2 A table to show the food product categories used to classify the main food item appearing in each food advertisement in terms of nutritional content

Food Product Categories	Code
Core Foods	
Bread/rice/pasta/noodles	1
Low sugar/high fibre breakfast cereals	2
Fruit and fruit products	3
Vegetables	4
Low fat/reduced fat milk/yoghurt/custard and cheese	5
Meat and meat alternatives	6
Core foods combined (inc. frozen meals, sandwiches etc)	7
Baby foods (excl. milk formulae)	8
Bottled water	9
Non-core Foods	
High sugar/low fibre breakfast cereals	10
Crumbed/battered meat and meat alternatives	11
Cakes/pies/pastries	12
Snack foods (inc. crisps, snack bars, popcorn)	13
Fruit juice and fruit drinks	14
Frozen/fried potato products (excl. crisps)	15
Full cream milk/yoghurt/dairy desserts/cheese	16
Ice cream	17
Chocolate and confectionery	18
Fast food restaurants	19
High fat/sugar/salt spreads	20
Sugar sweetened drinks	21
Alcohol	22
Miscellaneous Foods	
Vitamin and mineral supplements	23
Tea and coffee	24
Supermarkets advertising mostly non-core foods	25
Supermarkets advertising mostly core foods	26
Supermarkets - generic ads or not clearly core/non-core	27
Baby and toddler milk formulae	28
Home delivery food companies - not clearly core/non-core	29

6.3 Results & Discussion

The total recording time for this study was 5233.5 hours, and within this sample there were 147,672 adverts at an average rate of 28.2 adverts per hour.

Initial analyses indicated that the day of recording (Tuesday/Thursday/Saturday/Sunday) did not have a significant effect on the overall number of adverts broadcast (food and non-food; $p = 0.836$), the total number of food adverts broadcast ($p = 0.273$), nor the proportion of food adverts that were for core foods ($p = 0.355$), non-core foods ($p = 0.838$) or miscellaneous foods ($p = 0.428$). Therefore data for all days of recording were analysed together throughout this chapter.

For clarity, all descriptive data and all tables and figures represent mean values but statistical significance was identified using non-parametric analyses which use median values.

6.3.1 Hypotheses relating to the extent of food advertising:

H1: Food would be the most heavily advertised product.

During the study period, there were a total of 147,672 adverts of which 18,888 (12.8%) were for food (average rate of 3.6 food adverts per hour).

A Friedman's ANOVA found that there was a significant difference in the proportion of the various product categories advertised ($\chi^2(19) = 3583.14$, $p < 0.001$). The most advertised product category was 'channel promotions' (i.e. the advertising of future programmes on the same channel) which accounted for 28,966 (19.6%) adverts. Subsequent Wilcoxon Signed Rank tests confirmed that this was a significantly greater proportion of the total adverts than that of food adverts ($p < 0.001$). There were 26,497 toy adverts, comprising 17.9% of total adverts. This was greater, but not significantly so, than the proportion of food adverts ($p = 0.677$). This makes food products the third most heavily advertised product category (see Figure 6-1).

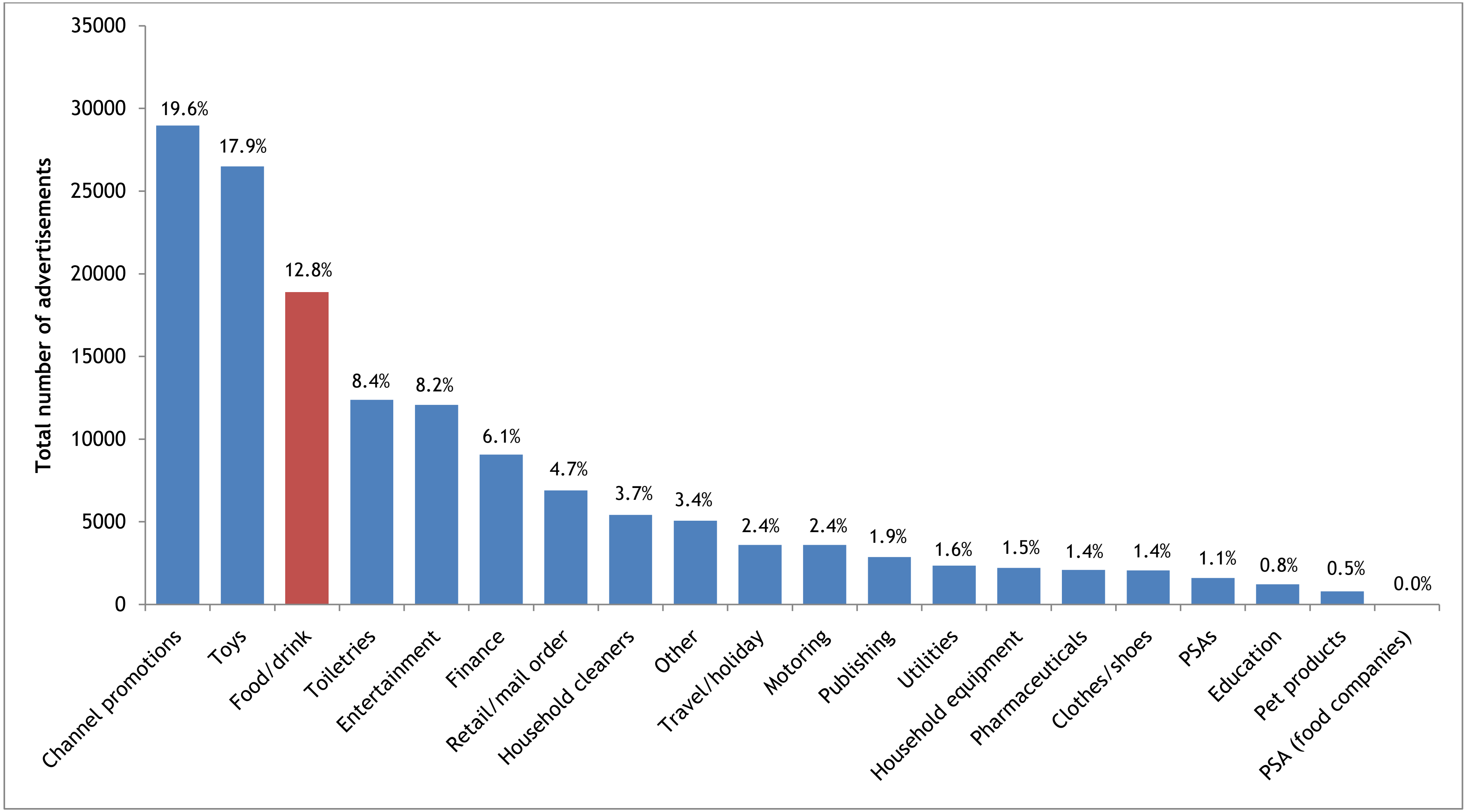
Food adverts comprised a significantly greater proportion of the overall number of adverts than (all $p < 0.001$):

- clothing/shoes ($Mdn = 0.60$; $T = 43.00$, $z=-15.839$, $r= -0.87$)
- education ($Mdn = 0.60$; $T = 26.00$, $z=-15.848$, $r= -0.87$)

- entertainment (*Mdn* = 7.20; *T* = 11243.50, *z*=-9.208, *r*= -0.50)
- finance (*Mdn* = 5.40; *T* = 5962.00, *z*=-12.463, *r*= -0.68)
- household cleaners/detergents (*Mdn* = 2.90; *T* = 1531.00, *z*=-14.945, *r*= -0.82)
- household equipment (*Mdn* = 0.60; *T* = 317.50, *z*=-15.659, *r*= -0.86)
- motoring (*Mdn* = 1.90; *T* = 623.00, *z*=-15.512, *r*= -0.85)
- pet products (*Mdn* = 0.00; *T* = 16.00, *z*=-15.854, *r*= -0.87)
- pharmaceuticals (*Mdn* = 0.80; *T* = 14.00, *z*=-15.855, *r*= -0.87)
- public service/information announcements (PSAs) (*Mdn* = 0.80; *T* = 28.00, *z*=-15.847, *r*= -0.87)
- PSAs sponsored by food companies (*Mdn* = 0.00; *T* = 0.00, *z*=-15.863, *r*= -0.87)
- publishing (*Mdn* = 1.50; *T* = 141.00, *z*=-15.735, *r*= -0.86)
- retailing and mail order (*Mdn* = 4.20; *T* = 2406.00, *z*=-14.417, *r*= -0.79)
- toiletries (*Mdn* = 8.40; *T* = 8302.50, *z*=-11.093, *r*= -0.61)
- travel/transport/holidays (*Mdn* = 1.90; *T* = 372.50, *z*=-15.604, *r*= -0.85)
- utilities (*Mdn* = 1.40; *T* = 49.50, *z*=-15.835, *r*= -0.87) and
- other product types e.g. charity promotions (*Mdn* = 3.60; *T* = 619.50, *z*=-15.488, *r*= -0.85).

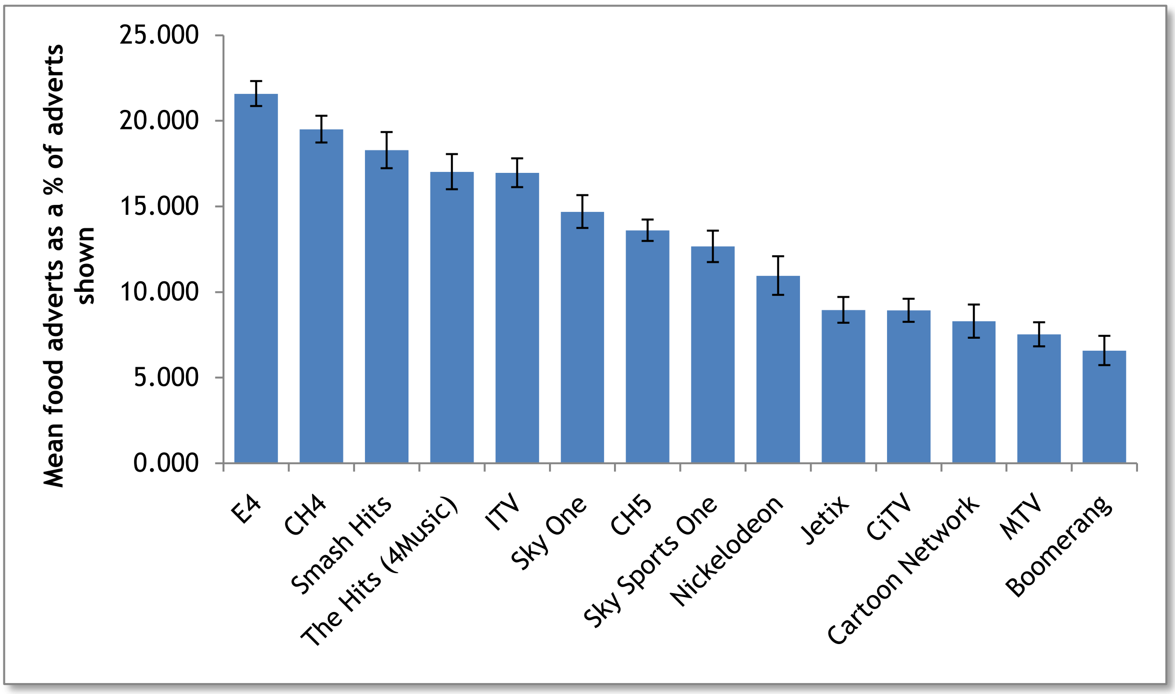
H1 is not supported because food was not the most heavily advertised product category overall; rather food was the third most heavily advertised product behind channel promotions and toys.

Figure 6-1 Total number of adverts for each product type advertised across the entire study period for all channels monitored



Furthermore, when examining food adverts as a proportion of the total adverts broadcast, using a Kruskal-Wallis test there was significant variation between channels ($H(13) = 191.304$, $p < 0.001$) (see Figure 6-2). The highest proportion of food adverts (as a percentage of total adverts shown) was found on E4, which had a significantly greater proportion of food ads than Channel Four (21.6% v 19.5%; $p < 0.05$). The lowest proportion of food adverts was found on Boomerang (6.6%). This was not significantly lower than that of MTV (7.5%; $p = 0.694$), Cartoon Network (8.3%; $p = 0.268$), CiTV (8.9%; $p = 0.074$), or Jetix (9.0%; $p = 0.099$) but was significantly lower than Nickelodeon (11.0%; $p = 0.009$).

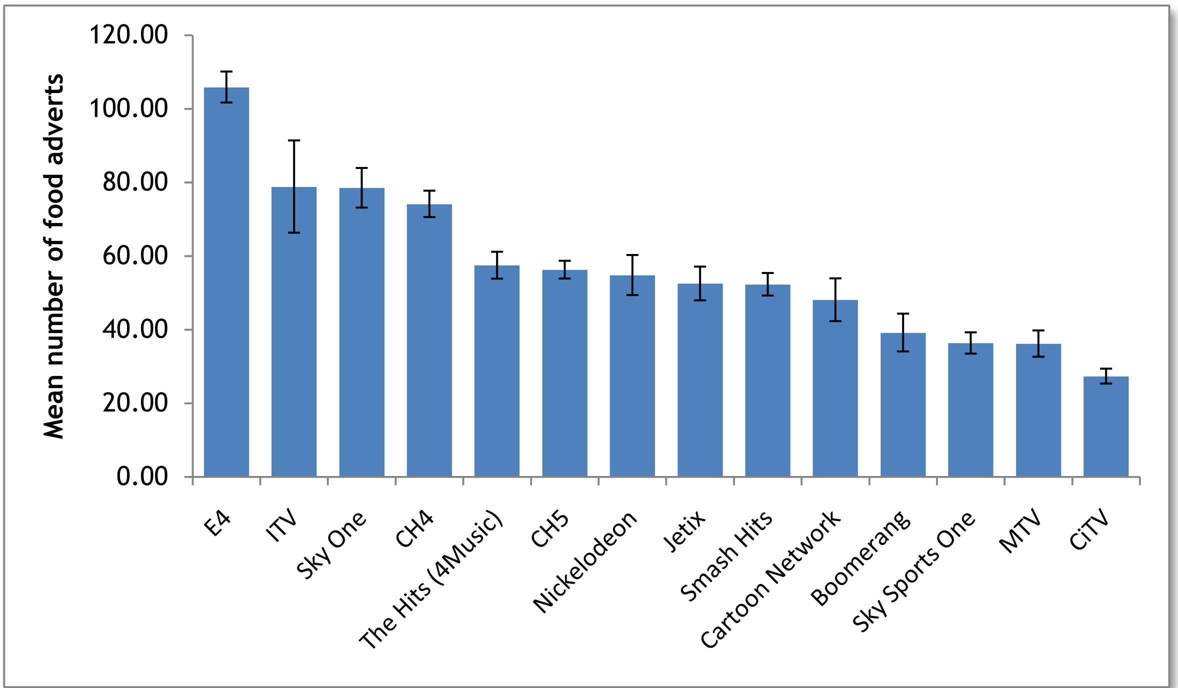
Figure 6-2 Average (mean) proportion of adverts broadcast that were for food on each monitored channel during a recording day (n =24 per channel)



There was also significant variation between channels in terms of the overall number of food adverts broadcast ($H(13) = 157.701$, $p < 0.001$) (see Figure 6-3). The greatest mean number of food adverts broadcast in a single recording day was found to be 105.8 for E4, significantly greater than that of ITV (78.8; $p < 0.001$). With significance taken at $p < 0.0083$ due to corrections, ITV’s mean number of food adverts per day was not significantly different from that of Sky One (78.5; $p = 0.258$), Channel Four (74.1; $p = 0.458$), The Hits (4Music; 57.4; $p = 0.087$), Channel Five (56.2; $p = 0.036$), Nickelodeon (54.8; $p = 0.024$), or Jetix

(52.5; $p = 0.017$) but was significantly greater than the mean food adverts broadcast on a recording day by Smash Hits (52.3; $p = 0.008$). The lowest number of food adverts was found on CiTV (27.3). With significance taken at $p < 0.0125$ due to corrections, CiTV's mean food adverts per day was not significantly different from that of MTV (36.1; $p = 0.062$), Sky Sports One (36.3; $p = 0.029$) or Boomerang (39.1; $p = 0.029$) but was significantly lower than that of Cartoon Network (48.0; $p = 0.005$).

Figure 6-3 Average (mean) number of food adverts broadcast on each monitored channel during a recording day (n =24 per channel)

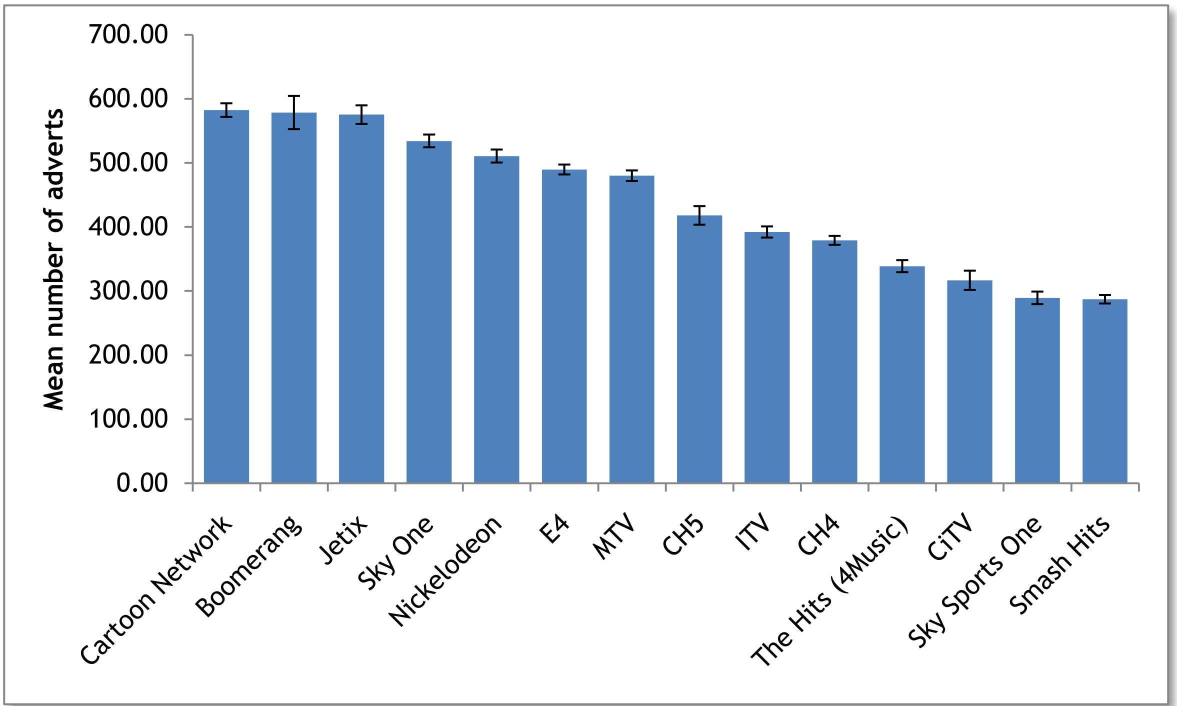


Note: Typical recording days were 6am-10pm (16 hours) except for CiTV which only broadcasts from 6am-6pm (12 hours).

In addition, significant differences were evident between channels regarding the total number of adverts shown (food and non-food) ($H(13) = 274.704$, $p < 0.001$) (see Figure 6-4). The greatest mean number of adverts (food and non-food) broadcast in a single recording day was found to be 582.3 for Cartoon Network. With significance taken at $p < 0.0167$ due to corrections, Cartoon Network's mean number of adverts per day was not significantly different from that of Boomerang (578.5; $p = 0.489$) or Jetix (575.2; $p = 0.757$) but was significantly greater than the number of adverts broadcast on Sky One during a recording day (534.2; $p =$

0.003). The lowest mean number of adverts was found on Smash Hits (287.0). With significance taken at p < 0.025 due to corrections, Smash Hits' mean adverts per day was not significantly different from that of Sky Sports One (289.2; *p* = 0.893) but was significantly lower than CiTV (316.6; *p* = 0.002).

Figure 6-4 Average (mean) number of all adverts (food and non-food) broadcast on each monitored channel during a recording day (n =24 per channel)



Note: Typical recording days were 6am-10pm (16 hours) except for CiTV which only broadcasts from 6am-6pm (12 hours).

H2: Breakfast cereals would be the most heavily advertised food product category, and fruit and vegetables the least advertised.

Of the 18,888 food adverts broadcast during the study period, 2317 (12.3%) were generic supermarket adverts (where the emphasis was neither for core nor non-core products, or where no specific food product was featured) (see Figure 6-5). The second most frequently featured food product category was fast food, accounting for 2237 (11.9%) of the total number of food adverts, followed by high sugar/low fibre breakfast cereals (1764 adverts, 9.4%). 3.5% of food adverts were for low sugar/high fibre breakfast cereals, therefore overall breakfast cereal adverts comprised 12.9% of all food adverts. The first prediction of H2 is supported; breakfast cereals (core and non-core versions combined) were the most heavily advertised food product category overall.

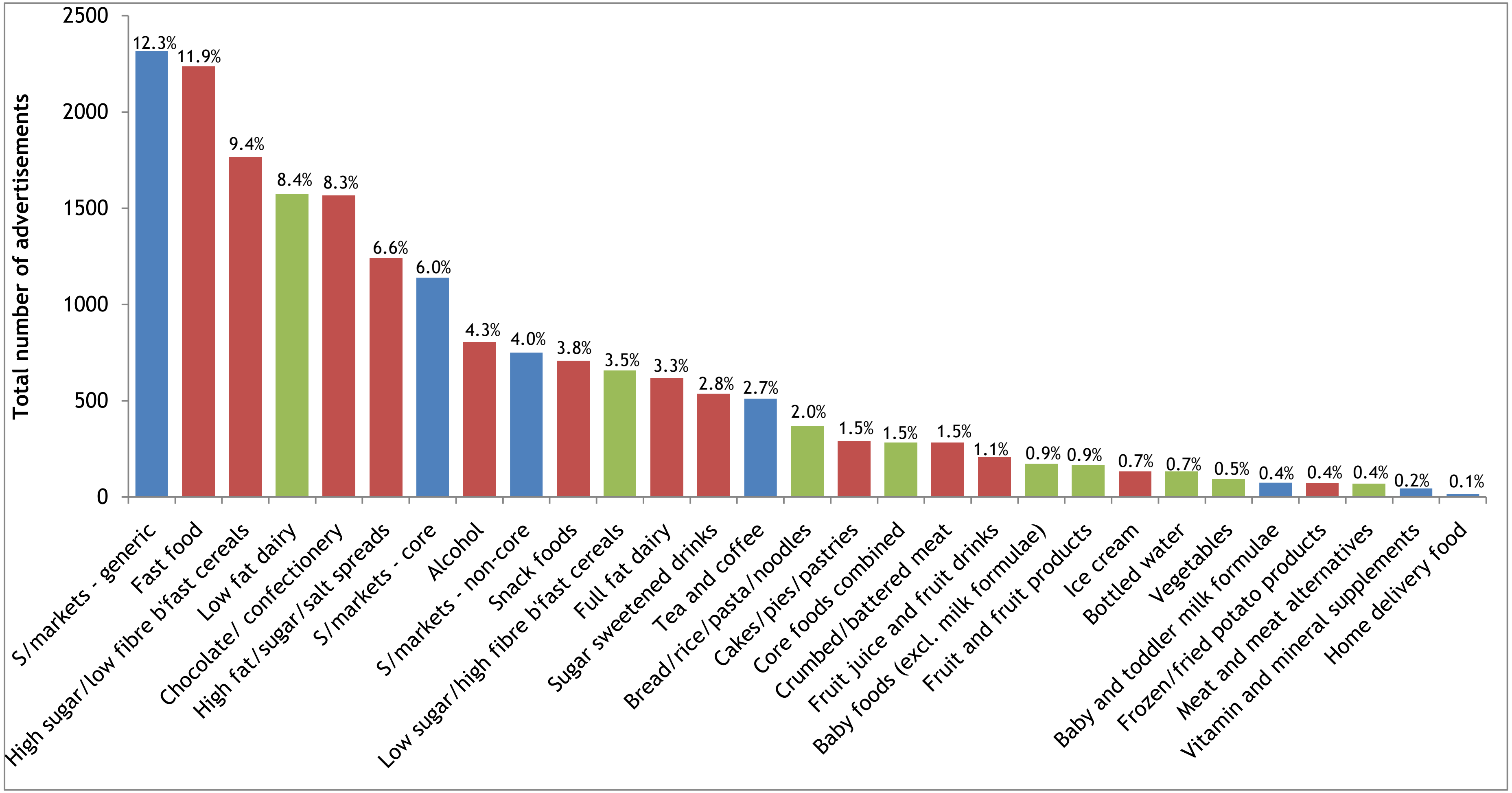
A Friedman's ANOVA found that there was a significant difference in the proportion of the various food product categories advertised ($\chi^2(28) = 3227.86$, $p < 0.001$). Wilcoxon Signed Rank tests demonstrated that the proportion of generic supermarket adverts was not significantly different from that of fast food advertising (12.3% v 11.9%; $p = 0.448$) but was significantly greater than the proportion of food adverts for high sugar/low fibre breakfast cereals (12.3% v 9.4%; $p < 0.001$). Fast food adverts also comprised a significantly greater proportion of the food adverts than high sugar/low fibre breakfast cereals (11.9% v 9.4%; $p < 0.001$).

The proportion of adverts for high sugar/low fibre breakfast cereals was not significantly different from the proportion of adverts for low fat dairy items (9.4% v 8.4%; $p = 0.837$) or chocolate and confectionery (9.4% v 8.3%; $p = 0.754$) (the product categories advertised fourth and fifth most frequently, respectively), however, it was significantly greater than the proportion of adverts for high fat/sugar/salt spreads (9.4% v 6.6%; $p = 0.002$), supermarkets advertising core foods (9.4% v 6.0%; $p < 0.001$) and all other products advertised less frequently. The proportion of adverts for low sugar/high fibre breakfast cereals was significantly less than that of supermarkets advertising core foods (3.5% v 6.0%; $p < 0.001$) but was not significantly different from the proportion of adverts for alcohol (3.5% v 4.3%; $p = 0.540$), supermarkets advertising non-core foods (3.5% v 4.0%; $p = 0.329$), snack foods (3.8% v 3.5%; $p = 0.207$), full fat dairy items (3.5% v 3.3%; $p = 0.577$), sugar sweetened drinks (3.5% v 2.8%; $p = 0.270$), or tea and coffee (3.5% v 2.7%; $p = 0.045$ with significance taken at 0.0167 due to corrections). However, low sugar/high fibre breakfast cereals did comprise a greater proportion of the adverts than breads/rice/pasta/noodles etc (3.5% v 2.0%; $p < 0.001$) or cakes/pies/pastries etc (3.5% v 1.5%; $p < 0.001$) and all other products advertised less frequently.

Fruit and fruit products (without added sugar) were the 21st (0.9% of food adverts), and vegetables the 24th (0.5%) least advertised products of from a total of 29 categories. This does not specifically support the second part of H2; they were not the least advertised food product types. According to Wilcoxon Signed Rank tests, frozen/fried potato products (0.4%), meat and meat alternatives (0.4%), vitamin and mineral supplements (0.2%) and home delivery meals (0.1%) were all advertised significantly less frequently than fruit and fruit products (all $p < 0.01$). Vitamin and mineral supplements (0.2%) and home delivery meals (0.1%) were advertised significantly less frequently than vegetables (both $p < 0.01$).

Overall, although these data do not specifically support the second prediction of H2, it is clear that breakfast cereals were the most frequently, and fruit and vegetables were among the least frequently advertised food product categories during the study period.

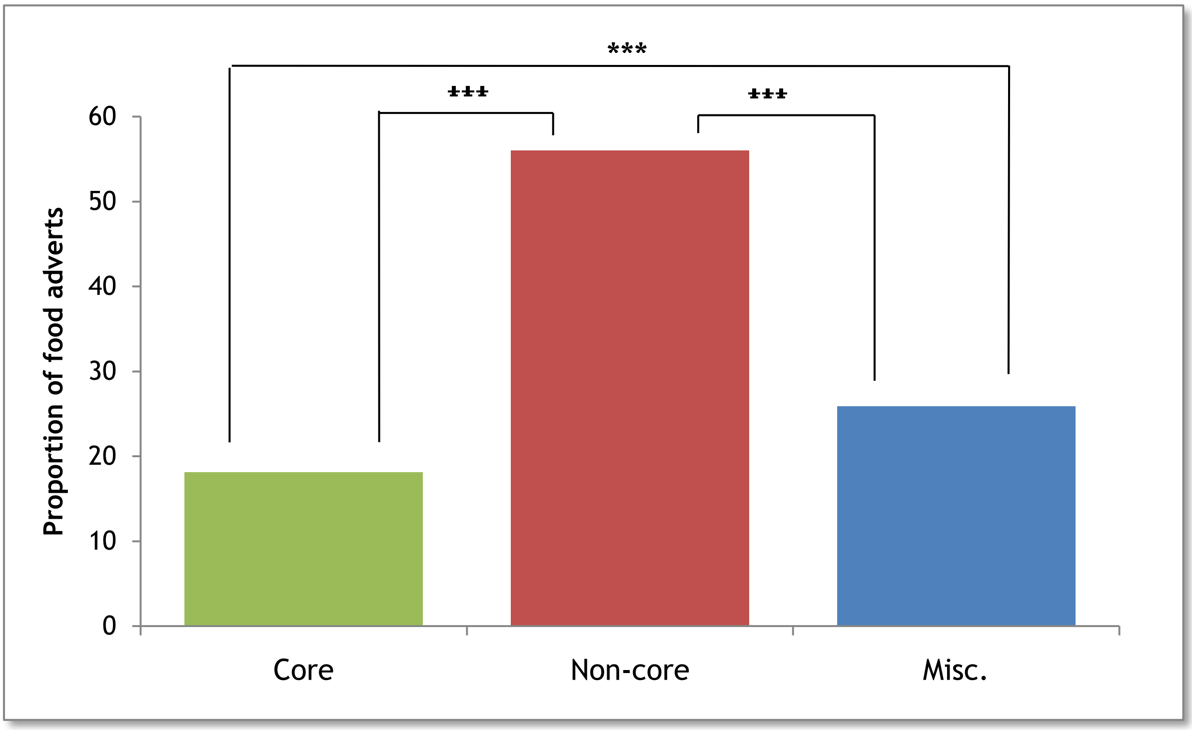
Figure 6-5 Total number of food advertisements broadcast (throughout all recording days, peak and non-peak periods) for each food product category across all monitored channels during the entire study period (Key: Core foods, Non-core foods, Miscellaneous foods)



<u>H3: There would be a significantly greater proportion of food adverts for non-core foods than core foods.</u>

A Friedman's ANOVA showed that overall, there was a significant difference between the proportion of food adverts for core, non-core and miscellaneous food items across all channels ($\chi^2(2) = 276.65$, $p < 0.001$) (see Figure 6-6). Wilcoxon Signed Rank tests were used to follow up this finding. A Bonferroni correction was applied and so all effects are reported at a 0.0167 level of significance. The proportion of non-core foods (56.0%) was significantly greater than the proportion of miscellaneous foods (25.9%) advertised, and was also significantly greater than the proportion of core foods (18.1%) advertised. The proportion of miscellaneous foods (25.9%) was significantly greater than the proportion of core foods (18.1%) advertised. Therefore, H3 is supported by these data.

Figure 6-6 Average (mean) proportion of core, non-core and miscellaneous food adverts broadcast during recording days on all channels monitored



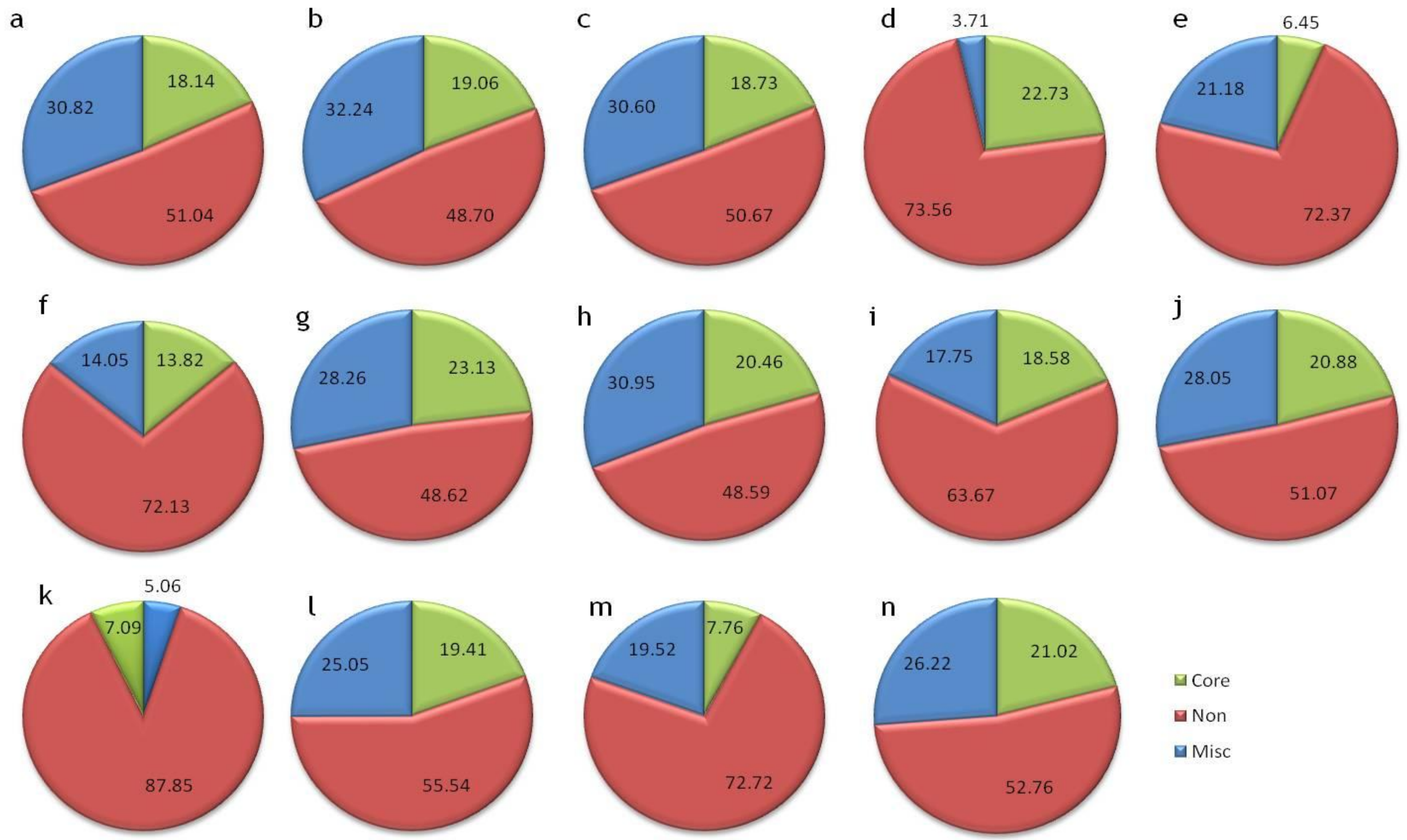
This pattern of the proportion non-core foods advertised > miscellaneous foods > core foods also held for ITV ($\chi^2(2) = 30.08$, $p < 0.001$), Channel Four ($\chi^2(2) = 24.33$, $p < 0.001$) and Channel Five ($\chi^2(2) = 18.75$, $p < 0.001$) (see Figure 6-7[a-c]).

For the majority of channels, the proportion of non-core foods was significantly greater than the proportion of both core foods and miscellaneous foods advertised but there was no significant difference between the proportion of miscellaneous foods and core foods advertised. This was true of (all $p < 0.001$, see Figure 6-7[d-m]):

- Cartoon Network ($\chi^2(2) = 18.99$)
- Jetix ($\chi^2(2) = 29.43$)
- CiTV ($\chi^2(2) = 22.11$)
- The Hits (4Music) ($\chi^2(2) = 17.33$)
- Smash Hits ($\chi^2(2) = 15.08$)
- MTV ($\chi^2(2) = 22.75$)
- Sky One ($\chi^2(2) = 14.33$)
- Sky Sports One ($\chi^2(2) = 29.20$)
- E4 ($\chi^2(2) = 29.25$)
- Boomerang ($\chi^2(2) = 15.61$).

However, for Nickelodeon only, there was no significant difference between the proportion of core, non-core or miscellaneous foods advertised ($\chi^2(2) = 7.04$, $p > 0.05$) (see Figure 6-7[n].

Figure 6-7 The average (mean) proportion of core, non-core and miscellaneous food adverts broadcast throughout a recording day on each individual channel monitored during the study period



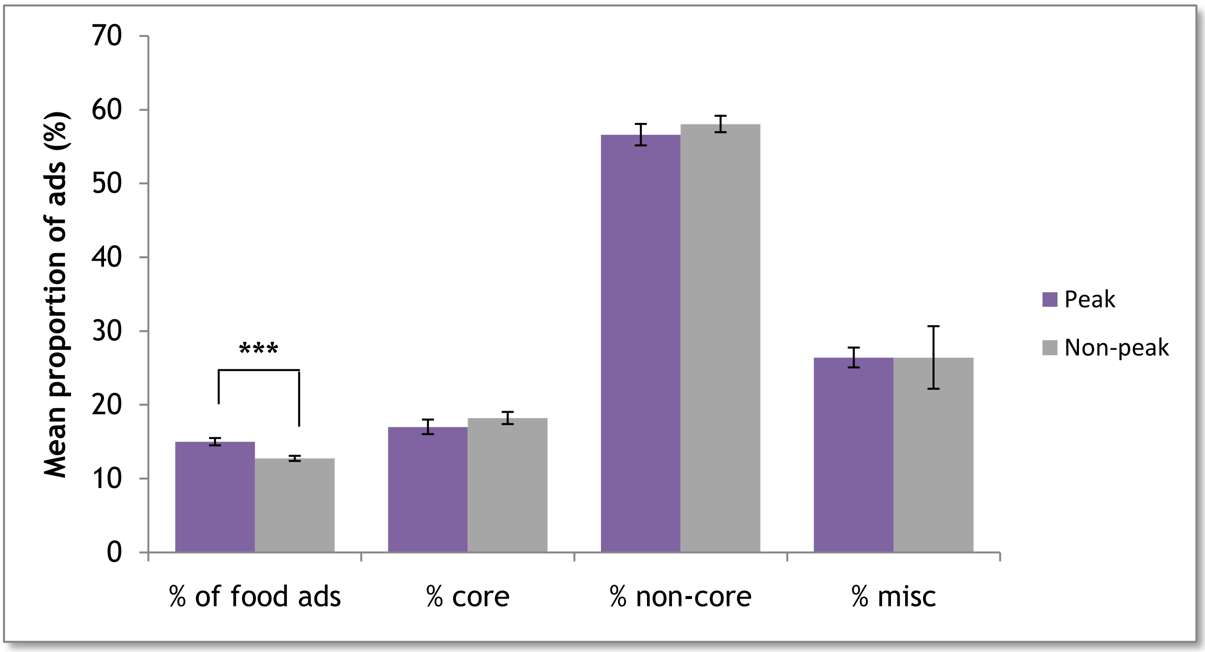
Note: (a) ITV, (b) Channel Four, (c) Channel Five, (d) Cartoon Network, (e) Jetix, (f) CiTV, (g) The Hits(4Music), (h) Smash Hits, (i) MTV, (j) Sky One, (k) Sky Sports One, (l) E4, (m) Boomerang, (n) Nickelodeon

<u>H4: There would be a difference in the balance of core versus non-core food advertising between peak and non-peak children's viewing times.</u>

A Wilcoxon Signed Rank test showed that overall there were a significantly greater proportion of adverts for food during peak compared to non-peak children's viewing times (15.0% v 12.7%; $p < 0.001$).

However, further Wilcoxon Signed Rank tests showed that the proportion of food advertising that was for non-core foods did not change between peak and non-peak children's viewing times ($p = 0.301$). The same is also true of core ($p = 0.874$) and miscellaneous food advertising ($p = 0.191$). Therefore, the balance of core, non-core and miscellaneous food advertising did not change between peak and non-peak children's viewing times (see Figure 6-8).

Figure 6-8 The proportion of adverts that were for food, and the proportion of food adverts specifically that were for core, non-core and miscellaneous food items between peak and non-peak children's viewing times during the entire study period across all channels monitored



As with the overall analysis, the same pattern held for a number of individual channels (greater proportion of food advertising during peak viewing period compared to non-peak, but no change in balance of core, non-core and miscellaneous foods represented) including ITV, Channel Five, Nickelodeon, and

E4 (a Bonferroni correction was applied, so significance is taken at the 0.01 level, see Table 6-3).

For several other channels, in contrast to the overall analysis, there was no significant difference in the proportion of adverts that were for food during peak compared to non-peak children's viewing periods, but again the balance of core, non-core and miscellaneous food advertising did not change between peak and non-peak viewing times. This was true of Channel Four, Cartoon Network, Jetix, The Hits (4Music), Smash Hits, MTV, Sky One, Sky Sports One, and Boomerang (a Bonferroni correction was applied and so all effects are reported at a 0.0167 level of significance).

For CiTV only, there was no significant difference between the proportion of adverts that were for food during peak compared to non-peak children's viewing periods, and no significant difference between peak and non-peak viewing times in terms of the proportion of food adverts that were for non-core foods or miscellaneous foods. However, the proportion of adverts that were for core foods was greater during non-peak than peak children's viewing time. Therefore, both overall and on an individual channel basis, H4 is not supported.

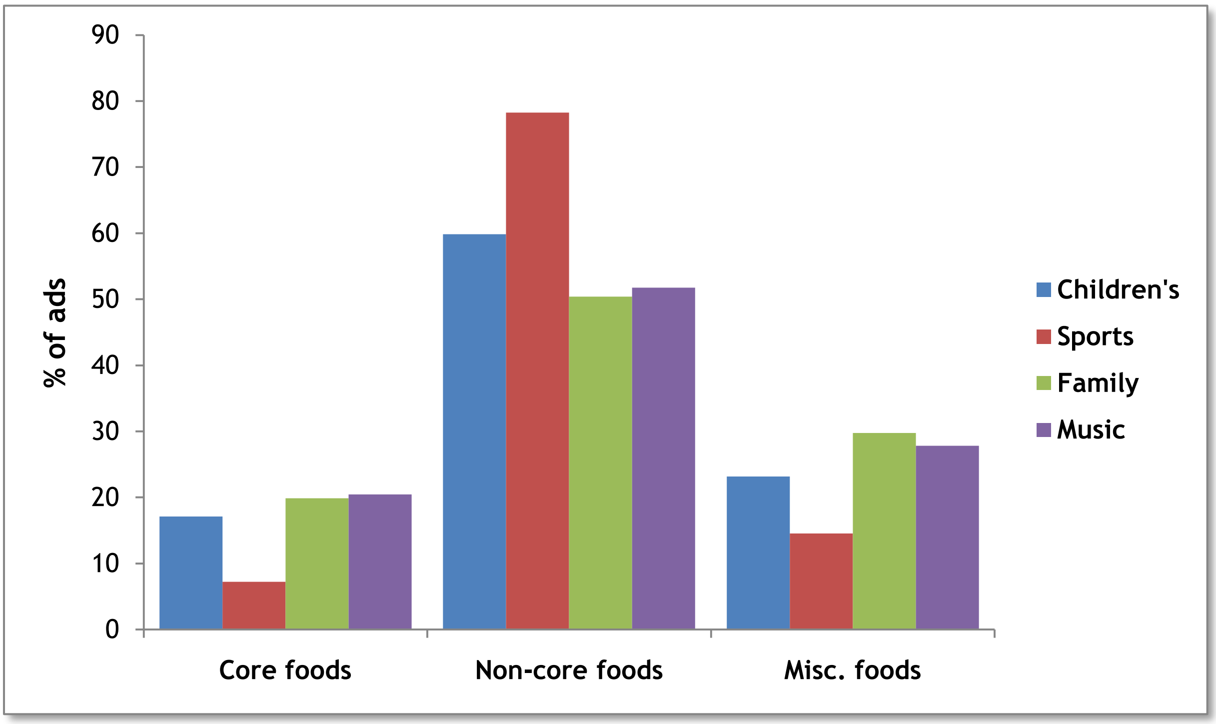
Table 6-3 The relative proportion of food advertising broadcast during peak and non-peak children's viewing periods across the entire study period for each individual channel monitored

Channel	Peak Food > Non-peak Food	Peak Core ≈ Non-peak Core	Peak Non-core ≈ Non-peak Non-c	Peak Misc ≈ Non-peak Misc
ITV	$p = 0.002$	$p = 0.943$	$p = 0.560$	$p = 0.850$
Channel Five	$p < 0.001$	$p = 0.426$	$p = 0.435$	$p = 0.950$
Nickelodeon	$p < 0.001$	$p = 0.441$	$p = 0.756$	$p = 0.257$
E4	$p = 0.002$	$p = 0.304$	$p = 0.149$	$p = 0.478$
	Peak Food ≈ Non-peak Food	**Peak Core ≈ Non-peak Core**	**Peak Non-core ≈ Non-peak Non-c**	**Peak Misc ≈ Non-peak Misc**
Channel Four	$p = 0.927$	$p = 0.435$	$p = 0.705$	$p = 0.422$
Cartoon Network	$p = 0.020$	$p = 0.900$	$p = 0.176$	$p = 0.050$
Jetix	$p = 0.950$	$p = 0.552$	$p = 0.633$	$p = 0.341$
The Hits (4Music)	$p = 0.622$	$p = 0.949$	$p = 0.964$	$p = 0.460$
Smash Hits	$p = 0.703$	$p = 0.852$	$p = 0.828$	$p = 0.850$
MTV	$p = 0.022$	$p = 0.763$	$p = 0.774$	$p = 0.402$
Sky One	$p = 0.028$	$p = 0.158$	$p = 0.098$	$p = 0.510$
Sky Sports One	$p = 0.134$	$p = 0.078$	$p = 0.389$	$p = 0.431$
Boomerang	$p = 0.014$	$p = 0.151$	$p = 0.442$	$p = 0.961$
	Peak Food ≈ Non-peak Food	**Peak Core < Non-peak Core**	**Peak Non-core ≈ Non-peak Non-c**	**Peak Misc ≈ Non-peak Misc**
CiTV	$p = 0.145$	$p = 0.004$	$p = 0.084$	$p = 0.313$

H5: Dedicated children's channels would broadcast a lower proportion of non-core food advertisements than other channel types (relating to the impact of restrictions).

A Kruskal-Wallis test demonstrated that the proportion of food adverts that were for non-core foods was significantly affected by channel type ($H(3) = 43.57$, $p < 0.001$) (see Figure 6-9). Mann-Whitney tests were used to follow up this finding. A Bonferroni correction was applied and so all effects are reported at a 0.008 level of significance. Overall, the sports channel (Sky Sports 1) broadcast the greatest proportion of non-core food adverts (78.3% of food adverts on this channel), significantly greater than children's channels (Boomerang, CiTV, Nickelodeon, Cartoon Network, Jetix; 59.8%), music channels (The Hits (4Music), Smash Hits and MTV; 51.8%) and family channels (ITV, Channel Four, Channel Five, Sky One and E4; 50.4%). However, the children's channels were also found to broadcast a significantly greater proportion of non-core food adverts than the family channels (59.8% v 50.4%; $p < 0.001$), and a greater proportion than the music channels although this difference was not significant ($p = 0.013$).

Figure 6-9 The average (mean) proportion of core, non-core and miscellaneous food advertisements broadcast during recording days on children's, sports, family and music channels throughout the entire study period



With regards to the advertising of core foods, a further Kruskal-Wallis test showed that this was also significantly affected by channel type (H(3) = 34.95, $p < 0.001$). Again, Mann-Whitney tests were used to follow up this finding. A Bonferroni correction was applied and so all effects are reported at a 0.008 level of significance. Music channels were found to broadcast the greatest proportion of core food adverts (20.4%), significantly greater than children's channels (17.1%; $p = 0.004$) or the sports channel (7.2%; $p < 0.001$). The family channels also broadcast a significantly greater proportion of food adverts for core foods (19.9%) than children's channels ($p = 0.001$) or the sports channel ($p < 0.001$). Children's channels broadcast a greater proportion of food adverts for core foods than the sports channel but this effect was not significant ($p = 0.031$).

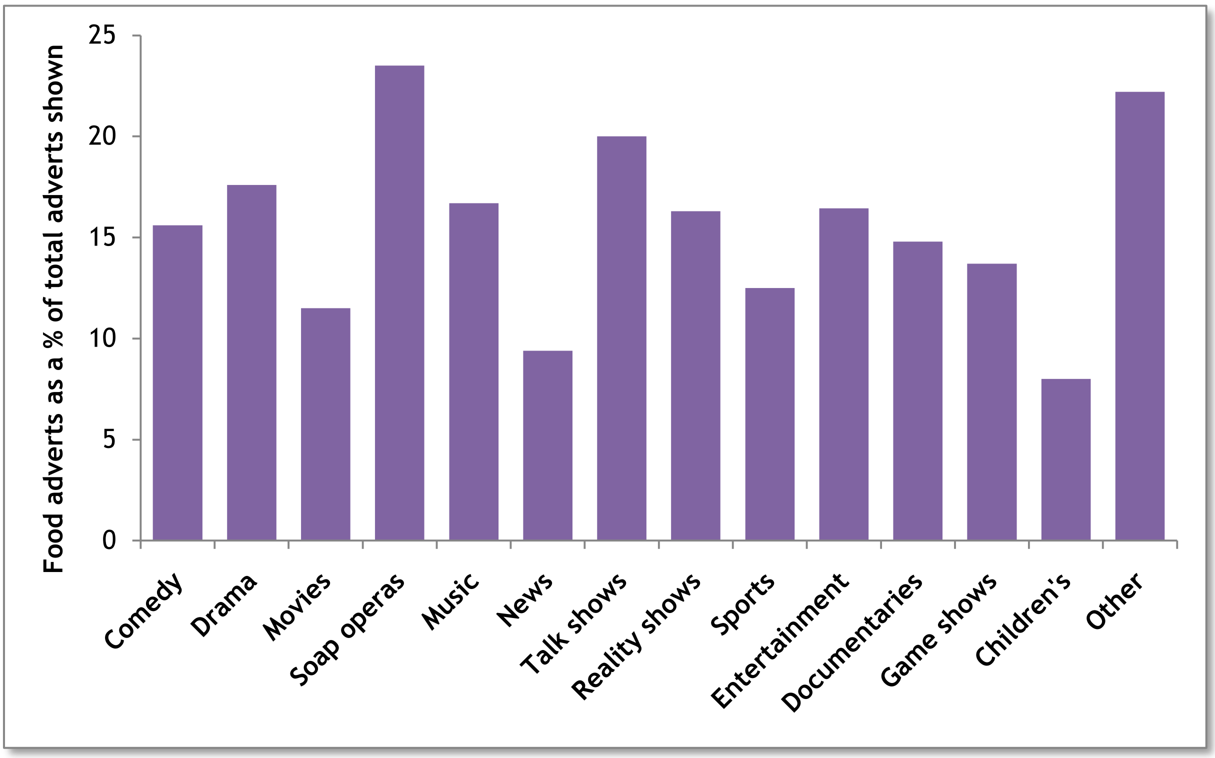
Regarding miscellaneous food adverts, a Kruskal-Wallis test showed that this was also significantly affected by channel type (H(3) = 29.36, $p < 0.001$). As previously, Mann-Whitney tests were used to follow up this finding and a Bonferroni correction was applied, so all effects are reported at a 0.008 level of significance. Family channels were found to broadcast the greatest proportion of miscellaneous food adverts (29.7%), significantly greater than children's channels (23.2%; $p < 0.001$) and the sports channel (14.5%; $p < 0.001$). Music channels also broadcast a significantly greater proportion of miscellaneous food adverts (27.8%) than the sports channel ($p < 0.001$).

Therefore, in support of H5, children's channels did broadcast a significantly lower proportion of non-core food adverts than the sports channel. However, in contrast to H5, children's channels actually broadcast a significantly greater proportion of non-core food adverts than the family channels. Children's channels also broadcast a greater proportion of non-core food adverts than the music channels but this difference was not statistically significant.

H6: There would be a greater proportion of food adverts around programmes aimed at general audiences (soap operas and entertainment shows specifically) than programmes aimed at children.

A Friedman's ANOVA demonstrated that there was a significant difference between soap operas, entertainment shows and children's programmes in terms of the proportions of adverts broadcast that were for food items ($\chi^2(2) = 21.778$, $p < 0.001$) (see Figure 6-10). Subsequent Wilcoxon Signed Rank tests showed that a significantly greater proportion of the adverts broadcast around soap operas were for food (25.4%) compared to around entertainment shows (19.7%; $p < 0.01$) and to around children's programmes (4.5%; $p < 0.001$). The proportion of adverts that were for food was significantly greater around entertainment shows compared to children's programmes (19.7% v 4.5%; $p < 0.001$).

Figure 6-10 The average (mean) proportion of advertisements that were for food broadcast around different programme types during all recording days across the entire study period for all channels monitored



The proportion of food adverts that were for core foods was not significantly different between soap operas (19.0%), entertainment shows (21.4%) and children's programmes (22.3%; $p = 0.799$). There was also no significant difference between the programme types in terms of the proportion of food adverts that were for non-core foods (56.4%, 47.6% and 53.0% respectively; $p = 0.721$) or miscellaneous foods (24.6%, 31.0% and 24.7% respectively, $p = 0.224$).

H6 is supported by these data, a greater proportion of the adverts are for food around general audience programmes (specifically soap operas and entertainment shows) than around children's programmes. The balance of core, non-core, miscellaneous foods was not different between the various programme types.

H7: The types of foods advertised would vary by month of recording, with a greater proportion of non-core foods during months containing school holidays (e.g. August and December).

Friedman's ANOVA showed that the total number of adverts broadcast (food and non-food) did not vary significantly by month ($\chi^2(11) = 3.955$, $p = 0.971$) (see Figure 6-11). Similarly, no effect of recording month was found for the total number of food adverts coded ($\chi^2(11) = 14.514$, $p = 0.206$) (see Figure 6-12) or for the proportion of adverts for food ($\chi^2(11) = 13.301$, $p = 0.274$) (see Figure 6-13).

Figure 6-11 The average (mean) number of advertisements (food and non-food) broadcast during recording days each month across the entire study period for all channels monitored

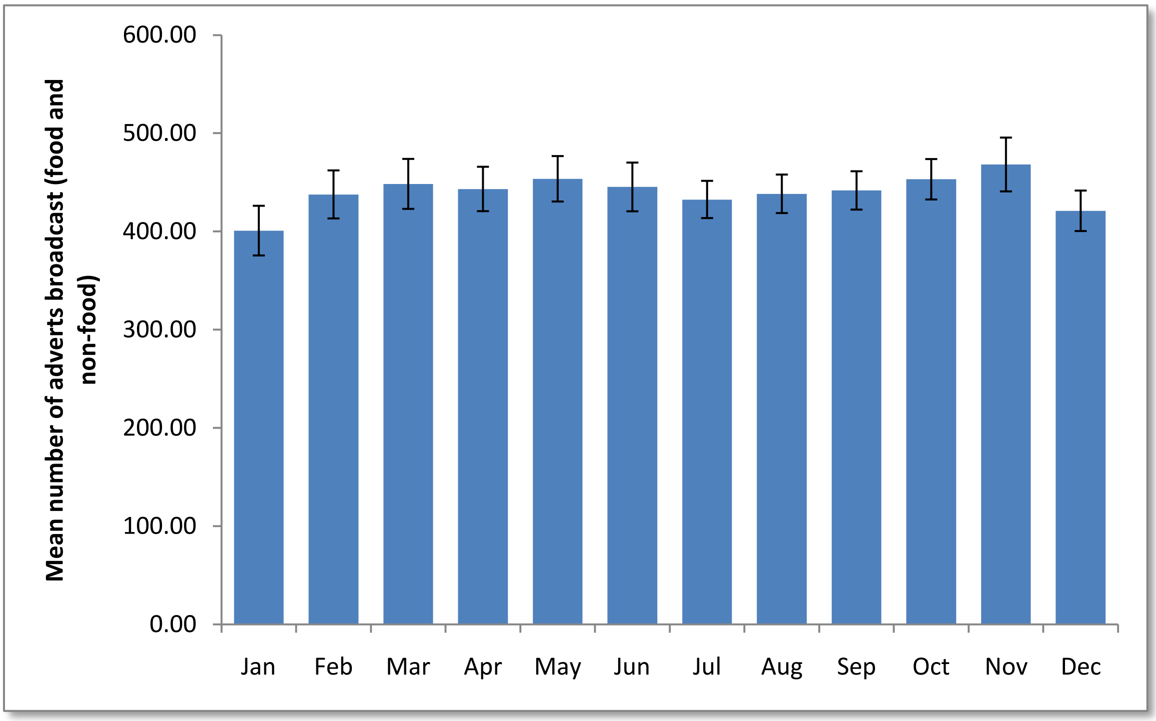


Figure 6-12 The average (mean) number of food advertisements broadcast during recording days each month across the entire study period for all channels monitored

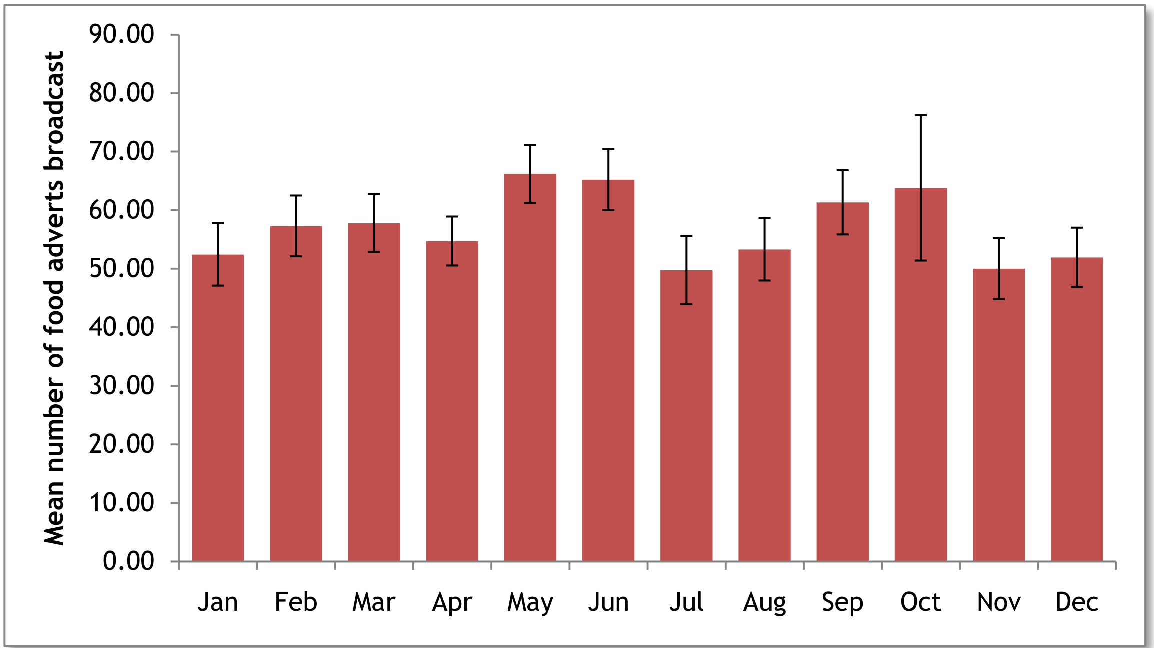
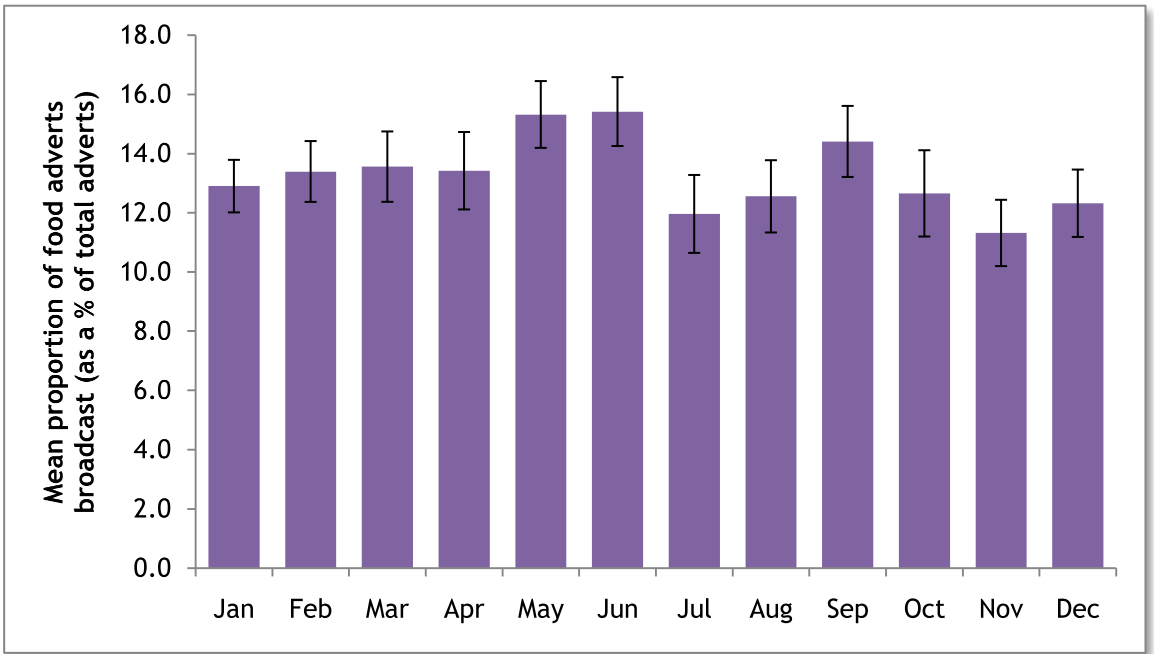


Figure 6-13 The average (mean) proportion of advertisements that were for food broadcast during recording days each month across the entire study period for all channels monitored



However, significant differences between recording months were found for the proportion of food adverts for core foods ($\chi^2(11) = 108.254$, $p < 0.001$), non-core foods ($\chi^2(11) = 85.484$, $p < 0.001$) and miscellaneous foods ($\chi^2(11) = 141.927$, $p < 0.001$) (see Figure 6-14).

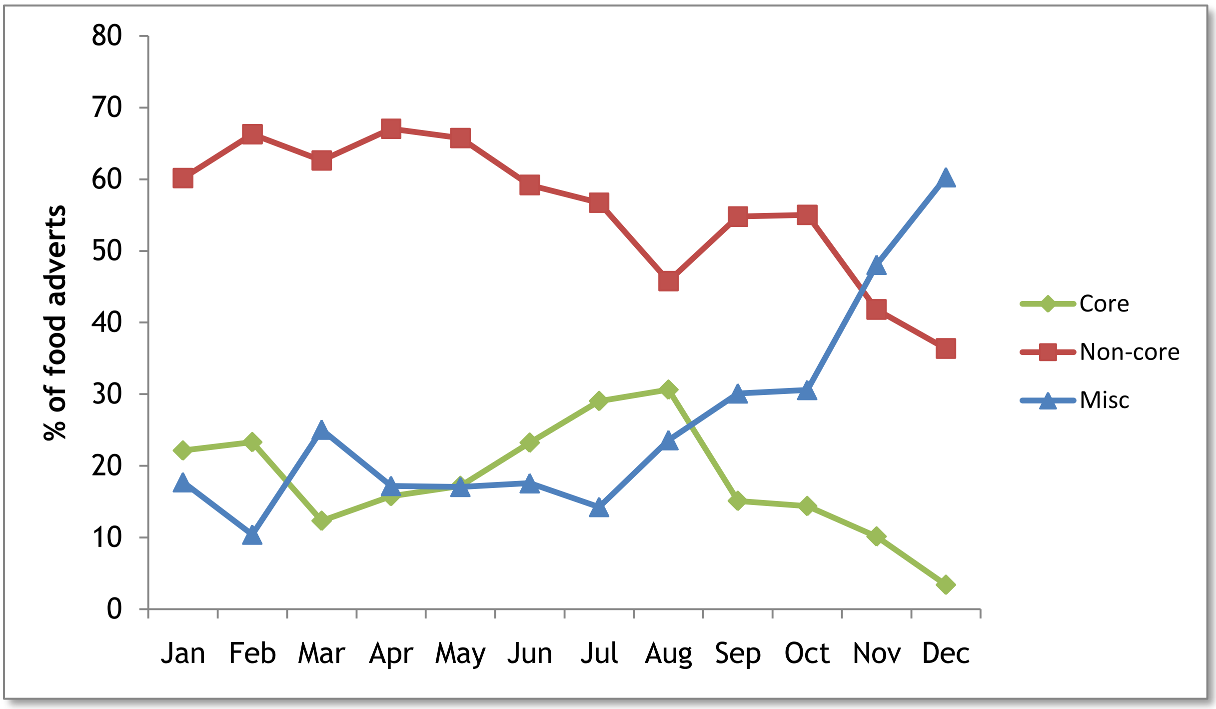
With significance taken at $p < 0.0167$ due to corrections, during January, a significantly greater proportion of food adverts were for non-core foods than core foods ($p < 0.001$) or miscellaneous foods ($p < 0.001$). The proportion of adverts for core and miscellaneous foods were not significantly different ($p = 0.080$). In February, again non-core foods comprised a significantly greater proportion of the food adverts than core foods ($p < 0.001$) or miscellaneous foods ($p < 0.001$), however there were also a significantly greater proportion of core foods than miscellaneous foods ($p < 0.001$). Regarding March, non-core foods again accounted for the majority of food adverts, significantly more than core foods ($p < 0.001$) and miscellaneous foods ($p < 0.001$). However, unlike January or February, miscellaneous foods were advertised significantly more than core foods ($p < 0.001$). April followed a similar pattern to January whereby a greater proportion of food adverts were for non-core foods than core foods ($p < 0.001$) or miscellaneous foods ($p < 0.001$) but core and miscellaneous foods were advertised a similar amount ($p = 0.501$). May also followed this pattern, non-core foods > core foods ($p < 0.001$), non-core foods > miscellaneous foods ($p < 0.001$) and core foods ≈ miscellaneous foods (p = 0.785). This was also true of June, non-core foods > core foods ($p < 0.001$), non-core foods > miscellaneous foods ($p < 0.001$), core foods ≈ miscellaneous foods (p = 0.113).

During July, again non-core foods comprised the greatest proportion of food adverts, significantly more than that of core foods ($p = 0.001$) and miscellaneous foods ($p < 0.001$). However, as with February, in July core foods accounted for a greater proportion of food adverts than miscellaneous foods ($p = 0.008$). In terms of August's broadcasting, for the first time non-core foods were not a greater proportion of the food advertising than core foods ($p = 0.027$) but were significantly more than miscellaneous foods ($p = 0.001$). Core foods did not comprise a greater proportion of food adverts than miscellaneous foods (p = 0.255). Recordings in September contained food advertising of which a majority represented non-core foods, significantly greater than miscellaneous foods ($p = 0.002$) and core foods ($p < 0.001$), with miscellaneous foods also comprising a greater proportion of food adverts than core foods ($p < 0.001$). This pattern was held for October, with non-core foods > miscellaneous foods ($p = 0.001$), non-core foods > core foods ($p < 0.001$) and miscellaneous > core foods ($p < 0.001$). In November, miscellaneous foods appeared to comprise a greater proportion of food adverts than non-core foods although this difference was not statistically significant ($p = 0.161$), both miscellaneous ($p < 0.001$) and non-core foods ($p < 0.001$) accounted for more food adverts than core foods. In December alone, miscellaneous foods comprised a greater proportion of food adverts than non-core foods ($p < 0.001$) and core foods ($p < 0.001$). Non-core foods were still advertised more than core foods in December ($p < 0.001$).

Therefore, H7 is partially supported as the types of foods advertised varied by month of recording. However, it was not the case that a greater proportion of non-core foods were advertised during months containing school holidays (notably August and December). On the contrary, the data show that non-core foods comprised a smaller proportion of the total food advertising during August, November and December than during the other 9 months studied.

The proportion of food advertisements representing miscellaneous foods increased noticeably from July onwards. This was suggestive of increased advertising of supermarkets in the months prior to Christmas, therefore this was investigated further. With significance taken at $p < 0.0167$ due to Bonferroni corrections, Kruskal-Wallis tests showed that the percentage of food adverts for supermarkets advertising core foods did not change across the recording months ($p = 0.044$), but the advertising of non-core ($p < 0.001$) and non-specific foods ($p < 0.001$) by supermarkets did alter significantly by month. Regarding supermarkets advertising non-core foods, between August and September only there was a significant increase (0.7% to 2.9%; $p = 0.012$). In terms of the advertising by supermarkets that did not feature a food item or was not clearly for core or non-core products, there was a significant increase between July and August (5.6% to 14.0%; $p = 0.004$) and October-November (17.4% to 34.8%; $p < 0.001$). The increase in advertising of miscellaneous foods between November and December (48.1% v 60.3%; $p = 0.002$) was not attributable to a significant increase in the advertising of any one product, but non-significant increases were seen in the proportion of tea/coffee (1.7% to 5.7%) adverts broadcast and adverts by supermarkets for non-core (6.6% to 11.0%) and core (4.5% v 8.2%) foods shown.

Figure 6-14 The average (mean) proportion of food advertisements that were for core, non-core and miscellaneous foods broadcast during recording days each month across the entire study period for all channels monitored



H8: Cable/satellite channels would show more advertising (food and non-food) than terrestrial channels.

Of the study sample, four channels were terrestrial (ITV, CiTV, Channel Four and Channel Five) providing 96 recordings days of television; the remaining 10 channels were cable/satellite access and provided 239 recording days. A Kruskal-Wallis test found that cable/satellite channels did show a higher mean number of total adverts (food and non-food) broadcast on a recording day than the terrestrial channels (466.0 v 376.3; $p < 0.001$). There was no difference between the cable/satellite and terrestrial channels in terms of the mean number of food adverts appearing on a recording day (59.1 v 56.2; p = 0.388). However, the advertising broadcast on terrestrial channels comprised a larger proportion of food adverts than the advertising on cable/satellite channels (14.7% v 12.7%; p = 0.002).

Looking at the balance of foods advertised, there was no difference between cable/satellite and terrestrial channels in the proportion of food adverts that were for core foods (18.3% v 17.7%; $p = 0.584$). With significance taken at $p < 0.0167$ due to corrections, there was also no significant difference between the two channel access types in the advertising of non-core foods (57.5% v 52.5%; $p = 0.031$). However, there was a significant difference in the advertising of miscellaneous foods, terrestrial channels' food advertising comprised a larger proportion of miscellaneous food adverts than cable/satellite channels (29.9% v 24.3%; $p = 0.005$).

These data support H8; cable/satellite channels did broadcast a greater number of adverts (food and non-food) than the terrestrial channels. No differences in the proportion of core, non-core or miscellaneous foods between cable/satellite and terrestrial channels were found.

6.3.2 Discussion relating to the extent of food advertising:

In this sample of 5233.5 hours of television, food was the third most heavily advertised product category accounting for 12.8% of total adverts. Of the 20 categories coded, only channel promotions and toys comprised a greater proportion of the broadcast advertising than food. However, this indicates a much lower prevalence of food advertising on UK television than some previous studies have found. In their sample of children's television Chestnutt & Ashraf (2002) found that 62.5% of advertising time was devoted to food, similarly Lewis & Hill (1998) reported that food adverts comprised 62.8% of the adverts in their study. The findings of the current study are more consistent with that of Morgan et al., (2009) who found that 16.4% of the advertising time in their 2006 sample was promoting food products; and the UK sample of the Kelly et al., (2010) study in which 15% of advertised products were foods. The inconsistency with the older studies may be attributable to differences in study design or the coding of variables, for instance examining 'advertising time' versus numbers of advertisements, or differences in what is categorised as a food product (e.g. whether or not beverages, or brand advertisements such as those for supermarkets where no foods are featured, are included). These differences may also reflect the proliferation of channels in recent years, providing marketers with greater choice and flexibility over their advertising strategy and placement of commercial messages, or simply an increased amount of non-food advertising.

Alternatively, these findings may partially reflect the impact of the Ofcom regulations, particularly on the food advertising taking place on dedicated children's channels. Certainly, examining the percentage of adverts that were for food on different channels did indicate that the children's channels typically had a lower proportion of food adverts than other channels. 5 of the 6 channels with the lowest prevalence of food advertising were dedicated children's channels, whereas the highest prevalence was seen on E4 and Channel Four, both family channels less affected by the regulations due to their popularity with adult viewers (Ofcom's scheduling restrictions being based on the proportion of children in the audience rather than number).

However, examining the mean *number* of food adverts broadcast on recording days, again the family channels E4, ITV, Sky One and Channel Four had the highest figures; but for this variable the children's channels were positioned 7th (Nickelodeon), 8th (Jetix), 10th (Cartoon Network), 11th (Boomerang) and 14th (CiTV) of the 14 channels studied. Therefore while the proportion of food advertising on children's channels was lower than other channel types, the actual number of food adverts shown in a 16 hour period was comparable with some family (e.g. Channel Five) and music channels (The Hits/4Music, Smash Hits). This indicates that on children's channels there was a substantial amount of non-food advertising, accounting for a considerable proportion of the advertising on those channels. Cartoon Network, Boomerang, Jetix and Nickelodeon were all amongst the top 5 channels in terms of the mean number of adverts (food and non-food) broadcast during the 16 hour samples coded, but as already stated, had amongst the lowest prevalence of food advertising. That CiTV did not feature in the upper end of this table is likely to reflect the reduced broadcasting hours of this channel as well as perhaps indicating that there was less commercial content broadcast. Given concerns about the impact of the food advertising regulations on the revenue of children's channels, these findings suggest that channel promotions and toy advertising now comprise much of the advertising on dedicated children's channels. This may form part of an overall marketing activity around children's programmes such as Ben 10 which have a commercial impact, generating considerable revenue for stakeholders from merchandising etc potentially to help offset reductions in food advertising funding.

However, if the overall impact of the Ofcom regulations was to simply increase the number of commercial messages children are exposed to so that the *proportion* of adverts for food rather than the *number* of food adverts was reduced this would be a concern. Nevertheless it must be taken into account that these recordings took place during the second phase of the implementation of the new rules, therefore the picture of advertising ascertained is likely to reflect a transitional phase prior to the removal of all HFSS advertising from dedicated children's channels (from January 2009) after which further research should be conducted. Previous studies of food advertising to children in the UK have focused on a single commercial channel, usually the main terrestrial channel that carries advertising, ITV (Sixsmith & Furnham, 2010; Chestnutt & Ashraf, 2002; Consumers International, 1996; Rodd & Patel, 2005). This is the first study to investigate food advertising across numerous channels that can be accessed via several platforms (terrestrial/free-to-air digital/subscriber-only satellite/cable) to better reflect the fragmented viewing patterns of young people (Ofcom, 2008) and to provide novel between-channel comparisons.

Due to the expected impact of restrictions specifically targeted at the HFSS food advertising on dedicated children's channels it was predicted that there would be a lower proportion of non-core food adverts on these channels compared to other channel types. However, these data showed that although lower than the sports channels and similar to that of the music channels, the prevalence of non-core food advertising was greater on children's channels than family channels. Conversely, children's channels broadcast a similar proportion of core food adverts to the sports channel, but significantly less than that of family and music channels. Therefore, of the channel types, children's channels were the second worst of four in terms of the balance of food types being promoted. Given that such channels were only permitted to broadcast HFSS advertising at a maximum of 50% of 2005 levels during the recording period and the known effects of such advertising on children's food choices and consumption (Halford et al., 2008a; Halford et al., 2007; Halford et al., 2008b; Halford et al., 2004), this is perhaps indicative of how far the advertised diet was from the recommended one in 2005, and therefore that the regulations were both necessary and justified. Nevertheless, these data also suggest that the food advertising on children's channels following full implementation of the rules in January 2009 is worthy of investigation to ensure that nutrient profiling is effectively screening out non-core products. Further, these findings indicate that there is still work to be done in terms of the balance of core and non-core food advertising on other channels also popular with children, notably Sky Sports One. Such a range of channels have never been included in content analyses of UK food advertising before, and the variation in these data across channels highlights the usefulness of studying several channels, and several genres of channel, as an accurate picture cannot be obtained by investigating a single channel.

In terms of reducing young people's exposure to food advertising, it is a concern that around one fifth of advertising on family channels such as E4 and Channel Four was devoted to food, particularly given that viewing patterns indicate that children and adolescents spend a majority of their television viewing time outside of dedicated children's programming (Ofcom, 2008). Furthermore, when the nature of the food products advertised is considered, while the percentage of advertising on television that is for food in this sample was lower than that recorded by some previous studies, the balance of healthy versus unhealthy food advertising was still emphatically weighted towards the latter despite the role of nutrient profiling in the advertising legislation. If the data are examined in terms of the categories of core, non-core and miscellaneous foods this clearly shows that the majority of food advertisements on UK television channels popular with children in 2008 were for energy-dense, HFSS foods. Despite regulatory reform purported to be designed to "change the balance of HFSS and non-HFSS foods advertising on television" (Ofcom, 2008), 56.0% of food adverts on the channels most popular with young people depict non-core products, with only 18.1% representing core, nutrient-dense items. Just over a quarter (25.9%) of food adverts were for miscellaneous food items, a vast majority of which were adverts for supermarkets of which some were promoting non-core products (4% of food adverts) in addition to a small percentage (2.7% of food adverts) for tea/coffee products. Although there was some variation between channels, for every channel except Nickelodeon, core items were either the least or the joint least (with miscellaneous items) advertised category of foods indicating that there is certainly no evidence from this sample that healthier dietary options are being emphasised by UK television food advertising.

Comparisons with previous studies regarding the balance of core and non-core foods advertised are problematic due to differences in study design, however the results of the UK sample of the study on which the current coding scheme is based (Kelly et al., 2010) found that 56% of foods advertised were non-core, 27.5% were core and 16.5% were miscellaneous food adverts. This indicates a very consistent level of non-core food advertising between the two studies (both 56%), but suggests that the advertising of core and miscellaneous food items is more variable, taking into account that the current study incorporates an additional 11 television channels above that of Kelly et al., (2010) and a substantially bigger sample size.

Based on the findings of Morgan et al., (2009) in which the amount of high sugar advertising varied between school holiday and non-holiday periods prior to Christmas, it was hypothesised that there would be a greater proportion of non-core foods advertised during months containing school holidays, notably August and December. No previous study has reported food advertising comparisons seasonally or across all 12 months of the year, so to address this is a novel aspect of the current study. Whilst the number of adverts, the number of food adverts, and the proportion of food adverts did not vary between recording months, the balance of core, non-core and miscellaneous foods advertised did change significantly over the course of the year. There was a notable increase in the advertising of miscellaneous foods from July onwards, mostly attributable to the increased promotion of non-core and non-specified foods by supermarkets in the build up towards the Christmas period as well as non-statistically significant increases in advertising of tea and coffee and core foods by supermarkets. There was also a slight shift in the balance of non-core towards core food marketing during the summer months (although non-core foods remained the majority), and a distinct dip in the promotion of non-core foods in both August and November/December (during the latter two months non-core foods were advertised less than miscellaneous foods). This is tentatively positive, suggesting that during school holiday periods, when children theoretically have more free time to watch television, the balance of food types depicted by television food advertising is marginally better than during school term time, although it should be taken into account that some of the miscellaneous advertising that is so dominant in November and December is supermarket promotion of non-core products.

The previous chapter of this thesis (Chapter Five) showed that children with access to cable/satellite television at home requested significantly more branded products and more products overall than children who could only access terrestrial channels. This effect is not explained by the findings of the current study, as although the cable/satellite channels studied did show a higher mean number of total adverts (food and non-food), the mean number of food adverts on recording days was not significantly different between the two types of channels, and the proportion of advertising that was for food was significantly greater on terrestrial compared to cable/satellite channels due to more miscellaneous food advertising. Therefore, this suggests that there may be other differences between terrestrial and cable/satellite channels in terms of children's brand exposure such as programme sponsorship or product placement. This is worthy of further investigation, particularly given that digital channels are permitted to show more advertising than terrestrial channels (Ofcom, 2008). This is the first study to have compared food advertising on terrestrial versus cable/satellite channels; therefore the data do not exist to discuss temporal trends. The current study provides a baseline against which future data can be compared.

Focusing on the individual food types advertised during the current study, although generic supermarket adverts comprised the greatest proportion of food advertisements, fast food was a close second, followed by breakfast cereals with low levels of fibre but high sugar content. Indeed, of the 10 most advertised food products, 6 were non-core foods (fast food, unhealthy breakfast cereals, chocolate/confectionery, high fat/sugar/salt spreads, alcohol and snack foods) with only one core food featuring in this list (low fat dairy). Lewis & Hill (1998) found that of the foods advertised in their sample, 60% were cereals and confectionery/savoury snacks. Combining the most similar food product categories from the current study (all breakfast cereals, chocolate/confectionery and snack foods) indicates that these items accounted for 25% of the food advertising within this sample. This lower figure may reflect the availability of an increased number of products types and therefore a greater range of food products being advertised, or perhaps the proliferation of supermarket advertising, which alone comprised 22.3% of the total food adverts in the current study but is barely mentioned in earlier studies aside from Kelly et al., (2010) who note that supermarket adverts are among the most likely 'food groups' to feature premium offers.

Despite evidence to suggest that advertising for healthier food choices has a positive effect on attitudes to and consumption of healthy foods (Dixon et al., 2007; Beaudoin et al., 2007), it appears that an opportunity is being missed to help improve the diet of UK children through the promotion of foods beneficial to health. Across all channels, adverts for fruit (including fruit products with no added sugar) and vegetables combined accounted for just 1.4% of all food advertisements, approximately 1/7th of that of fast food advertising alone. Given that neophobia is a considerable barrier to the acceptance of fruits and vegetables in young children (Falciglia et al., 2000), their increased promotion on television would contribute to greater familiarity of children with such products and therefore may assist to increase consumption of healthier food items. Establishing good dietary choices in young children is beneficial for their short- and long-term health, so augmenting the advertising of all core foods (but notably fruits and vegetables) on television could be a key factor in the effort to combat rising childhood obesity in the UK.

Examining the data by peak and non-peak children's viewing times revealed that overall the prevalence of food advertising (as a proportion of total advertising) was significantly greater during peak compared to non-peak viewing times. However, the balance of core, non-core and miscellaneous food advertising did not change significantly between the viewing times. For ITV, Channel Five and Nickelodeon, during viewing periods where large numbers of children are watching, the prevalence of food advertising was greater than at other times, and the food advertising emphasis was still towards the promotion of non-core foods. For the majority of channels (Channel Four, Cartoon Network, Jetix, The Hits/4Music, Smash Hits, MTV, Sky One, Sky Sports One, and Boomerang) neither the proportion of food advertising nor the balance of food types promoted changed between viewing periods, indicating that the regulations do not seem to be effective at identifying the programming in and around which food advertising rules should be applied in order to most effectively reduce children's exposure to HFSS advertising.

The current study examined the channels most popular with children, and at viewing times most popular with those children, the advertising of food was as, or more, prevalent than at other times and was similarly weighted towards the promotion of non-core foods with no apparent shift in emphasis towards healthier food options. Indeed for the one channel to show a difference in the balance of food types advertised during peak and non-peak periods (CiTV), the result was in a slightly less desirable direction, with core foods advertised more frequently during non-peak children's viewing periods. Previous studies have tended to focus entirely on dedicated children's programming or other programming occurring during children's airtime (i.e. after school and on Saturday mornings) (Lewis & Hill, 1998; Rodd & Patel, 2005) or have not conducted any comparisons based on children's viewing periods. Chestnutt & Ashraf (2002) did note that food advertising was more prevalent and promoted a greater proportion of foods detrimental to oral health during children's television than during primetime programming, but did not provide further details of the balance of food types advertised between the two periods. Kelly et al., (2010) found that the rate of advertising increased during children's peak viewing times (from 3 to 5 food adverts/hour/channel) in the UK (as well as Brazil, China and Germany), and furthermore that the proportion of all food advertisements that were for non-core foods also increased during peak children's viewing times (53.0% to 60.5%). Therefore the lack of a significant increase in non-core food advertising during peak children's viewing times in the current study is promising; this may be attributable to the adjustments made by dedicated children's channels during 2008 in order to comply with the phase 2 level of regulation and to anticipate the phase 3 implementation from January 2009. Further study of food advertising after this date is needed to determine if such trends continue in this direction.

The Ofcom regulations ban the advertising of HFSS foods in and around programmes of particular appeal to children, determined by the proportion of children in the audience as opposed to the actual number. Therefore, although soap operas and light entertainment shows have been shown to be amongst the most popular with young people (Which?, 2007b), the high adult viewing figures for such programming means that the restrictions do not typically apply. The data from the current study indicate that children viewing these types of programmes could still be exposed to a considerable amount of HFSS food advertising. A significantly greater proportion of the advertising in and around soap operas and entertainment programmes was devoted to food compared to children's programmes, and as found across the entire sample; the majority of the foods advertised were non-core. This is consistent with the findings of the UK sample of Kelly et al., (2010), the only other study to conduct analyses across programme genres, whereby soap operas and entertainment programmes both featured in the top 5 program categories with the highest proportion of food advertisements, whereas children's programmes did not. This provides encouraging indications regarding the impact of the regulations on dedicated children's programming but also suggests that children's viewing of programmes with more general appeal, such as entertainment programmes and soap operas, should be taken into account in the design of legislation to limit HFSS food advertising exposure in this age group.

6.3.3 Hypotheses relating to the nature of food advertising:

H9: Promotional characters (including celebrities) would feature on a significantly greater proportion of adverts for non-core foods than core foods.

Across all channels studied, a promotional character (a brand equity character such as Coco the Monkey advertising Kellogg's Cocopops, a licensed character such as Homer Simpson advertising Butterkist popcorn, or a celebrity endorser e.g. Jamie Oliver promoting Sainsbury's) was featured on a mean of 55.7% of food adverts. A Friedman's ANOVA showed that there was a significant difference between the use of promotional characters (including celebrities) to promote core, non-core and miscellaneous foods ($\chi^2(2) = 136.66$, $p < 0.001$). Subsequent Wilcoxon Signed Rank tests found that of the food adverts featuring promotional characters, significantly more were promoting non-core foods (54.8%) than core foods (20.9%; $p < 0.001$) or miscellaneous foods (24.2%; $p < 0.001$). The difference between the proportion of core and miscellaneous food adverts featuring promotional characters (20.9% v 24.2%) was not significant ($p = 0.251$) (see Figure 6-15). These data support the prediction made in H9.

Kruskal-Wallis tests demonstrated that there was also a significant difference between the use of promotional characters to promote core ($p = 0.001$), non-core ($p < 0.001$) and miscellaneous foods ($p < 0.001$) across different channel types. Of the food adverts featuring promotional characters, these adverts were more likely to be promoting core foods on children's channels (Boomerang, CiTV, Nickelodeon, Cartoon Network, Jetix) than on sports channels (Sky Sports One) (24.8% v 11.1%; $p = 0.001$) and, accordingly, were more likely to feature on non-core food adverts on sports channels than children's channels (77.5% v 61.8%; $p = 0.013$). Of the food adverts using promotional characters, there was no significant difference in the proportion that were for miscellaneous foods between children's and sports channels (13.3% v 11.4%; $p = 0.284$).

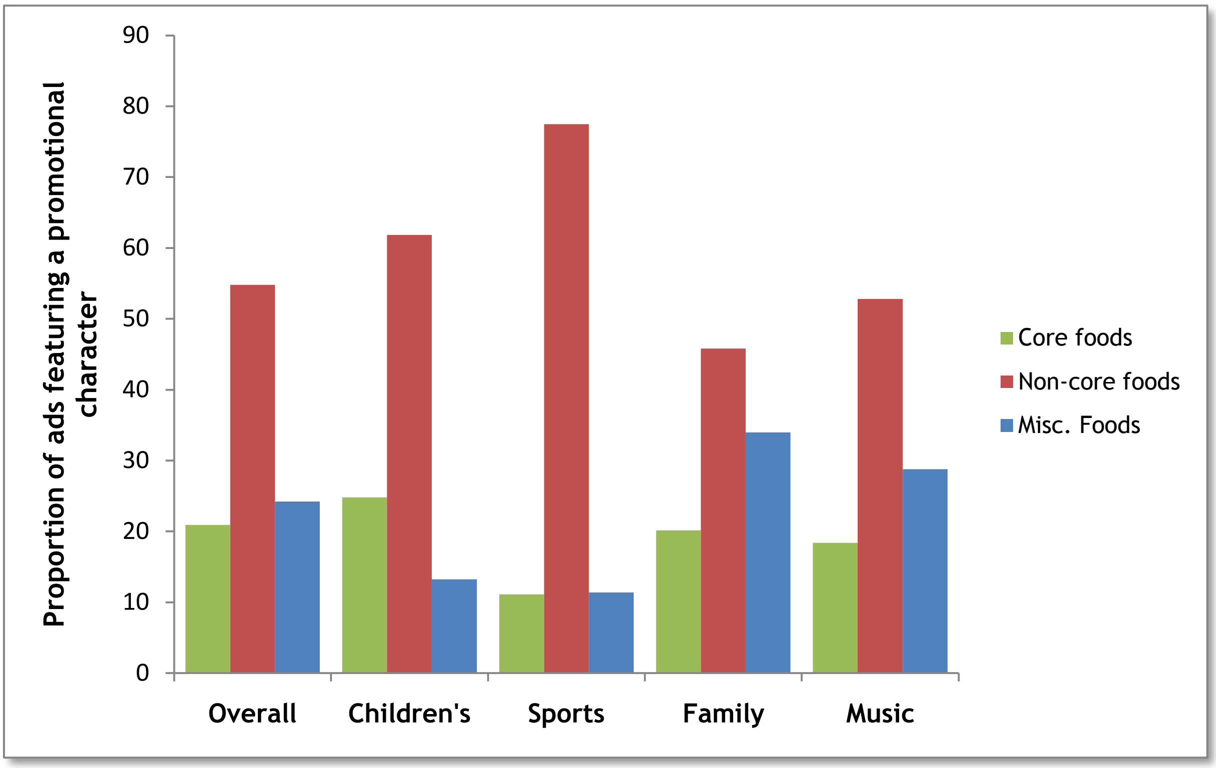
Further tests demonstrated that of the food adverts featuring promotional characters these were more likely to be for non-core foods on children's channels than on family channels (ITV, Channel Four, Channel Five, Sky One and E4) (61.8% v 45.8%; $p < 0.001$) but were more likely to feature on miscellaneous food adverts on family channels compared to children's channels (34.0% v 13.3%; $p < 0.001$). There was no significant difference in the proportion of core food adverts using promotional characters between children's and family channels (24.8% v 20.1%; p = 0.946).

It was also found that of the food adverts featuring promotional characters on music channels (The Hits (4Music), Smash Hits and MTV) these were more likely to be adverts promoting core foods than those using promotional characters on sports channels (18.4% v 11.1%; p = 0.011), with a similar finding regarding miscellaneous food adverts (28.8% v 11.4%; p = 0.006). Conversely, where promotional characters were used it was more likely to be for non-core foods on sports channels than music channels (77.5% v 52.8%; p = 0.003).

In addition, there was no significant difference between family and music channels in terms of the use of promotional characters to advertise core (20.1% v 18.4%; p = 0.043), non-core (45.8% v 52.8%; p = 0.101) and miscellaneous food items (34.0% v 28.8%; p = 0.051).

However, because the sample size of food adverts featuring promotional characters for sports channels (n = 18) was so much smaller than the sample size for children's channels (n = 116), family channels (n = 120) or music channels (n = 71), these results need to be interpreted with caution when making assumptions regarding the overall exposure to food adverts featuring promotional characters on these channel types.

Figure 6-15 The proportion of food adverts (as a % of those featuring a promotional character - brand equity/licensed character or celebrity endorser) promoting core, non-core and miscellaneous foods overall and by channel types across the entire study period



Therefore, these data appear to support H5 - promotional characters (including celebrities) did feature on a significantly greater proportion of adverts for non-core foods than core foods and there was some variation between channel types.

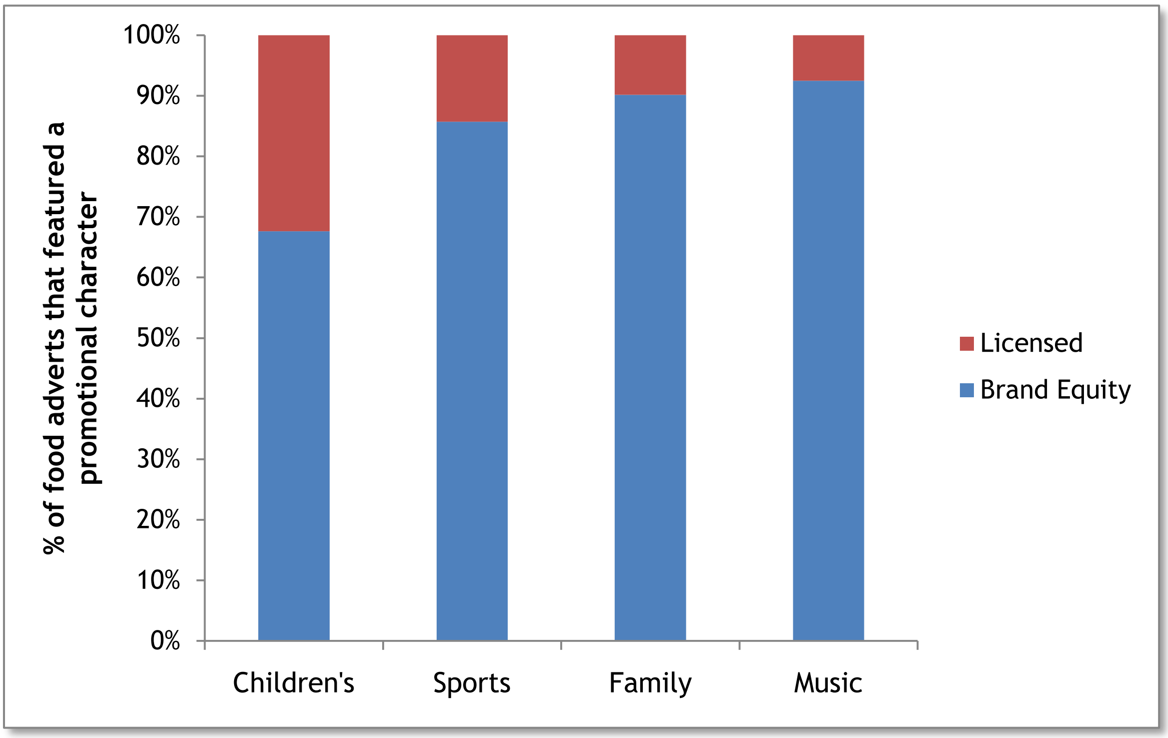
<u>H10: Brand equity characters would be used to advertise foods more frequently than licensed characters (relating to the impact of restrictions).</u>

A Friedman's ANOVA found that, of the food adverts featuring a promotional character, a significantly greater proportion used brand equity characters (e.g. Tony the Tiger promoting Kellogg's Frosties) than used licensed characters (e.g. Spiderman advertising Nesquik) to promote food products (81.4% v 18.6%; $\chi^2(1) = 145.510$, $p < 0.001$) (see Figure 6-16). This pattern held for all channel types, with brand equity characters featuring on a greater proportion of the food ads with promotional characters on children's channels (67.6% v 32.4%; $p < 0.001$), the sports channel (85.7% v 14.3%; $p = 0.004$), family channels (90.1% v 9.9%; $p <$

0.001) and music channels (92.5% v 7.5%; $p < 0.001$) than licensed characters. These data are in support of H10.

Furthermore, there were also differences between channel types in terms of the proportion of food adverts with promotional characters that featured brand equity and licensed characters i.e. the balance between the use of each type of character ($H(3) = 66.82$, $p < 0.001$). Brand equity characters (such as Snap, Crackle and Pop promoting Kellogg's Rice Krispies) were featured on the greatest proportion of the food adverts with promotional characters on the music channels (92.5%), this was not significantly greater than that of the family channels (90.1%; $p = 0.038$ with significance taken at $p < 0.025$ due to Bonferroni corrections) or the sports channel (85.7%; $p = 0.354$) but was significantly greater than that of the children's channels (67.6%; $p < 0.001$). Conversely, licensed characters (e.g. Bratz characters advertising Marks and Spencer's Milk Chocolate Lollipops) were featured on the greatest proportion of the food adverts with promotional characters on the children's channels (32.4%), significantly greater than that of the sports channel (14.3%; $p = 0.005$), family channels (9.9%; $p < 0.001$) or music channels (7.5%; $p < 0.001$).

Figure 6-16 The proportion of food adverts (as a % of those featuring a promotional character *not* including celebrity endorsers) using licensed versus brand equity characters to promote foods, across all recording days by each channel type across the entire study period



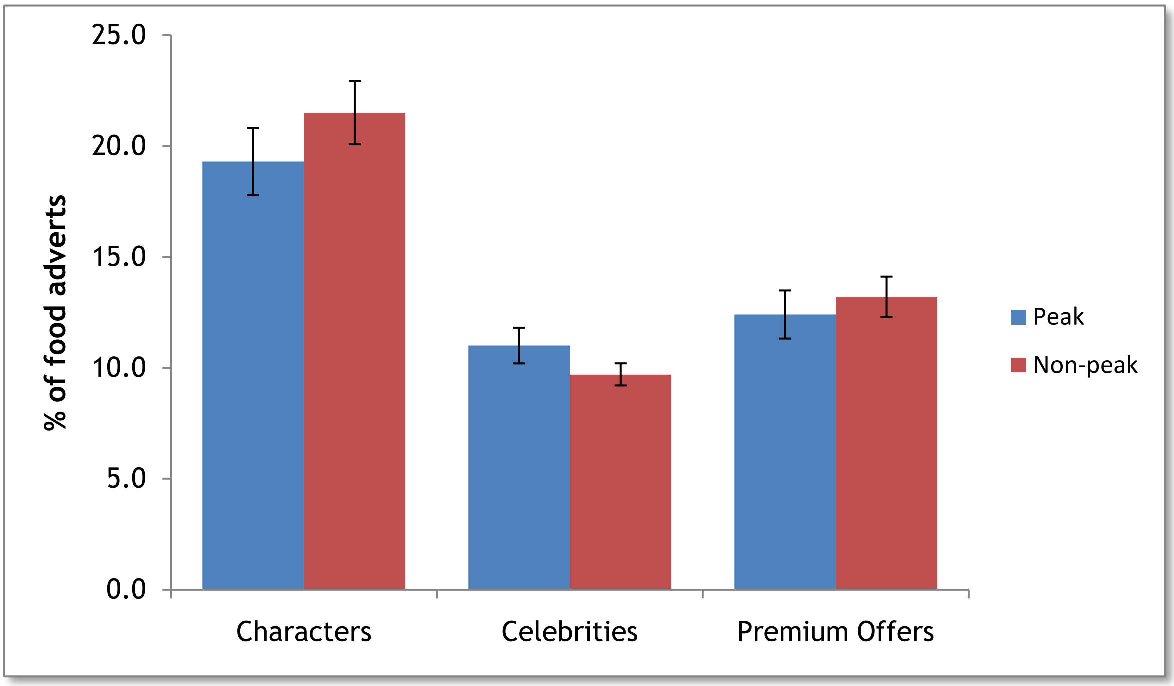
<u>H11: Brand equity/licensed characters, celebrities and premium offers would feature on a significantly greater proportion of adverts during peak children's viewing times than non-peak children's viewing times.</u>

Contrary to predictions, a Wilcoxon Signed Rank test found that overall, there were a significantly greater proportion of food adverts featuring brand equity (e.g. the Haribo boy promoting Haribo jelly sweets) or licensed characters (e.g. the penguin from Happy Feet advertising Nestlé Weetos) during non-peak compared to peak children's viewing periods (21.5% v 19.3%; p= 0.001)(see Figure 6-17). Further Wilcoxon tests were used on individual channels to follow up this finding. No significant difference in the proportion of food advertising featuring promotional characters between peak and non-peak viewing periods was found on these channels: ITV, CH4, CH5, Nickelodeon, Jetix, CITV, The Hits, Smash Hits, MTV, Sky One, Sky Sports One, E4, and Boomerang. On Cartoon Network only, the proportion of food adverts featuring a brand equity/licensed character was significantly higher during non-peak children's viewing periods than during peak viewing periods (59.3% v 38.9%; *p*= 0.001). The difference found for Cartoon Network drove the overall effect, which occurred in the opposite direction to that predicted by H11.

A Wilcoxon Signed Rank test showed there was no significant difference between the proportion of food adverts featuring celebrity endorsers (e.g. Steven Gerrard advertising Lucozade Sport) during peak and non peak children's viewing periods (11.0% v 9.7%; p = 0.883). As there was no significant difference, follow up tests were not carried out.

A further test found that there was no significant difference between the proportion of food adverts featuring premium offers during peak and non peak children's viewing periods (12.4% v 13.2%; p = 0.095). As there was no significant difference, follow up tests were not carried out.

Figure 6-17 The average (mean) proportion of advertisements that were for food which featured promotional characters (brand equity/licensed characters), celebrity endorsers and premium offers during peak and non-peak children's viewing periods across all channels monitored throughout the entire study period

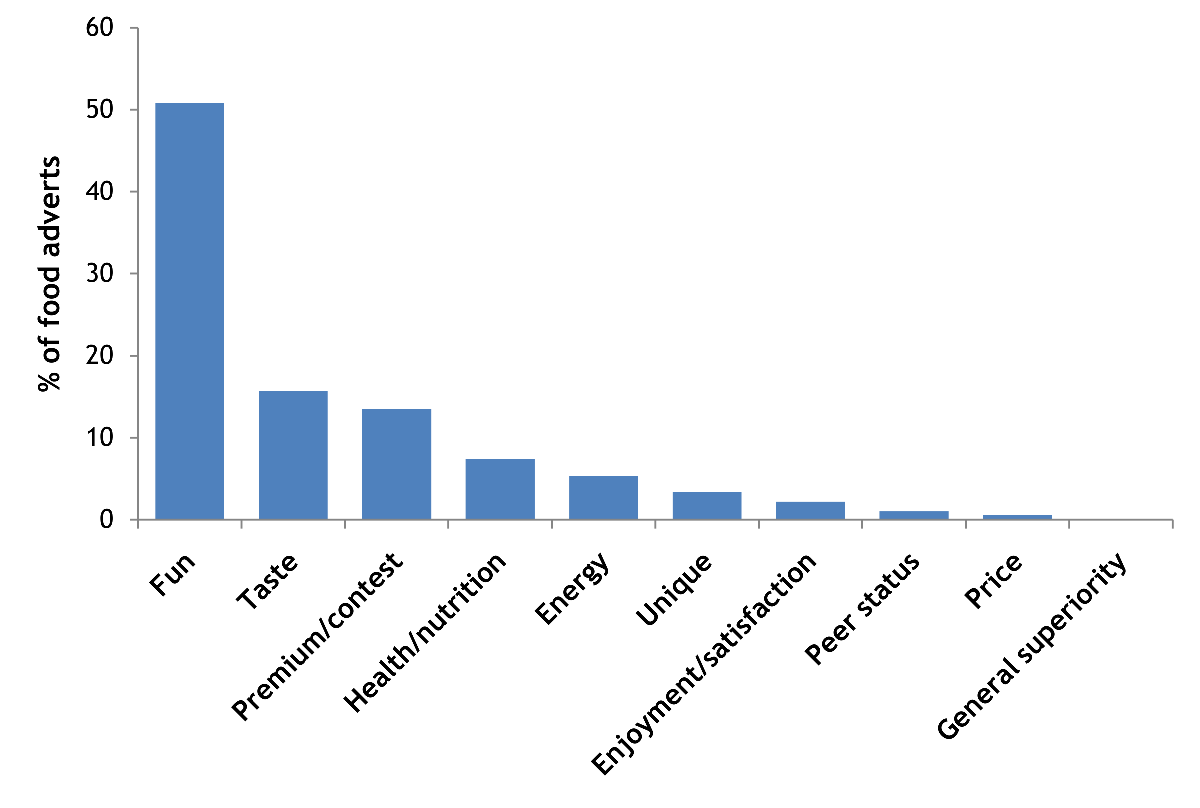


In summary, the proportion of food adverts featuring celebrity endorsers and premium offers were not significantly different between peak and non-peak children's viewing periods. Regarding the use of brand equity characters in food advertising, there was a significant difference between peak and non-peak viewing periods for Cartoon Network only. However, this difference was in the opposite direction to predictions – brand equity characters actually featured in a significantly greater proportion of food adverts during non-peak children's viewing times on this channel. Therefore H11 is not supported.

H12: Fun would be the most common persuasive appeal used to advertise foods to children.

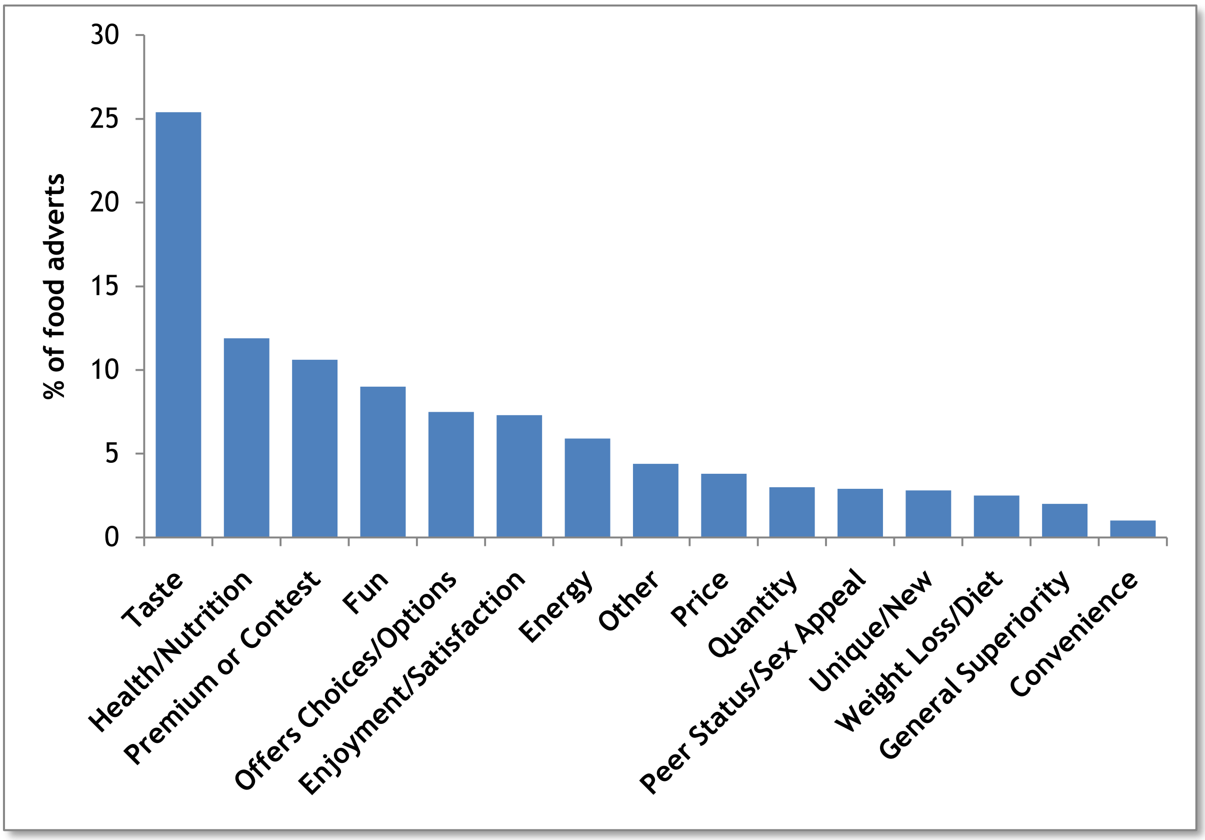
During the study period, a total of 4114 food adverts (21.8% of all food adverts) were considered to be aimed primarily at children. A Friedman's ANOVA showed that overall, there was a significant difference between the proportion of different persuasive appeals used in these adverts ($\chi^2(16) = 1808.60$, $p < 0.001$). Wilcoxon Signed Rank tests were used to follow up this finding. During the study period, 'fun' was the most commonly featured primary persuasive appeal, appearing in a significantly greater proportion of adverts than the seven other primary persuasive appeals used in adverts aimed at children, 'taste' ($p < 0.001$), 'health/nutrition' ($p < 0.001$), 'product uniqueness' ($p < 0.001$), 'energy' ($p < 0.001$), 'peer status' ($p < 0.001$), 'price' ($p < 0.001$) and 'general superiority' ($p < 0.001$) (see Figure 6-18).

Figure 6-18 The average (mean) proportion of each primary persuasive appeal used in food advertisements aimed at children across all channels monitored during the entire study period



A total of 2236 food adverts (11.8%) were considered to be primarily aimed at teens and adults. A further Friedman's ANOVA showed that overall, there was also a significant difference between the proportion of different persuasive appeals used in these food advertisements ($\chi^2(16) = 672.30$, $p < 0.001$). However, the primary persuasive appeals most commonly used to advertise foods to teens/adults were different from those used in adverts aimed at children. The most frequently used primary persuasive appeal in food adverts targeting teens/adults was 'taste' (25.4%), followed by 'health/nutrition' (11.9%) then the use of a 'premium/contest' (10.6%) (see Figure 6-19).

Figure 6-19 The average (mean) proportion of each primary persuasive appeal used in food advertisements aimed at teens/adults across all channels monitored during the entire study period

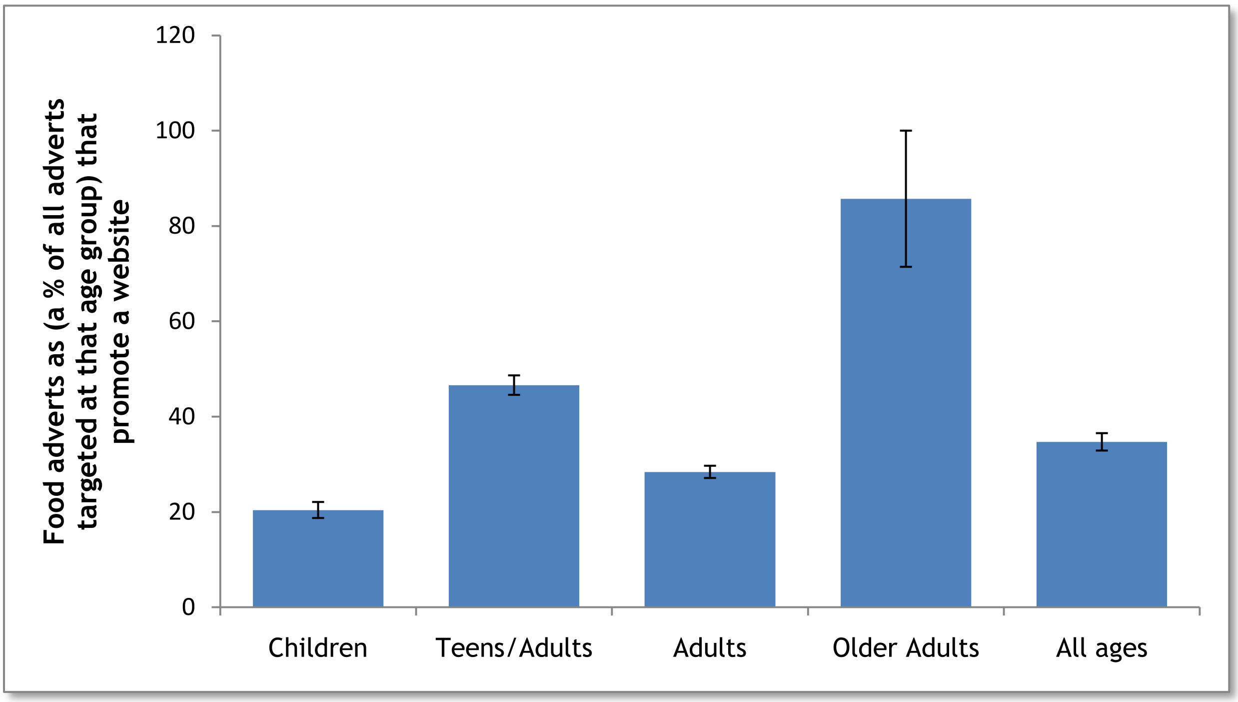


Therefore, H12 was supported by these data – fun was the most common persuasive appeal used to advertise foods to children, but not teens/adults where taste appeared to be considered a more important attribute of the food to emphasise.

<u>H13: A significantly greater proportion of food advertisements with children as the primary target would direct the viewer to websites compared to the adverts with other age groups as the primary target.</u>

Across the entire sample, a mean of 30.8% of food adverts promoted a website during the advertisement (see Figure 6-20). A Friedman's ANOVA found that there was no significant difference between the proportion of food adverts directing the viewer to a website when children were the primary target of the advert, compared to adverts aimed at other age groups ($\chi^2(4) = 7.971$, $p = 0.093$). Of the food adverts targeted at children, 20.4% directed the viewer to a website, for teens/adults this was 46.6%, for adults alone the figure was 28.4% and for food adverts targeted at 'all ages' 34.7% pushed a website address during the advertisement. For food adverts aimed at older adults 85.7% included a website address; however it should be taken into account that a mean of only 0.082% of food adverts were aimed specifically at this age group. As the analysis was non-significant, follow up tests were not performed.

Figure 6-20 The average (mean) proportion of advertisements that were for food aimed at each age group to promote a website during the advertisement, across all recording days of all channels monitored during the entire study period



Further tests examining the proportion of food adverts directing the viewer to a website showed no significant difference between peak and non-peak viewing periods ($\chi^2(1) = 0.299$, $p = 0.584$) or between adverts for core or non-core products ($\chi^2(1) = 0.649$, $p = 0.421$) so subsequent comparisons were not carried out for these variables.

These data do not support H13, the proportion of food adverts directing the viewer to a website did not vary according to the primary target of the advert, the type of food being advertised or the viewing period in which the advert was shown. However, the data do indicate the prevalence of such activity; a third of all food advertisements direct the viewer to a website during the advertisement.

6.3.4 Discussion relating to the nature of food advertising:

Given that a majority of food advertisements coded were for non-core foods, it is perhaps unsurprising that where promotional characters (referring to brand equity characters, licensed characters and celebrities in this context) were featured on food adverts; those adverts were significantly more likely to be for non-core foods than core or miscellaneous foods. On dedicated children's channels, of the adverts featuring promotional characters, over 60% of those were for non-core foods. This is comparable with the 65% reported by Kelly et al., (2010). On family channels this figure was close to 50% and was just over 50% for music channels. Only on the sports channel were a greater proportion of adverts featuring promotional characters representing non-core foods, although it should be taken into account that on Sky Sports One only 18 food adverts used such characters in their advertising. These data indicate that not only did non-core food advertising account for the majority of food advertising on the UK television channels most popular with children in 2008, but promotional characters, a marketing technique known to be liked by children (Ülger, 2009), and to increase both children's attention to (Wicks et al., 2009) and the persuasive power of food adverts (Batada & Borzekowski, 2008; Which?, 2005), were often used to promote these non-core food types.

The content rules state that licensed characters and celebrities popular with children may not be used in HFSS adverts targeted directly at pre-school or primary school children, yet the findings of the current study suggest that this leaves a significant opportunity for such persuasive techniques to be used to promote HFSS foods on channels popular with children provided that the advert is of more general appeal. This can occur regardless of the number of children being exposed to and persuaded by the commercial message to request or purchase HFSS foods. However, on children's channels, of the adverts featuring promotional characters approximately a quarter were promoting core foods (again, consistent with the 25% reported by Kelly et al., (2010)) which is encouraging given the (albeit limited) evidence that use of such characters can improve both the reported willingness to eat and the actual likelihood of consumption of healthier foods by children (Kotler, 2007). The current study is the first to examine the use of promotional characters in food advertising in a large sample size and across such a range of channels and, therefore, may be useful for policy discussions over the use of such techniques in promoting foods to children.

In addition to brand equity/licensed characters and celebrity endorsers, premium offers are also thought to increase the persuasive power of advertising (Hastings et al., 2003). It was predicted that all of these marketing techniques would feature on a greater proportion of food adverts during peak children's viewing periods so that promotional campaigns could maximise their impact on young viewers. However, it was found that on the vast majority of channels there was no difference in the frequency of use of brand equity/licensed characters between the two viewing periods. Only on Cartoon Network was there a difference, but in the opposite direction to that predicted as 20% more food adverts featured brand equity/licensed characters during non-peak compared to peak children's viewing periods. Furthermore, there were no significant differences between the proportion of food adverts featuring celebrity endorsers or premium offers between peak and non-peak viewing periods. These two techniques each featured on approximately 10-15% of food adverts, whereas brand equity/licensed characters were more prevalent, featuring on approximately 20% of food advertisements on these channels. The data were not collated in such a way to enable the full degree of overlap between all of these techniques to be assessed, nevertheless it does not appear that adverts using these techniques are targeted at young people in the sense that they are preferentially scheduled during periods with large numbers of child viewers.

However the data also show that the Ofcom regulations do not appear to have quashed the use of persuasive techniques known to appeal to children to promote HFSS foods on the television channels most popular with young people in the UK. As referred to previously, the regulations are very specific to restrict the use of 'celebrities *of particular appeal* to children' and to ban the use of promotional offers 'in HFSS product advertisements targeted *directly* at pre-school or primary school children' (Ofcom, 2007a), which permits the continued use of celebrities with general appeal (such as Gary Lineker's promotion of Walker's Crisps) and the use of promotional offers in HFSS food adverts aimed at a more general audience. Further research is necessary to determine the effect of celebrities on product choice to build upon the work of Ross et al., (1984), and the Kaiser Family

Foundation (Gantz et al., 2007), and more specifically to elucidate if there are any differences in children's responses to celebrities of particular appeal to their age group versus celebrities of more general appeal so that the appropriateness of discriminating between the two in a regulatory sense can be assessed. Additionally, although the food adverts may not be specifically aimed at children, it is clear that on the UK television channels most popular with children, premium offers continue to be used to promote HFSS products.

Again referring to the specifics of the regulations, licensed characters are not permitted to be used for HFSS advertisements targeted at pre-school or primary school children but this prohibition does not apply to brand equity characters. Ofcom's justification of this distinction was that a ban on brand equity characters would 'impair the value of the brand far more' (Ofcom, 2007a). However, there is no research evidence to suggest that brand equity characters are less persuasive in their promotion of HFSS foods than licensed characters. The findings of Chapter Four of this thesis certainly suggest that children typically have a high level of awareness of brand equity characters and the products they promote, and data from the current study provide some explanation for this, although more research is required to elucidate the effects of brand equity characters on food preference and choice.

Across all channels combined, of the food adverts featuring a promotional character, over 80% incorporated a brand equity character and less than 20% used a licensed character. Brand equity characters featured on the greatest proportion of the food adverts using promotional characters on the music channels, followed by the family channels and the sports channel. These channel types are likely to be broadcasting fewer programmes whereby the proportion of children in the viewing audience reaches the critical value for the BARB 120 index to be triggered (the method used to calculate programmes of particular appeal to children as part of the regulatory system). Therefore despite being popular with young people, the additional appeal of their programming to adults ensures that the impact of the restrictions is not felt as strongly, and brand equity characters are able to advertise HFSS foods on these channels to an audience including a sizeable number of children and young people. Furthermore, of the adverts featuring a promotional character on dedicated children's channels, a third used a licensed character. As the use of such characters to promote HFSS foods is banned by the regulations, it has to be assumed that all foods promoted by licensed characters on the children's channels were core items (although the data do not exist in a form to allow this to be ascertained beyond the statement that only 24.8% of adverts featuring either brand equity or licensed characters were for core foods on these channels). The relative proportion of food adverts featuring brand equity versus licensed characters has never been examined before in any content analyses, and as such these novel data may be useful alongside experimental evidence of the effects of such marketing techniques in future policy deliberations.

Previous studies have shown that fun and fantasy are frequently used to advertise food to children (Lewis & Hill, 1998; Hastings et al., 2003), and the current study findings are consistent with this. Fun was the most used primary persuasive appeal in food adverts aimed at children, significantly greater than the next most common appeal, taste, and subsequently health/nutrition. Marketing strategies that encourage children to enjoy and engage with the advertisements are likely to have persuasive power (Hastings et al., 2003), although further research is necessary to establish to what extent the various appeals or themes differ in their persuasiveness. Food adverts aimed at teenagers and adults are more likely to emphasise the taste of the product, health/nutrition and the use of premiums/contests. This concurs with the findings of Priya et al., (2010) to suggest that younger children's attitudes towards adverts are based primarily on entertainment and brand icons, whereas aspiration and credibility were paramount in the attitude formation of older children. This work could be informative to identify which type of persuasive appeal would be most useful for health promotion strategies to encourage children to adopt healthier dietary choices.

Just 20.4% of food adverts judged to be aimed at children directed the viewer to a website, compared to 46.6% of the food adverts aimed at teens/adults and 28.4% of those targeting a broad age range of individuals, although these differences were not statistically significant. There were no significant differences in the proportion of food adverts directing viewers to a website between peak and non-peak viewing periods or between food adverts for core and non-core products. However, across all food adverts a third directed the viewer to a website during the advertisement suggesting that manufacturers and advertisers place value in the additional brand exposure a viewer (particularly teens and adults) would experience were they to visit the brand or product website following the television food advert. As children spend increasing amounts of time on the internet, it was expected that they would be particularly targeted by website promotion during television food advertisements. However, for advertising to all consumers, from a marketer's perspective the internet has many advantages over television not least regarding cost-effectiveness and audience tracking capabilities (Moore, 2006). Online content requires attention to be focused, and whilst looking at online content young people's engrossment in particular can be captured and maintained for extended periods of time (Kelly, Bochynska, Kornman, & Chapman, 2008). In addition, internet advertising is not based on passive exposure as with television, individuals must actively seek the online content they require (Moore & Rideout, 2007) and therefore whilst activity searching they are engaging with the media. Furthermore, the internet offers opportunities for advertisers to interact with consumers (Moore & Rideout, 2007) to generate engagement and interest in food promotion activities. As internet-based food advertising develops as a medium, trends in the promotion of food brand websites during television advertising should be monitored.

6.4 Final discussion

A key strength of the current study is the sample size of television studied. The largest previous study in the UK examined 503 hours of television (Morgan et al., 2009), this study assesses over 5,200 hours and therefore is the most comprehensive study ever conducted of food advertising on the UK television channels most popular with children. A further strength is in the use of inferential statistics to investigate both the extent and nature of foods advertised on 14 terrestrial and cable/satellite channels, providing a thorough and systematic analysis of food advertising along a number of dimensions pertinent to their likely persuasive effect and children's level of exposure.

The findings must be considered in the context of the level of television food advertising regulation in place at the time of data collection. Recording for this study took place throughout 2008 (during phase 2 of the regulations when HFSS adverts were not permitted in or around programmes likely to be of particular appeal to children aged 4 – 15 years, and dedicated children's channels were required to scale back all HFSS advertising to 50% of 2005 levels (Ofcom, 2007a)). There is some evidence that the television food advertising landscape is improving, with a lower prevalence of food advertising than previous studies have found. However, it must be taken into account that between-study differences could be as much an artefact of variations in study design and television sample as an indication of changes in television food advertising patterns over time. Without baseline data of similar structure and magnitude as the current study, trends must be interpreted with caution. However, the current findings do provide a baseline against which future changes can and should be measured. Of particular use will be a re-examination of the channels studied following full implementation of the food advertising regulations from January 2009 to evaluate the impact of the full regulations, as part of on-going systematic monitoring of the foods advertised to children on television.

The findings of this study indicate that whilst the overall prevalence of food advertising on television appears to have reduced since the work of Lewis & Hill (1998), the balance of food advertising is still heavily weighted towards the promotion of unhealthy foods on all channels, including those specifically targeting a child audience. 6 of the 10 most heavily advertised products were non-core items (fast food, unhealthy breakfast cereals, chocolate/confectionery, HFSS spreads, alcohol and snack foods) with just 1.4% of food advertisements devoted to fruit and vegetables. Furthermore, there is some evidence that the proportion of food adverts broadcast is actually higher during periods where large numbers of children are watching compared to periods with low viewers. Given that children's viewing patterns indicate that a majority of their viewing is outside of dedicated children's programming, with family viewing such as entertainment programmes and soap operas, it is a concern that a significantly greater proportion of advertising around such programmes is for food compared to during children's airtime.

The current study provides the most thorough indication of the nature of television food advertising to children on UK television, with analysis showing that promotional characters (brand equity/licensed characters and celebrities) were significantly more likely to promote non-core than core foods. Brand equity characters (not prohibited by the Ofcom regulations) were significantly more prevalent than licensed characters (prohibited by the Ofcom regulations), with celebrity endorsers and premium offers also appearing in 10-15% of food adverts across all channels. Food adverts aimed at children preferentially use the persuasive appeal of fun to engage children with advertising for foods (including

HFSS items), whereas food advertising to teenagers and adults emphasises the taste of products as a primary theme. Website addresses were promoted in just over 30% of all food adverts, although teenagers and adults were targeted with this more often than children. There are significant gaps in the literature regarding the relative effects of these aspects of food advert content. The current study presents the clearest picture to date of both the extent and nature of UK television food advertising on the channels most popular with children. This work provides a benchmark against which future changes in food advertising prevalence can be measured to monitor children's overall exposure to commercial food promotion messages, but may also focus research attention on the marketing techniques that may determine the effectiveness of this advertising at persuading children to prefer, request, and consume HFSS foods. Increased understanding of the mechanism behind this persuasion may assist with reducing the detrimental effects of HFSS food advertising on children's diets and overall health, as well as informing health promotion strategies to encourage healthier dietary choices during childhood.

6.4.1 Summary

- Food was the third most heavily advertised product on UK television (12.8% of all adverts), behind channel promotions and toys.
- A majority of the foods advertised (56.0%) were unhealthy/non-core foods, with 25.9% of food adverts for miscellaneous foods and 18.1% for healthy/core items.
- Generic supermarket adverts (12.3%) were the most frequent food adverts, followed by fast food (11.9%) and high sugar/low fibre breakfast cereals (9.4%).
- Fruit/fruit products without added sugar and vegetables combined only comprised 1.4% of food advertising.
- There were a significantly greater proportion of adverts for food during peak compared to non-peak children's viewing periods, but the balance of non-core/core/miscellaneous did not change between the viewing times.
- Children's channels broadcast a greater proportion of non-core foods than the family channels overall.
- Food advertising is more prevalent in and around programmes popular with young people, specifically soap operas and entertainment programmes, than dedicated children's programming.

- The balance of core, non-core and miscellaneous food adverts was affected by recording month but not the prevalence of food advertising overall.
- Cable/satellite channels broadcast a higher mean number of adverts (food and non-food) than terrestrial channels, but a lower percentage of food adverts.
- Promotional characters were used to promote non-core foods (54.8%) more frequently than core foods (20.9%) or miscellaneous foods (24.2%), particularly on children's channels and the sports channel.
- Brand equity characters were used significantly more often than licensed characters to promote foods, although licensed characters featured on the greatest proportion of the food adverts with promotional characters on the children's channels.
- Brand equity and licensed characters were more prevalent in food advertising during non-peak compared to peak children's viewing periods on Cartoon Network only.
- In food adverts aimed at children, the most common primary persuasive appeals used were fun, taste, and health/nutrition. In food adverts aimed at teenagers/adults, the most common appeals were taste, health/nutrition and the use of a premium/contest.
- A mean of 30.8% of food adverts promoted a website during the advertisement.

Chapter Seven

7. Synthesis of research findings

This thesis examined the short-term effects of television food advertising exposure on children's food preferences and choices, and investigated if there was a relationship between relative advertisement exposure and brand requests, awareness of brand equity characters (and the products they promote), weight status and food preferences in children. The current food advertising landscape on UK television was also examined, to provide the most extensive and detailed study to date of the nature and extent of food advertising broadcast following the introduction of regulations to limit children's exposure to commercial food promotion in the UK.

The key findings of the experimental work described in chapters 3-6 of this thesis are shown in Table 7-1. These findings can be divided into four related areas: The effects of acute, experimental food advertising exposure; the effects of habitual food advertising exposure; the extent of food advertising on UK television; and the nature of food advertising on UK television. This chapter collates the research findings into these categories, and describes how the original contributions that arise from this thesis integrate with the literature to aid our understanding of the phenomena under investigation. Consideration is given to the limitations of the current work and the potential for future research in these important areas.

7.1 Effects of acute, experimental food advertising exposure

7.1.1 Food preferences

One aim of this thesis was to assess the effects of acute, experimental advertising exposure on children's branded and non-branded food preferences. Chapter 3 describes the findings that address this aim, whereby all children selected more branded and non-branded foods from the food preference measures following exposure to 10 food advertisements compared to their selections following 10 toy adverts. Specifically, children increased their selection of branded and non-branded high fat and high carbohydrate foods following food advert exposure, increases in the mean selection of high protein and low energy density foods were not statistically significant. These findings are consistent with those of previous studies looking at food preferences (Halford et al., 2008a; Gorn & Goldberg, 1980; Gorn & Goldberg, 1982) and actual food intake (Halford et al., 2007; Halford et al., 2008b; Halford et al., 2004).

Table 7-1 A summary of the experimental findings of this thesis

Study	Participants	Design & Measures	Outcomes
Chapter 3: An experimental study of the effect of television food advertising on food preferences and choice in children of differing weight status	281 children 6-13y (mean 9.5y) 146 m, 135 f BMI 12.3 – 27.0 (mean 17.9 kg/m^2) 208 NW, 69 OW/OB 139 high TV viewers (>21 hrs/wk), 142 low TV viewers	Mixed measures 2*2 Design, parametric analysis Within subjects factor: 2 levels of advertisement exposure (toy or food adverts) Between subjects factors: 2 levels of weight status (NW or OW/OB) or TV viewing (high or low) Also correlations with BMI SDS	↑ selection of branded fat and branded CHO items after food advertisements No effects of weight status In food advert condition, high TV viewers ↑ selection of branded foods relative to low TV viewers More food adverts correctly recognised than toy adverts
Chapter 4: An experimental study to investigate the relationship between commercial television viewing (a measure of relative advertisement exposure), and awareness of brand equity characters, food preferences and weight status in children	226 children 7-11y (mean 9.2y) 109 m, 117 f BMI 12.5 -34.5 (mean 18.0 kg/m^2) 141 NW, 51 OW/OB 110 high TV viewers (>24.5 hrs/week), 107 low TV viewers	Between subjects design Non-parametric analysis Between subjects factors: 2 levels of age (older or younger), weight status (NW or OW/OB), TV viewing (high or low), TV sets in house (high or low) Also correlations with BMI SDS	Children were better able to correctly identify product names from brand character stimuli than vice versa Older children better able to correctly identify product names than younger children Increasing age positively associated with increasing correct brand character identification No effects of weight status, BMI SDS, TV viewing or number of TV

			sets on brand character/product identification High TV viewers showed greater preference for branded and non-branded products
Chapter 5: An experimental study to investigate the relationship between commercial television viewing (a measure of relative advertisement exposure), and brand requests, food preferences and weight status in children.	172 children 7-11y (mean 9.1y) 93 m, 79 f BMI 11.5 – 29.4 (mean 18.2 kg/m^2) 119 NW, 53 OW/OB 88 high TV viewers (>28.5 hrs/week), 83 low TV viewers	Between subjects design Non-parametric analysis Between subjects factors: 2 levels of age (older or younger), weight status (NW or OW/OB), TV viewing (high or low), gender (male or female), 4 levels of viewing style (alone, co-viewing with parent, co-viewing with sibling, co-viewing with friend)	Food requests not affected by TV viewing level, viewing style, gender or weight status Access to satellite TV affected food requests High TV viewers showed greater preference for branded high fat foods Weak positive associations between non-branded product requests and self-reported preferences Older children requested more food items than younger children
Chapter 6: Food advertising to children on UK television in 2008	14 television channels most popular with children and adolescents 1 weekday and 1 weekend day per month for 2008 (06:00-22:00h) for each channel Peak and non-peak children’s	Content analysis All adverts coded for channel, date, time, product type All food products coded further for food item (28 specific categories within groups of core/non-core/miscellaneous),	Food was the 3rd most heavily advertised product on UK TV during study period A majority of foods were non-core (unhealthy) Generic supermarket adverts most frequent, followed by fast food and unhealthy breakfast cereals Greater proportion of adverts for

	viewing periods identified	promotional characters, persuasive appeals etc.	food during peak versus non-peak viewing times Food advertising differs across channel types, programme types, and month of recording Promotional characters used more often to promote non-core than core foods, brand equity characters more frequent than licensed characters Themes of fun, taste, health/nutrition used to promote foods to children A third of food adverts promote a website

Note: NW = normal weight, OW/OB = overweight or obese; CHO = carbohydrate

Therefore, the work of this thesis adds to the current literature, reconfirming previous findings in a much larger sample size to demonstrate the reproducibility and robustness of this effect within the current paradigm. In addition, as the food items featured in the food preference measures were not those items represented in the food advertisements shown, these findings again demonstrate the 'beyond-brand' nature of food advertising effects on preferences. Acute, experimental food advertising exposure affects general food selection patterns, and does not simply alter food preferences in the direction of the advertised product. Although the increased selection of foods following food advertisement exposure is small in magnitude, over time, with repeated exposure and the collective effect of reinforcement, increased preference particularly for high fat and high carbohydrate items could contribute to a positive energy balance and weight gain. These findings (and those discussed in section 7.2.2) reinforce the need for systematic monitoring of television food advertising and add to the growing body of evidence to indicate that regulation of food promotion is necessary and justified.

As stated in Chapter 3 (section 3.1.1), a specific aim of the first study was to examine the role of individual differences in response to acute, experimental food advertising exposure. One such individual difference that has previously been shown to affect children's intake (Halford et al., 2008b) and food preference (Halford et al., 2008a) response to experimental food advertising exposure is weight status. Using a similar paradigm to that described in Chapter 3, Halford et al., (2008a) found differences between normal weight and overweight/obese children's self-reported food preferences in the control (toy advertisement) condition, but following food advert exposure these differences were not apparent, suggesting that viewing food adverts produced an 'obesigenic' food preference response in normal weight children.

However, it is shown in Chapter 3 that there were no weight status differences found in either the toy advert or the food advert conditions. Therefore, the normal weight and overweight/obese children did not differ in their self-reported food preferences either in the control condition or following the experimental manipulation (food advert exposure), or in their specific response to that exposure. As discussed (Chapter 3, section 3.4) the findings for the control condition may reflect the existence of a 'steady state', as put forward by Moreno & Rodriguez (2007), whereby following weight gain obese children no longer exhibit dietary differences to compared to normal weight children. Yet this would not explain the inconsistency with Halford et al., (2008a) in terms of weight status differences in response to food advertising exposure. As Halford et al., (2008a) did not measure habitual television viewing habits, it is possible that the differential response to food advertising that was attributed to weight status could have been confounded by differences in habitual food advertising exposure between the weight status groups. Individual differences in food preference response to acute, experimental food advertising based on the child's level of TV viewing were seen, and will now be discussed.

In Chapter 3, children categorised as high TV viewers (based on a median split of the sample) had a higher mean BMI SDS than those in the low TV viewing category. This is consistent with the purported link between television viewing and obesity (Epstein et al., 2008; Gortmaker et al., 1996). There were no differences in self-reported food preferences between the TV viewing groups (high/low) in the control (toy advert) condition, but differences were apparent following food advert exposure. After viewing food adverts all children increased the number of items selected, but the high TV viewing children selected significantly more branded and non-branded items than the low TV viewers. In addition, more branded than non-branded food items were selected by high TV viewers in this food advert condition only so preference for branded foods in particular was enhanced by food advert exposure in these children. This suggests that one of the effects of high levels of habitual television viewing, and therefore habitual food advertising exposure, is an increased 'susceptibility' to food advertising messages (further effects relating to habitual food advertising exposure are discussed in section 7.2). As this indicates a cumulative effect of food advertising, so that in addition to being exposed to more food adverts per se due to their greater TV viewing these children are also likely to display a greater magnitude of response to the adverts, these findings are consistent with the growing body of evidence to suggest that reducing television viewing time reduces children's weight gain and BMI (Epstein et al., 2008; Robinson, 1999) and the assertion by the American Academy of Pediatrics that television viewing should be limited to 2 hours per day for children (AAP, 2001). This is the first study to demonstrate that children with a greater habitual exposure to television food advertising respond differently to acute, experimental food advertising exposure than children who watch less television.

Food preferences are key determinants of actual dietary intake, particularly in children (Birch, 1998), and therefore any environmental factors that have a detrimental effect on these preferences is of concern. Although the acute, experimental effects of food advertising exposure on food preferences appear to be relatively small in magnitude, if such small changes in preference towards HFSS, energy-dense items were to persist over time this could contribute to weight gain. Promotional activities exploit children's innate preferences for sweet items and those items generating positive post-ingestive signals (i.e. those with a high fat content), and such effects could reduce the nutritional quality of children's diets as well as increasing the likelihood of children overconsuming energy and, consequently, experiencing weight gain, obesity, and the associated health risks. Food advertising has been demonstrated to have persuasive power, and therefore there is an opportunity to use television food promotion to highlight healthier dietary choices in a way that appeals to children. Food preferences and eating patterns are more modifiable in childhood than later in life, and therefore exposure to advertising for healthier food options on television may benefit an individual's health throughout the lifespan (HSE, 2007). The findings discussed so far in this thesis, regarding the extent and nature of food advertising on UK television as well as the effects of food advertising exposure on food preferences, highlight that although small steps to limit HFSS food advertising to children have been taken, there is research evidence to suggest that more could and should be done to try to halt the rise in childhood obesity.

7.1.2 Food choice

Given the consistency with which acute, experimental advertising exposure has been shown to affect food preferences (including the work of this thesis as well as Halford et al., (2008a)) and food intake (Halford et al., 2007; Halford et al., 2008b; Halford et al., 2004), it was hypothesised that effects would also be seen on food choice. However, this was not the case; in the study described in Chapter 3, children's food choice was not found to differ (along the dimensions of sweetness or fattiness) following food adverts compared to toy adverts. Nevertheless, this lack of an effect is consistent with that of Halford et al., (2008a) and lends support to the notion that the tool is not sufficiently sensitive to detect food choice differences in this type of paradigm. As the food choice measure used in both studies (LFCT, see 2.5.1.3) is a picture-based tool (see Appendix 10), it relies heavily on the quality of the images to evoke a similar response to actual foods of that type and it is possible that the images used were not of sufficient quality, clarity or vividness (colour and brightness) to achieve that. As discussed in Chapter 3 (section 3.4), that effects on food choice were not found does not weaken the food preference findings, rather it reinforces the fact that these are separate concepts measuring different aspects of motivation to eat.

7.1.3 Advertisement recognition

With regards to advertisement recognition, as is reported in Chapter 3, all children correctly recognised a greater number of food advertisements than toy advertisements. This is indicative of the children paying greater attention to the food-related stimuli used in this study than the toy adverts used, and therefore experiencing increased engagement with the food adverts over advertising for other products (Curlo & Chamblee, 1998; Hastings et al., 2003). It may also be a sign of the strength of food brand recognition relative to other types of brands, potentially as a result of this attentional bias persisting over time. One of the purposes of branding activity specifically (as part of overall marketing activity) is to establish recognition in potential consumers (Connor, 2006), and it may have been the case that children found it easier to recognise the brand names of the food products than those of the toys, and therefore were more likely to correctly identify the items they had seen advertised. Although Nestlé appeared on more than one product listed on the recognition tool for the food condition (Appendix 14b), the other brand names (e.g. Kellogg's) only appeared next to one product, so if a child could remember that the Kellogg's brand had appeared in the advertising they would be able to select the correct item without recognising the product name. This issue of habitual food advertising exposure affecting brand awareness is revisited and discussed further in sections 7.2.3 and 7.2.4.

Previous studies have found weight status differences in food advert recognition ability. For example, in an earlier study, obese children correctly recognised a greater number of food adverts than normal weight children, and this recognition was positively associated with the amount of food subsequently consumed (Halford et al., 2004). Recognition of food adverts has also been found to relate to BMI (Halford et al., 2007; Arredondo et al., 2009). No such weight status differences were found in this study (Chapter 3), which may relate to the hunger states experienced by the participants. In the fasted state, both normal weight and obese children have been found to show a bias towards food stimuli compared to non-food controls whereas in the fed state, this bias was maintained in the obese children only (Castellanos et al., 2009). The next section discusses the need for future studies of this type to control for this potential confounder.

Greater recognition ability for food brand logos has been shown to be associated with some aspects of eating behaviour (food knowledge and snacking) (Kopelman et al., 2007). Therefore increasing our understanding of individual differences in recognition ability, and furthering knowledge of the relationship between this ability and food preferences and behaviours, could assist with attempts to limit the persuasive power of food branding activity and limit the detrimental effects of food promotion on children's food preferences, diets and overall health. Section 7.2.4 discusses the related concept of brand awareness and the work from Chapter 4 examining potential associations between this awareness and self-reported food preferences in children.

7.1.4 Directions for future research

The research described in Chapter 3 of this thesis takes an experimental approach to investigate the effects of acute, experimental food advert exposure, using actual television food adverts as stimuli and assessing response using self-report measures. Such an approach measures the short-term effects of advertising exposure, and one adaptation to the current paradigm could be to incorporate differing lengths of time delay between advert exposure and completion of food preference measures to investigate how long this behavioural modification lasts.

Furthermore, it may be that there are other approaches that could be used to generate useful data on this topic, and adaptations to the current paradigms that may improve our understanding of food advertising effects – both these options can be related to the wider literature regarding food cues responsiveness. It has been suggested that food adverts act as food cues and that exposure to such cues may act to promote food intake and related behaviours (Harris et al., 2009) which is consistent with the findings presented here and those of previous studies by this group (Halford et al., 2008a; Halford et al., 2007; Halford et al., 2008b; Halford et al., 2004).

Variation in children's responsiveness to food cues is one explanation of the observed individual differences in response to television food advert exposure. Although weight status differences in response to food advertising were not found in the current studies, such differences have been seen in similar studies conducted previously (Halford et al., 2008b). Similarly, overweight children have been shown to overeat in response to food cues whereas normal weight children did not, this effect was related to cue-elicited salivation flow but not psychological factors such as mood, body esteem and a restrained eating style (Jansen et al., 2003). Children who are more responsive to external food cues (e.g. the presence of food images or smells) as opposed to internal cues (such as hunger and satiety) are more likely to display eating behaviours such as 'eating in the absence of hunger' which are associated with weight gain (Jansen, Mulkens, & Jansen, 2007). Fisher and Birch (1999a) developed this concept of 'eating in the absence of hunger (EAH)', operationalised as the intake of food following the consumption of a mixed meal to satiety (Hill et al., 2008). EAH has been classified as a "behavioural phenotype that is not specific to overweight children but instead shows a graded association with adiposity across the weight continuum" (Hill et al., 2008). Certain external stimuli can provoke eating even in the absence of nutritional need (Rogers, 1999), and as mentioned above, when fasted both normal weight and obese individuals have been shown to display visual attention bias towards food cue images (versus non-food controls) but in the fed condition, this bias was maintained in the obese group only (Castellanos et al., 2009). Together, these studies suggest that a logical next step is to incorporate manipulations of hunger state into the paradigm described in Chapter 3 to both remove hunger state as a potential confounder in the relationship between exposure and food preference response, but also to investigate individual differences in response to food adverts (food cues) in the fed and fasted states, which is potentially critical to our understanding of weight gain and obesity.

In addition, obese children have been shown to display increased dorsolateral prefrontal cortex activation in response to food stimuli whereas normal weight children show activation in other brain areas following food cue exposure (Davids et al., 2010). In that study, children were shown colour photographs of single food items (pizza, hamburger and sweets) as food cues, but to date no authors have sought to examine fMRI activation in response to images from food advertisements. This could be a useful approach, to identify those regions of the brain that respond to food adverts and identify individual differences (including those related to weight status) that may be apparent using these techniques, but would not have been identified using the paradigm described in Chapter 3 of this thesis.

Furthermore, it may also be beneficial to incorporate different measures of food choice in future experimental paradigms. As differences between self-reported food preferences were found between the food advert and toy advert conditions in the first study of this thesis, that the Leeds Forced Choice Test did not reveal between-condition differences is suggestive of weaknesses in this tool. Use of improved and updated images may add to the sensitivity of this measure, and the use of PCs or interactive whiteboards to display the images may confer a number of advantages for use over the current paper format. Firstly, the image resolution and appeal of the food items represented would be enhanced to be more closely aligned with the visual appeal of actual food items. Secondly, child participants would likely engage more with a computer-based task than a paper based one, and the use of such technology would enable quicker data collection from large groups, and would automate (and therefore remove the possibility of human error from) data assimilation and analysis. In addition, running a food choice measure on a computer would provide a number of potentially useful options regarding manipulation of stimulus exposure, such as variation in the time children are given to make the choice, or variations in the order or combinations of food items presented.

Summary of Key Points:

- All children selected more branded and non-branded food items from the food preference measures following food advertisement exposure compared to after viewing toy advertisements.

- Weight status differences in food preferences or response to food advertising exposure were not found.

- High TV viewers (those with greater habitual advertising exposure) had a higher mean BMI SDS and showed an enhanced branded food preference response to food advertising exposure compared to low TV viewers.

- No effects of advertisement exposure on food choice were found, which may suggest that the tool used (LFCT) is not sufficiently sensitive to detect differences in the current paradigm.

- All children recognised a greater number of food advertisements than toy advertisements.

- Future studies should look to incorporate differing lengths of time delay between advert exposure and completion of food preference measures in order to investigate the duration of the behavioural modification.

- Further, other approaches that take into account the concepts of individual differences relating to eating in the absence of hunger (EAH) and cue responsiveness (including EEG and fMRI measurements) would be useful.

- Adaptation of the LFCT to a PC- or interactive whiteboard-based task may improve the validity and usefulness of this tool.

7.2 Effects of habitual food advertising exposure

In accordance with the stated aims of this thesis, one individual difference consistently addressed throughout Chapters 3, 4 and 5 is the role of habitual food advertising exposure. The studies described in these chapters all included a measure of children's typical weekly television viewing habits, so that this measure of viewing could be used as a proxy measure for this prior, cumulative food advertising exposure. The role of habitual food advertising exposure in children's responses to advertising was examined (discussed above in section 7.1.1), as were the potential relationships between this habitual exposure and BMI, self-reported food preferences, advert recognition, brand character and product identification ability (a measure of brand awareness), and food product requests. These findings will now be discussed.

7.2.1 BMI

As already mentioned, in Chapter 3 children categorised as high TV viewers (based on a median split of the sample) had a higher mean BMI SDS than those in the low TV viewing category and there was a weak but significant and positive correlation between BMI SDS and the number of hours of TV viewed in a typical week. In Chapters 4 and 5 no such relationship between BMI SDS and television viewing times were found. Although the relationship between television viewing and obesity is well documented (Dietz & Gortmaker, 1985; Gortmaker et al., 1996), in relatively small, cross-sectional studies of this type it is perhaps not a surprise that such a relationship was not readily demonstrated. Nevertheless, that the children in the high and low TV viewing groups did not differ dramatically in terms of their weight status classifications in any study of this thesis ensures that any conclusions drawn about the effect or the role of habitual food advertising exposure are not simply referring to lean/obese differences in behaviour.

7.2.2 Food preferences

Previously in this chapter (section 7.1.1) differences between high and low TV viewers (and therefore, those with greater or lesser habitual exposure to food advertising) in terms of their responses to the experimental manipulation (viewing food adverts) were discussed. However, this section addresses another aspect considered throughout this thesis – whether or not, in the absence of such an experimental manipulation, there is any evidence of a fundamental difference between the food preferences of children with greater or lesser habitual food advertising exposure.

Whilst the findings for the control (toy advert) condition of the first study (Chapter 3) showed that the high TV viewers did not differ from low TV viewers in their reported food preferences, the studies described in Chapters 4 and 5 did find food preferences differences between high and low TV viewers. In Chapter 4 it was found that high TV viewers (those with greatest habitual exposure to television advertising) selected more high CHO and high fat items (both branded and non-branded) than low TV viewers and in Chapter 5 it was found that high TV viewers showed a greater preference for branded foods, specifically the high fat items, than the low TV viewers. These inconsistencies may relate to the way the high and low TV viewing groups were categorised. Median splits were conducted for each sample, and although this is a useful and legitimate means of creating dichotomous variables for analyses, it also means that a child reporting a typical week's TV viewing as 25 hours per week would have been categorised as a high TV viewer for Chapters 3 and 4 but a low TV viewer in Chapter 5 (where the median was 28.5 hours per week). This could be considered one of the limitations of this work, and is discussed further in section 7.5.

However, as addressed in the discussion sections of the relevant chapters, it may also be the case that aspects of the study procedure in Chapters 4 and 5 provided food cues or stimuli that brought out between-TV viewing group differences in food preferences. Following food advertisement exposure in the first study (Chapter 3), high TV viewers selected more branded and non-branded foods than the low TV viewers (discussed in section 7.1.1), effects that were not seen in the control condition and therefore could be attributed to the food advert exposure. It is possible that exposure to the brand character and product flashcard task and the shopping list task acted in a similar way to viewing food adverts. These tasks may have been experienced by the children as food cues, with the stimuli eliciting positive reinforcement regarding foods and food brands. If the relative influence of these cues or the magnitude of response to these cues varied between children with greater or lesser prior exposure to commercial promotion this could then have manifested itself in the differential food preference responses between high and low habitual TV viewers. As both Chapters 4 and 5 described studies which were between-subject designs with a single study day at which all measures are taken, it is not possible from these data to elucidate whether or not such differences would have been found in the absence of these stimuli.

Furthermore, the role of branding in this effect is not clear. The results of Chapter 5 indicate that habitual food advertising exposure specifically affects preferences for branded products, whereas both branded and non-branded foods were selected more by high than low TV viewers in the study described in Chapter 4. These findings may either reflect the 'beyond-brand' effect of food advertising exposure, increasing demand for all food products (or the entire 'energy-dense foods' category) rather than simply altering brand choice, or it may indicate that the brand aspect becomes a more salient stimuli to children with repeated exposure to promotional activity by a range of food brands. Although previous studies have demonstrated that television viewing is associated with poorer dietary quality (Davison et al., 2006; Boynton-Jarrett et al., 2003; Coon & Tucker, 2002), these are the first studies to demonstrate that children with greater or lesser habitual exposure to television food advertising may differ in their food preference responses to food and food brand-related stimuli. This phenomenon is worthy of further investigation and clarification, to enable identification of the level of food advertising or brand exposure necessary to generate such effects in order that children most vulnerable to commercial food promotion can be better protected from its detrimental effects on diet and health.

7.2.3 Advertisement recognition

High television viewers did not correctly recognise a greater number of food or non-food adverts than low TV viewers in Chapter 3. Therefore, greater habitual food advertising exposure did not ensure that those children were better able to identify the food products they had seen advertised from a list than children with lesser prior exposure to food advertising on television. This is interesting when considered alongside the finding discussed in section 7.1.1 that high TV viewers showed enhanced preference for branded food items relative to the low TV viewers following experimental food advert exposure. As high TV viewers did not show greater advert recognition ability, this somewhat discounts the possibility that this increased selection of branded foods in the food advert condition was a result of greater food brand awareness, and reinforces the notion put forward in sections 3.4 and 7.1.1 that the high TV viewers were actually more prone, or susceptible, to the food promotion messages.

Furthermore, this raises another issue worthy of consideration. As good recognition of brands is assumed to indicate positive attention and memory of advertising activity (Curlo & Chamblee, 1998), the results of Chapter 3 of this thesis suggest that all children have good recognition memories for food advertisements (with mean correct recognition of 7.8 advertisements out of 10) and also better recognition of these adverts relative to toy advertisements, but that greater levels of exposure to food advertisements does not significantly increase this ability any further. Both recognition and recall are thought to be required for sophisticated purchase decisions in retail contexts (Valkenburg & Buijzen, 2005), so it would appear that food advertising has the ability to engage and gain the attention of even low TV viewers to such a degree that, at the point of purchase, these children (with relatively low habitual exposure to food advertising) can perform successful information retrieval and make brand and product choices. This indicates the level of persuasive power offered by food advertising and, alongside the demonstrated increased susceptibility of those children with higher exposure to those messages, indicates the importance of further work to increase understanding of this phenomenon and to develop programmes and policies to limit the detrimental impact of HFSS food advertising on children's dietary choices.

7.2.4 Brand character and product identification ability

As discussed in Chapter 4 (section 4.4), children with higher levels of habitual food advertising exposure (high TV viewers) were not significantly better at identifying brand equity characters (from the products they promote), or identifying products (from the brand equity characters used in their television advertisements) than children with lower levels of advertising exposure. This is consistent with the previously discussed findings relating to advertisement recognition. Despite seemingly being more responsive to acute, experimental food advertising exposure, and displaying differences in self-reported food preferences to the low TV viewers, high TV viewers in this study did not display greater brand awareness (as measured by the flashcard tasks). Given that the correct response rates were above 60% for both brand character and product identification abilities across the group as a whole, this does indicate the effectiveness of food marketing activities of creating awareness of brand character-product associations. However, there are a number of explanations for the lack of a brand awareness difference between high and low TV viewers including cognitive limits on the amount of brand information children in this age group can store/process at any one time; differences in the frequency of broadcasting of some adverts; and variations in the level of exposure to the character in this advertising (always used/occasional minor role in the advertisement).

The findings of Chapter 4 suggest that children were better able to identify correct product names from brand character images than vice versa, and a potential explanation is that the lack of a personality or further substance being attributable to these characters may limit the extent to which they confer aspects of brand identification to children, rather they may operate as simple visual cues used in a similar way to logos or other brand markers. This would suggest a distinction between brand equity characters and licensed characters that could justify the different legislation applied to the two types of characters, but further research is needed to increase our understanding of the role of these characters within the persuasive power of advertising activity.

Furthermore, the study described in Chapter 4 did not find evidence that the children with better knowledge of brand character-product associations displayed greater self-reported preferences for branded items on the food preference measures. As this is inconsistent with previous research by Batada & Borzekowski (2008) and DiFranza et al., (1991), this may suggest that the study had some limitations that should be addressed in future designs (see section 4.4). Addressing these limitations would allow researchers to further investigate the process that is thought to take place between initial brand character exposure, cumulative exposure through television viewing, and to potential changes in food preferences and associated weight gain. Greater understanding of this process could confer benefits in terms of intervention designs targeted at those children most at risk from the detrimental impacts of commercial food promotion on dietary choices that may lead to poor health outcomes.

This thesis was the first to investigate children's level of brand awareness using a brand character-product association flashcard task incorporating a number of branded food products across several food categories, and, as discussed, raises some interesting possibilities that warrant further research. For example, despite brand equity characters being liked by children (Ülger, 2009) and their product associations evidently well known, it has not yet been elucidated what effect the presence or not of these types of characters have on food preferences or choices (see section 7.2.6). It is reasonable to assume that the use of such characters contributes to children's enjoyment of television food advertising, which encourages their engagement with, and attention to, the promotional messages, factors that are essential for the persuasive power of the advertisement to have its effect. If, therefore, the use of brand equity characters is a contributor to the persuasive effect of food advertising, this raises issues over their use for the promotion of HFSS products potentially harmful to health, but also identifies the opportunity for use of these characters to encourage healthier dietary choices in children.

7.2.5 Food purchase requests

A stated aim of this thesis was to examine the relationship between habitual television food advertising exposure and children's purchase requests for food products. The literature relating to children's purchase requests is extremely limited, and to date no published studies have addressed this potential association with cumulative food advertising exposure.

Chapter 5 described the findings of a study that used a novel method for assessing children's food purchase requests. Through the use of a 'shopping list' measure in a between-subjects study design, it was ascertained that habitual food advertising exposure (measured as high or low television viewing relative to the rest of the sample for that study) did not affect children's product requests for branded items. However, children with access to cable or satellite television channels did request more branded items specifically and more items overall than children who could only view terrestrial channels at home. This was not due to increased viewing, nor (based on the findings of Chapter 6) likely to be due to a greater frequency of food advertising on cable/satellite channels compared to terrestrial channels. It is plausible that children with access to a greater range of commercial television channels may have been exposed to a greater variety of food brand advertisements, if not a greater number, and therefore may have been aware of more branded items to request. This is an interesting finding that warrants further investigation, it has never before been demonstrated that differences in viewing patterns may have an effect on the behavioural outcomes of food advertising. Current guidelines relating to television viewing in childhood, such as that put forward by the American Academy of Pediatrics (AAP, 2001), do not make distinctions between the different platforms on which children may view television (and television food adverts) but it may be that consideration should be given to not just the amount but the range and variety of brand exposure experienced by children with access to a multitude of different television channels.

Weight status differences in food product requests were not found, but a significant and positive correlation between BMI SDS and the number of branded items requested suggests that the study was underpowered to detect normal weight versus overweight/obese differences. Older children requested a greater number of products than younger children, which could be explained by the greater cognitive capacity of the older children to perform recall and complete the written task, or may reflect an enhanced role for older children in family decisions over food purchases. As there were no differences in requests between children with different viewing styles or between the genders, both findings which are inconsistent with previous literature (Pine, Wilson, & Nash, 2007; Pine & Nash, 2002), this could indicate that the paradigm used was problematic. That the number of non-branded products requested correlated positively with the number of non-branded high carbohydrate items and the total number of non-branded items selected on the non-branded food preference measure suggest that the shopping list tool has potential as a task to assess children's food purchase requests, but the lack of other expected findings implies a lack of power which should be addressed with further data collection before the full utility of this measure can be assessed.

Alongside the short-term effects of acute, experimental television food advertising exposure and the seemingly longer-term effects of habitual television food advertising exposure, food purchase requests are one of the other key outcomes that determine the impact commercial food promotion can have on children's health. Through their roles as both independent consumers (with increasing spending power) and as key influencers of household purchase decisions (Macklin, 1994; Schor & Ford, 2007) children's food product desires often translate into consumption of that food. Previous studies have demonstrated that children who have greater prior exposure to television food advertising typically make more requests for products and specifically more requests for advertised brands than children who watch less television (Bridges & Briesch, 2006; Arnas, 2006) and have identified media exposure as a risk factor for future food requests (Chamberlain et al., 2006). The study described in Chapter 5 attempted to add to this knowledge by examining the relationship between habitual television food advertising exposure and food product requests; a strength of this type of study is the recreation of the standard time delay that would be expected to occur between advertising exposure and the opportunity for a child to make a product request. The use of the shopping list tool ensured that children's requests were not limited to the products available at a certain store, or on a list, but as this study appears to have been underpowered it is not possible that individual differences in product request behaviour may have been elucidated using this paradigm if the sample was of sufficient size.

7.2.6 Directions for future research

The previous section discusses the findings of this thesis that relate to the relationships between habitual exposure to television food advertising and BMI, self-reported food preferences, advert recognition, brand character and product identification ability (a measure of brand awareness), and food product requests. This work has generated several research questions that could be addressed in future studies; these issues will now be discussed.

A recent study has shown that licensed characters do influence children's food selections (Roberto et al., 2010), but whilst the findings of Chapter 4 indicate that children have good awareness of brand equity characters and are usually able to identify the products with which the characters are associated, data do not yet exist to demonstrate whether brand equity characters can also have an effect on children's food choices. As discussed above (section 7.2.4), because children were better able to identify products from brand equity characters than characters from products it may be that this was due to the lack of personality or substance of these characters. Beyond their colour and animation, these characters offer little in the way of representation for the wider aspects of brand identity in perhaps the way that a licensed character or a celebrity endorser might (i.e. indicating that the brand is quirky/sophisticated/of a certain culture etc). If children identify brand characters by their colour or shape as they would a brand logo then that character is simply operating as a visual cue or marker for that product, rather than acting in a persuasive manner to draw the child into a brand relationship based on perceived shared values. However, that is not to say that the visual appeal of the character is not adding to the persuasive appeal of the brand or product – the bright colour, sound and activity/animation of the brand equity character's role in television advertising is likely to contribute to the child's enjoyment of and engagement with the advert and therefore their presence may be an important aspect of whether or not the advert does alter a child's perception of the brand and likelihood of selection that item over others. Therefore, given that brand equity characters are currently unregulated in television food advertising, more research is needed to identify their role in brand identity, to understand their contribution to children's engagement with advertising and to establish their effects on food preferences and choices. It is interesting that some brand equity character-product associations were better known than others, and therefore future studies could seek to address why this might be. It is possible that simply those characters and products most frequently advertised on television are better known, but there may also be other factors to consider such as the way the character is used in the television advert (central or peripheral figure), whether or not the character typically appears prominently on product packaging, the extent to which the advertisers have attempted to give the character a personality or substance in line with the persuasive appeal they are aiming for, and the relative importance of each of these features in generating awareness of that brand in young consumers.

Despite the introduction of television food advertising regulations, the majority of branded foods that advertise on television and include a brand character as part of their promotional activity are foods high in fat, sugar and/or salt (HFSS). So increasing our understanding of these relationships further will help to elucidate what aspects of television food advertising contribute to their persuasive power, which will assist with protecting children from the detrimental effects and utilising this knowledge to persuade children towards healthier dietary choices.

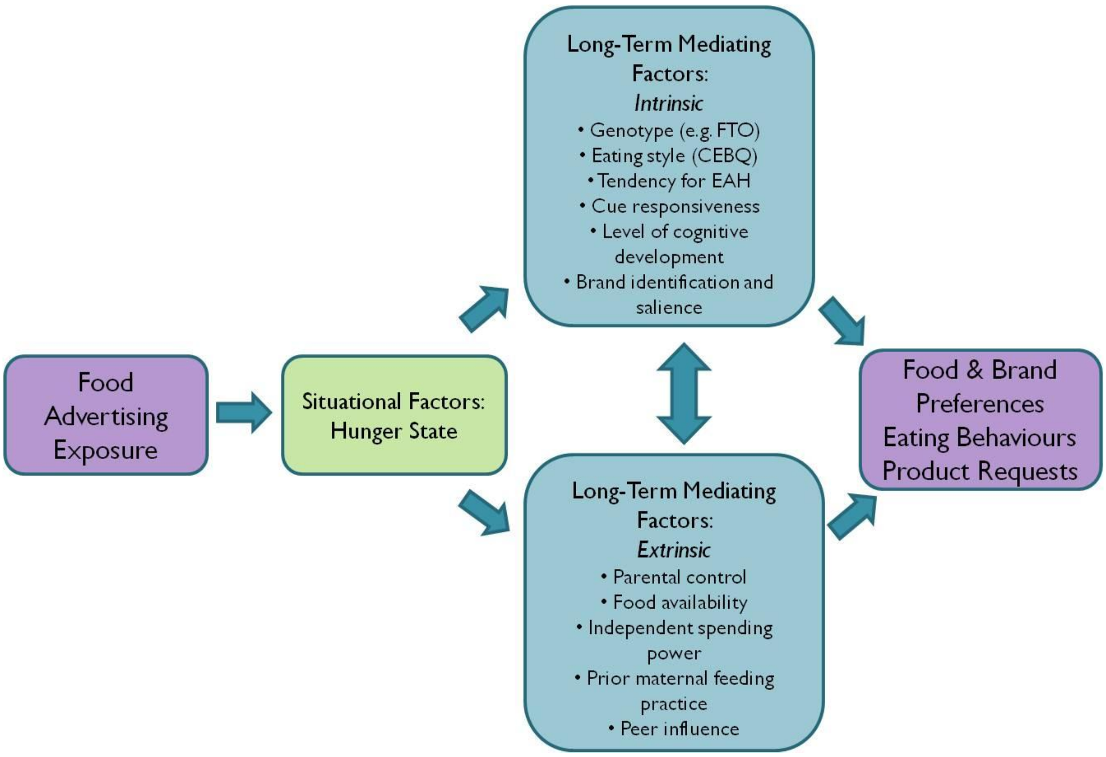
In addition, as those children with greater levels of brand awareness (measured by the brand equity character and product flashcard task in Chapter 4) did not show greater preference for branded food items on the food preference measures than the children with poorer brand awareness, this suggests that the relationship between brand awareness and brand preference may involve other elements. It has previously been shown that if a child is able to recognise an association between a character and a product, that ability has predictive value for the likelihood of that child developing favourable attitudes towards the product (DiFranza et al., 1991). Further, children who recognise characters, logos, and slogans from ads have been shown to be more likely to select those products and brands (Batada & Borzekowski, 2008). Raised food brand awareness does indicate that the brand aspect of advertising is a salient cue for those children (especially given that there was no relationship with level of habitual exposure to food advertising), however, the findings from this thesis intimate that greater recognition of brand characters and their product associations does not necessarily strengthen the preference children have for branded products in general. Longer term studies are needed to identify if, over time, greater brand awareness does translate into a greater preference for branded products. Furthermore, it may be beneficial to adopt food preference measures that place fewer artificial constraints on the branded foods children can show preferences for. Technological innovation may allow tools to contain a much larger number of branded items for the children to select from, without damaging the usability of the measure in a young study population.

The findings of Chapter 5, particularly the significant positive correlation between BMI SDS and branded food purchase requests, suggest that further work to explore this relationship could be useful. With the addition of further data for this study, a weight status effect on branded food requests may become evident. Whether using this paradigm or an alternative, further research to investigate whether overweight and obese children make a greater number of product requests to their parents than their normal weight counterparts is warranted and an examination of the proportion of these requests that result in actual purchase and consumption would be useful in order to explore this finding further. Weight status is one individual difference worthy of further investigation; another is the finding relating to children with access to cable/satellite television channels displaying different request behaviour to children with access to only terrestrial channels. Given that Chapter 6 did not seem to indicate that this difference may be due to a fundamental difference in the advertising landscape between these two viewing platforms, there may be differences in the viewing behaviour (i.e.

attentiveness of viewing/frequency of 'channel hopping'/likelihood of viewing TV whilst simultaneously doing another activity etc) between these two groups of children that explain this finding. As brand requests lead to both parent-child conflict (Linn, 2004) and the purchase and consumption of HFSS foods (undermining parents attempts to encourage healthier choices) (McDermott et al., 2006), this research is timely and important.

The issues addressed in this section (7.2.6), in addition to the previous section in this chapter dealing with directions for future research emanating from work with human participants (7.1.4), can be combined into a model that attempts to describe the relationship between food advertising exposure and the behavioural outcomes measured (principally food and brand preferences, eating behaviours and food product requests) with respect to the multitude of unknown or poorly explained variables that may mediate this effect (see Figure 7-1). The suggestions for future research should seek to build upon this foundation, through the use of a variety of study designs and measures in order to develop our understanding of this phenomenon and the key factors involved.

Figure 7-1 A summary figure to demonstrate a possible pathway of potential mediating variables between food advertising exposure and effects on food preferences, brand preferences and eating behaviours



Summary of Key Points:

- Food preference differences between high and low TV viewers (those with greater or lesser habitual advertising exposure) were only apparent after viewing television food adverts in Chapter 3, but were evident in both Chapters 4 and 5 without acute advert exposure.

- This may indicate that the brand character and product flashcard task and the shopping list task acted as food stimuli, creating a food preference response similar to that observed following food adverts in Chapter 3. Alternatively, this may reflect differences in the categorisation of high and low TV viewers in the different study samples.

- Higher habitual advertising exposure (greater weekly TV viewing) did not confer a greater ability to recognise food advertisements.

- Children were better able to identify products from brand character images than vice versa, but higher habitual advertising exposure (greater weekly TV viewing) did not confer a greater ability to identify the correct brand character and product associations from flashcards.

- Children's level of habitual advertising exposure did not affect the number of product requests made for branded or non-branded foods.

- However, children with access to cable/satellite TV channels did request more branded items and more items overall than children with only terrestrial channels available at home. This did not appear to be related to differences in the food advertising landscape between the different viewing platforms, and should be explored further in future studies.

- Weight status differences in food product requests were not found, but a significant and positive correlation between BMI SDS and the number of branded items requested suggests that the study was underpowered to detect normal weight versus overweight/obese differences.

- Future work needs to consider the role of brand equity characters in generating brand awareness in young consumers and longer term studies are needed to address the relationship between raised brand awareness and brand preference.

7.3 The extent of food advertising on UK television

A further aim of this thesis was to characterise the extent of food advertising being broadcast on the UK television channels most popular with children and adolescents, this was examined in Chapter 6. It is evident from the sample size of over 5,200 hours of television across 14 channels that this study was by far the most comprehensive assessment of commercial food promotion on television ever conducted for any nation, and certainly the only large scale analysis to focus on UK broadcasting to date.

It was found that food advertising in this sample was less prevalent than that reported by some previous authors (Lewis & Hill, 1998; Chestnutt & Ashraf, 2002) but relatively consistent with data published more recently (Morgan et al., 2009; Kelly et al., 2010). Without comparable baseline data, it is impossible to attribute these differences definitively to either the introduction of regulations to limit HFSS food advertising to children from 2007 onwards or differences in study design/coding systems between studies. This difficulty in interpretation highlights the need for regular, consistent, systematic monitoring of television food advertising. The data collected for this thesis provide a benchmark from which future change can and should be measured (see section 7.6).

Chapter 6 demonstrates the strength of the study design used in this thesis in comparison to previous studies which typically focused on a single channel, a limited recording period and/or restricted attention to only those time periods traditionally known as 'children's airtime'. Considerable variation in the extent of food advertising was seen between channels, channel types (e.g. dedicated children's channels versus family channels), channel broadcast platforms (i.e. terrestrial/cable/satellite), and viewing times (peak or non-peak periods in terms of child audience levels). Furthermore, the balance of unhealthy (non-core) and healthy (core) food advertising changed considerably over the course of the year, but aside from Morgan et al., (2009) this has not been previously addressed in the literature.

These data provide a more comprehensive assessment of the food advertising landscape, whereby viewing patterns (i.e. preferred channels, programmes and viewing times) may largely determine a child's overall level of food advertising exposure. Specifically, family channels were found to broadcast both the greatest number and the greatest proportion of food advertisements, and there was an increased prevalence of food advertising during peak children's viewing times compared to non-peak, the latter finding seemingly incongruent with the introduction of legislation to limit children's exposure to HFSS food advertising. A strength of the study described in Chapter 6 is the volume of data collected and the diversity of the sample (across several channels and time periods) which allowed not only a better overall picture to be ascertained, but also enabled a multitude of within-sample and between sample comparisons to be conducted using inferential statistics that add depth to current knowledge on this topic.

It is evident from Chapter 6 that unhealthy foods dominated advertising, with a majority of food advertisements promoting non-core products such as fast food, high sugar/low fibre breakfast cereals and chocolate/confectionery. This is consistent with the limited recent data (Kelly et al., 2010) on this topic and, as a mere 18.1% of food advertisements depicted core, nutrient-dense foods, indicates that there is still work to be done to "change the balance of HFSS and non-HFSS foods advertising on television" (Ofcom, 2008). Previous studies have shown that advertising for healthier food choices has a positive effect on attitudes to and consumption of healthy foods (Dixon et al., 2007; Beaudoin et al., 2007), and yet across all channels, adverts for fruit (including fruit products with no added sugar) and vegetables combined accounted for just 1.4% of all food advertisements, approximately 1/7th of that of fast food advertising alone. Establishing good dietary choices in young children is beneficial for their short- and long-term health, so augmenting the advertising of all core foods (but notably fruits and vegetables) on television could be a key factor in the effort to combat rising childhood obesity in the UK. However, the findings described in Chapter 6 do not indicate that the current regulations have had this effect.

That this 'non-core versus core' food promotion imbalance is still demonstrable during peak children's viewing times on the television channels most watched by young people in the UK, despite legislation, suggests that either the full impact of the regulations were not felt at the point of recording (2008, with full implementation of the new rules being enforced from 1st January 2009), or that the scheduling regulations are not effectively reducing children's exposure to HFSS food advertising.

Indeed, one of the main criticisms of the Ofcom legislation (particularly the 'scheduling restrictions') is that it only covers programming specifically aimed at children less than 16 years of age. As previously stated, children no longer confine their viewing to a few children's time slots; they are regularly watching prime time and other non-age segregated media (Schor & Ford, 2007). Ofcom themselves acknowledge that children spend 71% of their viewing time (12 hours per week) outside of dedicated children's airtime (Ofcom, 2004), therefore current regulations do not impact on the majority of their viewing. Ofcom carried out a review of the restrictions in 2008 and concluded that "food and drink advertising spots have shifted from children's airtime to adult airtime" while concurrently acknowledging that over half of children's viewing is in so-called "adult airtime" (Ofcom, 2008). Given the popularity of this programming and airtime with children, it can be considered a misnomer for Ofcom to use the term 'adult airtime' at all. Nevertheless, steps should be taken to limit children's exposure to HFSS food advertising during programming outside of dedicated children's airtime.

Also, the method of assessing which programmes are 'of particular appeal' to children under 16 is based on the *proportion* of children watching, rather than actual numbers. This is a flawed system because even if a large number of children are watching a particular programme, the restrictions will not apply if there is also a large adult audience (thereby reducing the proportion of the entire audience made up by children) (Which?, 2008). In their consultation response to Ofcom, the consumer group Which? included a table of the top 30 most popular programmes watched by 4 – 15 year olds during a week in October 2006 and noted that although there were over 1.1 million children watching the top rated show, it was not covered by the restrictions. In fact, the first programme to be covered by the restrictions was the 27th most popular show, with under 200,000 child viewers (Which?, 2006).

The findings described in Chapter 6 elucidate differences and identify variation in the extent of television food advertising across a number of dimensions (channels, genres, programming, viewing times etc), this may assist with highlighting where interventions or policy options are most needed and therefore should be applied, rather than relying on generalisations made from small samples of TV as the previous literature would necessitate.

7.3.1 Directions for future research

There is a clear need for regular surveillance of food advertising on television across multiple channels. Using the data described in this thesis as a baseline would enable monitoring of changes to food advertising and an assessment of the success of advertising regulations, such as any changes that could be attributed to the full implementation of the Ofcom regulations from 1st January 2009. Further studies should seek to continuously assess the usefulness and design of each coding variable, and to incorporate additional variables in order to address ongoing trends in food advertising. For example, future studies could include coding of programme sponsorship and product placement.

Furthermore, to enable the collection of comparable data both within and between countries, some consistency of coding scheme is required. This thesis used a simple categorisation of foods into core, non-core and miscellaneous items (based where appropriate on pre-defined criteria regarding fibre and sugar content) and although useful, is just one method by which foods could be differentiated. The strengths of the coding scheme defined by Kelly et al., (2007) include its ease of use and the generation of data that are clear to interpret, however it does involve some subjective interpretation over which category to assign products to.

Ofcom regulations are based on foods categorised according to the Food Standards Agency's (FSA) Nutrient Profiling Scheme (2006) which removes the possibility of any subjective assessment, assigning numerical values to nutritional components according to the UK Dietary Guidelines for Recommended Daily Intakes. Points are allocated to foods and beverages for four 'risk increasing' components (kilojoules, saturated fat, sugar and sodium in 100g of product), from which points for three 'risk decreasing' components (percentage of 'fruit, vegetables and nuts', fibre and protein content in 100g of product) are deducted (although points for protein content are not included in the equation if the total points for the 'risk increasing' components reaches a certain threshold in the absence of significant fruit, vegetable or nut content). If the final score is calculated as 4 or more for a food (or 1 or more for a beverage) the food is classified as HFSS and is subject to the food advertising regulations.

Applying these criteria to the 29 food advertisements featuring in the first recording day of the study described in Chapter 6 (ITV, recorded on Saturday 5th

January 2008) shows that 12 of the food adverts represented non-HFSS foods (41.4%), 11 represented HFSS items (37.9%) and 6 represented unclassifiable items (supermarkets, no particular food product shown) (see Table 7-2).

Table 7-2 The application of both the FSA Nutrient Profiling Scheme and the Kelly et al., 2007, 2010 advert coding schemes (alongside standard nutritional information) to the food items represented in 29 food adverts recorded on Saturday 5th January 2008

	Values per 100g								
Brand/Product	kJ	Kcal	Protein (g)	CHO (sugars)	Fat (saturates)	Fibre (g)	Sodium (mg)	FSA Nutrient Profiling	Kelly et al., 2007, 2010 coding system
McDonalds Happy Meal (Hamburger)	1050	250	12.0	31.0 (6.0)	9.0 (3.5)	2.0	520.0	HFSS	Non-core
McDonalds Happy Meal (Hamburger)	1050	250	12.0	31.0 (6.0)	9.0 (3.5)	2.0	520.0	HFSS	Non-core
Warburton's	998	237	0.0	43.0 (1.6)	2.6 (0.9)	24.0	421.5	Non-HFSS	Core
Burger King (3 Pepper Angus)	1168	278	15.0	17.9 (3.3)	16.7 (5.1)	3.0	67.8	HFSS	Non-core
Danone Activia (Fat free strawberry)	281	67	6.0	10.4 (9.8)	0.1 (Trace)	0.0	65.0	Non-HFSS	Core
Morrison's supermarket	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unclassifiable	Misc.
Morrison's Supermarket (Kelloggs Special K)	1606	379	14.0	76.0 (17.0)	1.5 (0.5)	2.5	0.5	Non-HFSS	Non-core
Asda supermarket	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unclassifiable	Misc.
Morrisons supermarket	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unclassifiable	Misc.
Quorn Low Fat Chicken Style Pieces	450	107	16.3	4.5 (1.1)	2.6 (0.7)	6.0	0.5	Non-HFSS	Core
Morrison's Supermarket (Kelloggs Special K)	1606	379	14.0	76.0 (17.0)	1.5 (0.5)	2.5	0.5	Non-HFSS	Misc.
Ryvita Mini's Sweet Chilli Flavour	1422	335	7.0	71.0 (13.0)	2.6 (0.4)	11.9	0.4	Non-HFSS	Core
Pizza Hut Four for All	1106	263.4	11.6	30.8 (3.1)	10.7 (4.5)	1.3	575.9	HFSS	Non-core
Tesco Supermarket	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unclassifiable	Misc.
Tesco Supermarket	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unclassifiable	Misc.
Innocent Smoothie	241	57	0.5	12.9 (10.2)	Trace (Trace)	1.6	1.0	Non-HFSS	Core
Pizza Hut Four for All	1106	263.4	11.6	30.8 (3.1)	10.7 (4.5)	1.3	575.9	HFSS	Non-core
Nestle Kit Kat	2136	510	6.4	62.8 (47.8)	25.6 (14.4)	2.3	0.1	HFSS	Non-core
Tetley Redbush	0	0	0.0	0.0	0	0.0	0.0	Non-HFSS	Misc.
Nestle Shredded Wheat	1442	340	11.6	67.8 (0.9)	2.5 (0.5)	11.8	Trace	Non-HFSS	Core
McDonalds Hot n Spicy range	1302	310	10.3	27.6 (3.4)	17.9 (3.4)	0.7	565.5	HFSS	Non-core
Domino's	945	225.1	8.6	30.7 (1.6)	37.9 (3.3)	2.0	505.0	HFSS	Non-core
Kelloggs Special K	1606	379	14.0	76.0 (17.0)	1.5 (0.5)	2.5	0.5	Non-HFSS	Non-core
Asda supermarket	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unclassifiable	Misc.
Kellogg's Cocopops	1639	387	5.0	85.0 (35.0)	2.5 (1.0)	2.0	0.3	HFSS	Non-core
Domino's	945	225.1	8.6	30.7 (1.6)	37.9 (3.3)	2.0	505.0	HFSS	Non-core
Danone Actimel	301	71	2.8	10.5 (10.5)	1.6 (1.1)	0.0	0.0	Non-HFSS	Core
Nestle Kit Kat	2136	510	6.4	62.8 (47.8)	25.6 (14.4)	2.3	0.1	HFSS	Non-core
Kelloggs Special K	1606	379	14.0	76.0 (17.0)	1.5 (0.5)	2.5	0.5	Non-HFSS	Non-core

Key: CHO = carbohydrate

The analysis reveals some interesting differences between the two schemes, particularly regarding Kellogg's Special K cereal. Using the Kelly et al., (2007; 2010) system the cereal is classified as non-core as it contains 17g sugar and just 2.5g fibre per 100g product, which fits the criteria for a low fibre, high sugar breakfast cereal. Using the FSA nutrient profiling scheme the cereal is classified as non-HFSS, and would not be subject to Ofcom's food advertising regulations. Jenkin et al., (2009) provide some critical evaluation of the FSA model, particularly noting that diet soft drinks are classified as non-HFSS but are still 'suboptimal nutritionally', whereas some olive oils are classified as HFSS but contain important nutrients and are typically used sparingly. Taking into account the benefits and drawbacks of each coding instrument, future studies should seek, where possible, to apply more than one scheme to the same dataset (taking into account product reformulations). This would facilitate between-study comparisons, as well as ensuring that the usefulness of this model and the current regulations could be more easily assessed.

Furthermore, it should also be taken into account that there are other avenues used to promote food items, such as non-broadcast advertising on the internet. It is important to consider children's overall exposure to HFSS food marketing in whatever format, but there are sizeable methodological challenges involved in quantifying the extent and nature of advertising through these alternative and often rapidly evolving media. These challenges may well be insurmountable, but the contribution of their messages to the overall effect of HFSS marketing on children's food preferences and diets should not be ignored.

Summary of Key Points:

- Regular, consistent, and systematic monitoring of television food advertising is required to allow trends to be tracked over time

- Food advertising varies across channels, channel types, broadcast platforms, viewing times, and recording period (month of the year).

- Despite regulations, unhealthy foods dominate television advertising (even during peak children's viewing periods on channels popular with young people) with promotions for healthy foods comprising less than a fifth of total advertisements.

- In order to reduce children's exposure to HFSS food advertising, Ofcom regulations should take into account children's viewing outside of dedicated children's airtime and should determine which programmes are subject to regulations by the number of children in the viewing audience rather than the proportion.

- Different coding schemes may categorise foods differently, as demonstrated in Table 7-2, and therefore where possible more than one scheme should be applied to each data set to enable between-study comparisons, as well as evaluations of the usefulness of the coding models and of the regulations.

7.4 The nature of food advertising on UK television

A further aim of this thesis was to specifically address the gap in the literature relating to the nature or content of television food advertising in the UK. Chapter 6 describes the prevalence of persuasive techniques used, whereby a majority of food adverts studied featured a promotional character such as a brand equity character, a licensed character, or a celebrity endorser. Furthermore, given the dominance of HFSS food advertising, these characters were often promoting unhealthy foods on the channels that young people watch the most. Indeed, even on dedicated children's channels (those, theoretically at least, most targeted by the Ofcom regulations) 60% of promotional characters were used to promote foods 'providing nutrients and/or energy in excess of requirements'.

The Ofcom content rules state that licensed characters and celebrities popular with children may not be used in HFSS adverts targeted directly at pre-school or primary school children, yet this thesis describes data to suggest that this wording leaves a significant opportunity for such persuasive techniques to be used to promote HFSS foods on channels popular with children where the advert can be purported to be of more general appeal. This therefore allows the use of promotional characters on unhealthy food adverts to continue to occur on non-dedicated children's channels, regardless of the number of children being exposed to and persuaded by the commercial message to request or purchase HFSS foods, provided the viewing audience is predominantly adults. In addition, concerns have been raised over the distinction between types of promotional characters and the lack of restrictions regarding the use of brand equity characters as these characters are also known to appeal to children (Which?, 2006) although their role in the persuasive aspect of advertising is yet to be demonstrated empirically. The findings of Chapter 4 (discussed in section 7.2.4) may suggest that brand equity characters, rather than putting forward aspects of personality and substance to communicate wider brand identity, occupy a kind of 'enhanced brand logo' role which is an important aspect of children's attitudes towards advertising (Priya et al., 2010). As brand equity characters featured on a greater proportion of adverts than licensed characters, it would be timely to further research in this area in order to determine whether or not the regulation, as it stands with regard to the use of promotional characters, reflects the most appropriate and effective policy option available (see section 7.2.5).

On dedicated children's channels, of the food adverts broadcast that did feature promotional characters, a greater proportion of these were for core foods than on other channel types. These tentative findings may indicate that some progress has been made; it is certainly clear that the opportunity is there to use persuasive techniques to encourage healthier food choices among children and adolescents, and the potential exists to use marketer's expertise in persuasive food promotion to facilitate a shift towards overall healthier eating patterns in youth. This is also an example of the variation in the nature of food advertising that was seen along a number of the pertinent dimensions studied including channels, channel types, and viewing times (peak or non-peak periods), differences not addressed in previous studies due to limited sample sizes or a lack of potential for comparison (single channel recordings).

The findings of this thesis indicate that food adverts aimed at children principally rely on 'fun' as a key attribute of both the advertising experience and the use/consumption of the product, this is in keeping with the wider notion described by Hastings et al., (2003) that perpetuating child enjoyment and engagement with advertising is key to their persuasive power. Teenagers and adults were more likely to be targeted with the 'taste' appeal, which reflects the importance of credibility in advertising (Priya et al., 2010) to those young people (adolescents) likely to have a better understanding of persuasive intent and be less open to adverts with themes of fantasy or pure entertainment with limited substance. Both the use of promotional characters for brand representation and themes of fun in food advertising to children are consistent with Priya (2010)'s assertion that branding and entertainment are important determinants of children's attitudes to advertising. The use of themes or appeals in television food advertising is underexplored, and is another aspect of the persuasiveness of adverts that, if better understood, could be useful for the promotion of healthier food choices.

Overall a third of food advertisements directed the viewer to a website, with close to half of the food adverts adjudged to be aimed at teenagers/adults including reference to a website in the promotion. It is reasonable to assume that as regulations are applied, promotional activity will shift to less regulated areas and therefore it is important, in the context of diet and overall health impact, to consider young people's overall exposure to HFSS food advertising across all media and avenues (including event sponsorship etc). This pattern, as stated previously, has been seen with the shift of HFSS food advertising to family viewing times as a response to tightening legislation around children's airtime (Ofcom, 2008), and so use of the internet (as a relatively low cost and largely unregulated form of advertising) to prolong and enhance brand exposure as part of overall food promotional activity is likely to increase in line with this trend. Although research of the effects of exposure to internet-based food advertising is still in its infancy (Pempek & Calvert, 2009), the findings of this thesis add weight to the argument that food advertising regulations could be more effective if applied across media rather than in their current media-specific form. This introduces the difficulty of regulating cross-border marketing (marketing originating outside of the UK but being accessed from within the country) and, alongside the complexity of attempting to monitor internet-based commercial activity, highlights the challenges faced by policy makers in attempts to reduce children's exposure to HFSS food marketing.

7.4.1 Directions for future research

Future studies should look to address perceived weaknesses in the current regulations, to provide the data to determine if and where changes need to be made to achieve the aims of the food advertising legislation, namely reduced exposure of children to HFSS food advertisements. For example, analyses could include an assessment of the prevalence of brand advertising, i.e. advertisements for a particular brand that do not include a particular food product and therefore cannot be subjected to the nutrient profiling model (those referred to as 'unclassifiable' in the example analysis provided in section 7.3.1). Ofcom have been criticised for failing to legislate against brand advertising because of the practical difficulties of doing so. This means that even brands well known for their HFSS foods will be able to advertise during children's programming provided that food products are not explicitly shown. This could be considered to be a significant loophole. Given that the brand of an item is thought to be an important factor in the food choice decisions of young people (Jaeger, 2006), the extent to which this type of advertising activity occurs (which could be perceived as manufacturers and advertisers complying with the letter of the law if not the spirit of it) is one of the important considerations to make regarding the effectiveness of the current regulatory framework.

As the findings of this thesis show, despite significant changes in the regulation of food advertising, there is still cause for concern over the extent and nature of foods advertised to children. This work has added substantially to our limited knowledge of 1) what foods are being advertised on UK television and 2) how they are being advertised to children; two vital aspects required for informed policy debate. However, it is important to emphasise that this information should not be considered in isolation, rather it provides context for the rest of this thesis, which focuses on the behavioural outcomes of both acute and habitual television advertising exposure. It is this behavioural response that determines the health impact of television food advertising, and therefore the discussion will now address how this thesis has added to current knowledge of the effects of exposure to commercial food promotion on food preference, food choice, and related factors such as brand awareness and purchase-request behaviours.

Summary of Key Points:

- This thesis adds significantly to the literature in relation to the nature or content of television food advertising in the UK.

- The use of promotional characters (brand equity characters, licensed characters and celebrities) is pervasive, and often these characters are used to promote unhealthy foods.

- The use of characters to promote healthier food items was greater on dedicated children's channels than other channel types, possibly reflecting the impact of the regulations.

- The nature of food advertising varied along a number of dimensions, including channels, channel types, and viewing times.

- For continued evaluation of the usefulness of the Ofcom regulations, further exploration of the frequency of 'brand advertising' is warranted.

- The promotion of food brand websites during TV advertising slots should be closely monitored alongside all internet-based promotional activity which is less tightly regulated than television, early studies suggest such exposure does affect food preferences and choice.

7.5 Limitations of this research

There are some limitations to the research described in this thesis, which should be taken into account when interpreting the findings and also when designing studies to address the further research questions raised by this work.

The main limitation of the experimental studies with human participants described in Chapters 3-5 is that the sample sizes are relatively small (although comparable to or greater than those of other similar studies) and homogeneous. All participants were healthy children aged 6-13 years, predominantly Caucasian, living in the North West of England. Generalisations should not be made to other social, cultural or ethnic groups without caution. The homogeneity of the groups could have affected the results; certainly it is possible that the lack of weight status differences identified in this thesis is a result of the lack of obese participants (just 37% of all children taking part were in the overweight *and* obese category). Results may have been different if the samples had included more obese children, allowing separate categories for overweight and obese children and therefore comparisons between three weight status groups (normal weight/overweight/obese). The known links between socioeconomic status, television viewing and obesity prevalence (Stamatakis et al., 2010; Stamatakis, 2009), indicate that children in low SES schools have the most to gain from increasing our understanding of television food advertising effects. However, gaining access to children in schools of relatively low SES is challenging due to the time demands placed on teaching staff in such schools, and the trend for parents to be unwilling to provide consent for their children to participate; particularly where weighing and measuring of their child is involved. Therefore, there is always a tendency in studies of this kind for the sample population to be drawn from middle class schools where levels of obesity are slightly lower and generalisations to children beyond this social class may be problematic. In addition, researchers in the United States have described the phenomena of ‘targeted marketing’; whereby advertisements for certain food or beverage products (e.g. fast foods and other high calorie, low nutrient foods) are aimed at particular ethnic groups (African Americans and Latinos) (Grier & Kumanyika, 2010). Whilst similar marketing practices have not been described in the UK, the possibility for ethnic differences in food advertising exposure exists and should be taken into account when interpreting the findings of this thesis.

Furthermore, Chapters 3-5 describe cross-sectional, experimental studies which do not allow causality to be inferred in relationships. Particularly regarding Chapter 3, the effects of acute, experimental exposure to television food advertising demonstrates the short-term effects of this manipulation without establishing how long this behavioural modification may be sustained for. This is an important consideration when assessing the overall impact of such effects on dietary composition and risk of weight gain. Although this thesis introduces evidence of food preference differences between children with greater and lesser habitual television food advertising exposure which is indicative of the effects of longer term, cumulative exposure to food promotion, longitudinal or prospective studies are required in order to establish causality.

However, prior to embarking on such studies (which require considerable financial investment), it is important to identify the most useful and valid research tools. This thesis contributes to that process, through the use of both established paradigms in larger sample sizes to demonstrate their utility and the robustness of the observed effects, and the incorporation of novel measures for assessing the behavioural outcomes of food advertisement exposure. The majority of tools used were designed specifically for use in this research and therefore were of unknown reliability or validity, and the food preference measures, whilst used in previous published studies in both children (Halford et al., 2008a) and adults (Blundell et al., 2005; Larsen et al., 2010; Blundell et al., 2006) do not have reliability or validity data available. Therefore, much of the work of this thesis describes a process of development for these tools, generating what could be considered as pilot data, from which improvements can be made and against which future work can be compared in order to begin to generate reliability and validity statistics.

A further limitation of this work relates to the use of self-report measures. These measures can introduce bias and inaccuracy into the study design, and so data emanating from such tools should be interpreted carefully and with this issue taken into consideration. In addition, the use of a median split of each study sample to distinguish between high and low television viewers (Chapters 3-5) led to differences in the definitions of these categories between studies (i.e. using this method, high TV viewers were classified as those typically watching >21 hours of television per week in Chapter 3, in Chapter 4 this was > 24.5 hours and in Chapter 5 > 28.5 hours). Where whole population data are available (e.g. the estimated median of the typical television viewing hours of children in the UK as may be known by Ofcom), use of these figures as the basis for creating dichotomous variables would be advisable to avoid any categorisation differences between studies potentially affecting the interpretation of findings.

7.6 Final summary

In summary, this thesis has added to our knowledge of the effects of acute and habitual exposure to television food advertising on food preferences, brand awareness, and food purchase requests. In addition, this work has provided the most comprehensive analysis to date of the nature and extent of television food advertising being broadcast on the UK channels most popular with children and adolescents.

The principal findings indicate that acute, experimental exposure to food advertising does affect children's self-reported food preferences and that an individual's level of habitual television food advertising exposure may mediate their food preference response to food advert stimuli. Further, for the first time, habitual food advertising exposure has been shown to be related to food preference, suggesting that there are cumulative effects of commercial food promotion on children's dietary selections. Habitual food advertising exposure did not appear to affect children's brand awareness or requests for branded and non-branded food items, although previously discussed limitations of these studies regarding sample sizes (and therefore statistical power) and the novel nature of the tools mean that further research is needed to address these issues prior to stronger conclusions being drawn. This thesis also demonstrated that although television food advertising regulations may have had an effect on the relative frequency of food advertisements, there is still much work to be done to redress the balance between the promotion of non-core (unhealthy) and core (healthy) food products and to further understand the constituents of the persuasive power of food adverts in order to utilise that knowledge for the promotion of healthier dietary choices for children.

Increased understanding of the environmental determinants of behaviour is essential in order to foster food preferences in childhood that are beneficial to health both in the short and longer term. Given that such factors appear to be amenable to change, reducing the impact of the commercial promotion of HFSS foods and increasing children's exposure to persuasive messages encouraging healthier food consumption patterns would undoubtedly contribute to a wider societal effort to curb overconsumption of nutrient poor foods and halt the global rise in childhood obesity.

Approximately 14 million children in the EU were overweight or obese in 2004, with this figure rising by close to half a million young people every year (Lobstein et al., 2004). There are numerous health consequences, for example incidences of type II diabetes and fatty liver (associated with excessive weight) in youth were unheard of in the paediatric literature prior to 1980 but are now occurring in approximately a third of obese children (Ludwig, 2007).

It is clear that the current ‘obesogenic’ environment is one in which highly palatable, energy-dense foods are aggressively and persistently marketed at children through various media. It is essential that we understand the effects of this, and develop ways to protect children from pervasive messages encouraging the consumption of foods and diets so detrimental to their health, before the prediction that “paediatric obesity may shorten life expectancy by 2 to 5 years by 2050” (Ludwig, 2007) is realised.

Whilst there is a clear commercial imperative for food manufacturers and advertisers to maximise sales and consumption, if that consumption is of unhealthy food resulting in the earlier death of your consumers, this activity does not make long term economic sense. If all stakeholders work together to produce and persuasively promote healthier, nutrient-high food choices, the food industry can look to generate significant profit from the sales of these items to consumers throughout their extended lifespan.

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APPENDIX 1

Ethical Approval RETH000094

I am pleased to inform you that the Sub-Committee has approved your application for ethical approval. Details and conditions of the approval can be found below.

Please ensure that you send a signed copy of the final version , with all supporting documentation, to the Research Governance Officer, Contract Services, Research and Business Services, Foresight Building, Liverpool, L69 3GL.

Ref:	RETH000094
Sub-Committee:	Non-Invasive Procedures
PI:	Dr Jason Halford
Title:	An investigation of the relationship between commercial television viewing (a measure of relative advertisement exposure), and brand product requests, awareness of brand equity characters, food preferences and weight status in children.
First Reviewer:	Dr Kay Richardson
Second Reviewer:	n/a
Date of initial review:	22/10/07
Date of Approval:	23/11/07

The application was APPROVED subject to the following conditions:

Conditions

1	Mandatory	M: All serious adverse events must be reported to the Sub-Committee within 24 hours of their occurrence, via the Research Governance Officer (ethics@liv.ac.uk).

This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Sub-Committee should be notified.

If it is proposed to make a major amendment to the research, you should notify the Sub-Committee by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/researchethics/amendment%20procedure%209-07.doc.

APPENDIX 2a

Initial Letter

Dear Sir/Madam,

As you may be aware, the Food Standards Agency and the Medical Research Council have recently stated that T.V food advertisements may have an impact on children's eating behaviour and consequently their health. I am a doctoral research student pursuing a PhD in Psychology at the University of Liverpool and am currently conducting research into this area for my thesis.

To do this study, I need to carry out a short test on 60 children (aged between 7 – 11 years) on two separate occasions separated by two weeks. The experiment should take no longer than one hour on each occasion. Children will be shown a DVD clip consisting of some television advertising (selected from children's television) and a short cartoon. Following this they will be given three tools to complete after some brief verbal instructions. Children will then be asked to recall the adverts they will see, as well as completing a short questionnaire regarding how often they watch television, their food preference, and after school activities. After the second session, I would need to record their weight and height measurements. All data collected would of course be kept strictly confidential, with children being allowed to withdraw at any time they wish.

I have a consent form on which parents can provide their signature if they do not wish for their child to take part. In addition, parents will be asked if they could fill out a short questionnaire on their child's television viewing habits. Children will then be asked themselves if they wish to take part in the study prior to data collection.

It would be very much appreciated if you would consider allowing me to conduct this research at your school. I will follow up this letter with a phone call to discuss possible arrangements, but in the meantime if you have any queries or require further information regarding the study, please do not hesitate to contact me (details provided below).

Many thanks,

Emma Boyland

Contact Details:

Address: School of Psychology, University of Liverpool, Eleanor Rathbone Building, Bedford Street South, Liverpool L69 7ZA

Phone: (0151) 794 1478

Email: e.boyland@liverpool.ac.uk

Headteacher Information and Consent Form

This study is designed to investigate the effects of television food advertising on food preferences and choice in children.

Informed consent will also be sought from parents and children before the commencement of the study.

The study will be carried out on two occasions, separated by a period of two weeks. On both occasions, the children will be asked to watch a collection of 10 television adverts followed by a Scooby Doo cartoon. On one visit the adverts will be for toys and on the other visit the adverts will be for food products. Following viewing, the children will be asked to fill in three short questionnaires to assess their food preferences/choice. They will then be asked to complete a recognition test of the adverts they have seen and also to fill in a questionnaire regarding their habitual TV viewing habits. Children will be instructed as to how to complete these questionnaires and researchers will be present at all times to answer any questions.

On completion of the second session, children's height and weight will be recorded in order to establish their age and gender-appropriate Body Mass Index (BMI). This will be done on an individual basis, in private with a member of school staff present at all times.

Confidentiality will be upheld at all times, only the lead researcher (Emma Boyland) will have access to the data, and the information will be coded such that individual children will not be identifiable from any documentation.

I agree to this study being carried out in [SCHOOL].

Headteacher: ______________________________

Signed: ______________________________

Date: ______________________________

Consent For Use of the Parental Opt Out Method

It is proposed that the parental opt out method will be used in order to gain consent from parents to allow their child to participate in this study.

The parental opt out method will involve letters being sent to parents. If parents do not wish their child to participate in the study, the consent form will be signed and returned to the school. If letters are not returned to the school, this will indicate that parents or guardians are happy for their child to participate in the study.

I agree to the use of the parental opt out scheme in my school.

Signed: ____________________

Print Name: ____________________

Position: ____________________

School: ____________________

Date: ____________________

APPENDIX 2b

Initial Letter

Dear Sir/Madam,

As you may be aware, the Food Standards Agency and the Medical Research Council have recently stated that T.V food advertisements may have an impact on children's eating behaviour and consequently their health. I am a doctoral research student pursuing a PhD in Psychology at the University of Liverpool and am currently conducting a research study in this area for my thesis. I have Criminal Record Bureau (CRB) approval to conduct research with children.

To do this study, I need to carry out a short test with 60 children (aged between 7 and 11 years) at a single visit. The experiment should take no longer than two hours. Children will be given two questionnaire tasks to complete, and a flash card task to complete after some brief verbal instructions. These tasks will involve the children 1) completing brief questionnaires regarding their food preferences and television viewing habits at home, and 2) marking down products when being shown a flashcard of a product character, and marking down characters when being shown a product name. At the end of the session, I would need to record their weight and height measurements in private with a member of school staff present at all times. All data collected would of course be kept strictly confidential, with children being allowed to withdraw from the experiment at any time they wish.

I have a consent form on which parents will be asked to indicate whether or not they are willing for their child to take part. Children will then be asked themselves if they wish to take part in the study prior to data collection.

It would be very much appreciated if you would consider allowing me to conduct this research at your school. I will follow up this letter with a phone call to discuss possible arrangements, but in the meantime if you have any queries or require further information regarding the study, please do not hesitate to contact me (details provided below).

Many thanks,

Emma Boyland

Investigator Contact Details:

Emma Boyland (e.boyland@liv.ac.uk)
School of Psychology, Eleanor Rathbone Building,
University of Liverpool, Bedford St South, Liverpool L69 7ZA
Tel.: (0151) 794 1478
Fax.: (0151) 794 1479

Headteacher Information and Consent Form

INFORMATION SHEET

You have probably seen that there is currently a lot of debate surrounding the advertising of foods on television, particularly around programmes watched by children. We are interested in how these adverts may affect the foods children show preferences for and the foods they choose to eat.

This study has four parts. In Part 1, the children will be shown 10 flashcards showing brand characters and will be asked to write down what product they think the character advertises e.g. if a picture of Coco the Monkey is shown, the correct answer would be Kellogg's CocoPops. The children will then be shown 10 flashcards with pictures of food products on and asked to identify the brand character featured in advertisements for that item e.g. if a picture of Kellogg's Frosties is shown, the correct answer would be Tony the Tiger.

In Part 2, children will be given a short list of foods and will be asked to place a mark next to a food item if they would like to eat that particular food at that moment. The foods on the list will be everyday UK foods, both branded and non-branded, that the children are likely to be familiar with (e.g. "a medium sized dish of Heinz spaghetti", "a roast chicken breast").

In Part 3, children will be asked to fill in a questionnaire about their television viewing habits (e.g. "do you usually watch television in the evenings after school?", "what channel do you spend most time watching").

In Part 4, children's height and weight measurements will be taken, in private, with a member of staff present at all times. Results will be recorded discreetly so they are not seen by the child, or any subsequent children.

Ethics, confidentiality considerations and parental consent

Parts 1-3 will all be carried out in the child's normal classroom with the class teacher present. Completed sheets will be securely stored in a locked filing cabinet. These sheets will not include children's names, but will include a numerical "key" for each participant (this is simply to allow us to destroy the child's sheets if their parent withdraws consent after the data has been collected). After the study has been completed and written up, the key sheet will be destroyed.

Part 4 will be carried out in a private room, with a member of school staff present at all times. Any children who do not wish to be weighed or measured will not be coerced.

In the write-up of the research, the data will be presented completely anonymously, without referring to individual children (e.g. "75% of children knew that Tony the Tiger was used to advertise Frosties"). The school will also be sent a summary of the results of the study (again, this will not refer to individual children).

Please note that this research is not aimed at assessing individual children's diet or health, and indeed does NOT produce any score that can be taken as a measure of this. This research will not "test" individual children.

Contact Details

If you would like further information on this study or have any questions, please do not hesitate to contact me, Emma Boyland, on 0151 794 1478 (University of Liverpool) or by email at e.boyland@liv.ac.uk or my supervisor, Dr Jason Halford on 0151 794 2952 (University of Liverpool) or by email at j.c.g.halford@liv.ac.uk.

Many thanks for your help, Emma Boyland, University of Liverpool

CONSENT FORM

HEADTEACHER : Please read the statements below before signing.
*I have read the information outlined in the information sheet.
*I agree to the children in my school taking part in the study outlined in the information sheet.
*The investigator has answered all my outstanding questions about the study and its purpose.
*I understand that I can withdraw from the study at any time. I understand that if I wish to withdraw from the study after taking part, I can request that any data collected from the children at my school be destroyed. However, I understand that this will not be possible if the study has already been submitted for publication.
*I understand that all data will be anonymous and confidential. The children will not be identifiable in any publications. Only the investigators at the University of Liverpool will have access to the raw data.
*I understand that, in accordance to the Data Protection Act, I can request access to the data collected.

NAME OF HEAD TEACHER: ____
SIGNATURE:__________________________________ DATE: _______________

RESEARCHERS: Please read the statements below before signing.
*I agree that the headteacher or parent/guardian can choose to withdraw their child at any time.
*I understand that if the headteacher or parent/guardian wishes to withdraw from the study after taking part, I must destroy all data if they so request it. However, I understand that this will not be possible if the study has already been submitted for publication.
*I agree to keep all data anonymous and confidential and not to allow access to raw data to any investigator outside the University of Liverpool.

NAME OF RESEARCHER: ____
SIGNATURE:__________________________________ DATE: __________________

APPENDIX 2c

Initial Letter

As you may be aware, the Food Standards Agency and the Medical Research Council have recently stated that T.V food advertisements may have an impact on children's eating behaviour and consequently their health. I am a doctoral research student pursuing a PhD in Psychology at the University of Liverpool and am currently conducting a research study in this area for my thesis. I have enhanced Criminal Record Bureau (CRB) approval to conduct research with children.

To do this study, I need to carry out a short test with 60 children (aged between 7 – 11 years) at a single visit. The experiment should take no longer than two hours. Children will be given three written tasks to complete after some brief verbal instructions. These tasks will involve the children 1) writing a list of all the foods they would like to eat at that particular moment, 2) marking against a simple checklist of branded and non-branded foods if they'd like to eat those items at that particular moment, and 3) filling in a questionnaire about their television viewing habits at home. At the end of the session, I would need to record their weight and height measurements in private with a member of school staff present at all times. All data collected would of course be kept strictly confidential, with children being allowed to withdraw from the experiment at any time they wish.

I have a consent form on which parents will be asked to indicate whether or not they are willing for their child to take part. Children will then be asked themselves if they wish to take part in the study prior to data collection.

It would be very much appreciated if you would consider allowing me to conduct this research at your school. If you are interested, have any queries or require further information regarding the study, please do not hesitate to contact me (details provided below).

Many thanks,

Emma Boyland

Investigator Contact Details:

Emma Boyland (e.boyland@liv.ac.uk)

School of Psychology, Eleanor Rathbone Building, University of Liverpool, Bedford St South,

Liverpool L69 7ZA

Tel.: (0151) 794 1478 / Fax: (0151) 794 1479

Headteacher Information and Consent Form

INFORMATION SHEET

You have probably seen that there is currently a lot of debate surrounding the advertising of foods on television, particularly around programmes watched by children. We are interested in how these adverts may affect the foods children show preferences for and the foods they choose to eat.

This study has four parts. In Part 1, children will simply be asked to make a list of all the foods they would like to eat at that moment.

In Part 2, children will be given a short list of foods and will be asked to place a mark next to a food item if they would like to eat that particular food at that moment. The foods on the list will be everyday UK foods, both branded and non-branded, that the children are likely to be familiar with (e.g. "a medium sized dish of Heinz spaghetti", "a roast chicken breast").

In Part 3, children will be asked to fill in a questionnaire about their television viewing habits (e.g. "do you usually watch television in the evenings after school?", "what channel do you spend most time watching").

In Part 4, children's height and weight measurements will be taken, in private, with a member of staff present at all times. Results will be recorded discreetly so they are not seen by the child, or any subsequent children.

Ethics, confidentiality considerations and parental consent

Parts 1-3 will all be carried out in the child's normal classroom with the class teacher present. Completed sheets will be securely stored in a locked filing cabinet. These sheets will not include children's names, but will include a numerical "key" for each participant (this is simply to allow us to destroy the child's sheets if their parent withdraws consent after the data has been collected). After the study has been completed and written up, the key sheet will be destroyed.

Part 4 will be carried out in a private room, with a member of school staff present at all times. Any children who do not wish to be weighed or measured will not be coerced.

In the write-up of the research, the data will be presented completely anonymously, without referring to individual children (e.g. "75% of children chose more branded items than non-branded"). The school will also be sent a summary of the results of the study (again, this will not refer to individual children).

Please note that this research is not aimed at assessing individual children's diet or health, and indeed does NOT produce any score that can be taken as a measure of this. This research will not "test" individual children.

Contact Details

If you would like further information on this study or have any questions, please do not hesitate to contact me, Emma Boyland, on 0151 794 1478 (University of Liverpool) or by email at e.boyland@liv.ac.uk or my supervisor, Dr Jason Halford on 0151 794 2952 (University of Liverpool) or by email at j.c.g.halford@liv.ac.uk.

Many thanks for your help,

Emma Boyland, University of Liverpool

CONSENT FORM

HEADTEACHER : Please read the statements below before signing.
*I have read the information outlined in the information sheet.
*I agree to the children in my school taking part in the study outlined in the information sheet.
*The investigator has answered all my outstanding questions about the study and its purpose.
*I understand that I can withdraw from the study at any time. I understand that if I wish to withdraw from the study after taking part, I can request that any data collected from the children at my school be destroyed. However, I understand that this will not be possible if the study has already been submitted for publication.
*I understand that all data will be anonymous and confidential. The children will not be identifiable in any publications. Only the investigators at the University of Liverpool will have access to the raw data.
*I understand that, in accordance to the Data Protection Act, I can request access to the data collected.

NAME OF HEAD TEACHER: ____
SIGNATURE:________________________________ DATE: ______________

RESEARCHERS: Please read the statements below before signing.
*I agree that the headteacher or parent/guardian can choose to withdraw their child at any time.
*I understand that if the headteacher or parent/guardian wishes to withdraw from the study after taking part, I must destroy all data if they so request it. However, I understand that this will not be possible if the study has already been submitted for publication.
*I agree to keep all data anonymous and confidential and not to allow access to raw data to any investigator outside the University of Liverpool.

NAME OF RESEARCHER: ____
SIGNATURE:________________________________ DATE: _________________

APPENDIX 3

Study Information and Parental Consent Form

Dear Parent/Guardian,

The School of Psychology at the University of Liverpool is currently conducting research into the increasingly important area concerning the impact of T.V. food advertisements on children's eating behaviour. We are particularly interested in examining the influence of T.V. advertising on food choice in school children. Approval has been granted by the head of [SCHOOL] for one of our PhD students, Emma Boyland, to conduct such research for her degree and, with your consent, we would very much like to involve your child in this study.

Pending consent, your child and their class will be shown a short video consisting of some T.V advertisements and a cartoon clip. Subsequently, children will be asked to recall the adverts they have seen, and will be required to complete some short questionnaires on food preferences and T.V. viewing habits. Children will be tested on two occasions with a time period of two weeks separating testing sessions. Please note that all research conducted will take place within school hours.

This study requires measurements of children's height and weight. As some children can be particularly sensitive regarding their weight we can assure you that confidentiality will be upheld at all times. Furthermore, measurements will be taken on a one to one basis with a teacher present at all times. Once again, we would like to assure you that for all data collected; confidentiality will be upheld at all times. No information that can be used to identify individual children will appear in the project write up/any resulting publications. You have the right to withdraw your child from this study at any stage.

If you are happy for your child to participate in this research then you do not need to return this form. However, please return the completed questionnaire attached. If you would **not** like your child to participate in this research, please sign and return Part A (below) of the consent form to the school and do not return the questionnaire.

Please try not to influence your child's results by discussing information of this study in any great detail. A completed copy of this experiment and its findings will be available from the school on completion of this study. If you have any further queries or concerns please do not hesitate to contact us. Please address any correspondence to the school for the attention of [NAME OF STAFF MEMBER].

Part A- I do not wish for my child ______________________________to participate in this research.

Signed ________________________(Parent/Guardian)

APPENDIX 4

Study Information and Parental Consent Form

Information about the study

[CHAPTER 4 STUDY] You have probably seen that there is currently a lot of debate surrounding the advertising of foods on television, particularly around programmes watched by children. We are interested in how these adverts may affect the foods children show preferences for and the foods they choose to eat.

This study has four parts. In Part 1, children will simply be asked to make a list of all the foods they would like to eat at that moment.

In Part 2, children will be given a short list of foods and will be asked to place a mark next to a food item if they would like to eat that particular food at that moment. The foods on the list will be everyday UK foods, both branded and non-branded, that the children are likely to be familiar with (e.g. “a medium sized dish of Heinz spaghetti”, “a roast chicken breast”).

In Part 3, children will be asked to fill in a questionnaire about their television viewing habits (e.g. “do you usually watch television in the evenings after school?”, “what channel do you spend most time watching”).

In Part 4, children’s height and weight measurements will be taken, in private, with a member of school staff present at all times. Results will be recorded discreetly so they are not seen by the child, or any subsequent children.

[CHAPTER 5 STUDY] You have probably seen that there is currently a lot of debate surrounding the advertising of foods on television, particularly around programmes watched by children. We are interested in how these adverts may affect the foods children show preferences for and the foods they choose to eat.

This study has four parts. In Part 1, the children will be shown 10 flashcards showing brand characters and will be asked to write down what product they think the character advertises e.g. if a picture of Coco the Monkey is shown, the correct answer would be Kellogg’s CocoPops. The children will then be shown 10 flashcards with pictures of food products on and asked to identify the brand character featured in advertisements for that item e.g. if a picture of Kellogg’s Frosties is shown, the correct answer would be Tony the Tiger.

In Part 2, children will be given a short list of foods and will be asked to place a mark next to a food item if they would like to eat that particular food at that moment. The foods on the list will be everyday UK foods, both branded and non-branded, that the children are likely to be familiar with (e.g. “a medium sized dish of Heinz spaghetti”, “a roast chicken breast”).

In Part 3, children will be asked to fill in a questionnaire about their television viewing habits (e.g. “do you usually watch television in the evenings after school?”, “what channel do you spend most time watching”).

In Part 4, children's height and weight measurements will be taken, in private, with a member of school staff present at all times. Results will be recorded discreetly so they are not seen by the child, or any subsequent children.

Ethics, confidentiality considerations and parental consent

Children will work with the researcher (a postgraduate student at the University of Liverpool) in their class groups in the classroom with their normal class teacher present. The researcher involved has full "Enhanced Disclosure" Police-check certificate (the same certificate that teachers are now required to obtain).

Only the researcher involved will have access to the data and the children's names will not be stored with the data. In the write-up of the research, the data will be presented anonymously, without referring to individual children. The school will also be sent a summary of the results of the study (again, this will not refer to individual children).

Participation is entirely voluntary and you may withdraw a child at any time without having to give a reason, and without detriment to you or the child (if you withdraw a child after the study has begun we will destroy any data already collected). If any child does not want to participate themselves they will not be asked to, even if you have given your consent for the child to participate. Under the Data Protection Act, parents have the right to request access to the data for their child.

Reporting complaints and adverse events

Nearly all children enjoy taking part in studies like this one, which has been approved by the University of Liverpool Research Ethics Committee. However, the University have a formal procedure to deal with complaints and for the reporting of adverse effects. If a participant or a participant's representative wishes to raise a concern about the study, and in particular about the conduct of the study or the individuals involved, that would be inappropriate to raise with the principal investigator (Dr. Jason Halford 0151 794 2952), please use the complaints procedure. Complaints should be addressed to the Research Governance Officer in Research and Business Services (ethics@liv.ac.uk, 0151 794 8727). Please provide the identifying information below:

Principal Investigator: Dr. Jason Halford

Research Project Title: An investigation of the relationship between commercial television viewing (a measure of relative advertisement exposure), and brand product requests, awareness of brand equity characters, food preferences and weight status in children.

Ethics Reference Number: RETH000094

Contact Details

If you would like further information on this study or have any questions, please do not hesitate to contact me, Emma Boyland, on 0151 794 1478 (University of

Liverpool) or by email at e.boyland@liv.ac.uk or my supervisor, Dr Jason Halford on 0151 794 2952 (all University of Liverpool) or by email at j.c.g.halford@liv.ac.uk.

Many thanks for your help,

Emma Boyland

University of Liverpool

Ethics Form Attachment 1c – Parental Consent Form

Dear Parent,

At the Liverpool Laboratory for the Study of Ingestive Behaviour, we investigate how children develop food preferences. [HEADTEACHER] has kindly agreed that we can conduct one of our food preference studies at [SCHOOL].

[CHAPTER 4 STUDY] This study focuses on how television advertising affects the foods children prefer and choose to eat. It will involve children firstly making a shopping list of all the foods they would like to eat, then filling in one questionnaire on food preferences and another on television viewing habits, and finally having their weight and height measured in private. Further details of the study are given on the parent information sheet overleaf.

[CHAPTER 5 STUDY] This study focuses on how television advertising affects the foods children prefer and choose to eat. It will involve children firstly looking at pictures of brand characters on flashcards and identifying the product they advertise and vice versa, then filling in one questionnaire on food preferences and another on television viewing habits, and finally having their weight and height measured in private. Further details of the study are given on the parent information sheet overleaf.

Children tend to enjoy these studies and are usually eager to participate. However, we require consent from you before your child can take part. Participation is entirely voluntary and you may withdraw your child at any time without having to give a reason, and without detriment to you or your child (if you withdraw your child after the study has begun we will destroy any data already collected). If any child does not want to participate themselves they will not be asked to, even if you have given your consent for your child to participate.

Please indicate whether or not you are willing for your child to take part in this study by completing the slip below. Please sign, detach, and return the slip at the bottom of this page BY [DAY AND DATE] when the study will begin.

We do hope that you will be happy for your child to participate.

Yours sincerely

Emma Boyland

University of Liverpool

University of Liverpool

Study of Food Advertising and Preferences in Children

PARENT/GUARDIAN CONSENT FORM

PLEASE RETURN BY [DAY AND DATE]

I am/ am not (delete as applicable) willing for my child to participate in the food preference study to be conducted at [SCHOOL]. I have read and understood all the information provided in the information sheet and above, and have had any outstanding queries answered to my satisfaction.

Signed……………………………………………………………. Date…………………………………

Name of parent/guardian……………………………………(BLOCK CAPITALS PLEASE)

Name of child…………………………………………………..(BLOCK CAPITALS PLEASE)

APPENDIX 5a

Study Information and Consent Form for Child Volunteers

Please read through the following information carefully.

The experiment will be divided into two separate parts.

- Firstly, you will watch a cartoon, this will last around 20 minutes.
- For the second part of the experiment, you will be given 4 short tasks to complete. You will be instructed how to complete these after the cartoon has finished.

You will be asked to take part in a follow up study in two weeks time.

You can withdraw from this study at any time without giving a reason.

If you have any questions or need any help, please feel free to ask.

Consent

Please circle either Yes or No for each statement below

I am willing to take part in this experiment Yes / No

I understand what is required of me Yes / No

I understand that I can withdraw

from this experiment at any time Yes / No

Please complete the following:

Name: ______________________

Age: ________yrs_____________months

Girl / Boy

Are you a vegetarian?: ______________________

APPENDIX 5b

<u>Study Information and Consent Form for Child Volunteers</u>

Please read through the following information carefully.

The experiment will be divided into two separate parts.

- Firstly, you will be given three short written tasks to complete. I will explain these tasks to you before each one.
- For the second part of the experiment, I will take your height and weight measurements in a private room.

You can withdraw from this study at any time without giving a reason.

If you have any questions or need any help, please feel free to ask.

<u>Consent</u>

Please circle either Yes or No for each statement below

I am happy to take part in this experiment	Yes / No
I understand what I am being asked to do	Yes / No
I understand that I can withdraw	
from this experiment at any time	Yes / No

Please complete the following:

Name: ______________________

Age: ________yrs_____________months

Please circle either girl or boy below

Girl / Boy

APPENDIX 5c

Study Information and Consent Form for Child Volunteers

Please read through the following information carefully.

The experiment will be divided into two separate parts.

- Firstly, you will be given three short written tasks to complete. I will explain these tasks to you before each one.
- For the second part of the experiment, I will take your height and weight measurements in a private room.

You can withdraw from this study at any time without giving a reason.

If you have any questions or need any help, please feel free to ask.

Consent

Please circle either Yes or No for each statement below

I am happy to take part in this experiment	Yes / No
I understand what I am being asked to do	Yes / No
I understand that I can withdraw	
from this experiment at any time	Yes / No

Please complete the following:

Name: ________________________

Age: _________yrs_______________months

Please circle either girl or boy below

Girl / Boy

APPENDIX 6

Letter from Ofcom

Dear Ms Boyland

Freedom of Information: Right to know request 1-27184548

Thank you for your request for information regarding children's TV viewing data, which Ofcom received on 31 July 2007 and has considered under the Freedom of Information Act 2000. I am writing to advise you that Ofcom has decided not to disclose the information you requested.

The information you requested is being withheld as it falls under the exemption in section 43 of the Freedom of Information Act. This part of the Act deals with the exemption of information that would prejudice the commercial interests of a person or company. In applying this exemption we have had to balance the public interest in withholding the information against the public interest in disclosing the information. The attached annex A to this letter sets out the exemption in full, as well as the factors Ofcom considered when deciding where the public interest lay.

It is likely that other exemptions will apply.

However, I am able to supply you with a presentation, given by James Thickett of Ofcom at the Voice of the Viewer and Listener conference in May this year, which includes three tables that will be useful – pages 14,15 and 18 show share of children's viewing of the different children's channels on all platforms, and levels of children's viewing across the day. The presentation is enclosed and is also on the Ofcom website here:
http://www.ofcom.org.uk/media/speeches/2007/05/ovlv07.

We do not hold information to the level of detail you request in your question 2; i.e. viewing levels by quartiles of maximum viewing.

The data, from which the charts in the presentation are derived, are subject to the exemption described above, and are purchased under licence by Ofcom from BARB (Broadcasters' Audience Research Board Ltd). Should you wish to purchase access to BARB data, the contact there is: enquiries@barb.co.uk, and the website at www.barb.co.uk shows subscription rates.

Yours sincerely

:: Julia Fraser

Head of Knowledge Centre
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:: Ofcom

APPENDIX 7

Coding Scheme

COLUMN A: Country	UK
COLUMN B: Channel	Channel name
COLUMN C: Date	Format DD/MM/YY
COLUMN D: Day	Day of the week

COLUMN E: Programme name

Programme in which the advertisement is shown (if advert is between programmes name the preceding programme)

COLUMN F: Programme category

Code as below:

1 = Comedy

2 = Drama

3 = Movie

4 = Soap opera

5 = Music/music video

6 = News/commentary

7 = Talk shows

8 = Reality

9 = Sports

10 = Entertainment/variety

11 = Documentary

12 = Game

13 = Children's

14 = Infomercial

15 = Other

COLUMN G: Starting time

Starting time of the programme in 24hr clock format (e.g. 13:50 not 1.50pm. Must be separated with a colon).

COLUMN H:

Time slot	14:00 = 17
6:00 = 1	14:30 = 18
6:30 = 2	15:00 = 19
7:00 = 3	15:30 = 20
7:30 = 4	16:00 = 21
8:00 = 5	16:30 = 22
8:30 = 6	17:00 = 23
9:00 = 7	17:30 = 24
9:30 = 8	18:00 = 25
10:00 = 9	18:30 = 26
10:30 = 10	19:00 = 27
11:00 = 11	19:30 = 28
11:30 = 12	20:00 = 29
12:00 = 13	20:30 = 30
12:30 = 14	21:00 = 31
13:00 = 15	21:30 = 32
13:30 = 16	

COLUMN I: Peak or non-peak children's viewing time

<u>Peak = 1</u>

Weekdays = 17:30 – 22:00

Weekend = 19:00 – 21:00

<u>Non-peak = 0</u>

All other times

COLUMN J: High or non-high children's viewing time

<u>High = 1</u>

Weekdays = 07:30 – 09:30

= 15:00 – 22:30

Weekend = 08:00 – 22.30

Non-high

All other times

COLUMN K: Between or within programme

Within programme = 1

Between programmes = 0

COLUMN L: Advert product type

1 = Food and drink

2 = Clothes/shoes

3 = Education

4 = Entertainment (including music, video, films, entertainment parks)

5 = Financial (including building societies, banks, insurance, pensions)

6 = Household cleaners/detergents (including washing up liquid, washing powders, cleaning fluids)

7 = Household equipment (including electrical appliances)

8 = Motoring (including cars and petrol)

9 = Pet products (including pet food)

10 = Pharmaceutical (including medications, vitamin pills, breath fresheners)

11 = Public information announcements/community service announcements (general)

12 = Public information announcements (sponsored by food companies)

13 = Publishing (including magazines, books, newspapers. Includes recipe books and cooking magazines)

14 = Retailing & mail order (including catalogues, other that supermarkets)

15 =Toiletries (including soap, hair shampoo, cosmetics, nappies, sanitary protection)

16 = Toys

17 = Travel/transport/holidays

18 = Utilities (including telephone, gas, electricity)

19 = Channel promotions (including promotions for the channel, other programs)

20 = Other

The following additional details of all *FOOD* advertisements are to be coded:

COLUMN M: Food product brand name

Manufacturer's name and brand name of product (e.g. McDonald's Big Mac or Cadbury's Fruit & Nut Chocolate).

COLUMN N: Detailed description of food product

The description of the product should be thorough. The product needs to be identifiable for the purposes of collecting nutrition information. Include flavour or brand variant (E.g. "chocolate coated, cream-filled biscuit" rather than just "biscuit").

COLUMN O: Food code

Food product categorised as one of 28 food categories shown below.

If more than one food product is shown in an advertisement, select the one that is the most dominant. If equal attention is given to different products, select the product that is shown first.

<u>Core and healthy food categories</u>

1 Breads (include high fibre, low fat crackers), rice, pasta and noodles

2 Low sugar and high fibre breakfast cereals (<20g/100g sugar *and* >5g/100g dietary fibre)

3 Fruits and fruit products without added sugar

4 Vegetables and vegetable products without added sugar

5 Low fat/reduced fat milk, yoghurt, custard (<3g/100g fat) and cheese (<15g/100g fat; includes 50% reduced fat cheddar, ricotta and cottage) and their alternatives (E.g. soy) (including probiotic drinks)

6 Meat and meat alternatives (not crumbed or battered) (includes fish, legumes, eggs and nuts and nut products, including peanut butter and excluding sugar coated or salted nuts)

7 Core foods combined (including frozen meals (<10g/serve fat), soups (<2g/100g fat, excludes dehydrated), sandwiches, mixed salads and low fat savoury sauces (<10g/100g fat; includes pasta simmer sauces)

8 Baby foods (excluding milk formulae)

9 Bottled water (including mineral and soda water)

Non-core and unhealthy food categories

10 High sugar and/or low fibre breakfast cereals (>20g/100g *or* <5g/100g dietary fibre)

11 Crumbed or battered meat and meat alternatives (e.g. fish fingers) and high fat frozen meals (>10g/serve fat)

12 Cakes, muffins, sweet biscuits, high fat savoury biscuits, pies and pastries

13 Snack foods, including chips, savoury crisps, extruded snacks, popcorn, snack bars, muesli bars, sugar sweetened fruit and vegetable products (such as jelly fruit cups, fruit straps) and sugar coated nuts.

14 Fruit juice and fruit drinks

15 Frozen/fried potato products (excluding packet crisps)

16 Full cream milk, yoghurt, custard, dairy desserts (>3g/100g fat) and cheese (25% reduced fat and full fat varieties, and high salt cheese, including haloumi and feta) and their alternatives

17 Ice cream and iced confection

18 Chocolate and confectionery (including regular and sugar-free chewing gum and sugar)

19 Fast food restaurants/meals (include general pizza, burgers, 'healthy' alternatives from fast food restaurants)

20 High fat/sugar/salt spreads (includes yeast extracts, excludes peanut butter), oils, high fat savoury sauces (>10g/100 fat), meal helpers (including stocks, tomato paste) and soups (>2g/100g fat tinned and all dehydrated)

21 Sugar sweetened drinks including soft drinks, cordials, electrolyte drinks and flavour additions e.g. Milo).

22 Alcohol

Miscellaneous

23 Vitamin and mineral supplements

24 Tea and coffee

25 Supermarkets – advertising mostly non-core foods

26 Supermarkets – advertising mostly core foods

27 Supermarkets – non-specified (generic supermarket ads or not clearly for core or non-core)

28 Baby and toddler milk formulae.

(Note: Many fast food restaurants sell ‘healthier’ products. These items should still be classified as unhealthy, as it is essentially the brand name that they are promoting, not the product. Consumers continue to purchase unhealthy foods from these venues, and the provision of healthy alternatives merely acts to give the brand a positive image.)

COLUMN P: Promotional Characters

Use of cartoons and celebrities to promote foods.

Food advertisements that contain cartoons (including branded characters, such as Ronald McDonald) and celebrities = 1 Without = 0

COLUMN Q: Premium Offers

Assess the use of premium offers (including giveaways, competitions, contests, vouchers and rebates) to promote foods.

Food ads with premium offers = 1 Without = O

COLUMN R: Primary persuasive appeal

1 Quantity

2 Convenience

3 Taste

4 Health/Nutrition

5 Energy

6 Price

7 Unique/New

8 Fun

9 General Superiority

10 Peer Status/Sex Appeal

11 Premium or Contest

12 Weight Loss/Diet

13 Offers Choices/Options

14 Enjoyment/Satisfaction

15 Product Introduction

16 Corporate Information

17 Other

COLUMN S: Secondary appeal

If food ad did not use health/nutrition or energy as a primary appeal, note if either set of appeals is used as a seconday appeal.

1 Health/Nutrition

2 Energy

COLUMN T: Physical activity depicted

Characters (real or animated) engaged in purposeful physical activity beyond casual walking or simply moving about in a reasonably prominent way, not in background or a quick glimpse.

Physical activity depicted = 1

None depicted = 0

COLUMN U: Health claims

Verbal or textual. Where more than one claim is made, use main claim. If more than one main claim, use first mentioned health claim.

1 Low fat/fat free

2 Sugar free

3 No added sugar/less sugar

4 Low calorie/light

5 Low carbohydrate

6 Organic

7 Natural ingredients/all natural/no preservatives/nothing artificial

8 Provides essential nutrients (inc. protein, calcium, potassium, vitamins, antioxidants)

9 Whole grain/whole wheat

10 Fibre or bran

11 Heart healthy

12 Low cholesterol

13 Diet

14 Baked

15 Five a day

COLUMN V: Disclaimers

1 Part of a balanced/complete/nutritious breakfast or meal

2 Part of a balanced/healthy diet

3 Not a substitute for a real meal

4 Enjoy in moderation

5 Other

COLUMN W: Celebrities

1 Entertainment celebrity

2 Sportsperson

3 Business Leader

4 Politician

5 Other

COLUMN X: Brand equity/licensed character

1 Brand equity character

Created by manufacturers, only associated with that brand and nowhere else (e.g. Coco the Monkey, Ronald McDonald).

2 Licensed character

Character in its own right, used to promote this product (e.g. Shrek).

COLUMN Y: Primary target

Intended target audience (determine using age of actors, network and nature of persuasive appeal).

1 Children and/or teens

2 Teens and adults

3 Adults (20-64 yrs)

4 Older adults (65+yrs)

5 All ages

COLUMN Z: Direction to website

Mentions the company website or flashed the website on the screen = 1

None = 0

APPENDIX 8

Leeds Food Preference Measure (LFPM)

Look at each item in turn. If you would like to eat it now tick the box next to it. If not, go on to the next one. Think about each item carefully but do not spend too much time on each one.

Non-Branded Food Items	
A roast chicken breast	
A currant bun	
A large chocolate bar	
A medium sized peach	
A baked potato with a small knob of butter	
A small dish of fried mushrooms	
A medium size grilled cod fillet	
2 average size tomatoes	
A grilled lean lamb cutlet	
A small slice of cheesecake	
A small green salad	
A crusty white or brown bread roll	
2 slices of corned beef	
4 ginger biscuits	
A medium size sausage roll	
A dish of fresh strawberries	
Half a cup of tinned salmon	
2 pickled onions	
A small slice of jam filled sponge	
A grilled lean piece of gammon	
2 lemon pancakes	
A medium size dish of baked beans	

A carton of natural yoghurt	
1½ packets of potato crisps (any flavour)	
A dish of shelled prawns	
A dish of tinned fruit salad	
A 2oz wedge of cheddar cheese	
A grilled ¼lb rump steak	
2 sticks of celery	
A cream filled chocolate éclair	
A medium size bowl of fried rice	
A small slice of honeydew melon	

APPENDIX 9

Adapted Food Preference Measure (AFPM)

Look at each item in turn. If you would like to eat it now tick the box next to it. If not, go on to the next one. Think about each item carefully but do not spend too much time on each one.

Branded Food Items	
A cherry scone from ASDA	
A large NESTLE ROWNTREE chunky kit-kat	
A SPUD-U-LIKE baked potato with a small knob of butter	
A portion of McDONALDS fried nuggets	
A slice of CADBURY fudge cake	
2 pieces of WARBURTONS bread	
2 FOX'S double choc chip cookies	
A medium size SAYERS pasty	
A MR KIPLING bake-well tart	
2 MR KIPLING lemon slices	
A medium size dish of HEINZ spaghetti	
1 packets of WALKERS potato crisps (any flavour)	
A dish of PRINCES tinned fruit pineapple	
A pack of DAIRY cheese pieces	
A sticky toffee HEINZ sponge pudding	
A portion of UNCLE BENS fried rice	

APPENDIX 10

Leeds Forced Choice Test (LFCT) Response Sheet

Please circle A or B for each food pair (1-30) to indicate which food you would eat if you had to eat one portion at this particular moment.

Picture		
1	A	B
2	A	B
3	A	B
4	A	B
5	A	B
6	A	B
7	A	B
8	A	B
9	A	B
10	A	B
11	A	B
12	A	B
13	A	B
14	A	B
15	A	B
16	A	B
17	A	B
18	A	B
19	A	B
20	A	B
21	A	B
22	A	B

23	A	B
24	A	B
25	A	B
26	A	B
27	A	B
28	A	B
29	A	B
30	A	B

Leeds Forced Choice Test (LFCT) Example Images (Actual Size)

4A

4B

APPENDIX 11

TV Viewing Questionnaire (Parent Report)

Please read each question carefully and circle the response that most applies to you and your child. Circle more than one response if applicable. Please note that T.V. viewing refers to channels broadcast by the television networks (e.g. BBC, ITV etc) and not to television viewed through DVDs or videogames.

Thank you for taking the time to complete this questionnaire, it is most appreciated.

How many hours of T.V. does your child watch per day?

1-2 3-4 5-6 6 or more

Which terrestrial T.V. channels does your child normally watch?

BBC 1 BBC 2 ITV1 Channel 4 Channel 5

Do you have any additional channels on your television e.g. SKY, cable etc?

Yes No

If yes, please select from the list below which channels your child watches (circle more than one response if applicable):

Cartoon Network	Nick Jr	Pop	Nicktoons
Toonami	CBeebies	CITV	Sky One
Boomerang	Jetix	Discovery Kids	E4
Nickelodeon	Disney Channel	CBBC Channel	MTV

What type of programmes does your child prefer to watch?

Cartoons Dramas Soaps Comedy Sport

Other (please specify)……………………

What are your child's favourite programmes? Please give three examples below.

1……………………………………………….

2………………………………………………

3………………………………………………

At what time/times of the day does your child typically watch T.V. on weekdays?

7am-9am 9am-12 noon 12noon- 3pm 3pm-6pm 6pm-9pm
9pm-12am

At what time/times of the day does your child typically watch T.V. on the weekends?

7am-9am 9am-12 noon 12noon- 3pm 3pm-6pm 6pm-9pm
9pm-12am

How many T.V. sets are there in your household?

1-2 3-4 5 or more

Does your child have a T.V. set in their bedroom?

Yes No

Do you restrict how many hours of T.V. and/or which channels your child watches?

Yes No

If yes, do you tell your child what time to switch off the television?

Yes No

If so, what time? …………………………………………………………….

If yes, do you stop your child from watching any channels?
Yes No

If so, which channel?..

Does your child eat meals in front of the television or with a T.V. set switched on in the room?

Yes No

If yes, how many times per week?

1-2 3-4 5-6 6 or more

Does your child eat snacks in front of the television?

Yes No

If yes, which of the following do they consume?

Crisps Sweets Chocolate Biscuits Fruit Cereal Bars Nuts Other

If yes, how many times per week?

1-2 3-4 5-6 6 or more

Does your child ask you to purchase products (food and non-food) that they have seen advertised on the T.V.?

Yes No

If yes, how often are requests made per week?

1-2 3-4 5-6 6 or more

If yes, have you ever bought these products for them?

Yes No

How long does your child spend doing homework per night?

15 minutes 30 minutes 45 minutes 60 minutes

Does your child participate in any extracurricular activities e.g. music lessons, football etc?

Yes No

If yes, how many hours do they dedicate to these activities per week?

1-2 3-4 5-6 6 or more

Would your child like to watch more T.V. than they do?

Yes No

APPENDIX 12

Habitual Television Viewing Questionnaire (HTVQ)

Please read each question carefully and circle the answer that most applies to you. You can circle more than one answer. T.V. means actually watching television programmes and not DVDs or videogames.

How many hours of T.V. do you watch per day?

1-2 3-4 5-6 7 or more

Which terrestrial T.V. channels do you normally watch?

BBC 1 BBC 2 ITV1 Channel 4 Channel 5

Do you have any additional channels on your television e.g. SKY, cable etc?

Yes No

If yes, please select from the list below which channels you watch (you can choose more than one):

Cartoon Network	Nick Jr	Pop
Nicktoons	Toonami	CBeebies
CITV	Sky One	Boomerang
Jetix	Discovery Kids	E4
Nickelodeon	Disney Channel	CBBC Channel
MTV		

What are your favourite types of programmes?

Cartoons Dramas Soaps Comedy Sport

Any others…………………………………………………………………..……………………..

Name your 3 favourite programmes

1…………………………………………………………………………………………….

2……………………………………………………………………………………………

3……………………………………………………………………………………………

At what time/times of the day do you watch T.V. on weekdays?

7am-9am 9am-12 noon 12noon- 3pm 3pm-6pm

6pm-9pm 9pm-12am

At what time/times of the day do you watch T.V. at weekends?

7am-9am 9am-12 noon 12noon- 3pm 3pm-6pm

6pm-9pm 9pm-12am

How many televisions are there in your house?

1-2 3-4 5 or more

Do you have a television in your bedroom? Yes No

Are you told what time to switch off the television? Yes No

If so, what time? ………………………………………………………….

Are you stopped from watching any channels? Yes No

If so, which channel?..

Do you eat meals in front of the television or with a T.V. set switched on in the room?

Yes No

If yes, how many times per week?

1-2 3-4 5-6 6 or more

Do you eat snacks in front of the television? Yes No

If yes, which of the following do you eat?

Crisps Sweets Chocolate Biscuits Fruit Cereal Bars Nuts Other

If yes, how many times per week?

1-2 3-4 5-6 6 or more

Do you ask your family to buy things that you have seen advertised on the T.V.?

Yes No

If yes, how many times per week do you ask them for things you have seen advertised on T.V.?

1-2 3-4 5-6 6 or more

If yes, do they buy these things for you? Yes No

How long do you spend each evening doing your homework?

15 minutes 30 minutes 45 minutes 60 minutes

Do you take part in any out of school activities e.g. music lessons, football etc?

Yes No

If yes, how many hours do you spend on these activities per week?

1-2 3-4 5-6 6 or more

Would you like to watch more T.V. than you do?

Yes No

Thank you very much for answering these questions, I really appreciate it.

APPENDIX 13

Revised Habitual Television Viewing Questionnaire (HTVQ-R)

Instructions:

Please think about the time you spend watching television when you answer these questions. Do not include time you spend watching DVDs or playing games that are connected to the TV.

Please put a circle around the answer that you think is right for you.

1. Do you usually watch television in the mornings before you come to school?

Yes / No

If you answered yes, how long do you usually watch television for before you come to school?

Less than half an hour / Half an hour / 1 hour / More than 1 hour

2. Do you usually watch television in the evenings after school?

Yes / No

If you answered yes, how long do you usually watch television for in the evenings after school?

Less than 1 hour / 2 hours / 3 hours / 4 hours / 5 hours / 6 hours or more

3. On Saturdays, do you watch television in the morning before lunch?

Yes / No

If you answered yes, how long do you usually watch television for on Saturday mornings?

Less than 1 hour / 2 hours / 3 hours / 4 hours / 5 hours / 6 hours or more

4. On Saturdays, do you watch television in the afternoon before your tea?

Yes / No

If you answered yes, how long do you usually watch television for on Saturday afternoons?

Less than 1 hour / 2 hours / 3 hours / 4 hours / 5 hours / 6 hours or more

5. On Saturdays, do you watch television in the evening after your tea?

Yes / No

If you answered yes, how long do you usually watch television for on Saturday evenings?

Less than 1 hour / 2 hours / 3 hours / 4 hours / 5 hours / 6 hours or more

6. On Sundays, do you watch television in the morning before lunch?

Yes / No

If you answered yes, how long do you usually watch television for on Saturday mornings?

Less than 1 hour / 2 hours / 3 hours / 4 hours / 5 hours / 6 hours or more

7. On Sundays, do you watch television in the afternoon before your tea?

Yes / No

If you answered yes, how long do you usually watch television for on Saturday afternoons?

Less than 1 hour / 2 hours / 3 hours / 4 hours / 5 hours / 6 hours or more

8. On Sundays, do you watch television in the evening after your tea?

Yes / No

If you answered yes, how long do you usually watch television for on Saturday evenings?

Less than 1 hour / 2 hours / 3 hours / 4 hours / 5 hours / 6 hours or more

9. Please circle which of these meals you usually eat in front of the television on school days:

Breakfast / Tea

10. Please circle the meals that you usually eat in front of the television on Saturdays:

Breakfast / Lunch / Tea

11. Please circle the meals that you usually eat in front of the television on Sundays:

Breakfast / Lunch / Tea

12. How many television sets are there in your house?

1 / 2 / 3 / 4 / 5 / More than 5

13. Do you have a television in your bedroom?

Yes / No

14. Do you have SKY / Cable television at your house?

Yes / No

15. Do you usually watch television alone or with someone else, for example a member of your family?

Alone / With a parent or guardian / With a brother or sister / With a friend

16. Which channel do you think you watch the most? Please circle the channel that you think you usually spend the most time watching.

BBC 1	DISNEY CHANNEL	JETIX
BBC 2	NICKELODEON	ITV2
ITV	CITV	SKY ONE
CHANNEL 4	CARTOON NETWORK	E4
CHANNEL 5	BOOMERANG	FOX KIDS

If the channel you watch the most is not on the list, please write the name of the channel below:

____

Thank you very much for doing this questionnaire!

APPENDIX 14a

Advert Recognition Test (Toy Condition)

Please circle as many of the TV advertisements that you can recognise after watching the cartoon.

1. Barbie
2. Scalextrics
3. Funky Furby
4. Nsects toy
5. Power Rangers
6. Cybertron Transformers
7. Megablocks
8. Magnetix
9. Lego
10. Garfield game
11. Pop up Pirate
12. Mastermind
13. Screwball Scramble
14. ‘Don’t Wake Dad’ boardgame
15. Buckaroo
16. Optix Memory game
17. Pokemon
18. Hornby Rail set
19. Dr Who toy
20. Digi Makeover

APPENDIX 14b

Advert Recognition Test (Food Condition)

Please circle as many of the TV advertisements that you can recognise after watching the cartoon.

1. Rowntrees Fruit Pastilles
2. Nestle Golden Nuggets
3. Coco Pops Mega Munchers
4. Dairylea Dunkers
5. Cheese Strings
6. Kentucky Fried Chicken
7. Juicy Drop Pops
8. Happy Hippo
9. McDonald's Happy Meal
10. Walkers Crisps
11. Starburst
12. McCain Home Fries
13. Iceland
14. Nestle Cheerios
15. Burger King
16. Coca Cola
17. Kellogg's cereal bars
18. Smarties
19. McVities Fruitsters
20. Nestle KitKat

APPENDIX 15a

Product Image Flashcard Task (PI-FT) Example Image (Actual Size)

2

3

10


Nestlé
Nesquik
Strawberry
artificial flavor
Helps Build Strong Bones!
Calcium, Vitamin C
Vitamins & Minerals
38
Magic Eye

APPENDIX 15b

Product Image Flashcard Task (PI-FT) Response Sheet

Please look carefully at the picture on the card the investigator holds up before you answer each question.

What characters do you think advertise product **1**?

____

What character do you think advertises product **2**?

____

What character do you think advertises product **3**?

____

What character do you think advertises product **4**?

____

What character do you think advertises product **5**?

____

What character do you think advertises product **6**?

____

What character do you think advertises product **7**?

____

What character do you think advertises product **8**?

____

What character do you think advertises product **9**?

____

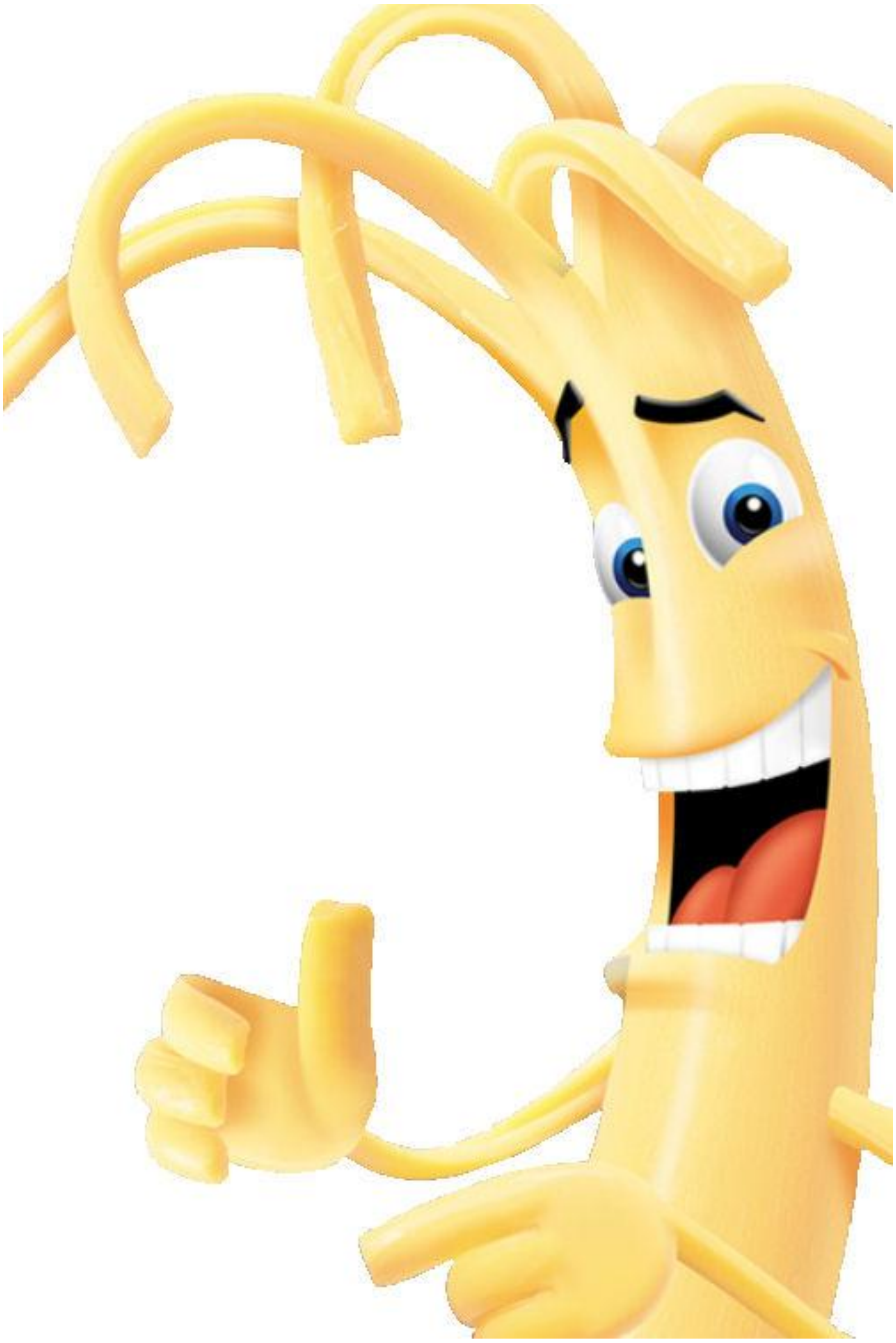
What character do you think advertises product **10**?

____

APPENDIX 16a

Brand Character Flashcard Task (BC-FT) Example Images (Actual Size)

A



C

J

APPENDIX 16b

<u>Brand Character Flashcard Task (BC-FT) Response Sheet</u>

Please look carefully at the picture on the card the investigator holds up before you answer each question.

What product do you think is advertised by character **A**?

____

What product do you think is advertised by character **B**?

____

What product do you think is advertised by character **C**?

____

What product do you think is advertised by character **D**?

____

What product do you think is advertised by character **E**?

____

What product do you think is advertised by character **F**?

____

What product do you think is advertised by character **G**?

____

What product do you think is advertised by character **H**?

____

What product do you think is advertised by character **I**?

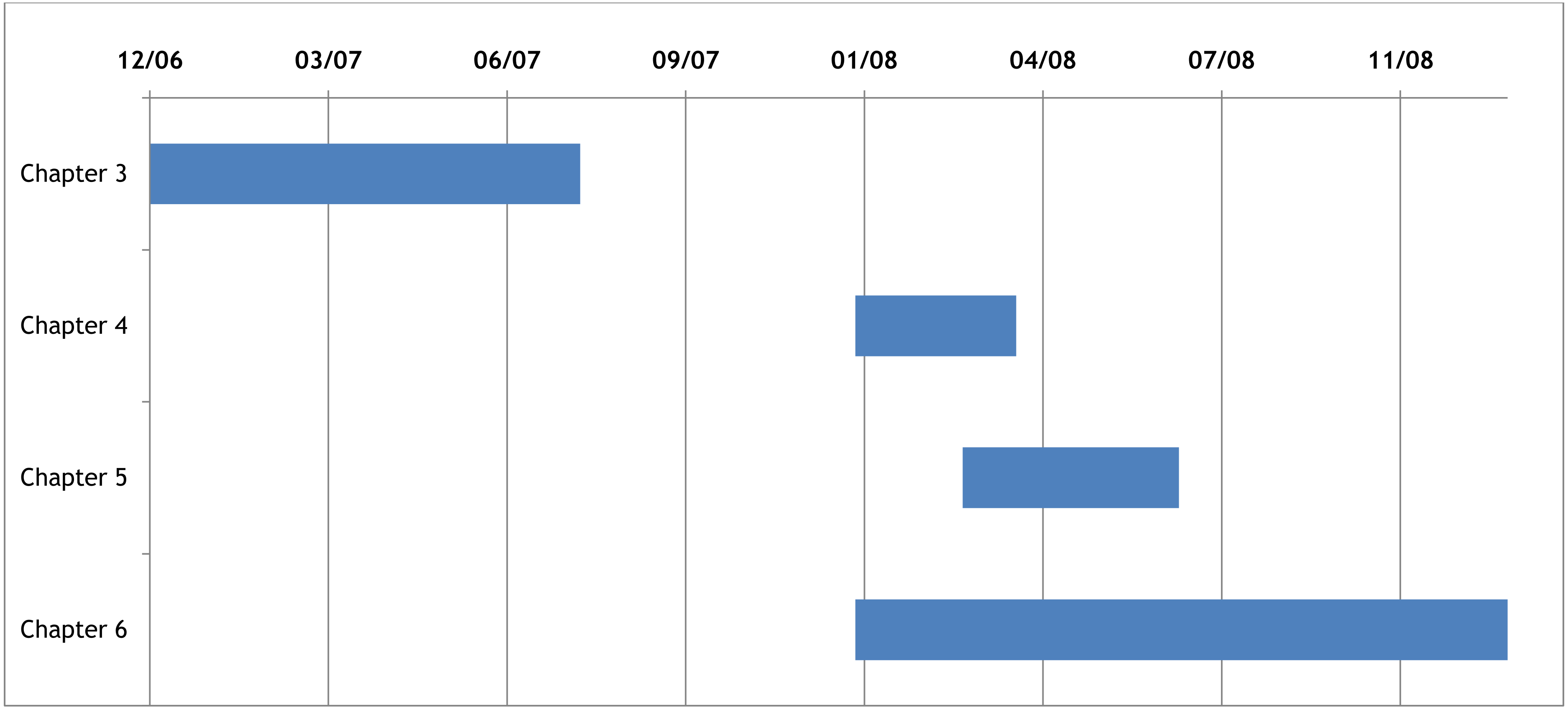
____

What product do you think is advertised by character **J**?

____

APPENDIX 17

A figure to show the data collection periods for all experimental studies of this thesis



APPENDIX 18

Tables to show participant characteristics (weight status and TV viewing groups) at each age for each experimental study of this thesis

Chapter Three

An experimental study of the effect of television food advertising on food preferences and choice in children of differing weight status.

Chapter 3: Weight Status

	Normal weight (*n* = 208, 75.1%)	Overweight/Obese (*n* = 69, 24.9%)	**All (*n* = 281)**
6-7y	64	20	**84**
8-9y	40	16	**56**
10-11y	87	31	**122 (n = 4 missing data)**
12-13y	17	2	**19**

Chapter 3: TV Viewing

	Low TV viewing (< 21 hrs/week) (*n* = 139)	High TV viewing (> 21 hrs/week) (*n* = 142)	**All (*n* = 281)**
6-7y	33	51	**84**
8-9y	30	26	**56**
10-11y	60	62	**122**
12-13y	16	3	**19**

Chapter Four

An experimental study to investigate the relationship between commercial television viewing (a measure of relative advertisement exposure), and awareness of brand equity characters, food preferences and weight status in children.

Chapter 4: Weight Status

	Normal weight (*n* = 141, 62.4%)	Overweight/Obese (*n* = 51, 22.6%)	**All (*n* = 226)**
6-7y	16	7	**34 (n = 11 missing data)**
8-9y	39	11	**61 (n = 11 missing data)**
10-11y	86	33	**131 (n = 12 missing data)**

Chapter 4: TV Viewing

	Low TV viewing (< 24.5 hrs/week) (*n* = 107)	High TV viewing (> 24.5 hrs/week) (*n* = 110)	**All (*n* = 226)**
6-7y	11	19	**34 (n = 4 missing data)**
8-9y	25	33	**61 (n = 3 missing data)**
10-11y	71	58	**131 (n = 2 missing data)**

Chapter Five

An experimental study to investigate the relationship between commercial television viewing (a measure of relative advertisement exposure), and brand requests, food preferences and weight status in children.

Chapter 5: Weight Status

	Normal weight (*n* = 119, 69.2%)	Overweight/Obese (*n* = 53, 30.8%)	All (*n* = 172)
6-7y	47	14	**61**
8-9y	34	17	**51**
10-11y	38	22	**60**

Chapter 5: TV Viewing

	Low TV viewing (< 28.5 hrs/week) (*n* = 83)	High TV viewing (> 28.5 hrs/week) (*n* = 88)	**All (*n* = 172)**
6-7y	25	36	**61**
8-9y	23	28	**51**
10-11y	35	24	**60 (n = 1 missing data)**

APPENDIX 19

Verbal Instructions Given to Participants for the Completion of Study Tasks

For all tasks participants were asked to work individually, not to discuss their answers with their friends and to work through each item and task at the pace set by the researcher and not to rush ahead of the group. All participants were encouraged to write what they really thought and not to try to put what they believed the researcher or the teacher wanted. The participants were also encouraged to raise their hands and ask questions if they were unsure about anything. For the very youngest children or children who would normally have a support worker to help them with school work, it was ensured that a member of teaching/support staff was close by to work through the questions with them in small groups (3-4 participants) or individually where necessary.

Food Preference Measures (LFPM and AFPM):

In their classrooms, the participants were provided with the food preference checklists (Appendix 8 & 9) and were told that we were interested in finding out which foods on the list they would like to eat at that particular moment. Each item on the list was read out to the class group and participants were asked to place a tick next to an item if they would like to eat it, and to leave it blank or to put a cross (as some participants found it easier to mark each line so that it was clear where they had got up to on the list) if they did not want to eat that food, at that moment. Participants were encouraged to ask if they were not sure about any of the items or the descriptions and that explanations would be provided, e.g. it was sometimes necessary to clarify that 'shelled prawns' referred to prawns without the shell.

Food Choice Measure (LFCT):

In their classrooms, the participants were provided with the response sheet for this task (Appendix 10). A booklet containing the food images was present on each table and was also presented by both the researcher and the class teacher moving around the room. It was ensured that all participants had viewed the items for each choice. Each item was named upon presentation (i.e. "here you are being asked to choose between a doughnut and a bread roll") and participants were asked to circle A or B on the response sheet to show which item they would choose.

Habitual Television Viewing Questionnaires (HTVQ and HTVQ-R):

Participants were asked to consider a normal weekday and a normal weekend day, it was explained that of course not each day is the same but that they should try to think what they *usually* do. Each question was read out loud to the class group and participants were asked to circle the answer that most applied to them.

Advertisement Recognition Task:

Participants were presented with a list of 20 product names (Appendices 14a and 14b) and were asked to circle the items they had just seen advertised on the DVD.

Product Image and Brand Character Image Flashcard Tasks:

In their classrooms, the participants were provided with the response sheet for these tasks (Appendices 15b and 16b). A booklet containing the product and brand character images was present on each table and was also presented by both the researcher and the class teacher moving around the room. It was ensured that all participants could see the image, and participants were asked to write down the brand character that was associated with that product or the product that was associated with that brand character (i.e. "What is the name of the character that is in the television adverts for this product? This character often also appears on the packaging for the product"). Participants were told to not worry about spelling and to write down as much of the name as they knew. They were also told that if they could not remember a name then they should try to write a brief description of the character or product.

Shopping List Task:

Participants were told to imagine that they could write a shopping list of all the foods and drinks that they would like to eat and that these foods would be bought for them, they were told not to worry about where the items could be bought from (i.e. "it doesn't matter if they are all from different shops") or how much they cost. They were asked to write down all the foods that they would like, to write down as much of the name of the food/drink as they knew, and to not worry about spelling things correctly if they weren't sure.

APPENDIX 20

Scoring of Flashcard Tasks

Responses to the flashcard tasks were categorised as correct, partially correct and incorrect/not identified. Identification scores were calculated using both a moderate measure in which partially correct responses were categorised as correct, and a more conservative measure in which partially correct responses were categorised as incorrect.

<u>Examples of answers from the PI-FT:</u>

When shown an image of Kellogg's Frosties:

Partially correct answer = "a tiger"; Correct answer = "Tony the Tiger".

When shown the image of Kellogg's Rice Krispies:

Partially correct answer = "three little men"; Correct answer = "Snap, Crackle & Pop".

<u>Examples of answers from the BC-FT:</u>

When shown an image of Mr Pringle:

Partially correct answer = "crisps in a tube"; Correct answer = "Pringles".

When shown an image of Moo the Dairylea Cow:

Partially correct answer = "cheese triangles"; Correct answer = "Dairylea".

Prior to coding, the scheme above was agreed between the researcher and all supervisors. All coding was completed by a single researcher. Any coding ambiguities would have been discussed with supervisors, and would have necessitated a re-coding of a subset of responses by an alternative coder in order to assess inter-rater reliability. However, no coding ambiguities were identified. It was always found to be clear (regardless of spelling) whether the participant had written the full, exact character or product name (correct answer) or whether they had made an attempt to name or describe the character/product (partially correct) or whether they had written the wrong character/product or left the space blank (incorrect/not identified).