

School of Public Health

**An investigation of the role of television advertising
in positively enhancing children's memories of,
and expectancies for, the taste of apples**

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**This thesis is presented for the Degree of
Doctor of Philosophy of
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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

A handwritten signature in blue ink, appearing to read 'J. P. ...', followed by a horizontal line and a period.

Signature:

Date: 30/9/2014

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Abstract

Television advertising of energy-dense nutrient-poor (EDNP) foods and beverages has been widely implicated as influencing children's food and beverage preferences, purchase requests and consumption. However, television advertising of nutritious foods such as fruit and vegetables is an underutilised tool in health promotion.

Taste perception is an important influence in dietary choices. Advertising can increase adults' positive taste perceptions if exposure occurs before the product is consumed and positively reconstruct taste memory if shown after consumption of the product.

This thesis provides unique evidence that liked television advertising can positively enhance children's expectancies for, and memories of, the taste of apples. Two television advertisements using appeals commonly used in promotion EDNP foods to children, one promoting the 'great taste' of apples and the other depicting apples as a socially-approved 'fun' food that, were shown to be effective with pleasant tasting apples. The taste advertisement was also able to positively influence children's taste ratings for less pleasant tasting apples when shown after they had eaten apple. These advertising-enhanced taste ratings influenced children's decision to eat more apple, intention to ask for purchase of the advertised apples and intention to purchase apples using their own money. This evidence supports the use of television advertising to successfully promote fruit and vegetables to children.

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Chapter 1. Study overview

1.1 Introduction

Television advertising of energy-dense nutrient-poor (EDNP) foods and beverages has been widely implicated by public health researchers and practitioners as a significant contributing factor to the rise of childhood obesity over the past 30 years. International literature reviews by respected researchers, published by reputable organisations, have described and confirmed this link (Cairns, Angus, & Hastings, 2009; Escalante de Cruz, Phillips, Visch, & Saunders, 2004; Federal Trade Commission, 2008, 2012; Gantz, Schwartz, Angelini, & Rideout, 2007; Hastings et al., 2003; McGinnis, Gootman, & Kraak, 2006; Wilcox et al., 2004). This link is of public health concern as being overweight or obese puts children at a higher risk of a range of serious health issues.

EDNP food advertising is ubiquitous and utilises a range of persuasive script and production techniques to gain children's attention and associate desirable emotions and attributes with the advertised products. Messages commonly used in children's advertising are that the advertised food 'tastes great', is 'fun', 'cool' and its consumption will result in a positive life transformation. It is argued that this advertising has contributed to the development of a social norm for the acceptable consumption of advertised EDNP foods and beverages, and directly influencing children's attitudes to brands, preferences, purchase requests, and consumption. Consequently, the World Health Organisation (WHO) has recommended a reduction in the marketing of EDNP foods and beverages to children (World Health Organization, 2010, 2012).

Although television advertising as a major component of the social marketing mix has increased consumption of healthy food choices by adults (Pollard et al., 2008; Reger, Wootan, & Booth-Butterfield, 1999) and children (Silver, 1983), television advertising for nutritious foods remains an underutilised tool in health promotion. Children would gain health benefits from eating more fruit and vegetables (National Health and Medical Research Council, 2013) and television advertising is a potential method for increasing such consumption.

1.2 Overview of the research problem

Taste perception is an important influence on children's fruit and vegetable preferences and consumption (Baranowski et al., 1993; Baxter & Thompson, 2002; Bere & Klepp, 2005; Blanchette & Brug, 2005; Brug, Tak, te Velde, Bere, & de Bourdeaudhuij, 2008; De Bourdeaudhuij et al., 2006; Perez-Rodrigo, Ribas, Serra-Majem, & Aranceta, 2003; Wind et al., 2006). While health promoters seek to encourage children to eat more fruit and vegetable, these products can vary greatly in taste quality depending on ripeness, freshness and storage history. A method which successfully increases children's positive taste perception of fruit and vegetables has the potential to increase their consumption of fruit and vegetables.

Empirical studies have shown that advertising can positively influence adults' taste perceptions (Braun-LaTour & LaTour, 2005; Braun, 1999; Chang, 2004; Kum & Lee, 2011; Micu, 2010; Olson & Dover, 1979; Orth & De Marchi, 2007b). Advertising can increase positive taste perceptions if exposure occurs before the product is consumed (forward framing) and positively reconstruct taste memory if shown after consumption of the product (backwards framing). It has been hitherto unknown if these advertising framing effects can influence children's taste perceptions.

1.3 Scope of the study

This study sought to investigate the ability of advertising to influence children's taste perceptions and discover if, as with adults, forward and backward framing effects exist. The literature to be presented in Chapter 3 indicates that there may be differences between the responses of children who have just become able to verbalise the selling intent of advertising (i.e. 7 to 8 year olds) and children with a more sophisticated understanding of advertising for whom an understanding of persuasive intent has begun to emerge (i.e. 11 to 12 year olds). Some published studies reported in Chapter 3 have found that boys are more influenced than girls and that overweight/obese children are more influenced than healthy weight children. Therefore, this study will consider those variables.

This study also sought to respond to calls for health promoters to utilise high-quality, professionally created television advertisements that are liked by children and contain elements that appeal to children to promote healthy foods such as fruit and vegetables (Dovey, Taylor, Stow, Boyland, & Halford, 2011; Goldberg, Gorn, & Gibson, 1978; Gorn &

Goldberg, 1982; Jeffrey, McLellarn, & Fox, 1982). Chapter 3 established that taste appeals and emotive fun/social acceptance appeals are widely used in television advertising of EDNP foods to children. This study therefore utilised two well-liked fruit advertisements: one that depicted a taste appeal as a positive emotional consumption process (Micu, 2012; D. J. Moore & Lee, 2012) and one that depicted an emotional fun/social acceptance appeal (Schor & Ford, 2007). Neither advertisement made any reference to nutrition. This study was also able to respond to the concern of Dovey (2011), who noted a limitation of research being the prohibitive cost of creating television advertisements for nutritious foods that have parity with the high budget EDNP food advertisements. The candidate is a trained and experienced filmmaker who was able to produce a professional product at a low cost.

Red apples were chosen as they are a popular fruit with children (Coase & Bayliss, 1995; Kühn & Thybo, 2001; Perez-Rodrigo et al., 2003; Thybo, Kühn, & Martens, 2003), are available year-round in Western Australia, and slices of apple are robust enough to enable similar looking portions to be created and utilised over a time period of half an hour before deteriorating.

Adult studies have indicated that advertising-enhanced product experience can occur even when the product experience was unpleasant (Braun-LaTour & LaTour, 2005; Braun, 1999; Kum & Lee, 2011). Hence this study used both pleasant and less pleasant tasting apple slices. Apples are somewhat absorbent and can be made to taste unpleasant by painting them with a mixture of salt and vinegar. Some children have a preference for more sour tasting fruit (Liem, Bogers, Dagnelie, & de Graaf, 2006; Liem & Mennella, 2003), but the use of vinegar, which contains acetic acid rather than citric acid, adds sourness but with a less pleasant after-taste.

This project was approved by the *Curtin University Human Research Ethics Committee* (HR 24/2006) and supported by a research grant from *Healthway* – the Western Australian Health Promotion Foundation (Research Project Grant 15165).

1.4 Aims of the study

The aims of this study were to determine:

1. Whether professionally-made liked advertising is able to increase children's taste ratings of apple slices;
2. Whether advertising the positive taste attribute of apples or the positive fun/social experience of apples is more effective in influencing children's taste judgements;
3. Whether advertising exposure before the consumption of apples ('forward framing') is able to positively influence subsequent taste judgements, even if the taste experience is actually unpleasant;
4. Whether advertising exposure after the consumption of apples ('backward framing') is able to positively reconstruct memories of apples consumption, even if the taste experience is actually unpleasant; and
5. Whether advertising exposure impacts on children's decision to eat more apple in the immediate future, intention to request apple purchase, and intention to use their own money to purchase apples.

The study also aims to assess whether there are any differences in responses according to a child's age group, socio-economic (SES) level, gender or body mass index (BMI).

1.5 Hypotheses of the study

This study tested the following hypotheses:

1. Both the taste and fun advertisements will increase taste rating in exposed children compared with control children;
2. Both the taste and fun advertisements will have both forward and backward framing effects on taste ratings for both pleasant and unpleasant tasting apple;
3. Both the taste and fun advertisements will increase decision to eat more apple, intention to request apple purchase, and intention to use own money to purchase apples in exposed children compared with control children.

This study explored the results by age group, gender, SES and BMI with null hypotheses postulated; that is, that there would be no significant differences between these groups.

1.6 Significance of the study

This thesis provides unique evidence that television advertising for apples can positively influence children's taste rating of apples with both forward and backward framing effects. Two television advertisements, one promoting the 'great taste' of apples and the other depicting apples as a 'fun' food, were shown to be effective with pleasant tasting apples. The advertisement promoting taste was also able to positively influence children's taste ratings when the apple tasted less pleasant. These advertising-enhanced taste ratings were related to children's decision to consume more apples, intention to ask for purchase of the advertised apples and intention to purchase apples using their own money.

This evidence supports the use of television advertising to successfully promote fruit and vegetables to children. Health promoters can use both taste and fun/social appeals to enhance children's taste expectations for, and taste memories of, fruit and vegetables. This is likely to increase children's consumption of the advertised fruit and vegetables. The use of taste appeals is particularly important as the taste of fruit and vegetables can vary and vegetables are not usually well-liked by children. Engaging children with a nutrition or health message is not required; the same strategies that have proven effective with EDNP foods can also be effective with fruit and vegetables.

This new evidence can also be used to support the work of public health advocates who argue for a reduction or elimination of the exposure of children to television advertising for EDNP foods and beverages. That is, this study has demonstrated a specific way by which advertising may influence EDNP food preference and consumption by enhancing taste expectations and taste memories.

1.7 Thesis organisation

The following four chapters provide a detailed background to the research area sourced from the published literature both internationally and in Australia. Chapter 2 presents evidence for the link between television viewing and childhood overweight and obesity. Chapter 3 presents evidence for the influence of television advertising on children's EDNP food preferences, purchase requests and consumption. Chapter 3 outlines the persuasive appeals and themes successfully used by EDNP food and beverage television advertising. Chapter 4 discusses current knowledge with regard to television advertising of nutritious foods, particularly fruit and vegetables. Chapter 5 describes the known influence of advertising on food and beverage product experience, including taste ratings, by adults and children.

The subsequent three chapters then present this study in detail. Chapter 6 outlines the three stages of the methodology: (i) the development of the two television advertisements; (ii) the pre-testing of the advertisements and the apple slices; and (iii) the main study which sought to test the hypotheses and answer the research questions. Chapter 7 presents the results of the main study. Chapter 8 discusses the results and their implications for the successful promotion of fruit and vegetable consumption to children. The contribution of this study to the development of public health policy addressing the marketing of unhealthy foods and beverages to children is also discussed.

When referring to children of specific age ranges, the age range will be given in years when relevant. The term 'pre-schoolers' will be used to refer to those aged 5 years and under, 'children' when referring to 6 to 12 year olds, and 'adolescents' when referring to 13 to 17 year olds. When the term 'children' is used more generally, it is intended to refer to all people aged under 18 years.

Chapter 2. Children's television viewing and overweight/obesity

2.1 The increase in the prevalence of childhood obesity in Australia

There has been a global increase in the prevalence of overweight and obesity in childhood since the 1970s, particularly in higher income countries and among urbanised populations (Wang & Lobstein, 2006). Australian children have followed this international trend.

Norton et al. (2006) analysed all available data sets from over the last century and calculated the overweight and obesity prevalence rates of Australian children aged from 5 to 15 years. This analysis revealed that prevalence rates were low and relatively constant before accelerating from about the 1970s and continuing to climb until at least 2003. A re-evaluation of two national surveys of Australian children's BMI in 1985 and 1995, applying the new standard international definitions of overweight and obesity (Cole, Bellizzi, Flegal, & Dietz, 2000), found a doubling of overweight and a trebling of obesity between 1985 and 1995 (Magarey, Daniels, & Boulton, 2001). Results from five smaller surveys in three Australian states between 1969 and 1997 confirmed that the prevalence of combined overweight and obesity doubled between 1985 and 1997, and that the rate of increase was accelerating (Booth et al., 2003). One state-based Australian survey noted a continued increase in children's BMI between 1997 and 2002 (Dollman & Pilgrim, 2005).

The *2007 Australian National Children's Nutrition and Physical Activity Survey* measured more than 4,000 children and reported that 17% of children were overweight and 6% were obese (Department of Health and Ageing, 2008). The *Western Australian Child and Adolescent Physical Activity and Nutrition Survey (CAPANS) 2003* measured over 2,000 children aged 7 to 16 years (Hands, Parker, Glasson, Brinkman, & Read, 2004) and the later *CAPANS 2008* survey measured over 1,800 children aged 8 to 16 years (Martin et al., 2010). These two surveys reported that the proportion of overweight or obese children and adolescents in Western Australia did not change significantly between 2003 and 2008, remaining at around 23%. Furthermore, overweight and obese Australian children are likely to remain so over time (Hesketh, Wake, Waters, Carlin, & Crawford, 2004; Wake & Maguire, 2012).

In three Australian studies undertaken between 1995 and 1997, no consistent differences were found in the prevalence of overweight and obesity between children from different levels of socioeconomic status (SES) (Booth et al., 2001). Later state-based studies, however, revealed that prevalence was higher in Australian children of lower SES (O'Dea,

2003), particularly for girls (Booth, Macaskill, Lazarus, & Baur, 1999; Dollman & Pilgrim, 2005). A longitudinal study of more than 8,000 Australian children confirmed that significant socio-economic differences have emerged since 2000 (Wake, Hardy, Canterford, Sawyer, & Carlin, 2007). Australian preschool children in the lowest quintile of socio-economic status were 47% more likely to be in a heavier BMI category compared to those in the highest quintile (Wake et al., 2007). It was also more likely that overweight or obesity would persist over time (Wake & Maguire, 2012). The *2007-2008 ABS National Health Survey* (Australian Institute of Health and Welfare, 2012) and the later 2011-2012 survey (Australian Institute of Health and Welfare, 2014) estimated that Australian children aged between 5 and 14 years living in the lowest SES areas were 1.7 times as likely to be overweight or obese as children living in the highest SES areas.

A recent review of 41 Australian surveys between 1985 and 2008 concluded that there has been a plateau, or only a slight increase, in the prevalence of childhood overweight and obesity over the past decade (Olds, Tomkinson, Ferrar, & Maher, 2010). Levels had reportedly stabilised at the high level of 21-25% for overweight and obesity (with 5-6% for obesity alone) rather than following the widely “anticipated exponential trajectory” (Olds et al., 2010, p. 57). A subsequent review of international data has revealed that prevalence levels are also stabilising, or showing a small decline, in several other countries (Olds et al., 2011). The most recent Australian data has indicated a continued slow increase since 2007-2008, with 26% of Australian children (and 26.5% of Western Australian children) aged 5 to 14 years, being overweight or obese in 2011-2012 (Australian Institute of Health and Welfare, 2014).

2.2 The impact of childhood obesity on health

Childhood obesity is a significant public health concern. Many international studies over the past decade have established that overweight or obese children and adolescents are at higher risk of a number of serious health problems.

A high BMI increases a child’s risk of several medical conditions, such as hypertension, hyperglycaemia, hyperinsulinaemia, high serum triglycerides, and low high-density cholesterol level which, in turn, increase risk of cardiovascular disease and diabetes (L. B. Andersen et al., 2008; Din-Dzietham, Liu, Bielo, & Shamsa, 2007; Flechtner-mors et al., 2012; l'Allemand et al., 2008; Lazorick et al., 2011; Reinehr & Wunsch, 2010; Ribeiro et al., 2004; Trent, Jennings, Waterfield, Lyman, & Thomas, 2009). Overweight and obesity have

been associated with the increase in diagnoses of type 2 diabetes amongst children and adolescents (Ehtisham & Barrett, 2004; A. Levin, Morad, Grotto, Ravid, & Bar-Dayyan, 2010).

Childhood and adolescent obesity have also been implicated as contributing to the development of other physical and psychosocial problems such as: asthma (Cottrell, Neal, Ice, Perez, & Piedimonte, 2011; Lazorick et al., 2011; Spathopoulos et al., 2009; Trent et al., 2009; Wickens et al., 2005); sleep apnoea (Kohler et al., 2009; Lazorick et al., 2011); gastrointestinal problems (Størdal, Johannesdottir, Bentsen, Carlsen, & Sandvik, 2006; Teitelbaum, Sinha, Micale, Yeung, & Jaeger, 2009); non-alcoholic fatty liver disease (Adibi, Kelishadi, Beihaghi, Salehi, & Talaei, 2009; Dâmaso et al., 2008; Welsh, Karpen, & Vos, 2013); musculoskeletal pain and injuries (Krul, van der Wouden, Schellevis, van Suijlekom-Smit, & Koes, 2009; Paulis, Silva, Koes, & van Middelkoop, 2014); eating disorders (Erermis et al., 2004; Trent et al., 2009); anxiety and depression (Anderson, Cohen, Naumova, & Must, 2006; Erermis et al., 2004; Hillman, Dorn, & Bin Huang, 2010; Merikangas, Mendola, Pastor, Reuben, & Cleary, 2012); poor self-esteem (Bjornelv, Nordahl, & Holmen, 2011; Erermis et al., 2004); bullying (Griffiths, Wolke, Page, & Horwood, 2006; Janssen, Craig, Boyce, & Pickett, 2004); peer and emotional problems (Sawyer, Harchak, Wake, & Lynch, 2011); social isolation (Erermis et al., 2004); and both suicidal ideation and suicide attempts (Eaton, Lowry, Brener, Galuska, & Crosby, 2005). Several Australian studies also have found an association between childhood and/or adolescent obesity and hypertension, hyperglycaemia, hyperinsulinaemia, dyslipidaemia, diabetes, depression and anxiety, bullying, poor self-esteem, body dissatisfaction, dieting behaviours, eating disorder symptoms, musculoskeletal pain, obstructive sleep apnoea, and asthma (L. M. Bell et al., 2007; L. M. Bell et al., 2011; Gibson et al., 2008; Kohler et al., 2009; McMahon et al., 2004; Tai, Volkmer, & Burton, 2009; Wake et al., 2010).

Australian parents of overweight and obese primary school aged children were more likely to report their children have poorer health (Wake, Salmon, Waters, Wright, & Hesketh, 2002) and Australian adolescents who are overweight and obese were more likely to report that they experience poorer health than non-overweight adolescents, with this likelihood higher in obese compared to overweight adolescents (Wake et al., 2010).

Large cohort studies from the United States (US) and United Kingdom (UK) provided early international evidence that, while most overweight or obese adults were not overweight or obese as children, the persistence of childhood obesity into adulthood is a significant issue (Braddon, Rodgers, Wadsworth, & Davies, 1986; Clarke & Lauer, 1993; David S. Freedman et al., 2005; Power, Lake, & Cole, 1997; Stark, Atkins, Wolff, & Douglas, 1981). An

Australian cohort study, which followed more than 4,000 children to adulthood, revealed that the risk of becoming obese was greater for adults who had been obese as children, and attributed 6.4% of male and 12.6% of female adult obesity to childhood obesity (Venn et al., 2007). It is well established that overweight and obese adults are at higher risk of increased mortality and morbidity than non-overweight adults. Obesity, along with the related risks of hypertension, high blood glucose and physical inactivity, constitute four of the five leading global risks for mortality, contributing to the development of chronic diseases such as cancer, diabetes and heart disease (World Health Organization, 2009). Obesity has become the leading cause of preventable disease burden in Western Australia (Hoad, Somerford, & Katzenellenbogen, 2010) and was estimated to have cost A\$241 million in acute Western Australian hospital expenditure in 2011 (Scalley, Xiao, & Somerford, 2013).

A high childhood BMI that persists into adulthood can be independently linked to a range of health problems. Obesity, glucose intolerance and hypertension in childhood have all been associated with an increased risk of premature death (Franks et al., 2010). Several longitudinal cohort studies have associated child and/or adolescent overweight and obesity with an increased adult risk of: cardiovascular disease (Baker, Olsen, & Sorensen, 2007; D S Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001; Juonala et al., 2011; Must, Jacques, Dallal, Batjema, & Dietz, 1992); type 2 diabetes (Juonala et al., 2011; Yeung, Zhang, Louis, Willett, & Hu, 2010); colorectal cancer; gout; and arthritis (Must et al., 1992).

Recent genome-wide association studies have identified 32 genetic loci associated with high BMI (Speliotes et al., 2010), with several of these being linked to childhood obesity (Bradfield et al., 2012). Parental obesity is considered a strong predictor of childhood and adolescent obesity (Rooney, Mathiason, & Schauburger, 2011; Steffen, Dai, Fulton, & Labarthe, 2009; Svensson et al., 2011), and twin studies confirm a genetic predisposition for obesity (Naukkarinen, Rissanen, Kaprio, & Pietiläinen, 2012; Wardle, Carnell, Haworth, & Plomin, 2008). A recent systematic review of genetic studies that included over 18,000 twin pairs, concluded that 75% of childhood obesity was inherited (Nan et al., 2012).

Childhood obesity is increasingly considered a “programmed disease” in which “an obesogenic environment is... a trigger but not the primal cause of obesity” for children who are genetically predisposed (Tounian, 2011, p. 30). One recent review noted that: “The expression of genes favouring the storage of excess calories as fat, which have been selected for over many millennia and are relatively static, has become maladaptive in a rapidly changing environment that minimizes opportunities for energy expenditure and maximizes opportunities for energy intake” (Biro & Wien, 2010, p. 1499S). The

environmental factors which have triggered the rapid increase in the prevalence of childhood obesity over the past 40 years must thus be addressed by public health practitioners. Twin studies have demonstrated, for example, that higher physical activity levels are protective against the development of obesity (Naukkarinen et al., 2012).

2.3 Television and obesity

2.3.1 Higher television viewing levels linked to higher BMI

Television has long been considered a high-risk environmental factor for the development of childhood and adolescent obesity. Since the first large US study (Dietz & Gortmaker, 1985) which linked television viewing with childhood obesity a large number of international studies have confirmed this association, with many of them controlling for confounding variables such as physical activity levels, SES, diet and parental BMI (Most recently, Adachi-Mejia et al., 2011; Carson & Janssen, 2012; Liang, Kuhle, & Veugelers, 2009; Lissner et al., 2012; Mendoza, Zimmerman, & Christakis, 2007; Pardee, Norman, Lustig, Preud'homme, & Schwimmer, 2007; Rey-López et al., 2012; Staiano, Harrington, Broyles, Gupta, & Katzmarzyk, 2013). This link has also been reported in four Australian studies (Cox et al., 2012; K Hesketh, Wake, Graham, & Waters, 2007; van Zutphen, Bell, Kremer, & Swinburn, 2007; Wake, Hesketh, & Waters, 2003). Several international studies have found the risk higher for children with a television in their bedroom (Dennison et al., 2002; Lissner et al., 2012; Rey-López et al., 2012; Staiano et al., 2013; van Zutphen et al., 2007). A recent study has found that this relationship was partly mediated by viewing time but not by sleep duration or time spent undertaking physical activity (Cameron et al., 2013).

Gortmaker et al. (1996), in a large US study, attributed more than 60% of childhood overweight and obesity to excess television viewing time. Later studies have reported that a high level of television viewing as a pre-school child significantly impacted on BMI in adolescence (Proctor et al., 2003), and that childhood/adolescent television viewing continued to influence BMI into adulthood (Hancox, Milne, & Poulton, 2004; Viner & Cole, 2005). One recent study implicated two of the established BMI gene loci with an 'exacerbation' of the impact of screen time on BMI (Graff et al., 2013).

Several studies have directly linked the amount of time children and adolescents spend watching television with their development of cardiometabolic and diabetes risk factors such as hypertension, high blood triglycerides/cholesterol, hyperglycaemia and hyperinsulinaemia

(Goldfield et al., 2013; Hancox et al., 2004; Mark & Janssen, 2008; Pardee et al., 2007; Staiano et al., 2013). One large European study, however, found that television viewing by children was not independently associated with these metabolic risk factors once other variables were controlled for, whereas both obesity and physical activity levels were independently and significantly associated (Ekelund et al., 2006).

There have been mixed findings with regards to the impact of non-television screen-based activities on children's BMI. Some studies have linked other screen based activities (such as computer games) to obesity (Berkey, Rockett, Gillman, & Colditz, 2003; Mendoza et al., 2007; Steffen et al., 2009; Stettler et al., 2004; Wijga et al., 2010), while other studies have found that television alone impacts on BMI (Burke et al., 2006; Giammattei et al., 2003; Hernandez et al., 1999; Wake et al., 2003). One Australian study followed over 1,000 children for three years and found combined screen time (television viewing plus computer time) was associated with BMI (Hesketh et al., 2007). This study found that a relationship in both directions existed: higher initial screen time predicted a higher later BMI, and a higher BMI at baseline predicted more screen time later.

2.3.2 Australian children's television viewing levels

Australian Government guidelines published in 2004 recommended that children and adolescents be limited to 2 hours of screen time (for non-educational purposes) per day, that is, 14 hours per week (Department of Health and Ageing, 2004a, 2004b). The Australian Bureau of Statistics (ABS) (2004) surveyed the parents of more than 9,000 children in 2003 and reported that 98% of children watched an average of 11 hours of television per week and 71% played four hours of electronic/computer games per week. This would suggest that most Australian children were meeting the guidelines at the time. Other large Australian surveys published at that time, however, found that a higher proportion of children were watching more television than recommended. Wake (2003) surveyed the parents of over 2,800 children aged 5 to 13 years and reported that 79% watched more than 10 hours per week, with 27% watching more than 21 hours per week. The *Western Australian Child and Adolescent Physical Activity and Nutrition Survey 2003* survey of more than 2,000 children revealed that primary school aged boys reported watching an average of 2.2 hours of television per day on week days and an average 4.8 hours per day on weekend days (Hands et al., 2004). Secondary school aged boys reported they watched an average of 3.9 hours on weekdays and 5.0 hours on weekend days. Primary school aged girls reported that they

watched an average of 2.1 hours on weekdays and 3.7 hours at weekends while secondary aged girls watched 4.3 hours on weekdays and 4.6 hours on weekends (Hands et al., 2004). When all screen use per week was considered together, less than 4.3% of boys aged 9 to 16 years met the two hour recommended screen time guideline while, with girls, this ranged from 2.0% of 14 year olds to 13.9% of 7 year olds (Hands et al., 2004).

The later *2007 Australian National Children's Nutrition and Physical Activity Survey* confirmed these higher viewing levels, reporting that 9 to 16 year olds spent an average of 3.7 hours per day of screen time (which included 2.5 hours of television time) during the four day survey period, with 22% meeting the guideline when screen time was averaged over the four days (Department of Health and Ageing, 2008). Hesketh (2007) surveyed the parents of over 1,200 Australian children aged 5 to 10 years and again three years later when the children were aged 8 to 13 years. It was discovered that screen time increased over the three year period with 40% of children meeting the 2 hour screen viewing guidelines at baseline, but only 18% meeting the guidelines three years later. The later *Western Australian Child and Adolescent Physical Activity and Nutrition Survey 2008* surveyed 1,700 Western Australian children and adolescents, reporting that 77% participated in more than two hours of electronic media on all of the last seven days (Martin et al., 2010).

The Australian Bureau of Statistics surveyed the parents of more than 7,000 children in 2012 and reported that watching television, DVDs or videos remains the most common recreational activity for Australian children aged 5 to 14 years, with 96% of children watching an average 7 hours per week and 85% participating in 5 hours per week of other screen-based activities (computer, Internet or games consoles) outside of school in the last school fortnight (Australian Bureau of Statistics, 2012). Despite the conflict between the ABS data and other surveys of Australian children, these results suggest that television viewing by Australian children has been high, but there may have been a recent drop in the overall estimated average level of television viewing (with an increase in other screen based activities) over the past decade as the rise in the level of obesity has plateaued.

2.4 Television and physical activity

2.4.1 Television's link with lower physical activity levels

It was hypothesized for many years that television viewing replaced physical activity and thus contributed to the development of overweight and obesity by decreasing children's

energy expenditure. However, research has provided mixed evidence for this proposed causal pathway.

Increased levels of physical activity have been associated with a lower BMI and less television viewing (Dowda et al., 2001; Eisenmann et al., 2002; Hernandez et al., 1999), while increased television viewing has been associated with lower levels of physical activity, including decreased participation in team sports (U Ekelund et al., 2002; Lazzer et al., 2003; Salmon, Campbell, & Crawford, 2006; Storey et al., 2003). Other studies reported that BMI correlated with children's television viewing levels but did not correlate with their physical activity levels (R. E. Andersen et al., 1998; Grund et al., 2001), or that BMI had a stronger correlation with television viewing than with physical activity levels (Eisenmann, Barteel, Smith, Welk, & Fu, 2008). Canadian and Swedish studies found that the effect of television viewing was attenuated by physical activity levels (Ortega, Ruiz, & Sjöström, 2007; Tudor-Locke, Craig, Cameron, & Griffiths, 2011), while other US and European studies concluded that physical activity did not mediate the association between overweight and obesity and television viewing levels (Jackson, Djafarian, Stewart, & Speakman, 2009; Rey-López et al., 2012; Utter et al., 2003).

A WHO survey of more than 200,000 adolescents from 39 countries revealed that more than 2 hours of television viewing per day was associated with less physical activity for both boys and girls and that gaming use of computers was associated with less physical activity for boys, but reported that this pattern differed between countries (Melkevik, Torsheim, Iannotti, & Wold, 2010). It was noted that there was more "displacement" of physical activity by screen-time in countries where physical activity levels were already high, which could indicate that "physical inactivity is not a consequence of adolescents spending too much time in screen-based sedentary behaviors, but rather that inactive adolescents have more time to spend in different sedentary pursuits" (Melkevik et al., 2010, p. 7). A recent systematic review concluded that, while a strong association between overweight or obesity and physical activity exists, most published studies have been cross-sectional, thus a clear direction of causality cannot be established (Jiménez-Pavón, Kelly, & Reilly, 2010).

There is evidence from longitudinal studies supporting the alternative hypothesis: that children who are overweight or obese become less physically active as a consequence. One longitudinal US study indicated that at 5 years of age, obesity was correlated with increased television viewing but not physical activity levels, but at 10 years of age, obesity was associated with decreased physical activity levels (Salbe et al., 2002). This finding was confirmed by a prospective cohort study in the UK which found that overweight and obesity

was predictive of changes in children's physical activity over the following three years, but physical activity levels were not predictive of overweight and obesity (Metcalf et al., 2011). A longitudinal cohort study in the US considered the combined effects of both television viewing time and physical activity on more than 9,000 adolescents into early adulthood (Boone, Gordon-Larsen, Adair, & Popkin, 2007). This study found that, while screen time as an adolescent was strongly predictive of adult obesity, physical activity was not predictive for males and not strongly predictive for females. It was also reported that lower adolescent screen time was predictive for obesity regardless of physical activity levels, by 40% for females and 20% for males (Boone et al., 2007). One recent European longitudinal study with adolescents concluded that screen-based sedentary behaviours and physical activity were "largely independent behaviors that should be addressed separately in health promotion" (Gebremariam et al., 2013, p. 7).

The presence of overweight and obesity has been linked to poor motor skill development and endurance performance in children (Graf et al., 2004). A systematic review of qualitative studies exploring the barriers to physical activity experienced by overweight and obese adolescents revealed that many adolescents reported that they did not want to display their bodies in swimsuits or change rooms, or expose themselves to others while undertaking strenuous or difficult physical activities (Stankov, Olds, & Cargo, 2012). This study also noted that overweight and obese adolescents reported overt or perceived "verbal and physical bullying, social exclusion and stereotyping" (p. 9) in physical activity settings. Feelings of inferiority, consistent failure, physical discomfort and fatigue were also reported as concerns for overweight and obese adolescents when participating in physical activity (Stankov et al., 2012).

Recent evidence supports the conclusion that, while a high level of sedentary behaviour and a low level of physical activity can be linked with childhood obesity, the relationship is by no means simple, causal and in one direction. Children and adolescents who become overweight for whatever reason, are also more likely to avoid physical activity and choose to participate in more comfortable sedentary activities such as television viewing.

2.4.2 Australian children's physical activity levels

The Australian Government recommended in 2004 that children and adolescents participate in 60 minutes of moderate to vigorous physical activity per day (Department of Health and Ageing, 2004a, 2004b). The *Western Australian Child and Adolescent Physical Activity and Nutrition Survey 2008* reported that the guidelines were met in the preceding seven days by

41% of boys and 27% of girls in primary school, and by 38% of boys and 10% of girls in secondary school (Martin et al., 2010).

The Australian Bureau of Statistics (2012) surveyed the parents of more than 7,000 children in 2012 and reported those children's estimated participation in active recreational activities. In the two school weeks prior to the survey, 60% played organised sport for an average of 5 hours, 64% rode bikes for an average of 5 hours, and 54% skateboarded, rollerbladed or rode a scooter for an average of 4 hours. In the earlier 2003 ABS survey of parents of almost 9,000 children, it was estimated that 62% of children participated in organised sport for an average of 5 hours, 62% rode their bike for an average of 6 hours, and 23% skateboarded or rollerbladed for an average of 5 hours (Australian Bureau of Statistics, 2004). These results indicate that similar proportions of children participated in a similar levels of activity between the two surveys (and that scooters have become popular more recently).

A comparison of a 1959-1960 survey of Western Australian children's level of sedentary behaviours (before the introduction of television) with the 2003 ABS survey (Australian Bureau of Statistics, 2004) indicated that there had been little change over the intervening 43 year time span (Carter, 2005). The *WA Health & Wellbeing Surveillance System* has interviewed more than 550 people per month since 2002, approximately 19% of interviews being with parents of children up to the age of 15 years (Patterson, Joyce, & Tomlin, 2012). This survey recorded Western Australian parent ratings of the physical activity levels of their children aged 5 to 15 years from 2005 to 2011 and confirmed that there was limited change over that time (Patterson et al., 2012). In 2011, 45.6% of Western Australian children (55.5% boys and 35.1% girls) were rated by their parents as meeting the recommended 60 minutes per day of vigorous physical activity, and this level ranged between 45.4% and 56.0% over the 2006 to 2011 period (Patterson et al., 2012).

Hence it may well be more likely that the increased consumption of energy dense foods, rather than significantly decreased levels of physical activity, accounts for the increase in the prevalence childhood overweight and obesity in Western Australia over the past few decades. Thus children's food consumption patterns will be examined in the following section.

2.5 Australian children's diet

The evidence shows that Australian children's diets are inconsistent with the Australian Dietary Guidelines' recommendations. Increased consumption of energy dense foods and beverages (those high in fat and sugar) and decreased consumption of less energy dense food (such as fruit and vegetables) have been implicated in the development of childhood obesity (Jennings, Welch, van Sluijs, Griffin, & Cassidy, 2011; Sanigorski, Bella, & Swinburn, 2007; Tam et al., 2006; Vernarelli, Mitchell, Hartman, & Rolls, 2011).

The *1995 Australian National Nutrition Survey* (NNS) (McLennan & Podger, 1999) revealed that a high proportion of Australian children at that time had a daily energy intake from fats exceeding the National Health and Medical Research Council (NHMRC) recommended levels (National Health and Medical Research Council, 2013). The 1995 NNS also indicated that children's intake of refined sugar was too high, with sweetened beverages identified as a substantial source (Somerset, 2003), and that consumption of fruit and vegetables was well below recommendations and had declined since the *1985 National Dietary Survey* (Cashel, 2000; Magarey, Daniels, & Smith, 2001). The 1995 NNS also revealed that children aged 5 to 12 years and adolescents aged 13 to 18 years, gained more of their daily food energy from non-core foods and beverages than any other age group (A. C. Bell, Kremer, Magarey, & Swinburn, 2005).

The *Western Australian Child and Adolescent Physical Activity and Nutrition Survey 2003* found an increase in the consumption of confectionary and snack foods and a decrease in the consumption of fruit and vegetables in comparison to the national surveys conducted in 1985 and 1995 (Glasson et al., 2004). The *2007 Australian National Children's Nutrition and Physical Activity Survey* confirmed that children's diets are higher in saturated fat, sugar and salt, and lower in fruit and vegetables, than recommended by the Australian National Dietary Guidelines (Department of Health and Ageing, 2008). Energy intake for 10 to 15 year olds Australian children increased by 12% for girls and 15% for boys between the 1985 and 1995 surveys, and remained at this high level in 2007 (Magnus, Haby, Carter, & Swinburn, 2009).

Approximately 25% of Australian children and 43% of adolescents consume fast food at least once a week, and a recent analysis of children's fast food meals has found them to be high in saturated fat, sugar and salt (Wellard, Glasson, & Chapman, 2012). An analysis of the reported diets of over 3,000 Australian children and adolescents has found that the consumption of EDNP foods (such as fast food, sweetened beverages, fried potato and salty

snacks) occur in a pattern, with consumption related to each other and to a lower consumption of fruit and vegetables (Innes-Hughes et al., 2011).

The *2007 Australian National Children's Nutrition and Physical Activity Survey* found that levels of fruit and vegetable consumption decreased with age: 61% of 4 to 8 year olds ate the recommended amount of fruit but this dropped to 1% by age 14 to 16 years while only 3% of 4 to 8 year olds ate the recommended amount of vegetables and this fell to 0% by 14 to 16 years of age (Department of Health and Ageing, 2008). The *Western Australian Child and Adolescent Physical Activity and Nutrition Survey (CAPANS) 2008* indicated that, while the diet of Western Australian children was similar to that reported in the 2003 CAPANS survey, there had been a significant reduction in the consumption of confectionary and an increase in fruit consumption in primary school children with an increase in both fruit and vegetable consumption in secondary girls (Martin et al., 2010).

The *WA Health and Wellbeing Surveillance System* detailed higher levels of parent-reported fruit and vegetable consumption by Western Australian children (Patterson et al., 2012). There was an increase in the number of children eating the recommended level of fruit over the years: from 69.6% in 2002 to 73.6% in 2010, but a return to lower levels in 2011 with 68.9% (Patterson et al., 2012). Consumption was again found to differ by age with 75.1% of 4 to 7 year olds and 27.7% of 12 to 15 year olds eating the recommended level of fruit. The proportion of children eating the recommended amount of vegetables rose over the survey period from 37% in 2002 to 49.6% in 2011 (Patterson et al., 2012). Despite these higher reported consumption levels, a significant proportion of Western Australian children are not eating the level of fruit and vegetables recommended for good health.

The Australian National Dietary Guidelines reviewed an extensive published literature and concluded that fruit and vegetables are protective against weight gain, cardiovascular disease and some cancers of the digestive system due to "potential synergies between the foods" and "the action of specific components found at high levels" such as vitamins, minerals, phytochemicals (e.g. carotenoids and bioflavonoids) and fibre – as well as their low energy density (National Health and Medical Research Council, 2013, p. 40).

Many studies and reviews have directly implicated inadequate consumption of both fruit and vegetables with a reduced risk of poor respiratory health in children, including asthma and allergic rhinitis (Chatzi et al., 2007; Nurmatov, Devereux, & Sheikh, 2011). Several of the studies found that fruit (rather than vegetable) consumption is protective against the development of asthma, rhinitis and asthmatic symptoms such as wheezing (Ellwood et al.,

2013; Forastiere et al., 2000; Rosenlund et al., 2011; Sharma & Banga, 2007; Willers et al., 2011), and more severe symptoms among children already diagnosed with asthma (Mendes et al., 2011). However, other studies found that a high vegetable rather than fruit intake was protective against allergic asthma and airway hyper-responsiveness (Hijazi, Abalkhail, & Seaton, 2000; Protudjer, Sevenhuysen, Ramsey, Kozyrskyj, & Becker, 2012). One recent study linked a diet high in EDNP foods, accompanied by a low intake of fruit and vegetables, with increased risk for asthma in childhood (Lee et al., 2012). There has been a marked increase in the prevalence of asthma in 'Westernized countries' over the past 40 years (Varraso, 2012) as childhood obesity levels have risen. Asthma is now the most commonly reported chronic health condition experienced by Australian children under 14 years of age, with 10% diagnosed with the condition (Australian Institute of Health and Welfare, 2012). The second most commonly reported condition, experienced by 7% of children, is hayfever and allergic rhinitis (Australian Institute of Health and Welfare, 2012).

2.6 Television viewing and food consumption patterns

Many international and several Australian studies have provided evidence that child and adolescent television viewing is associated with dietary differences that contribute to the development of overweight and obesity.

A US prospective cohort study which followed-up 500 adolescents after two years, found that increased television viewing time was associated with increased calorie intake due to the increased consumption of foods commonly advertised on television (Wiecha et al., 2006). Internationally, children's and adolescents' high television viewing time per day has been associated with the increased consumption of EDNP products such as fast food, sweetened beverages, fried/baked foods and sweet/salty snacks, and with the decreased consumption of fruit and/or vegetables, in both cross sectional studies (Aranceta, Perez-Rodrigo, Ribas, & Serra-Majem, 2003; Barr-Anderson, Larson, Nelson, Neumark-Sztainer, & Story, 2009; Boynton-Jarrett et al., 2003; de Bruijn & van den Putte, 2009; Giammattei et al., 2003; Kremers, van der Horst, & Brug, 2007; Lissner et al., 2012; Lowry, Wechsler, Galuska, Fulton, & Kann, 2002; Taveras et al., 2006; Utter et al., 2003; Utter et al., 2006; Vereecken, Todd, Roberts, Mulvihill, & Maes, 2006), and longitudinal studies (Barr-Anderson et al., 2009; Gebremariam et al., 2013), with the impact having been observed in children as young as 3 years of age (S. A. Miller, Taveras, Rifas-Shiman, & Gillman, 2008). High levels of television viewing as an older child and adolescent, as recalled by young adults, has been

found to correlate with higher consumption of EDNP foods as an adult (Harris & Bargh, 2009).

These findings have been confirmed in several large Australian cross sectional and longitudinal studies (of over 18,000 children and adolescents), which concluded that children who watch more television are more likely to have a more positive attitude towards EDNP foods, ask for more EDNP foods, and consume more EDNP foods, while consuming less fruit and vegetables (Dixon, Borland, Segan, Stafford, & Sindall, 1998; Pearson, Ball, & Crawford, 2011; Salmon et al., 2006; Scully et al., 2012; Woodward et al., 1997). One of these studies noted that this relationship was mediated by children snacking while watching television (Pearson et al., 2011).

It has been long known that children from families that routinely watch television during meal-times consume fewer fruits and vegetables and more fast foods than children whose families do not routinely watch television during their meals (Coon, Goldberg, Rogers, & Tucker, 2001). Several studies have since confirmed that children who eat in front of the television are more likely to consume more EDNP foods and sweetened beverages and to eat fewer fruit and vegetables (Colapinto, Fitzgerald, Taper, & Veugelers, 2007; Dubois, Farmer, Girard, & Peterson, 2008; Feldman, Eisenberg, Neumark-Sztainer, & Story, 2007; Francis et al., 2003; Liang et al., 2009; Lissner et al., 2012; Marquis, Filion, & Dagenais, 2005; Skatrud-Mickelson, Adachi-Mejia, & Sutherland, 2011), and to be overweight and obese (Francis et al., 2003; Liang et al., 2009; Lissner et al., 2012; Vik et al., 2013), even after controlling for physical activity levels (Rey-López et al., 2012).

Television may play a role in distracting children from satiety cues while they eat. One experiment with 30 children aged 9 to 12 years, showed that children who watched a continuous television program ate more snack food than children who watched no television or a repeated segment of television (Temple, Giacomelli, Kent, Roemmich, & Epstein, 2007). A recent study found that 20 healthy weight boys, aged 9 to 13 years, ate more food while watching television (with no advertising) than when using a computer or playing a video game (Marsh, Mhurchu, Jiang, & Maddison, 2014).

While immersion in program narrative may play a distracting role when children eat in front of the television, it is believed that television advertising for EDNP food and beverages plays a far more powerful role in contributing to children's desire for the foods they see advertised. Frequency of eating in front of the television, for example, has been correlated with requests for parental purchase of advertised foods (Marquis et al., 2005). A Turkish study revealed

that: almost 90% of over 300 children aged 3 to 8 years ate while watching television; almost 33% asked for advertised foods while watching the advertisements; just over 40% asked their parents to purchase the advertised foods while shopping together afterwards; and a further 9% insisted on purchase of the food requested, arguing or crying to obtain the advertised product (Arnas, 2006).

2.7 Summary of the main findings

This chapter reviewed the literature linking childhood overweight and obesity with television viewing.

Childhood overweight and obesity is of public health concern as overweight or obese children and adolescents are at higher risk of a number of serious health problems. Current estimates are that 26.5% of Western Australian children are overweight or obese. While a genetic influence has been identified, the rapid rise in prevalence over the 1980s and 1990s indicates a contributing environmental trigger.

Higher levels of television viewing have been clearly linked to higher levels of overweight and obesity. A significant proportion of Western Australian children are viewing more than the recommended 2 hours of television per day. It was hypothesized that television viewing replaced physical activity and decreased children's energy expenditure. However, recent evidence has indicated that the relationship between sedentary behaviour and obesity is not simple, causal and in one direction. Children and adolescents who become overweight are more likely to avoid physical activity and choose to participate in sedentary activities such as television viewing. A significant proportion of Western Australian children do not meet the recommended 60 minutes per day of physical activity but this level has not changed markedly over time and thus cannot fully explain the rise in overweight and obesity. However, there has been a well-documented change in the diet of Western Australian children over this time, with an increased consumption of EDNP foods combined with a low consumption of fruit and vegetables. This diet has been significantly associated with higher levels of television viewing.

Overall, the evidence suggests that television viewing may impact on children's health via its influence on diet rather than by increasing sedentary behaviour. The next chapter will explore the relationship between television viewing and children's food choices.

Chapter 3. Television advertising of EDNP foods and beverages

3.1 Children's level of exposure to television advertising for EDNP foods

International analyses of the amount of advertising for EDNP foods and beverages during children's television programming have indicated consistently high levels of exposure in many countries. The first studies drawing attention to the issue were published in the US in the 1970s with the issue gaining continued attention in the US since that time (Coon & Tucker, 2002; Kotz & Story, 1994; Kunkel & Gantz, 1992; Story & Faulkner, 1990). Palmer (2006) reported an increase in estimates of US children's annual exposure to television advertisements from 20,000 in the 1970s to 30,000 in the 1980s, to 40,000 in the 1990s, and to 60,000 by 1999. Regulations introduced in the US in 1990 reportedly had little effect on exposure levels (Gamble & Cotugna, 1999; Taras & Gage, 1995), and there was a reported increase in the exposure of US children to food advertising between 2000 and 2005 (L. M. Powell, Szczypka, & Chaloupka, 2007).

A 1996 comparison of 13 countries, including Australia, revealed that food was the most frequently advertised product during children's television programming, with the EDNP food categories of confectionary, breakfast cereals and fast food comprising over half of food advertisements (Dibb, 1996). This report also noted that Australia had the highest number of advertisements per hour (34), followed by the US (24 per hour) and the UK (17 per hour), far more than the ten other European countries (0 to 16 per hour) in the study. A later ecological review found a significant association between these advertising levels and the estimated proportion of children overweight or obese in those 13 countries (Lobstein & Dibb, 2005).

Goris et al. (2010) utilised published studies from the period 2000 to 2008 to compare the levels of television exposure to food advertising and the prevalence of childhood obesity in six countries, including Australia. The study concluded that the contribution of television advertising to childhood obesity could be estimated at 16 to 40% in the US, 10-28% in Australia and Italy, and 4-18% in the UK, Sweden and the Netherlands (Goris et al., 2010). This association between advertising exposure and obesity was confirmed by a US retrospective data analysis of 1997 and 2002 children's viewing of commercial television and their BMI (Zimmerman & Bell, 2010). After controlling for physical activity levels and eating in front of the television, this study concluded that it was exposure to advertising, rather than television viewing per se, that was associated with obesity.

An analysis of US television ratings data from 2003 to 2008 demonstrated that, since the implementation of new self-regulation of advertising by the food industry, there was a 30.8% increase in 6 to 11 year old children's exposure to fast food advertising, despite a 27.7% decrease in exposure to advertising for other EDNP foods and beverages (L. M. Powell, Schermbeck, Szczypka, Chaloupka, & Braunschweig, 2011). It has been claimed that the 'advertised diet' would supply more than the recommended daily servings of sugar, fat and salt and less than the recommended servings of fruit and vegetables (Mink, Evans, Moore, Calderon, & Deger, 2010).

In 2003, 94% of food advertising on television was for EDNP products, decreasing to between 70% and 86% over 2005 to 2009 (R. A. Bell, Cassady, Culp, & Alcalay, 2009; L. M. Powell et al., 2011). Further analysis has revealed that between 2004 and 2009, self-regulation decreased the amount of advertising during programs with children comprising 50% or more of viewers (Harris, Sarda, Schwartz, & Brownell, 2013). However, including programs not broadcast during children's programming time but with 20% of more child viewers in the analysis, there was still significant exposure to television advertising (Harris et al., 2013).

UK analyses have revealed that while young children's television programming complied with new regulations to reduce food advertising (Oates & Newman, 2010), children in 2008 and 2009 were still exposed to a significant level of food advertising in peak children's viewing times (Boyland, Harrold, Kirkham, & Halford, 2011; Jenkin, Wilson, & Hermanson, 2009). A later UK study found that children's exposure had actually increased (Adams, Tyrrell, Adamson, & White, 2012). One UK study noted that while there had been a drop in advertising for confectionary, there had been an increase in the advertising of foods that "contain large amounts of hidden sugar" (Morgan, Fairchild, Phillips, Stewart, & Hunter, 2009, p. 748).

Approximately 10 to 16 years ago, Australian children were estimated to watch an average of 23 hours of television per week (Woodward et al., 1997) and view an average of 8 food ads per hour (Hill & Radimer, 1997; Neville, Thomas, & Bauman, 2005; Zuppa, Morton, & Mehta, 2003). They were thus estimated to have been exposed to over 10,000 food advertisements every year (Story, 2003). Even if this exposure level was revised in line with the lowest contemporary estimate of an average of 11 hours viewing per week (Australian Bureau of Statistics, 2004), this would equate to approximately 2,900 advertisements per year. The highest estimates of that time, for secondary aged girls in Western Australia with

an estimated average of 30.7 hours viewing per week (Hands et al., 2004), would have exposed the girls to more than 12,700 food advertisements per year.

Early content analyses of advertising during Australian children's viewing times revealed that 72% to 79% of food advertising was for foods considered non-core by the *Australian Guide to Healthy Eating*, and 46% to 54% of all food advertisements were for EDNP foods such as fast food and confectionary (Hill & Radimer, 1997; Neville et al., 2005; Zuppa et al., 2003). Australian studies have also shown there were more food advertisements broadcast during peak children's viewing times (Chapman, Nicholas, & Supramaniam, 2006; Kelly, Hattersley, King, & Flood, 2008) with confectionary advertisements three times more likely, and fast foods advertisements twice as likely when compared to adults' programs (Neville et al., 2005).

More recent Australian studies have found only a small reduction in the advertising of EDNP foods and beverages to children. In 2006 and 2007, 25.5% of advertisements shown during children's television programming were for food, 49% of these for EDNP foods, with 3.3 EDNP food advertisements shown per hour (Kelly, Hattersley, et al., 2008; Kelly, Smith, King, Flood, & Bauman, 2007). Kelly et al. (2007) also noted a higher proportion of advertisements for EDNP foods during the most popular children's programs (65.9%). Estimates of exposure for children aged 5 to 12 years were 63 EDNP food advertisements per week, that is, nine per day (Kelly et al., 2007). A contemporary Western Australian study found that, while a slightly lower level of 22% of advertising during children's television programming was for food, 72.2% of this was for EDNP foods with only 3.2% for fruit and vegetables (M. Roberts & Pettigrew, 2007). Overall levels of food advertising decreased on Australian television in 2008 (Kelly, Chapman, King, & Hebden, 2011). However during children's viewing times, there were five food advertisements per hour per channel, with 57% being for EDNP foods during peak viewing times (Kelly et al., 2011). In contrast, children's subscription television in Australia was found to broadcast less EDNP food advertisements than free to air television: 72% of food advertising was for EDNP foods but at a rate of less than one advertisement per hour per channel (Hebden, King, Chau, & Kelly, 2011).

Overall there has been little change in the level of television advertising of EDNP foods to children in Australia between 2006 and 2011 despite two food industry self-regulatory pledges (Hebden, King, Grunseit, Kelly, & Chapman, 2011; King, Hebden, Grunseit, Kelly, & Chapman, 2013; King et al., 2011). Advertising for EDNP food remains a significant presence in Australian children's free-to-air television viewing.

3.2 EDNP food advertising influence on children's food preferences and consumption

Children's exposure to television advertising has been directly linked with increased desire for, and consumption of, heavily promoted EDNP foods and beverages.

A Dutch study of more than 200 children aged 4 to 12 years of age, related the children's advertising exposure to advertised brands in five EDNP food categories (sugared breakfast cereals, confectionery, savoury snacks, sweetened beverages and fast food) (Buijzen, Schuurman, & Bomhof, 2008). The researchers found that higher exposure to advertising for EDNP products increased consumption of both the advertised brands and EDNP food and beverages generally. A similar longitudinal study of more than 11,000 US children found a strong link between estimated exposure to television advertising for sweetened beverages and fast food and their later consumption of those products (Andreyeva, Kelly, & Harris, 2011). This study also found, a link between higher BMI and fast food advertising exposure (Andreyeva et al., 2011).

Many US and UK experimental studies have indicated that television advertisements directly influence children's food preferences. One early study required 45 children aged 6 to 8 years to watch a television segment into which either a control advertisement or an advertisement for an unknown brand of potato chips was inserted (Resnik & Stern, 1977). At the end of the session, the children were offered the choice of two unknown brands of potato chips. Compared to the children in the control condition, more children chose the brand they had just seen advertised on television. In another early experiment (Goldberg et al., 1978), 80 children aged 5 to 6 years watched a cartoon program into which had been embedded either high sugar snack and breakfast food advertisements or advertisements for nutritious snacks and breakfast foods (fruit, vegetables, milk and eggs). When asked to choose what they would like to eat, children who saw advertisements for EDNP foods were more likely to choose EDNP foods than children who saw advertisements for nutritious food or no advertisements. In a longer term study (Gorn & Goldberg, 1982), 288 children aged 5 to 8 years saw 4.5 minutes of advertising embedded into 30 minutes of television every day over two weeks of a summer camp and their subsequent snack choices recorded. Children who saw EDNP advertising ate more EDNP foods than children who saw no advertising, fruit advertisements or nutrition messages (Gorn & Goldberg, 1982). The researchers noted that while the children all knew that fruit was a healthier snack, their EDNP snack choice was more influenced by their advertising exposure. More recent experimental studies have supported these early findings. One study with 46 children aged 2 to 6 years, embedded

advertisements for EDNP foods into a cartoon program (Borzekowski & Robinson, 2001). This study confirmed that, when faced with a choice of two brands for a product, children who saw the advertising were more likely to choose the advertised brand than children in the control condition. Another experiment found that the majority of 75 children aged 4 to 5 years, chose a branded, advertised food or beverage product over a very similar non-branded product when asked which should be purchased for a child of their age and gender (Pine & Nash, 2003).

These initial studies assumed that younger children were inherently more vulnerable than older children to advertising effects. However, an early US experimental study with 96 children found that both 4 to 5 and 9 to 10 year olds were equally influenced by advertising, despite the older children demonstrating a better understanding of the purpose of advertising (Jeffrey et al., 1982). This study found that boys who saw EDNP food advertisements recalled more advertised products and ate significantly more calories from EDNP foods while snacking afterwards, than those who saw toy advertisements or healthy food advertisements. Subsequent UK and US experiments involving a total of 297 children aged 5 to 13 years, found that both boys and girls exposed to EDNP food advertising ate more EDNP food afterwards than children in the control condition (Halford, Boyland, Hughes, Oliveira, & Dovey, 2007; Harris, Bargh, & Brownell, 2009), particularly older overweight and obese children (Halford, Gillespie, Brown, Pontin, & Dovey, 2004; Halford et al., 2008). A later UK study of 37 adolescents aged 11 to 13 years, found that exposure to food advertisements increased preferences for branded food items in healthy weight children, and that overweight and obese children preferred branded food items irrespective of the advertising they had just viewed (Halford et al., 2008). A recent study found that this increased preference for both branded and non-branded food products after exposure to EDNP advertising was greater for those children who habitually watched a high level of television (Boyland, Harrold, Kirkham, Corker, et al., 2011). A similar Dutch study with 120 children aged 8 to 12 years, found that increased consumption after viewing food advertising occurred only for boys (Anschutz, Engels, & Van Strien, 2009). A US study involving 133 children aged 5 to 11 years found that both older and younger children were equally influenced in food brand preferences by branded advertising but also found that boys were more influenced than girls (Chernin, 2008).

Memory for advertising is believed to be an important factor in influencing children's later food choices (Hitchings & Moynihan, 1998). After only a brief exposure, children could recognise and recall food advertisements, with this ability increasing with age and repeated

exposure (Oates, Blades, & Gunter, 2002). An early UK qualitative study with 9 to 11 year olds found that there was an association between food advertisements that could be recalled and foods actually consumed, with the relationship strongest for sweetened beverages and savoury snacks (Hitchings & Moynihan, 1998). A later UK study found that the recognition and recall of advertised food brands correlated with the amount of food that 9 to 11 year old children ate afterwards, with obese children remembering more advertisements due to a hypothesised “heightened alertness to food related cues” (Halford et al., 2004, p. 221). Although a recent study found that overweight adolescents were less likely to name a food advertisement as their favourite advertisement (Adachi-Mejia et al., 2011), a larger study of over 2,500 US adolescents revealed that higher televised fast-food advertising ‘receptivity’ (more sensitively measured in this study by advertisement recognition, liking, and brand recall) is associated with a higher risk of obesity (McClure et al., 2013). Furthermore, overweight and obese children eat more calories than healthy weight children when food is presented to them in branded packaging (Forman, Halford, Summe, MacDougall, & Keller, 2009; Keller et al., 2012).

The different responses of overweight and obese children to food advertising have been supported by recent neuroimaging evidence from the US. For example, while undergoing functional magnetic resonance imaging, ten obese adolescents aged 10 to 17 years, demonstrated much higher activity levels in brain networks associated with motivation and rewards while viewing food images than 10 healthy weight children (Bruce et al., 2010). Similarly, a study involving 35 adolescent girls aged 15 to 17 found that girls with a higher BMI demonstrated more activation of brain areas associated with attention when viewing images of appetising food images than leaner girls (Yokum, Ng, & Stice, 2011). Obese children also demonstrated significantly less activation in a brain area involved in cognitive control while viewing food logos, as compared to non-food logos, than 10 healthy weight children (Bruce et al., 2013). A subsequent study involving 17 healthy weight children aged 10 to 14 years, found that, compared with non-food logos, known food logos activated brain regions associated with motivation (Bruce et al., 2014).

A more naturalistic study compared the neural responses of 30 adolescents to food advertisements and non-food advertisements embedded into a television show (Gearhardt, Yokum, Stice, Harris, & Brownell, 2014). The adolescents had a higher recall of food advertisements than non-food advertisements and this finding was supported by their greater activation of brain areas implicated in visual processing, attention, cognition, movement, somatosensory response, and reward during food advertisements. In contrast

with other studies, obese adolescents viewing food advertisements showed less activation of brain areas associated with visual processing, attention, reward and salience detection with a higher level of activation in a brain region implicated in semantic control (Gearhardt et al., 2014). The researchers hypothesised that the obese adolescents were “using control strategies to reduce their response during food commercials” while healthy weight adolescents were impacted “in a manner that might shape future eating tendencies” (Gearhardt et al., 2014, p. 6). Interestingly, the authors followed-up the adolescents one year later and found that a higher level of neural activation in response to food advertisements was associated with a greater increase in BMI over that time (Yokum, Gearhardt, Harris, Brownell, & Stice, 2014).

Parental mediation has been shown to moderate advertising effects on children and adolescents (Buijzen & Valkenburg, 2003; Buijzen & Valkenburg, 2005; Moschis & Moore, 1982). However, a recent experimental study with 75 children aged 3 to 8 years found that children’s choice of advertised foods after advertising exposure was only slightly moderated by parental encouragement to choose the healthier food item (Ferguson, Muñoz, & Medrano, 2012). It is important to note that parents are also influenced by television advertising for EDNP foods. A US study noted that parents’ higher exposure to television advertising for EDNP foods correlated with both their higher normative beliefs about the consumption of EDNP foods and their children’s higher consumption of those foods (Grier, 2007). A recent Australian study confirmed this by exposing over 1,300 children aged 8 to 14 years, and one of their parents, to television advertisements for four EDNP foods (Simone Pettigrew et al., 2013). Parents exposed to the television advertising were significantly more likely to desire to consume the advertised EDNP foods and to believe that the product could be consumed often, than parents who were exposed to a mere picture of the food product (Pettigrew et al., 2013). Parents in this study were actually found to be more responsive to the television advertising than their children, giving all of the advertised EDNP products higher ratings for perceived attributes such as taste, fun and health.

Overall then, ecological and experimental studies have clearly linked exposure to television advertising of EDNP food and beverages with increased consumption of the advertised foods. Several experimental studies indicated that overweight and obese children have higher recall of television food advertising than healthy weight children. This finding has been recently extended by functional magnetic resonance imaging which has mapped higher neural activation in overweight and obese children for brain areas associated with attention, motivation and reward.

3.3 EDNP food advertising influence on children's purchase requests

Several international and Australian quantitative and qualitative studies have indicated that parents are concerned about the impact of television advertising of EDNP foods and beverages on their children. Parents believe that it impacts on: children's food preferences and consumption (Campbell, Crawford, & Hesketh, 2007; Pettigrew & Roberts, 2006; K. P. Roberts & Powell, 2005); leads children to ask for advertised products (Arnas, 2006; M Buijzen & Valkenburg, 2003; Campbell et al., 2007; Kelly, Chapman, Hardy, King, & Farrell, 2009; Pettigrew & Roberts, 2006; K. P. Roberts & Powell, 2005; Young, De Bruin, & Eagle, 2003; Yu, 2012); causes parent-child conflict (Arnas, 2006; Buijzen & Valkenburg, 2003; Pettigrew & Roberts, 2006); and should be restricted (Dens, De Pelsmacker, & Eagle, 2007; Kelly et al., 2009; Morley et al., 2008; Young et al., 2003; Yu, 2012).

Children of all ages have significant influence on the purchasing of food and other products by their parents (Buijzen et al., 2008; Gaumer & Arnone, 2009; Nicholls & Cullen, 2004; S. Powell, Langlands, & Dodd, 2011). It has been estimated that in the US, children influence about US\$500 billion of food purchases annually (McGinnis et al., 2006). Children as young as three recognise advertised logos and products while shopping and reach for them, point at them or ask for them (Kinsky & Bichard, 2011), and this brand recognition in young children has been linked to their level of television exposure (Valkenburg & Buijzen, 2005). An early observational experiment linked 3 to 5 year old children's "commercial reinforcement value", that is, their higher level of desire to watch food advertisements during a television segment that required pressing a button to maintain activation, with a higher number of food purchase requests in the supermarket afterwards (Galst & White, 1976). Recently, US mothers of children aged 3 to 5 years reported that their children's food purchase requests were frequent and clearly linked to advertisements they had seen on television, particularly when familiar characters were involved, as they often did not know what the food product actually was (Henry & Borzekowski, 2011).

An earlier survey of over 500 UK parents of children aged 7 to 11 years, revealed that children's television viewing levels correlated with number of requests for advertised products, with 39% of requests being for foods recently advertised on television and 45% of requests being for EDNP foods or beverages (Donkin, Tilston, Neale, & Gregson, 1992). A UK study of 44 children aged 9 to 11 found a relationship between the advertisements for EDNP foods recalled from a televised segment and later parent-reported purchase requests for those foods (Hitchings & Moynihan, 1998). A US prospective cohort study of over 800 children aged 8 years, found that their amount of television viewing correlated with self-

reported requests for advertised food and beverages at baseline and when tracked for the subsequent 7 to 20 months (Chamberlain, Wang, & Robinson, 2006).

Evidence for a causal relationship comes from both experimental and observational studies. An experimental US study, involving 36 children aged 3 to 5 years, found that children who watched a television segment containing advertisements for EDNP foods were more likely, when shopping afterwards with their mother, to ask for the advertised brands of foods than children who did not see the advertisements (Stoneman & Brody, 1981). An extension of this study revealed that children who had watched the advertisements with their mother made more requests than those who had watched it alone, perhaps believing that their mothers would be more successfully persuaded having seen the same appealing messages (Brody, Stoneman, Lane, & Sanders, 1981). A very early US observational study of over 500 parent child-interactions while buying cereal in the supermarket, found that 20% of children requested a cereal while a further 46% “demanded” a cereal, with 9% of the children specifically mentioning an advertised premium (small ‘free’ gift) when explaining why they wanted a particular brand (Atkin, 1978). This study also noted that when the parent did not comply with their child’s desire, 65% of the interactions ended in conflict. A later US observational study of 133 child-adult interactions while selecting food in supermarkets revealed that in half of the interactions the child made a request, with over half of these for EDNP foods, and half of the requests were granted (O’Dougherty, Story, & Stang, 2006). In almost 29% of these interactions, food brand marketing reportedly played a role in the request (O’Dougherty et al., 2006).

Focus group discussions with parents and children in the US revealed that children as young as 3 years requested advertised food products using techniques such as crying and verbal demands (S. Powell et al., 2011). By age 7 to 8 years, children developed persuasive techniques to rationalise their parents’ choice such as explaining that they had “been good” and thus deserved a reward, or that parents should buy the product “because you love me” (S. Powell et al., 2011). An Australian qualitative study involving over 100 parents of 3 to 5 year olds, found that the purchase of EDNP foods for children in a supermarket setting was often motivated by the desire to avoid conflict (G. Noble, Stead, Jones, McDermott, & McVie, 2007). On the other hand, recent qualitative research with Irish parents and their children aged 5 to 11 years indicated that purchase request interactions can be a positive experience with both parties being aware of and enjoying the rules of the ‘game’ (Lawlor & Prothero, 2010; Nash & Basini, 2012).

Older children and adolescents do not necessarily need to request parental purchase when they have control over their own money. In 2006, US children aged 8 to 12 years were estimated to spend more than US\$200 billion per year of their own money without their parents' permission, with EDNP foods and beverages being the items most commonly purchased (McGinnis et al., 2006). Focus groups with children have revealed mixed findings internationally suggesting that the use of children's own money may be impacted by cultural norms and expectations. Discussion with Brazilian children aged 7 to 10 years, for example, revealed that they choose to spend their own money on EDNP foods (Fiates, Amboni, & Teixeira, 2008), while children aged 8 to 11 years in New Zealand did not use their pocket money for purchase of EDNP foods (Marshall, O'Donohoe, & Kline, 2007).

Overall, television advertising exposure, particularly at high levels, can increase the likelihood of children choosing, eating, requesting, demanding and buying EDNP foods. The next section considers the techniques that contribute to television advertising being such an effective marketing strategy.

3.4 Techniques utilised in EDNP television food advertising to children

Public health practitioners and researchers have become increasingly concerned with the elements within television food advertising that gain and maintain children's attention, and with the specific appeals and persuasive techniques utilised. A recent US survey of over 300 mothers of 7 to 12 year old children revealed that most held a negative view of the advertising directed at their children, believing that advertisers "use tricks and gimmicks" to "deceive children" (Yu, 2012, p. 373). Focus groups with Australian parents revealed their belief that advertising is "taking advantage of children's naiveté and playing on their emotions" (Ip, Mehta, & Coveney, 2007, p. 54).

Early experimental studies of children's eye gaze patterns, likeability ratings and recall of advertising showed that 6 to 9 year olds pay attention during physical action, lose attention during monologues, and that advertising needs to be "clear and concrete" for young consumers (Rust & Watkins, 1975, p. 24). Marketers have long known that children prefer products endorsed by celebrities, that a premium (an inducement to purchase such as a free toy, competition or licensed packaging) will impact on children's food preferences, and that repetition of advertisements will increase food product preferences (Gorn & Goldberg, 1980; J. M. Miller & Busch, 1979; Ross et al., 1984; Shimp, Dyer, & Divita, 1976).

There have been many international analyses of the scripting, production techniques, and messages communicated by food advertisements targeting children. An early UK study revealed that advertising for EDNP foods used significantly more animation, stories, humour and the promise of fun/happiness and positive mood alteration than children's advertisements for other products (Lewis & Hill, 1998). It was also found that, compared to advertising targeting adults, children's advertising was more likely to be repeated, include people (animated and 'real'), be faster paced, contain elements of magic or fantasy, and contain the emotional appeals of fun, action, adventure and achievement (Lewis & Hill, 1998). A later UK study noted a higher proportion of children's advertising, as compared to adults' advertising, contained elements of fantasy, animation and celebrities, usually for EDNP foods shown eaten as snacks in a leisure setting (Sixsmith & Furnham, 2010).

A recent UK study noted that in one third of advertisements, the food product being advertised was depicted in a "wider food context" which was usually healthier than the advertised product such as with added fruit or vegetables (Adams, Tyrrell, & White, 2011). Another recent UK study reported the high use of promotional characters and celebrity endorsers to promote EDNP foods, noting that the most common persuasive appeals were fun, taste and a premium (Boyland, Harrold, Kirkham, & Halford, 2012). A later experiment by the same authors involving 181 children aged 8 to 11 years, reported that the children ate more of a particular brand of potato chips after viewing a television advertisement for the brand with a celebrity endorser, and when the same celebrity was shown in his usual role of television presenter, than the amount consumed by children who saw an advertisement for another savoury snack or a toy advertisement (Boyland et al., 2013). It was concluded that the impact of a celebrity endorser goes far beyond their advertising role and influences food consumption when the celebrity is seen in other contexts.

Early US analyses reported that the most frequent explicit messages were about 'great taste', happiness and that it is fun or cool to eat EDNP foods (Byrd-Bredbenner & Grasso, 2000; Herr-Wagner, Houston, & McCulley, 1999; Kotz & Story, 1994; Kunkel & Gantz, 1992). It was also noted that premiums were the third most common feature and that there were often misleading messages that EDNP foods were healthy and part of a 'balanced diet' (Byrd-Bredbenner & Grasso, 2000; Kotz & Story, 1994). Commonly utilised content themes that emerged from analyses included achievement, mood alteration, enablement, trickery and product dependence, with the spoken scripts emphasising emotion (Rajecki et al., 1994).

More recent US analyses of advertising of EDNP products to children have detailed frequent use of animation, sound effects, visual effects, musical jingles, product identification characters accompanied by a high level of premium offers, the promise of great taste and children shown eating the product (Batada, Seitz, Wootan, & Story, 2008; Folta, Goldberg, Economos, Bell, & Meltzer, 2006; Page & Brewster, 2007; Warren, Wicks, Wicks, Fosu, & Chung, 2008). Frequently used emotional appeals included fun and good times, being cool, happiness, friendship or social success, speed and strength, action and adventure, magic and fantasy, adult approval, and trickery and deceit (i.e. “depictions of exaggerated pleasure sensation and dependency/addiction, portrayals of physical violence, trickery, thievery/stealing, fighting and taking extreme measures to obtain a food, and treating adults with disrespect”) (Batada et al., 2008; Folta et al., 2006; Page & Brewster, 2009, p. 150); Warren, 2008 #2216}.

It was also noted that many of the US children’s advertisements associated EDNP products with good health by depicting children undertaking physical activity while eating the product (Batada et al., 2008; Folta et al., 2006), or making health claims such as being part of a ‘nutritious breakfast’ or the presence of added vitamins (Batada et al., 2008). However, advertising aimed at pre-schoolers focussed on promoting fun/happiness, action/excitement, and the sweet taste of the advertised foods (Connor, 2006).

There has been an increase of in-store marketing programs utilising licenced characters and cross promotions with television celebrities or programs in the US (Harris, Schwartz, & Brownell, 2010), with the majority of television food advertising targeting children using a familiar character to promote EDNP products (Castonguay, Kunkel, Wright, & Duff, 2013). Advertising aimed specifically at pre-schoolers utilised characters and logos, focussing on a “branding approach” to create “lifelong customers rather than generating immediate sales” (Connor, 2006, p. 1478).

Several studies have confirmed that Australian children are exposed to the same advertising elements, messages, appeals and themes. An early analysis reported that, apart from breakfast cereal advertisements that frequently utilised nutrition claims such as vitamin and mineral content, the most common messages to promote EDNP foods were great taste, fun, being cool and premium giveaways, (Hill & Radimer, 1997). It was noted that the most frequently used features were animation and scenes of people eating the advertised food, usually within a social setting (Hill & Radimer, 1997). It was also reported that EDNP foods were made to look more nutritious through the addition of fruit and vegetables, for example, animated fruits promoting breakfast cereals that contain minimal fruit (Hill & Radimer, 1997).

Later studies noted the frequent use of promotional characters, celebrity endorsers, premium offers, fun/happiness appeals, and taste appeals while children were often depicted eating snack foods with family and friends in the home setting (Hebden, King, & Kelly, 2011; Kelly, Hattersley, et al., 2008). It was also noted that marketers routinely utilised multiple strategies within advertisements, for example, appealing to parents with a health/nutrition message while simultaneously presenting fun/happiness and fantasy/imagination appeals to children (Hebden, King, & Kelly, 2011).

A Western Australian analysis reported the most common appeals used were fantasy, fun, humour, taste and action/adventure with frequent use of a celebrity endorser and animated spokespeople/characters (M. Roberts & Pettigrew, 2007). Further thematic analysis revealed that snacking, often alone, was depicted more commonly than meals, core foods were denigrated, health claims were made for EDNP foods and the ability of the advertised foods to enhance popularity, performance and mood was implied (M. Roberts & Pettigrew, 2007). A later Australia-wide study by the same authors confirmed that themes such as mood enhancement and cravings were more common during peak children's viewing and for EDNP foods (Pettigrew, Roberts, Chapman, Quester, & Miller, 2012). The same authors conducted focus groups and in-depth interviews with Western Australian mothers and reported that the mothers were concerned with the use of premium offers, licenced characters and movie-tie ins, believing that the premium (particularly if the toys are part of a collectible set) drives their children's demands for foods they do not always like the taste of or want to eat (Pettigrew & Roberts, 2006; M. Roberts, 2005). Pettigrew (2006, p. 62) noted that: "mothers felt that their children were tantalised by clever promotional campaigns that effectively engaged their children and took advantage of their vulnerability" and that children act as "unpaid endorsers... with remarkable effectiveness" (p. 63) when the toys are brought to school to show their peers. Despite the existence of both mandatory and voluntary regulations, advertising audits in both 2005 and 2010 revealed that Australian children were exposed to advertising with content that breached those codes in their use of premium offers, competitions and character endorsements (Morton, Stanton, Zuppa, & Mehta, 2005; M. Roberts, Pettigrew, Chapman, Miller, & Quester, 2012).

Overall, analyses have revealed that television advertising for EDNP foods and beverages consistently uses positive appeals and persuasive techniques to engage with children and adolescents. The 'great taste' of the product is frequently communicated while positive emotions and positive social outcomes are routinely linked to the product experience. Parental reports have confirmed the relationship between specific marketing strategies (e.g.

premiums, licenced characters) with their children's requests and preferences for the advertised foods.

3.5 The impact of persuasive television advertising on children

3.5.1 Children's understanding of advertising's persuasive intent

There has long been concern that children are less aware of the commercial intent of advertising and thus more vulnerable to these persuasive techniques than adolescents or adults. Younger children under the age of 7 or 8 years of age were perceived to be at higher risk due to their under-developed information processing skills and their inability to make decisions based on more than one piece of information, particularly more abstract information (John, 1999). A more adult way of processing advertising was believed to develop at about the age of 11 years (John, 1999).

Many early US, UK and European studies explored children's ability to identify advertising and their comprehension of its commercial goal. Children aged 3 to 5 years in US studies were able to identify whether they were watching a television program or an advertisement, with the older children making more correct identifications, but were unable to explain the difference between the two (Butter, Popovich, Stackhouse, & Garner, 1981; S. R. Levin, Petros, & Petrella, 1982). Later European studies indicated that many 6 year olds were still confused between programs and advertisements (Andronikidis & Lambrianidou, 2010; Oates, Blades, Gunter, & Don, 2003), while US focus groups with children indicated that 7 year olds were able to articulate the difference (Mallalieu, Palan, & Laczniak, 2005). Other European studies have confirmed that this ability is well developed by the age of 8 to 9 years (Bijmolt, Claassen, & Brus, 1998; Lawlor & Prothero, 2003). A recent Dutch study reported that most 9 to 10 year olds have developed adult levels of advertising recognition (Rozendaal, Buijzen, & Valkenburg, 2010).

Identification of an advertisement, however, does not mean that a child is aware of its commercial intent. Research into discernment of commercial intent has been impeded by a lack of clear distinction between the concepts of 'selling intent' and 'persuasive intent'. An early US experimental study reported that the majority of children aged 3 to 6 years were able to non-verbally indicate their understanding that advertising wanted them to purchase the advertised product at a shop (Donohue, Henke, & Donohue, 1980). Subsequent studies, however, found that few pre-schoolers could achieve this (Macklin, 1985, 1987), but most

children were able to show non-verbal understanding of selling intent by age 7 (Owen, Auty, Lewis, & Berridge, 2007). While an early US study indicated that children were able to verbally express selling intent by the age of 8 (Paget, Kritt, & Bergemann, 1984), a later UK study found that only 25% of 8 year olds and 33% of 10 year olds were able to verbally express the persuasive intent of advertising (Oates et al., 2002). Focus groups with Greek children found that, by age 10 to 11, most children could verbalise persuasive intent (Andronikidis & Lambrianidou, 2010). The children who did not recognise either selling or persuasive intent believed advertising's role was to inform them, amuse them or provide a programming break (Andronikidis & Lambrianidou, 2010; Bijmolt et al., 1998; Oates et al., 2002; Oates et al., 2003). An Irish study using focus groups discussions found that 7 to 9 year olds were able to articulate a more sophisticated understanding of the commercial role of advertising, discussing the differing viewpoints and aims of viewers, advertisers and television channels (Lawlor & Prothero, 2008). US focus groups with children, however, found that this higher level of understanding was most confidently discussed by 11 to 12 year olds (Mallalieu et al., 2005).

A Western Australian study, involving more than 400 children aged from 4 to 12 years, used both non-verbal and verbal measures of understanding of a fast food television advertisement (Carter, Patterson, Donovan, Ewing, & Roberts, 2011). This study confirmed that by age 7 to 8 years, most children could verbally and non-verbally describe the selling intent of advertising, but revealed that the comprehension of persuasive intent developed more slowly with only 40% of 11 to 12 year olds demonstrating this understanding. A Dutch comparison of children's and adults' competencies confirmed that by age 12, children have still not reached an adult level of understanding of selling and persuasive intent (Rozendaal et al., 2010). A later study by the same authors found that children's comprehension of advertiser strategies increased between the ages of 8 and 10 years, with an understanding of some strategies, such as premiums and celebrity endorsement, present at an earlier age than others, such as product demonstration (Rozendaal, Buijzen, & Valkenburg, 2011).

A very early US study demonstrated that when 6 to 9 year old children realise the selling intent of advertisements, their belief and liking of advertising decreases and they are less likely to ask for the products being advertised (Robertson & Rossiter, 1974), thus 'resisting' advertising's effect (Rossiter & Robertson, 1974). A later study, however, suggested that children's cognitive defences had been overestimated; advertising knowledge did not increase 9 to 10 year old children's counter-arguments against advertisements unless triggered by direct adult questioning (Brucks, Armstrong, & Goldberg, 1988). An adult

making factual or negative comments about advertisements and the advertised products, after viewing them with the child, was found to enhance scepticism and reduce the intention to request product purchase of 7 to 10 year olds, but not of 5 to 6 year olds (Buijzen, 2007).

Rozendaal (2009) established that the recognition of advertising and the understanding of selling intent made no difference in desire for advertised products in 8 to 12 year olds. In 8 to 9 year olds, it was found that understanding persuasive intent actually increased children's desire for advertised products and only when children reached 10 to 12 years did their understanding of persuasive intent reduce advertising influence (Rozendaal et al., 2009). Focus groups with Australian children aged 8 to 11 years confirmed that advertising literacy does not decrease desire for advertised products (Mehta et al., 2010). The children in this study discussed advertising deception, that is that advertisers wanted to sell products for financial gain and that their chances of winning advertised competitions were very low. Nevertheless most of them reported that they desired and made purchase requests for EDNP food products after seeing advertisements (Mehta et al., 2010). A US study reported that adolescents, aged 11 to 14 years, are still in the process of developing knowledge about television advertising, but noted that a high level of scepticism towards advertiser strategies, both mistrusting advertiser motives and disbelieving advertising claims, and that their scepticism increased with age (Boush, Friestad, & Rose, 1994).

A systematic review concluded that younger children are not at greater risk, that in fact children of all ages are influenced by advertising whatever their advertising literacy skills (Livingstone & Helsper, 2006). Livingstone and Helsper (2006), citing Petty and Cacioppo's 1986 *Elaboration Likelihood Model of Persuasion*, proposed that children of different ages are persuaded by different features of advertisements. The authors suggested that younger children are persuaded by 'peripheral' aspects of a message, such as a spokes-character, celebrity or emotion, while adolescents are influenced if convinced by the 'central' content of the message. However, as current television advertising utilises emotional appeals rather than provision of product information, most children and adolescents process it using the 'peripheral route', and so do not use their advertising knowledge as a defence (Rozendaal, Lapierre, van Reijmersdal, & Buijzen, 2011).

Nairn and Fine (2008, p. 458) rejected age-based cognitive development "as an ethical benchmark for assessing the fairness of advertising to children" and argued that discussion should be informed by a child's ability to "resist implicit persuasion" (p. 460). The authors contended that advertising that links positive experiences to a product causes children to develop a preference for the product in implicit "non-conscious, non-rational" ways that have

a more powerful impact on behaviour than their explicit, consciously held beliefs (Nairn & Fine, 2008, p. 458).

Harris, Brownell and Bargh (2009) proposed a *Food Marketing Defence Model*, building on earlier models and theories about how people 'defend against' persuasive advertising. This model outlined four conditions which enable a child or adolescent to resist advertising: 1) awareness of advertisements and an understanding of their persuasive intent; 2) understanding of advertising effects and how to defend against them; 3) the ability to resist; and 4) the desire to resist (Harris, Brownell, et al., 2009). The authors argued that children, adolescents, and perhaps even adults, find it difficult to defend against an influence that works "outside of their conscious awareness", and would require an impossible level of vigilance, time and effort due to the "massive number of subtle marketing messages" communicated to individuals on a daily basis (Harris, Brownell, et al., 2009, p. 248).

In summary, while there is concern about younger children's vulnerability to persuasive advertising techniques due to their lack of awareness of commercial intent, there has been debate as to the age at which children become aware of this intent. Understanding of selling intent appears earlier than the understanding of persuasive intent, but research has demonstrated that while advertising literacy increases with age, even older children have not reached an adult level. Studies have also shown that advertising literacy is not protective against the influence of advertising and that children of all ages are persuaded by advertising. It is believed that pervasive and persuasive advertising messages cannot be 'resisted' as they utilise a range of different emotional appeals that bypass cognitive processing for all ages of children. To illustrate this, the next two sections consider emotional and social appeals that have a stronger effect at different ages.

3.5.2 Logos and characters assist recognition, recall and emotional connection in younger children

It has been recognised that simple visual marketing strategies appeal to children, and particularly younger children. The use of a 'key visual', such as a logo or character, is seen as important for brand communication by marketers because children make decisions based on less information and less product experience than adults (Dammler, 2002). Early experiments with pre-schoolers revealed that providing visual cues (such as a picture or a colour) improved their recall of brand names (Macklin, 1996). Children as young as three years of age, while they may not know brand names, recognise logos and associate them

with products (Fischer, Schwartz, & Richards, 1991; Kinsky & Bichard, 2011). The brand logos most recognised by 38 Australian children aged 3 and 4 years were fast food and sweetened beverage brands with some of the children able to attribute qualities such as “fun, exciting, and tasty” to those products (McAlister & Cornwell, 2010, p. 224). A US study involving children aged 4 to 8 years, noted that older and overweight children were more likely to recognise heavily advertised fast food logos than other food logos (Arredondo, Castaneda, Elder, Slymen, & Dozier, 2009). A recent UK study found a much higher level of visual branding (e.g. food packaging, street views of the restaurant, premiums) in children’s television advertisements, compared with adult advertisements from the same fast food companies (Bernhardt et al., 2013).

The attention of children as young as three is captured by spokes-characters with many recognised and identified by name when observed shopping with parents (Kinsky & Bichard, 2011). In US children aged 2 to 6 years, the utilisation of animated spokes-characters in television advertising has been found to positively influence children’s attention, recall, brand attitudes and intention to request purchase (Macklin, 1994; Mizerski, 1995; Neeley & Schumann, 2004). Children who liked the television characters were more likely to choose EDNP foods pictured with those characters compared with an unknown character or no character (Kotler, Schiffman, & Hanson, 2012). This effect was particularly strong when the EDNP food was ‘competing’ with a nutritious food (Kotler et al., 2012). Hoffner (2009) discussed the “para-social relationship” that children can develop with television characters and actors. According to Hoffner, the emotional bond which develops can lead children to see the characters as friends and this perceived relationship can influence their behaviour.

Focus group discussions and interviews with children have revealed that 3 to 4 year olds are attracted to free toys and cartoon characters from programs they watch, 5 to 6 year olds are highly attracted to a wider range of characters and collectable toys and 7 to 8 year olds are attracted to products that entertain (e.g. food pops out of a dispenser) and are ‘cool’ with their peers (S. Powell et al., 2011). Licenced spokes-characters from popular , movies, television shows or books, are used by marketers to promote the recognition and recall of a product by young children (Hémar-Nicolas & Gollety, 2012). Brand characters are images linked solely to a particular product to “establish emotional ties” and “build a close relationship with children... which will continue beyond childhood” (Hémar-Nicolas & Gollety, 2012, p. 20). They assist in communication “since children have much less developed analytical abilities than adults...characters act as shorthand for brands” (Lawrence, 2003, p. 44). The use of promotional characters on EDNP food packaging is prolific in Australia

(Hebden, King, Kelly, Chapman, & Innes-Hughes, 2011; Mehta et al., 2012), with most being brand characters that are not subject to Australian regulations (Hebden, King, Kelly, et al., 2011).

Younger children are clearly targeted by simple, visual and memorable marketing strategies. Emotional responses to licenced and spokes-characters, for example, are a vital aspect of their impact on young children's brand preferences. The next section will explore older children's response to emotional, social messaging.

3.5.3 Social aspiration and EDNP food consumption in older children

Food advertising to children over the 1950s to 1980s focussed on the "intrinsic product benefit" of good taste and children were not seen as a "lucrative market" that required high-budget, creative, persuasive advertising (Schor & Ford, 2007, p. 15). Marketers began to utilise symbolic appeals with children during the 1990s as children's roles as consumers grew, and the efficacy of associating brand with "coolness" when targeting teen and adults was recognised (Schor & Ford, 2007). Schor and Ford (2007) noted that symbolic messages such as 'coolness' have since become a dominant advertising strategy in the promotion of branded EDNP foods to children. The authors posited that children are being persuaded to eat EDNP foods due to the advertising-constructed social meaning of those foods.

Recent Australian research has indicated that children as young as 3 to 5 years "judge others on the basis of brand use", seeing children as "popular or unpopular, fun or boring, because of the brands they use" (McAlister & Cornwell, 2010, p. 224). In-depth interviews with UK children aged 7, 11 and 14 have indicated that highly advertised, branded EDNP foods and beverages gain a 'cool' lunchbox status with school peers by the age of 11 (Roper & La Niece, 2009). The authors reported that 14 year olds admitted to being bullied or teased if they have 'uncool' generic branded or nutritious foods in their lunch boxes. Focus groups with UK 13 to 15 year olds revealed that they "used food choices to help construct a desired image, as a means of judging others, and to signal their conformity with acceptable friendship and peer norms", and that it was "emotionally and socially risky to be seen to be interested in healthy eating" (Stead, McDermott, MacKintosh, & Adamson, 2011, p. 1131). The adolescents believed that "when they were seen consuming products and brands such as Walker's crisps, Pepsi, Coca Cola and Cadbury's chocolate, the desirable attributes associated with these brands transferred to themselves" (Stead et al., 2011, p. 1137).

Qualitative research undertaken with Western Australian children aged 8 to 12 supported these findings, suggesting that a hierarchy of foods exists, with highly advertised branded foods at the top and fruit and vegetables at the bottom (M. Roberts & Pettigrew, 2013). The authors also interviewed parents who revealed that they did not challenge this hierarchy, at least with publically consumed food such as school lunchboxes, because they wanted their children to fit in socially. Roberts and Pettigrew (2013) suggested that as there are compulsory uniforms and regulations against personal possessions in Western Australian schools, food is one of the “final frontiers of status consumption in schools” (M. Roberts & Pettigrew, 2013, p. 106). Children consuming high status advertised EDNP foods are perceived by their peers as “wealthier, more fun and more popular” (M. Roberts & Pettigrew, 2013, pp. 106-107). The authors suggested that televised EDNP food advertising serves to create and reinforce the social meaning and values of these foods.

In summary, the evolution of television advertising of EDNP foods targeting children has moved towards symbolic advertising which promotes a social meaning for EDNP foods. This advertising serves as a way by which older children in particular, develop their understanding of the social norms and social desirability of EDNP food consumption.

3.6 Liking and positive emotional responses towards advertising

3.6.1 Liking and positive emotions in adults

Advertising that is well-liked by adult consumers has long been linked to a stronger subsequent advertising impact. Evaluative conditioning, that is, “changes in the liking of a stimulus that are due to the fact that the stimulus has been paired with another, positive or negative stimuli” are well documented in the psychology literature (De Houwer, Thomas, & Baeyens, 2001, p. 853). Early research revealed that adults’ advertising recall (i.e. if they could remember and describe an advertisement they had seen on television in non-experimental conditions) was related to their liking of the advertisement (Du Plessis, 1994). Liking of television advertising was also associated with favourable attitudes towards the advertised brand and an increased intention to purchase the brand (Walker & Dubitsky, 1994). Later research linked the liking of advertisements to objectively measured success such as increased sales figures (Du Plessis, 2005). Liked advertisements were analysed and found to be entertaining, relevant and to enable the viewer to “see situations they would like to be in, or that they can aspire to” (Du Plessis, 2005, p. 155).

A liked advertisement is thought to gain the consumers' attention, create positive arousal and activation while processing, storing and recalling information, and to induce positive emotions in the consumer (Smit, Van Meurs, & Neijens, 2006). An Australian study of over 1,000 food advertisements revealed that liking accounted for 58% of the variability in adult consumers' recall of advertisements, with advertisements for unhealthy foods and emotional appeals having more impact than advertisements for healthy foods and rational appeals (Ewing, Napoli, & du Plessis, 1999). Liking is thought to be particularly important and prevalent in advertisements for lower risk, hedonic products such as EDNP foods as the purchase decision is less cognitive and advertising is processed via a peripheral route (Smit et al., 2006). Du Plessis (2005) posited that a consumer's first response is emotional and that purchasing behaviour results from brand memories passed through an emotional filter. The author went on to propose that, when advertising is recalled, people also recall the feelings they had when the advertising was experienced which influences their cognitive processing and decision-making (Du Plessis, 2011).

Recent research has linked both advertisement liking, as well as advertising evoked positive emotions to positive brand attitudes in adults (Pham, Geuens, & De Pelsmacker, 2013). Early research reported that cognitive processing moderated advertising-evoked negative feelings, but not advertising-evoked positive feelings (Brown, Homer, & Inman, 1998). A subsequent study revealed that advertisements that evoked the most positive feelings were the most memorable and understood (Mai & Schoeller, 2009). This has been confirmed by recent neuroimaging research which linked a higher level of advertising-elicited amygdala activation (i.e. emotional arousal) with increased memorability of advertising (Bakalash & Riemer, 2013). The researchers also noted increased activation in the area of the brain associated with social cognition, and posited that people interpret the social meaning of the emotions viewed and experienced thereby enhancing the memorability of the advertising. Another recent study linked the advertising-evoked release of oxytocin and adrenocorticotrophin hormones in response to an emotional anti-smoking television advertisement, to the subsequent behavioural response of donating money to an anti-smoking charity (Lin, Grewal, Morin, Johnson, & Zak, 2013).

The effect of liked, positive transformational emotional appeals is reportedly stronger for low-involvement hedonic products, such a food, than utilitarian products (Dens & De Pelsmacker, 2010; Geuens, De Pelsmacker, & Fasseur, 2011; Pham et al., 2013; Rossiter, Percy, & Donovan, 1991). Food liking has been found to be "particularly sensitive to emotional appeals" (Dube & Cantin, 2000, p. 251). Fabrigar and Petty (1999) reported that

greater advertising impact is gained when the emotional appeal seeks to influence an “affect-based persuasion” such as taste or smell.

3.6.2 Liking and positive emotions in children

Early research confirmed a similar effect with children. A US study with 111 children aged 8 to 12 years revealed that the children’s attitude towards EDNP food advertisements significantly impacted on their attitude towards advertised brands and their intention to request purchase of the brands, for both familiar and unfamiliar brands (Phelps & Hoy, 1996). The children’s attitude towards the advertisements was established as the sum of items on four four-point scales: “hate it-like it a lot; boring-exciting; stupid-great; dull-fun” (Phelps & Hoy, 1996, p. 89). Derbaix and Bree (1997) investigated the responses of 152 children aged 7 to 10 years to television advertising by asking them to indicate their emotional responses to the advertisement on a 4 point scale from ‘Not at all’ to ‘A lot’. Children were also asked to respond to two four-point scales: ‘I like this ad very much’ to ‘I don’t like this ad at all’; and ‘I would really like to see this ad again’ to ‘I don’t feel like seeing this ad again’. This study confirmed that, for both known and unknown brands, positive emotional responses and liking of the advertisement’s “elements of execution” best predicted children’s later positive attitudes towards the advertised brands (Derbaix & Bree, 1997, p. 207). The authors noted that “what children seem to look for in an advertisement is a state of mind where special elements can be strong enough to generate a feeling of pleasure”, and that while adults partly look at advertisements for information gathering purposes, “children have fewer reasons to do so” (Derbaix & Bree, 1997, p. 208). The authors concluded that children follow a peripheral route of processing advertising, with affective processing being the dominant feature.

Later research investigating interventions which may influence their scepticism towards advertising revealed that “the relation between children’s cognitive defenses and their susceptibility to advertising effects was not direct, but mediated by their affective responses to the commercials” (Moniek Buijzen, 2007, p. 424). That is, children’s liking of the advertisements was the most powerful influence on their intention to request purchase of the advertised product. D’Alessio, Laghi and Baiocco (2009) constructed and validated a new self-report scale with 300 children aged 8 to 10 years. They found that, while acceptance of truth in advertising decreased as children grew older, enjoyment of advertising and purchase

intention did not differ with age and “are less influenced by children’s cognitive development” (p. 416).

Liking and a positive emotional response towards an advertisement thus appears to be an important aspect of its effectiveness irrespective of age, cognitive development and general level of skepticism towards advertising. Children who like a food advertisement are more likely to desire the advertised food brand.

Qualitative research with adults has confirmed this, providing evidence that childhood is the life stage when people make powerful emotional associations with brands which impact their brand choices throughout their life (Braun-LaTour & LaTour, 2004; Braun-LaTour, LaTour, & Zinkhan, 2007). For example, experimental responses to television advertising for a US insurance company which has had a long standing advertising campaign associating their brand with well-known cartoon characters, revealed a stronger impact on young adults who had been exposed to the campaign from childhood than on older adults first exposed in their 20s (Braun-LaTour & LaTour, 2004). The authors proposed that early exposure to repeated advertising leads to a stronger mental ‘brand schema’ within memory. This resulted in a more positive attitude towards, and intention to purchase, the brand. It also resulted in a significantly higher remembered association between the cartoon characters and the brand, even when the characters were used to advertise another brand. In later qualitative research by the same authors, sensory-laden childhood memories of Coke, an iconic sweetened beverage brand, were more predictive of positive adult attitudes to the brand than memories formed in adolescence (LaTour, LaTour, & Zinkhan, 2010).

In summary, positive emotional responses towards liked advertising play a critical role in the development of attitudes towards advertised food and beverage brands. Children of all ages process advertising emotionally and their liking of advertisements plays a central role in their intention to request purchase of the advertised product. Indeed, if these emotional connections can be made while young, they have a stronger and lifelong impact on brand relationships.

3.7 Summary of the main findings

This chapter has explored several relevant aspects of the relationship between EDNP food advertising and children's food choices.

The chapter established that children are exposed to high levels of television advertising of EDNP foods and beverages. High advertising exposure levels were linked to increased choosing, requesting, demanding, buying and consumption of advertised EDNP products. It is believed that overweight and obese children may be more vulnerable to these effects. EDNP food advertising achieves this impact by the consistent use of persuasive techniques (e.g. premiums, celebrities). The 'great taste' of the product experience is frequently communicated while positive emotions and positive social outcomes are routinely linked to advertised products.

It was believed that younger children were more vulnerable to advertising effects due to their lower levels of advertising literacy. However, recent research has indicated that children of all ages are influenced by advertising due to the use of emotional and social appeals that are not processed cognitively. Younger children, for example, respond emotionally to licenced characters, while older children, for example, respond to social desirability messages and ascribe positive social meanings to EDNP foods. Generally, advertisement liking and a positive emotional response towards an advertisement are an important aspect of its effectiveness irrespective of children's age, cognitive development and general level of advertising literacy. Children who like a food advertisement are more likely to desire the advertised food brand.

It is thus clear that well-liked television advertising of EDNP products can influence children's food choices by linking the advertised product to positive emotions and social desirability. The next chapter will explore whether television advertising for nutritious foods can influence children's food choices in the same way.

Chapter 4 Television advertising of fruit and vegetables to children

4.1 Extent and impact of televised fruit and vegetable advertisements

Children are exposed to minimal television advertising promoting fruit and vegetable consumption. All of the international analyses of the content of television food advertising to children cited in Chapter 3 reported a much lower proportion of advertisements for nutritious foods and beverages compared to EDNP food and beverages. Several of these analyses specifically noted that they found little or no advertising for fruit and vegetables (Boyland, Harrold, Kirkham, & Halford, 2011; Gamble & Cotugna, 1999; Jenkin et al., 2009; Kelly et al., 2010; Mink et al., 2010; L. M. Powell et al., 2007; Story & Faulkner, 1990; Wilson, Signal, Nicholls, & Thomson, 2006).

Australian content analyses have also reported very few advertisements for fruit and vegetables on children's television (Hill & Radimer, 1997; Kelly et al., 2011; Kelly et al., 2007; King et al., 2013; Neville et al., 2005; M. Roberts & Pettigrew, 2007; M. Roberts, Pettigrew, Chapman, Quester, & Miller, 2013; Zuppa et al., 2003), even though one study sampled broadcasting during a fruit and vegetable social marketing campaign with a television advertising component (Chapman et al., 2006). Two studies specifically reported no television advertisements promoting healthy eating in their sampled time periods (Hill & Radimer, 1997; M. Roberts et al., 2013). These analyses also revealed that children were exposed to messages in which nutritious foods were depicted as a negative alternative to the advertised EDNP food, for example, vegetables being shown eaten by unhappy children while happier children eat the EDNP product (Hill & Radimer, 1997; M. Roberts & Pettigrew, 2007).

Experimental research has revealed mixed results with regard to the impact of television advertising of nutritious foods such as fruit and vegetables on children's food preferences and consumption patterns. An early US study found that exposure to television advertising for nutritious foods, including fruit, did not impact on 4 to 10 year old children's recall of advertised products or their later consumption of those nutritious foods (Jeffrey et al., 1982). This study acknowledged that the advertisements were all produced with a low budget and thus possibly not as effective in attracting or holding attention as high-budget EDNP food advertisements. The authors suggested that health promoters should "employ those social learning principles... which enhance vicarious learning" and "increase frequency of exposure to pro-nutrition commercials" (Jeffrey et al., 1982, p. 91). Another early study showed 20

minutes of television containing advertisements promoting healthy eating per day over 10 class days to children aged 6 years (Peterson, 1984). The study concluded that while the children were able to recall the nutrition messages, their food preferences or consumption behaviour did not differ from that of the control group. The authors posited that this was because the children's food preferences were already well-developed due to their previous exposure to advertising for EDNP foods. However, little detail was given about the quality or content of the programs and advertisements shown.

In contrast, other early experiments found that children aged 5 to 8 years were more likely to choose and consume fruit, vegetables and other nutritious foods if exposed to advertising promoting those foods, with the researchers acknowledging that the effects may have been stronger if the advertisements for the nutritious foods were as well-made and entertaining to children as EDNP advertisements (Goldberg et al., 1978; Gorn & Goldberg, 1982). In a study with 183 children aged 3 to 6 years, high quality television animated advertising, developed with mothers and pretested with children, significantly increased preferences for vegetables (Nicklas et al., 2011).

An Australian study involving over 900 10 and 11 year olds, found that television advertisements for nutritious foods, including fruit and vegetables, improved children's perception of the healthiness of their own diet (Dixon, Scully, Wakefield, White, & Crawford, 2007). There was also a non-significant increase in positive attitudes towards, and intention to consume nutritious foods, but no impact on the liking of fruit and vegetables. No details were given by the authors about the appeals used within the advertisements promoting nutritious foods. Children in the study who viewed advertisements for EDNP foods, however, had a significantly decreased liking for nutritious foods, but interestingly, no increased liking for EDNP foods (Dixon et al., 2007). The researchers also found that attitudes to vegetables were more negative when advertising for nutritious and EDNP foods were shown together, than when nutritious food advertisements were shown alone. This suggests that advertising for fruit and vegetables would not be as effective if broadcast amongst advertising for EDNP foods and that advertising for EDNP foods could actively reduce liking for nutritious foods. One large US media company, owner of the most watched children's television station with 47 of the 50 top rating programs, made a public commitment to promoting nutrition and physical activity to children (Batada & Wootan, 2007). However, while they broadcast messages promoting nutrition and physical activity and their licenced characters appeared on fruit and vegetables, the impact was questionable as an analysis revealed that the

majority of their television programming still advertised, and their characters still endorsed, EDNP foods (Batada & Wootan, 2007).

Qualitative research in New Zealand revealed that children aged 10 to 12 years, while sceptical of EDNP food advertising, also found health promoting messages about nutritious foods “conflicting and ambiguous” (Dorey & McCool, 2009). There is evidence, however, that television advertising for nutritious foods can have a positive impact at a community level. An ecological study found a weak negative association between the prevalence of overweight and obesity and the number of advertisements showing healthier foods in 13 countries, including Australia (Lobstein & Dobb, 2005). This association was confirmed by a cross-sectional study of more than 13,000 11 year old children in nine European countries, that found children’s self-reported exposure to television advertising for healthy foods was associated with their self-reported level of fruit and vegetable intake (Klepp et al., 2007). This study found that the positive relationship was mediated by their attitude towards, and liking of, fruit and vegetables.

Nutrition promotion campaigns that have utilised television advertising as a major component of their marketing mix, have been shown to significantly increase Australian adults’ consumption of fruit and vegetables (Dixon et al., 1998; Pollard, Miller, Woodman, Meng, & Binns, 2009; Pollard et al., 2008) and US children’s consumption of fruit (Silver, 1983). The only television campaign specifically promoting fruit and vegetables to Western Australian children was conducted in 1995 and 1996 (Pollard, 2003). This campaign incorporated activities such as distribution of resources to teachers, school meal strategies, distribution of children’s cookbooks and a children’s television cooking series. The campaign sought to promote fruit and vegetables as “fun, tasty, ‘cool’ and socially desirable” and successfully increased children’s attitudes towards and requests for fruit and vegetables (Pollard, 2003). However, actual consumption levels were not measured.

The use of television advertising to promote fruit and vegetable consumption specifically to children is rarely utilised. A recent systematic review of social marketing nutrition interventions between 2000 and 2012, identified only 34 empirical studies (Carins & Rundle-Thiele, 2014), of which 16 targeted children but only six of those sought to specifically promote fruit and vegetable consumption. These six studies were all school or community-based interventions utilising community activities, websites and limited-reach media such as posters. None used television advertising. Notably, an early multi-city comparison study demonstrated that mass media effects on fruit consumption were greater than those gained by school-based programs alone (Silver, 1983).

Australian children were exposed to high-quality television advertisements during the *Go for 2&5*[®] adult fruit and vegetable campaign (Pollard et al., 2008). However, these comprised only 4% of food advertisements sampled from children's television programming at that time (Chapman et al., 2006). The limited budget for these televised messages was described as a "drop in the ocean of food advertising" and the authors called on the Australian Government to ban advertising for EDNP foods during fruit and vegetable campaign periods (Chapman, Kelly, King, & Flood, 2007, p. 190).

In summary, while there is much less television advertising for nutritious foods than there is for EDNP foods, the limited research available provides some evidence that television advertising can positively influence children's preferences for nutritious foods. Research has been limited by the lack of high-budget, quality television advertising for nutritious foods. The largest challenge to television advertising for nutritious foods is thus the competition from marketers of EDNP foods in terms of the greater quantity and quality of their advertisements versus those promoting healthy food choices to children.

4.2 Persuasive techniques in televised fruit and vegetable advertisements for children

It has been increasingly understood that televised advertising to promote liking of nutritious foods must utilise the same effective persuasive techniques used by EDNP foods in order to have impact. Petrova and Cialdini (2011, p. 108) urged social marketers to utilise persuasive appeals that "focus on the function the behaviour serves" and are "aligned with the basis of the attitude", with affect-based attitudes being more susceptible to affect-based appeals. Dovey (2011, p. 445) suggested that many advertisements for nutritious foods require children to cognitively and emotionally engage with a risk message whereas advertisements seeking brand loyalty to an "inherently hedonically desirable" EDNP product do not attempt to engage in this way. It was proposed that nutritious food advertising should be developed which similarly does "not require acceptance of the necessity for a healthy diet" (p. 445).

It has been noted that fruit and vegetables are increasingly being promoted in the US by "cartoonification... cartoon characterisation of fruit and vegetables allied to colourful and individualised packaging" (S. Powell et al., 2011, p. 97). However, there have been mixed results with regard to the use of characters to promote fruit and vegetables. On one hand, recent Dutch research revealed that both a popular, familiar television character and an unfamiliar congruent (i.e. associated with the product conceptually or perceptually) brand

character on packaging can increase 4 to 6 year old children's liking of, and intent to purchase bananas to a similar level as that of banana confectionary (de Droog, Valkenburg, & Buijzen, 2011). However, a US study found that the effect of familiar television characters was not strong enough to encourage 2 to 6 year old children to choose healthier foods over EDNP foods (Kotler et al., 2012). Additional Dutch research reported that, while 4 to 6 year old children liked the familiar television character more than an unfamiliar character, unfamiliar characters highly congruent with carrots (i.e. orange rabbits), were equally well liked in combination with carrots (de Droog, Buijzen, & Valkenburg, 2012). The US study found that while known television characters could increase 2 to 6 year old children's preferences when choosing between two fruit or two vegetables, unfamiliar non-congruent characters (or no character) could not (Kotler et al., 2012). Overall, these US studies found that younger children will eat more fruit and vegetables if branded with the sticker of a favoured character (Keller et al., 2012; Kotler et al., 2012).

A European study with over 400 children aged 10 to 14 years, found that apple slices in bright, colourful packaging with a fun apple character, gained a significantly higher rating than a familiar plain packaged brand for fun, willingness to eat the product and intention to buy the product (Pires & Agante, 2011). On the other hand, a study with 9 to 11 year olds revealed that labelling with a cartoon character ranked low in the factors that influence fruit and vegetable consumption (Bezbaruah & Brunt, 2012). The leading factor influencing older children's self-reported fruit and vegetable consumption was taste, followed by nutrition, appearance and smell (Bezbaruah & Brunt, 2012). The authors concluded that advertisements "should be designed to make fruit and vegetables more palatable and appealing to children" (Bezbaruah & Brunt, 2012, p. 440).

In summary, the utilisation of promotional characters, a marketing technique frequently used with EDNP foods, can positively influence children's preferences for fruit and vegetables. Liked, familiar and congruent characters can increase preferences for fruit and vegetables but not always above children's preference for the hedonically more desirable EDNP foods. It also appears that, while emotional advertising utilised to promote EDNP foods may also gain a positive response when used to promote fruit and vegetables with younger children, promoting taste may also be an important strategy to impact older children.

4.3 Summary of the main findings

This chapter has reviewed the limited literature investigating the use of television advertising and related marketing techniques for the promotion of children's fruit and vegetable consumption.

There is considerably less television advertising for nutritious foods than for EDNP foods. However, there is some evidence from experimental research that television advertising, albeit advertising often of a lower quality than EDNP food advertising, can positively influence children's preferences for nutritious foods. For example, the utilisation of liked, familiar and congruent promotional characters, a technique frequently used with EDNP foods, can positively influence children's preferences for fruit and vegetables, and particularly with younger children.

Chapter 5. Advertising's influence on taste perception

5.1 The influence of taste on children's fruit and vegetable preferences and consumption

Not unexpectedly, taste is an important influence on food preferences and consumption of children and adolescents. Early studies revealed that children and adolescents are more likely to consume foods and drinks they prefer the taste of (Baxter, Thompson, & Davis, 2000). More significantly, they are more willing to try a new food if told that it tastes good (Pelchat & Pliner, 1995). Qualitative studies noted that while taste is an important criterion for food preference and choice by pre-schoolers, it grows in salience and becomes the most important feature reported by adolescents (Holsten, Deatrick, Kumanyika, Pinto-Martin, & Compher, 2012; Zeinstra, Koelen, Kok, & de Graaf, 2007) even when the adolescents know the food is unhealthy (C. Noble, Corney, Eves, Kipps, & Lumbers, 2003).

Children are born with an innate preference for sweet and salty tastes, a rejection of sour and bitter tastes, a fear of trying new foods, and the ability to learn new food preferences (Benton, 2004; Birch, 1999). Preferences for sweet and salty EDNP foods and beverages are thus not learned, while it has been proposed that the acceptance of foods that have "less intrinsic hedonic appeal", such as vegetables, is influenced by children's experience (Savage, Fisher, & Birch, 2007, p. 26). Several international studies have confirmed that children prefer the taste of EDNP foods and beverages, that fruit is more liked than vegetables, and that vegetables are a frequently disliked food (Baranowski et al., 1993; Baxter & Thompson, 2002; Cooke & Wardle, 2005; Douglas, 1998; Edwards & Hartwell, 2002; Nu, MacLeod, & Barthelemy, 1996; Zeinstra et al., 2007).

Taste is the most frequent reason given by children and adolescents for their like or dislike of fruit and vegetables (Zeinstra et al., 2007), and taste preferences for fruit and vegetables are positively correlated to their consumption by children and adolescents (Baranowski et al., 1993; Baxter & Thompson, 2002; Bere & Klepp, 2005; Blanchette & Brug, 2005; Brug et al., 2008; De Bourdeaudhuij et al., 2006; Perez-Rodrigo et al., 2003; Wind et al., 2006). A US study of almost 4,000 adolescents calculated that 28% of the variance in the consumption of fruit and vegetables was due to taste preferences (Neumark-Sztainer, Wall, Perry, & Story, 2003).

Early qualitative research revealed that Western Australian children's favourite foods are fast food, pasta dishes, rice dishes, chocolate and ice cream (Coase & Bayliss, 1995), with one

child noting that fast foods: "...taste nice... and they are always the same, you know what you are getting" (p. 29). This study also reported that vegetables are the least liked food and confirmed that taste was the strongest driver of liking and disliking fruit and vegetables. The report also indicated that children were very aware that fruit and vegetables vary in quality, and that this has the potential to impact greatly on their taste experience (Coase & Bayliss, 1995). A recent survey of over 500 children aged 7 to 10 years however, revealed that Western Australian children have healthier food preferences than expected by the over 500 health professionals simultaneously surveyed (Pescud, Pettigrew, Donovan, Cowie, & Fielder, 2012). The children indicated that fruit, pasta, meat and vegetables were favourite foods, with younger children and girls having healthier preferences than older children and boys. Nevertheless, recent qualitative research with Western Australian children aged 8 to 12, revealed they were not motivated by health when they chose and consumed foods in front of their peers at school; their priority was to eat foods that "were appreciated by their peers, helped them to integrate with their peer group", and were pleasurable, that is, "tasted good" (M. Roberts & Pettigrew, 2013, p. 106).

In summary, liking and taste are important influences on children's fruit and vegetable consumption. Preferences for EDNP foods appear innate while fruit and vegetable preferences are learned. Fruit is more liked than vegetables. However, even if children like fruit and vegetables, it is less socially acceptable to eat them with peers.

5.2 The influence of advertising on taste perception

Advertising exposure before a product is experienced has been shown to increase adults' positive perception of that experience. One aspect of product experience that is influenced by advertising is taste perception. For example, advertising can increase adults' positive taste perceptions when exposure occurs before the advertised food or beverage is consumed. This advertising effect is known as 'forward framing'. Advertising has also been shown to positively reconstruct adults' memories of their product experiences when exposed to advertising after their experience. For example, advertising shown after their consumption of a food or beverage can influence adults to remember a more positive taste. This is referred to as 'backward framing'. Research with children suggests that both forward and backward framing advertising effects may exist for food products, but no published research has reported on the impact of a discrete advertising exposure on children's taste ratings of the product advertised.

5.3 The influence of advertising on subsequent taste perception in adults

It has long been known that exposure to advertising prior to the product experience influences adult consumers' interpretation of that experience (Deighton & Schindler, 1988; Hoch & Ha, 1986; Kempf & Smith, 1998; I. P. Levin & Gaeth, 1988; Marks & Kamins, 1988; Smith, 1993). This 'forward framing' effect is believed to occur by directing attention to the brand, building anticipation of product experience, and directing attention to the product's best attributes during the experience (Deighton, 1984; Hall, 2002; Hoch & Ha, 1986; I. P. Levin & Gaeth, 1988). It is believed that a product trial is processed more "deeply, purposefully, and carefully" after advertising exposure, resulting in more confidently held beliefs (Kempf & Laczniak, 2001, p. 27). It has been proposed that advertising provides a hypothesis or schema to test, confirming or disconfirming recalled expectations via the product experience (Deighton, 1984; Deighton & Schindler, 1988; Oliver, 1980; Olson & Dover, 1979). This effect is stronger when the evidence presented is more ambiguous (i.e. differences between brands are small or different subjective quality interpretations are possible) (Hoch & Ha, 1986), and if there is less prior experience with and knowledge of the product (Chang, 2004).

Researchers investigating this relationship have often studied responses to food or beverage products because "major salient evaluative criteria can be easily assessed by consumers" (Orth & De Marchi, 2007b, p. 230). It has long been established that advertising influenced expectations of taste will influence adults' later sensory evaluation of the advertised food or beverage. In one very early study, men who could not distinguish the taste of their usual brand of beer from unidentified beer samples and did not give it a higher taste rating, subsequently gave it a higher taste rating when branded samples were provided (Allison & Uhl, 1964). Similarly, adults gave taste ratings for cola beverages based on the product label of Coke or Pepsi, regardless of which product was actually being tasted (Woolfolk, Castellan, & Brooks, 1983). Interestingly, a later study discovered that a specific area of the brain vital for emotion processing, the ventromedial prefrontal cortex (VMPC), mediates this response (Koenigs & Tranel, 2008). This research reported that neurologically intact adults, and adults who had a brain lesion but retained an undamaged VMPC, preferred the taste of Pepsi in a blind taste test but were more likely to prefer the taste of Coke when brands were known. People with a VMPC lesion retained their Pepsi preference (Koenigs & Tranel, 2008).

Several studies have investigated the impact of a discrete print advertising exposure on adult's subsequent taste ratings. After exposure to advertising emphasising the lack of

bitterness in a new ground coffee brand, women rated the taste of the coffee as less bitter than the control group (Olson & Dover, 1979). A later study by Chang (2004) found that adults' familiarity with the product category impacted on their taste response after advertising exposure. People with a higher level of prior knowledge about orange juice, compared to those with a lower level of knowledge, were less influenced by advertising exposure when asked to rate taste and intention to purchase bad tasting juice (Chang, 2004). It has since been confirmed that while taste is a strong influence in future intention to purchase juice, if the taste experience does not fully match the positive advertising-induced expectations, there is a reduction in positive attitude and intention to purchase (Orth & De Marchi, 2007a).

The impact of advertising on later product evaluation appears to be influenced by the advertising appeals used. Orth and De Marchi (2007b) compared the impact of different benefits communicated by print advertising exposure on a fruit juice trial one week later. The authors found that experiential (e.g. taste) and functional (e.g. healthy) beliefs had reduced impact after product experience whereas symbolic beliefs (e.g. fashionable) retained more impact as, they posited, the belief could not be contradicted when the product was later consumed. It was also found that positive promotion of chocolate highlighting attributes such as taste, energy and fun, was effective in gaining a positive reaction to the advertising and the product, and a willingness to pay a higher price relative to product trial alone (Micu, 2010). When experience attributes were communicated before chocolate consumption, emotions such as pleasure and arousal rather than cognitions influenced attitudes after product trial (Micu, 2012). This research has suggested that advertising used to promote food must communicate positive messages about the product experience in order to gain a pleasure response and enhance later product trial, but that the promotion of symbolic beliefs may have a longer lasting effect.

Further research has demonstrated that when verbal advertising appeals "vividly describe the pleasure of consumption", consumers can better "visualize the emotions that they are likely to experience during the consumption process... and even anticipate the very taste of the product" (D. J. Moore & Lee, 2012, p. 107). The authors compared a spoken advertisement that promoted visualisation with a spoken advertisement describing the utilitarian, nutritional virtues for both sweet cake and pizza. They concluded that advertising promoting visualisation enhanced anticipation of positive emotions during consumption, anticipation of great taste, rationalisation of consumption and yielding to impulse (D. J.

Moore & Lee, 2012). It can be assumed that television advertising would be an even more powerful advertising medium for promoting taste anticipation in a visual way.

In summary, advertising prior to consumption of food or beverages positively influences the subjective experience of subsequent taste ratings. This effect has been observed with familiar, favoured brands as well as after discrete print advertising exposures. Research has indicated that familiarity with the advertised product and a product experience that does not match the promised experience will decrease this effect. Positive communications that highlight a pleasurable consumption experience have a stronger effect than informational communications – although it may be that symbolic appeals have a longer lasting effect. To date, no published research has compared the impact of television advertising for a positive consumption experience with a symbolic appeal such as fun or social desirability.

5.4 The influence of advertising on subsequent taste perception in children

Product experience is believed to be particularly important to children because many of the sources of extra information utilised by adults (such as written information or price) are not accessible to them (E. S. Moore & Lutz, 2000). Moore and Lutz (2000), explored the relationship between EDNP food product trials and television advertising with 72 children in an experimental study. It was found that both older (10-11 year old) and younger (7-8 year old) children held product beliefs and attitudes formed from product experience more confidently than those formed from advertising alone, an effect not as strong in the younger children. While the study reported that 'brand attitudes' were measured, as the children had eaten the food, taste judgement would have been captured as an element of the children's brand liking. The younger children did not demonstrate increased positive brand perceptions and attitudes when exposed to advertising before product trial, that is, there was no forward framing effect (E. S. Moore & Lutz, 2000). The researchers hypothesised that younger children were less able to integrate the two information sources and relied more on their product trial experience. The older children, however, did demonstrate a forward framing effect for some EDNP foods – but not all of them (E. S. Moore & Lutz, 2000). The authors noted that advertisements which had a positive framing effect were more liked and more familiar to the children. It was also reported that in the younger children, liking for the advertisement directly and significantly influenced their liking of the advertised brand. This was also true of the older children, however their liking of the advertisement also influenced their beliefs and perceptions of the brand, which, in turn, impacted upon their attitude

towards the advertised brand. This finding supported Petty and Cacioppo's 1986 *Elaboration Likelihood Model of Persuasion* (Petty & Cacioppo, 1986) as it has been applied to children, that is, younger children are influenced by the peripheral aspects of advertising (e.g. liking) while older children are also influenced by a central cognitive persuasion route. This study indicated that television advertising, if it is known and liked, can play a role in the forward framing of older children's attitudes towards food brands. One important limitation of this study, however, was that each child was subjected to all four exposure conditions, in a counterbalanced order, one week apart. Previous experience, albeit a week or more earlier, could have influenced the children's later responses.

Subsequent research has demonstrated that young children's explicit taste judgements are impacted by visual marketing strategies seen before consumption. One experiment with 16 children aged 5 years, placed the same sweetened beverage into differently labelled cups, one associated with a smiling cartoon character and the other with the picture of a crying child. 92% of children wanted to drink the one related to their preferred picture and 90% of children said that they preferred the taste of that drink (Smeets & Barnes-Holmes, 2003). A later study involving 63 children aged 3 to 5 years, found that children preferred the taste of food from McDonald's branded packaging compared to identical food from plain packaging, particularly if the children ate McDonald's food frequently or had a television in their bedroom (T. N. Robinson, Borzekowski, Matheson, & Kraemr, 2007). This experiment utilised foods sold by McDonalds (e.g. hamburgers, chicken nuggets, fries) and a food not sold by McDonalds (e.g. baby carrots). Notably, this study demonstrated that branded packaging was able to increase children's taste preferences for healthier foods such as carrots and milk. A more recent study found that 40 children aged 4 to 6 years, exposed to identical food samples, preferred the taste of food presented in packaging illustrated with a popular cartoon character, with the significant effects being stronger for EDNP foods than vegetables (Roberto, Baik, Harris, & D, 2010). Another study with 47 children aged 9 to 11 years, found that children rated foods and beverages in packaging with a nutrition claim as healthier than a similar food without such a claim and were more likely to prefer the taste of the healthier product (Soldavini, Crawford, & Ritchie, 2012).

A more complex experiment with 108 children aged 3 to 5 years investigated the relationship between children's television viewing, food brand knowledge, food consumption and taste preferences (Cornwell & McAlister, 2011). Taste preferences were established both through parental survey and from children's taste ratings in response to food photographs (rather than by taste rating after consumption). The researchers found that children's brand

knowledge of fast food and sweetened beverages was influenced by their television viewing and consumption of those foods. In turn, brand knowledge predicted taste preferences for those foods. Interestingly, they also found that fast food product experience was only predictive of taste preferences when children had already “processed and stored information about the fast-food and soda brands” (Cornwell & McAlister, 2011, p. 436). Finally, the authors linked children’s taste preferences for foods high in fat, sugar and salt with consumption behaviors such as adding flavour to their food with sauces and complaining when foods were not flavourful. This study supports the contention that television food advertising and product experience both contribute to development of children’s taste preferences, and that stored advertising messages about brands moderate product experience and are directly predictive of taste preferences.

One recent study demonstrated that television advertising with animated fruit and vegetable fun characters could positively influence preschool children’s later taste anticipation of vegetables (Nicklas et al., 2011). The study sought to measure preference change but the measure actually investigated anticipated taste experience. The computer touch-screen measure presented photographs of food and children were asked to touch a facial-expression three-point scale to show if the food was ‘yummy’, ‘yucky’ or ‘okay’ (Jaramillo et al., 2006; Nicklas et al., 2011). A significant positive impact on the targeted vegetables, broccoli and carrot, was obtained but there was no difference for fruit which already had a high preference level (Nicklas et al., 2011). This finding is another indication that children’s actual taste experience may be impacted by previously viewed television advertising.

In summary, the limited research available has indicated that there may be a forward framing advertising effect in children. In response to liked televised food advertising before product trial, older children were found to have a more positive attitude towards the advertised brand. Brand knowledge previously gained from television viewing was found to influence younger children’s reported taste preferences. Animated television advertising has been found to positively influence younger children’s reported anticipation of taste, and visual marketing strategies such as branded packaging or pictures of cartoon characters have been found to yield significantly higher taste ratings upon later product trial.

5.5 The reconstruction of taste memory by advertising in adults

Consumers do not respond to advertising in isolation to their memories of their experiences with the advertised products - and memory has been identified as the vital connection

between emotion, cognition and decision making (Ambler & Burne, 1999; Hall, 2002, 2004). Memory is, however, not the simple act of retrieving a stored record. Memories, when retrieved or reactivated, are “consolidated anew, raising the possibility that the reconsolidated memory may include new information not present in the original” and thus “memory reactivation can lead directly to memory distortion” (Schacter, 2013, p. 56). This can be viewed as a positive adaptive process whereby memories are updated for current use through the inclusion of subsequent information (Schacter, 2013).

Advertising is an information source that can act to distort memory (Braun-LaTour & LaTour, 2005; Braun, 1999). In advertising, the creation of ‘false memories’ was originally thought to be caused by source monitoring errors, that is, consumers being unaware of the source of their product evaluations (Braun, 1999). Current conceptualisation, however, is that they are the results of sophisticated thinking, a deeper processing that is seeking meaning and connecting meaning to underlying events (LaTour, LaTour, & Brainerd, 2014). *Fuzzy Trace Theory* posits that memories are simultaneously recorded as verbatim surface information and as a ‘gist’, that is, the underlying concept or meaning is also captured (Brainerd & Reyna, 2005). Verbatim memory fades and it is proposed that false but consistent post experience advertising acts to strengthen the longer-lasting gist memory, particularly for consumers who carefully think through decisions (LaTour et al., 2014). Adult consumers, however, trust their product experience memories, believing that they have come entirely from retrieval of their direct product experiences, rather than being influenced by external sources such as advertising (Braun-LaTour & LaTour, 2005; Braun, 1999; Hoch, 2002).

Advertising, received after a direct product experience can ‘backward frame’ memory that is, reshape adult consumers’ affective and sensory memories of the experience to become more favourable. Braun (1999), later cited as Braun-LaTour and then LaTour, first investigated this effect, requiring adult consumers to taste a ‘new’ brand of orange juice before being exposed to two print advertisements communicating the positive taste of this juice. Some of the juice samples were made to taste less pleasant by adding water, vinegar and salt. Those consumers exposed to the advertising were more likely to positively remember the taste of the orange juice, even where the taste was unpleasant. They were also more likely to use the descriptive terms used in the advertising when describing their taste experience. When asked to later identify the juice sample they had tasted, the control group were more accurate, and those that experienced the advertising were more likely to choose a pleasant tasting juice sample (Braun, 1999). The participants who had an accurate memory of the taste experience, and those who had been misled by the advertising, were

equally confident in their recall of the taste experience. Subsequent experiments by Braun (1999) found that these advertising-influenced responses decayed when retested after a week, but the effect could be reinstated by re-showing the advertisements. A follow-up study by other researchers demonstrated that when the taste of the juice is completely different from that expected from the advertised taste (i.e. grapefruit juice rather than orange juice), the memory distortion effect does not occur (Cowley & Janus, 2004). This study provided evidence that when participants were less familiar with the products, they were more likely to combine their memories with the advertising message and recalled an orange and grapefruit juice blend.

A later study by Braun and colleagues, utilising the same print advertising as the earlier study, compared both forward and backward framing for the unpleasant orange juice taste experience (Braun-LaTour & LaTour, 2005). This study also considered long-term memory (15 minutes after the taste) and short term memory (15-30 seconds after the taste). Despite the unpleasant taste, all of the advertising conditions elicited more positive word responses (and less negative word responses) to describe the taste experience than the control conditions. Advertising before the experience was more influential when presented a few seconds prior to the experience, while advertising after the experience was more influential when it was presented 15 minutes later. This finding explained why earlier researchers (Hoch & Ha, 1986; I. P. Levin & Gaeth, 1988; Marks & Kamins, 1988; Smith, 1993) concluded that advertising before product trial had a stronger impact than advertising after trial. Braun-LaTour and LaTour (2005) noted the impact of advertising on long term memory in both the words used to describe the taste experience and the identification of a more pleasant tasting juice sample than that actually tasted. Those participants most influenced by the advertising were more likely to perceive the advertising as 'fair' and 'matching' their experience. The authors analysed the participants' overall product ratings and concluded that when the consumption experience was available in short-term memory, the participants "disliked the juice less" due to advertising impact (Braun-LaTour & LaTour, 2005, p. 26). It was also observed that, as memory fades, advertising is able to "exert more influence" as "liking" for the unpleasant juice developed in the long-term memory condition (Braun-LaTour & LaTour, 2005, p. 26). This finding was later confirmed in an experiment by the same authors investigating the impact of television advertising of a pharmaceutical product on the attitudes of adult consumers (Braun-LaTour & Zaltman, 2006). They found that the impact of the advertising on memory did not decay, and actually increased in some people, when the participants were asked about their attitudes towards the advertised product two or three days later. They posited that the advertising message had, by then, become "internalized

into their belief system”, and that “consumers no longer attribute the advertising information to its correct source” (Braun-LaTour & Zaltman, 2006, p. 64).

The findings of Braun-LaTour and LaTour were extended in a recent study by Kum and Lee (2011). They utilised similar print advertising and orange juice samples, comparing a trial-only control group to three experimental conditions: advertisement before the trial; trial before the advertisement; and simultaneous advertisement and trial. They found that all advertising conditions produced higher brand attitude scores than product trial alone for both good and bad tasting juice. They also reported that when the orange juice tasted good, simultaneous advertising and taste produced the highest brand attitude ratings as information from product experience and advertising were consistent and integrated together. When the orange juice tasted bad, they found that the highest scores were gained when the advertisement or product trial was integrated into memory before the next information source was made available. With bad tasting juice, scores were lower when simultaneous presentation allowed participants to become aware of the contradictory information being provided. Similarly, more participants in the advertising conditions did not correctly identify the juice sample they had initially consumed. When the juice tasted good, the strongest effect was obtained for the simultaneous advertising plus trial condition. When the taste of the juice was bad, the conditions with a temporal lag between information sources had the strongest effect – with trial before advertisement having a stronger effect than advertisement before trial.

Remembered enjoyment of eating has been found to increase food consumption in young adults. For example, when young adults were asked to write down the enjoyable aspects of a lunch they had eaten, they were more likely than the controls to remember the lunch as being enjoyable and to choose to eat the same food (and take a larger portion size) at a buffet lunch the next day (E. Robinson, Blissett, & Higgs, 2012). The authors concluded that changing remembered enjoyment can increase both food liking and intake and proposed that memory enhancement should be utilised with both adults and children to increase their consumption of healthier food options (E. Robinson et al., 2012).

In summary, advertising can serve as an information source used unconsciously by adults to update their memories of product experiences. Research has demonstrated that print advertising for orange juice has influenced the words used to describe taste experience and the identification of the correct juice consumed. Compared with product trial alone, higher ratings were given when advertising was used before, during or after product trial. This effect occurred even when the juice tasted was made to taste unpleasant. The strongest effect

was when a pleasant tasting juice was tasted while viewing advertising. While a strong effect was found with forward framing when the advertising was seen a few seconds before sampling the juice, backward framing has a stronger effect after a time lag allowed the advertising information to be integrated into the memory of the product trial. It is feasible that advertising-evoked remembered enjoyment can impact on later consumption.

5.6 The reconstruction of taste memory by advertising in children

In addition to forward framing of television advertising on children's attitudes to the advertised food, Moore and Lutz (2000) also explored the impact of backward framing. The authors hypothesized that exposure to advertising after product trial would reduce the impact of the advertising as "higher-order beliefs" about the product had been formed while it was being eaten (E. S. Moore & Lutz, 2000, p. 39). They found, however, that while the direct impact of both older and younger children's 'attitude to the advertising' on their 'attitude to the food brand' was reduced by advertising exposure after (compared to before) product trial, this decrease was not statistically significant. The authors did not explore the reasons for this, but it is clear now that this study was an indication of the ability of advertising to influence the children's memories of their product experience. The concept of 'attitude to brand' would have incorporated an element of sensory evaluation of the food product eaten. Thus this small study indicated that advertising may influence children's memories of their taste experience for advertised foods or beverages but more explicit taste testing with a larger number of children is required.

5.7 Summary of the main findings

This chapter first summarised the literature exploring the impact of taste perception on fruit and vegetable preference in children. The chapter then discussed the influence of advertising and other marketing strategies on consumer interpretations of their food or beverage product experience.

Liking and taste are important influences on children's fruit and vegetable consumption and while this liking is not innate, it can be learned. Taste becomes more salient as children age. Hence promoting taste may be an important strategy with older children. However, even if children like fruit and vegetables, it is less socially acceptable to eat them with peers. It is therefore vital to explore advertising's potential impact on liking, taste perception and the

social status of fruit and vegetables when promoting children's fruit and vegetable consumption.

In adults, it is clear that there is a forward and backward framing advertising effect on responses to food and beverages they consume. Research has described the significant effects of communicating a pleasurable consumption experience and the use of symbolic appeals. It has also been demonstrated that the positive advertising effect can occur whether the product experience is pleasant or unpleasant with the forward framing effect having more impact with pleasant tasting trials and the backward framing effect having more influence after a less pleasant tasting trial.

In children, the very limited research available has indicated that they might also be susceptible to forward and backward framing advertising effects. While television advertising has been shown to impact on anticipated taste of pictured foods and 'attitude towards' food previously consumed, other visual marketing strategies have been found to influence children to give significantly higher taste ratings upon later product trial. However, no published experiment has, as yet, investigated the impact of television advertising on children's explicit taste ratings of an advertised food or beverage, nor investigated forward and backward framing effects on such ratings.

Chapter 6. Methodology

This research project was undertaken in three separate stages that are detailed in this section. All stages were approved by the *Curtin University Human Research Ethics Committee* (HR 24/2006).

The first stage comprised the development of two television advertisements for apples. One advertisement highlighted the good taste of apples and a second advertisement highlighted the positive fun/social approval experience of apples. These advertisements were produced by professional filmmakers after group interviews in a Perth primary school informed their content and style.

The second stage comprised pre-testing of the children's liking of the advertisements and their rating of the taste of different apple slices. Children in another Perth primary school were asked to rate the taste of unadulterated apple slices and two slices of apple painted with different strength solutions of salt and vinegar. This pre-testing stage was undertaken to ensure that the advertisements were liked by children and to identify a solution strength that was mildly disliked by children.

The third stage was the main study, undertaken to answer the research questions and test the hypotheses outlined in Chapter 1, Sections 1.4 and 1.5. The main study was conducted in a dedicated test centre at the Perth Royal Show (Western Australia's biggest community event attracting 400,000 visitors from the city and the country every year). Children passing by the test centre were recruited and randomly allocated to the control and experimental exposure conditions.

6.1 Stage 1: Development of television advertisements for apples

6.1.1 Research objective

The objective of the first stage of the project was to use a convenience sample of the target audience to develop two likeable advertisements for apples, one with a taste appeal and one with a fun appeal.

6.1.2 Characteristics of the sample

Several primary schools in Perth Western Australia were identified via their school websites as having a stated emphasis on drama studies. These schools were contacted by both telephone and email. Primary School A's principal agreed to assist in the development of the television advertisements for apples as a part of that school's drama curriculum. The name of this school has not been used as confidentiality was promised to the school and participating children and parents.

Children in Years 2, 3, 4, 5, 6 and 7 at the school were invited to be involved in group interviews to explore their attitudes to television advertising, fruit, apples and what they believed an effective television advertisement for apples would contain. A permission letter was sent home to the parents of the students (See Appendix 1). 39 children returned a signed permission slip. Of these, 33 were present on the days the groups were conducted.

Six group interviews, with approximately five to seven students in each group, were held over two days. Two groups comprised Year 2 and 3 students, two comprised Year 4 and 5 students and two comprised Year 7 students. Year 6 students were on school camp during the two days that the school was visited. There was an approximate 50% split between males and females. See Table 6.1 for breakdown by year group and gender.

Table 6.1 Children in discussion groups by year level and gender

	Year 2/3	Year 4/5	Year 7	Total
Male	4	8	5	17
Female	6	5	5	16
Total	10	13	10	33

6.1.3 Research environment, materials, procedure and results

The group interviews were held in a quiet room at the school with all participants sitting on chairs surrounding a table. Permission was obtained from the students for the sessions to be recorded with a small digital audio recorder placed in the centre of the table. The groups were run by the candidate. A research assistant wrote down initial words of responses made by each child while the groups were running. The recorded comments were later transcribed

by the same research assistant, attributing the full responses correctly to the particular child who made them. See Appendix 2 for description of the group activities undertaken and the full list of questions asked.

The group discussion began with general talk about the children's preferred movies and television shows before a discussion of liked television advertisements. The children were then asked about their favourite foods and how they tasted. They then identified their favourite fruits, how they tasted and why they liked them. They were then asked to imagine they were fruit and were asked about how this would feel and what they would look like. The children were then asked about apples and identified their favourite apples from the main five varieties sold locally. They were then asked about when, how and why they ate apples, identifying the best and worst aspects and what they loved or hated about apples.

The next activity was for them to identify what they would put in their lunchbox and why. Children were then asked to define 'cool', how 'cool' children looked, and what 'cool' children eat/have in their lunchbox. Finally, the children were asked direct questions as to how television advertisements for apples should be made – what should be said and shown and why.

The children liked a range of movies current at the time the research was undertaken. Most of the favoured movies of the Year 2/3 children involved animation (e.g. *Shrek*) or music (e.g. *High School Musical*). Year 4/5 children also listed animated and musical movies but also added action movies (e.g. *Indiana Jones*) or fantasy (e.g. *Harry Potter*). Fewer Year 7 students mentioned animated films with more of them citing action, comedy or romantic films. The children also liked a range of mainly animated or comedy television shows. It is notable that the most commonly liked television show in all age groups was *The Simpsons*: 66% of the students across all age ranges listed *The Simpsons* among their favourites. The children in all age groups reported they liked a range of advertisements containing animation, animals and/or humour.

All children reported that they eat fruit and listed a range of fruits that they like 'because' they are "juicy", "healthy" and "taste good." They confidently identified favourite fruits with 90% of the children identifying apples as 'My favourite', 'One of my favourites' or 'OK'. No child stated that they hated apples. There was no discernable pattern of apple liking by age or gender. When asked to "imagine themselves as an apple", 70% of the children imagined themselves as an archetypical apple: red, shiny and medium size with most children agreeing that they would be sweet, juicy and crunchy. The children were given a page of

clear colour photographs of the most common five varieties of apples sold locally at the time (see Appendix 3), and asked to circle their favourite type of apple. The children were then asked to put a line under any other apples that were 'one of their favourites'. *Pink Lady* apples were the most commonly reported as being 'My favourite' or 'One of my favourites'. The children were thus able to make several choices so the total column adds up to more than 33. See Table 6.2 for the breakdown of preference by apple variety. There was no discernible pattern in the liking of particular apple varieties by age or gender.

Table 6.2 Children's preferences for commonly sold varieties of apple

Type of Apple	Favourite	One of my favourites	Total
Granny Smith	9	14	23
Sundowner	5	13	18
Royal Gala	10	8	18
Fuji	9	9	18
Pink Lady	10	18	28

NB: These are listed in the same order as the apple images in Appendix 3

When asked when they eat apples, 25 children reported that they eat them at school during recess or lunch and 28 ate them after school. Fewer children reported that they eat them at the weekend (n=10), after dinner (n=4) or at breakfast (n=5).

The Year 2, 3, 4 and 5 children were asked how they ate their apples. The most common responses were as a slinky (n=12), whole (n=9) and chopped up (n=9). An apple 'slinky' has been cored and cut into a spiral shape in seconds by an 'apple slinky machine.' The children reported that their school canteen had a machine and they could buy slinky apples or bring their own apples to be 'slinkied' at recess or lunch time.

When provided with colour photographs of food and a plain paper sheet 'lunchbox', the children were easily able to 'pack' their picture lunchboxes. Most of them packed them with food they would normally eat but a few packed food they were not usually allowed by their parents (e.g. chocolates). They could confidently list healthy foods, knew that fruit was a healthy food choice and agreed that it was important to eat healthy foods. All of the children, in all age ranges, claimed to bring apples to school in their lunchboxes. When asked what 'cool kids' look like, the themes which emerged were: popular; attractive; sporty; modern

hairstyles/clothes; and using electronic games/communications media. When asked, 18 of the 26 children responding to that question agreed that 'cool' children would eat apples.

When asked about what should be in television advertising for apples, in addition to frequent mention of animal characters, there were recurring script ideas involving children who "look like them", at "school" and "in uniform" and who were "a bit older than us." The use of an animated apple character who speaks was frequently suggested. Other common themes included showing red, shiny, juicy, "delicious to eat" apples, often suggested as appearing in lunchboxes. This mention of lunchboxes could have been primed by the earlier discussion of lunchboxes. It was suggested that apples be favourably compared in some way to junk food (e.g. the kids that eat the healthy apple are able to run further than kids who ate chocolate), and that the apples should demonstrate some transforming ability such as imparting energy, improving sporting ability, increasing social acceptance, enabling "passing a test" or reducing boredom. There were also several mentions that the apples shown could be cut into a fun 'slinky' spiral shape by the machine at their school canteen. It was generally agreed that "catchy" music was very important.

Overall, and consistent with the literature, these children were clearly 'advertising-literate' in that their suggestions consisted primarily of the most commonly used techniques in advertising to children.

6.1.4 Script development outcomes

Scripts for two 30-second television advertisements were developed by the candidate based on the group discussions and the children's explicit advertising recommendations. An industry recognised leader in advertising, Paul Yole from *The Brand Agency* in Perth Western Australia, voluntarily provided feedback on the script ideas before filming took place. The final pre-filming scripts can be seen in Appendix 4.

Both advertisements opened with the same scene of children sitting in class bored by their teacher's droning voice. The bell rings and they run outside to their lunch boxes. An animated apple jumps out of a lunch box and tells the children that he either "Tastes great" or is "So much fun". The two ads then show a montage of the same children from the class interacting with *Pink Lady* apples. The 'Taste' advertisement promoted the great taste of apples, highlighting images of children eating shiny, juicy, red apples with appreciation and verbalising their response to the great taste (e.g. "Yum"). The 'Fun' advertisement did not

show children eating apples as it aimed to communicate a fun/social approval appeal and avoid any inclusion of a taste appeal. Thus no verbal reference was made to the taste of apples and the taste experience was not demonstrated. Children were shown having fun with the apples (e.g. juggling, playing catch, playing with a 'slinky' apple) accompanied by laughter and cheering as children admired each other's skills. Both advertisements then finished with the apple in the lunch box saying either: "I told you I tasted great!" or "I told you I was fun!" The same cheerful music soundtrack was used in both advertisements.

The scripts were produced, directed and edited by the candidate, with the paid assistance of a research assistant and a professional crew (camera operator and sound recordist). Filming took place at Primary School A with the Years 4, 5 and 7 students who had participated in the group interviews. See Appendix 5 for the second permission letter that was sent home to the parents of those students. Only students who returned signed permission slips were involved in the filming – ten Year 7 students and seven Year 4/5 students.

The animated apple was developed by a professional animator based on a *Pink Lady* apple and the apple's voice was provided by a professional voice artist. The originally scripted images of the younger Year 4/5 children watching the older Year 7 children interacting with apples were not used in the final advertisements as they visually interrupted the story flow. It was decided that the Year 7 peers cheering each other on in the 'Fun' advertisement were sufficient to indicate popularity and social acceptance within a fun social setting. In the 'Taste' advertisement, children were only shown biting into chopped up apples and whole apples, the slinkies were omitted as they were not clearly identifiable as such in the close-up camera shots. There were no other significant deviations from the initial script presented in Appendix 4. The two advertisements can be found in a DVD attached to the bound copy of this thesis.

6.2 Stage 2: Sensory evaluation of apple slices and pre-testing advertisement liking

6.2.1 Research objectives

Chapter 3 established the important role that advertising liking plays in the influence of advertising on children. It was thus necessary to pre-test children's liking of the two advertisements and to make appropriate changes if necessary.

It was also necessary to ascertain the strength of salt and vinegar solution that would make the apples slices significantly less pleasant tasting but not so disliked by children that an advertisement would be unlikely to influence their taste ratings. Thus, pretesting of the children's responses to the plain untainted apple slices, and to apple slices painted in two strengths of a salt and vinegar solution, was undertaken.

6.2.2 Characteristics of the sample

Primary School B in Perth Western Australia was approached to request their assistance with this pre-testing. The name of this school has not been used as confidentially was promised to the school and participating children and parents.

The Department of Education and Training, Government of Western Australia, gave permission for the candidate to approach Primary School B to seek their agreement to participate. The procedure required by the department in order to gain school, parent and child informed consent was adhered to (See Appendix 6 for the approved letters and forms which were developed based on the templates provided by the Department of Education and Training). The school principal agreed and only children who returned signed permission slips, and were present on the days that an empty classroom was available for testing, were involved.

Seventy six children participated: 39 in Years 2 and 3 (18 male and 21 female) and 37 in Years 6 and 7 (18 male and 19 female). Children from Years 4 and 5 were not invited to participate in this pre-testing process as the main study was to include only 7 to 8 year olds and 11 to 12 year olds. Due to time constraints within the school schedule, 71 of the 76 children participated in the taste testing sessions. This number meets the recommended 70 participants, representative of the target group, required for the hedonic testing of food (Carpenter, Lyon, & Hasdell, 2000).

6.2.3 Taste ratings of different types of apples slices

6.2.3.1 Research objective

Using a 9-point hedonic scale, the objective was to determine how the tastes of four visually identical slices of Pink Lady apple were rated by the children. Two of the apples slices were unadulterated. One had a milder solution of salt and vinegar brushed over it ($\frac{1}{4}$ cup of water, $\frac{1}{4}$ cup of white vinegar, and $\frac{1}{2}$ teaspoon of salt) and the other had a stronger solution of salt and vinegar brushed over it ($\frac{1}{4}$ cup of white vinegar and $\frac{1}{2}$ teaspoon of salt).

6.2.3.2 Testing environment, materials and procedure

In groups of approximately six to eight, the children were brought into a quiet, empty classroom by the research assistant. The research assistant told the children that they were going to help out with apple research but did not answer requests for more detailed information while they were walking together to the classroom. If they asked questions, the children were told they would find out when they got to the class. Hedonic food testing requires that no background information as to the objectives or reasons for testing be shared with the participants (Carpenter et al., 2000).

The children entered the empty classroom to see desks lined up and cardboard cubicles in place (See Figure 6.1). They were asked to immediately take a seat at a cubicle so they were unable to see what any other children were doing. Subsequent distraction and interruption from other children were minimised. This is a standard desk and barrier configuration used in sensory evaluation of foods within the food industry (Meilgaard, Vance Cville, & Carr, 1999; Popper & Kroll, 2003). The children were requested to remain quiet during the testing period. The candidate and the research assistant stood behind the children on each side of the group of tables to ensure that the children were participating as requested and to give minimal prompts if required.

Each cubicle set up for this study used the recommended neutral light grey or off white colours with a minimum of distractions (Carpenter et al., 2000). Each cubicle contained a clear plastic cup of water and crackers (placed on a plain white serviette) for the children to be directed to use (to cleanse their palates) after tasting the apples slices. Four apples slices were laid out on a clean page with four shapes printed onto it. The shapes differentiated and labelled the almost identical apple slices. The shapes chosen were commonly used within a

school setting (i.e. square, triangle, circle, diamond) but did not indicate any intrinsic value to children (e.g. star shapes were not used as they may indicate good work and rewards). The children were also provided with a pencil and a response booklet in which they circled their taste rating of each apple slice (See Figure 6.2).



Fig 6.1 Taste testing cubicles set up in the classroom

The apples were hygienically cut up just before use with washed hands and a clean knife and plate behind a cardboard barrier in the corner of the classroom. They were then served from the plate to the clean paper using clean metal tongs. All unused slices were thrown away so that only fresh slices were used for each group. Only similar shaped slices with a mostly red strip of skin showing were used. The two containers of salt and vinegar solution were covered with a lid to reduce changes in the composition of the mixture concentration over the day due to the volatility of the vinegar in the solution. The solution was shaken to re-mix it before the apples were prepared for every testing group and the same amount of solution was brushed onto the apple slices using a pastry brush. The candidate carefully undertook this process to ensure each group of children was presented with nearly identical apple slices with the same amount of solution painted on them. To ensure a high standard of

food hygiene within each cubicle, the table surfaces were wiped and new presentation paper, cups and serviettes were used for each child.

The booklets consisted of four stapled pages with the 9-point Peryam and Kroll (Kroll, 1990) simplified word scale written on each page. At the top of each page was a circle, square, triangle or diamond so the children were visually prompted as to which piece of apple they were to rate the taste of on that particular page of the booklet. See Appendix 7 for a sample page of this booklet. The scale consisted of the following possible ratings: super good; really good; just a little good; maybe good or maybe bad; just a little bad; bad; really bad; super bad. 'Good' is placed at the left of the scale and all writing was presented in clear, black Times New Roman in 24 size font on white paper.

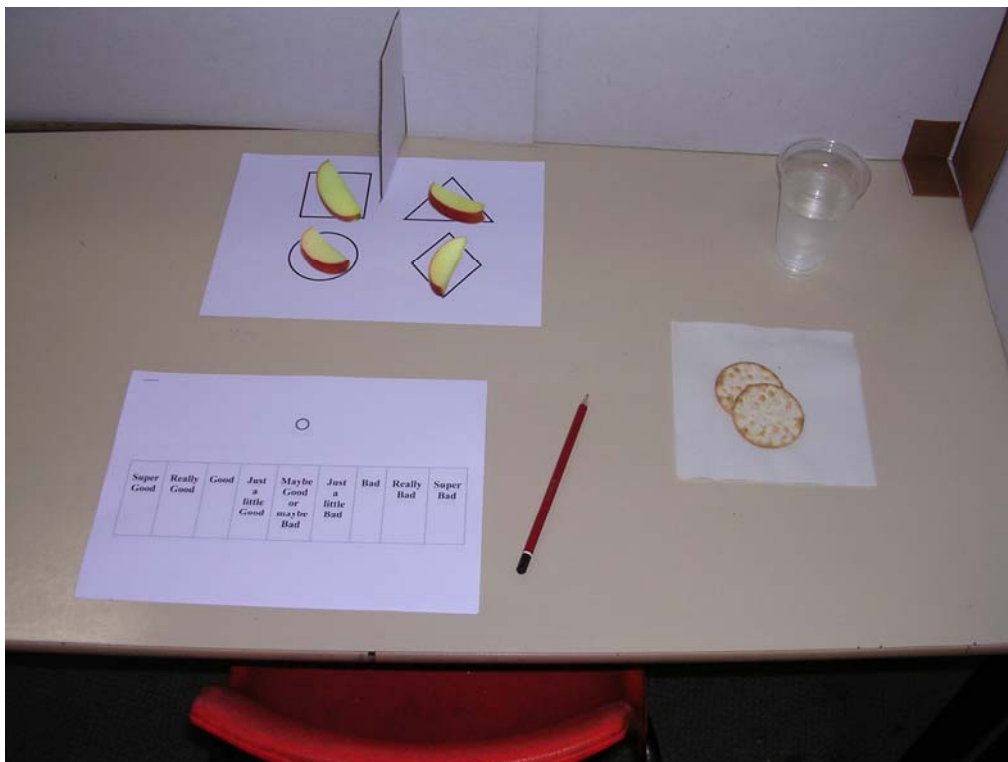


Fig 6.2 The test testing cubicle as set up ready for a child to use

Nine point scales are a well-established tool for use in taste rating by adults (Lawless & Heymann, 1998) and the simplified Peryam and Kroll scale has been shown with children aged above 5 years, to better discriminate than an adult word scale or a pictured face scale (Kroll, 1990). It was also found that a 9 point scale is more discriminating, with children aged

about 5 years, to a 1% level of significance than a 5 or 7 point scale (Kroll, 1990). This scale subsequently became widely used with children by the food industry (Popper & Kroll, 2003). Popper and Kroll (2011) later reported that children tend to give higher ratings than adults and younger children give higher ratings than older children using 9-point scales. A 9-point scale is thus more discriminating because it gives children more choices at the positive end of the scale where their ratings often cluster (Popper & Kroll, 2011). Despite this cluster effect, it was found that the 9-point scale was able to discriminate effectively between children's responses to different food products.

The taste testing procedure was tightly scripted (see Appendix 8) with the candidate leading the children through each stage of the testing process. In order to assist any child not reading at the level expected for their age, the candidate utilised a poster with the Peryam and Kroll word scale printed on it, pointing to each phrase as it was spoken when describing the activity requirements to the children. The very few questions asked by the children with regard to the purpose of the testing were responded to with the comment: "I don't know. All I know is that I have to ask you to try these apple slices and then ask you to tell me how they taste."

It is recommended that taste testing should not take place within 2 hours of a major meal with the optimal time for testing being between 10 am and lunch (Meilgaard et al., 1999). Due to limited access to the empty classroom and the time constraints of the school routine, testing needed to occur during the whole morning and in the afternoon, even though the time since consumption of breakfast or lunch for some groups of children were less than two hours. There was no difference in the taste ratings given between the differently timed groups. As a snack food was being tested in a small quantity, it was assumed that the level of satiety would not have a large impact on children's responses.

The first sample ('circle') was given as a 'warm-up' and was not used in overall analysis as 'untrained tasters' usually use their first attempt as training for the task (Carpenter et al., 2000). This warm-up sample was an unadulterated apple slice with the same unadulterated apple slice presented later as 'square'. The 'diamond' apple was painted with the mild salt and vinegar solution while 'triangle' was painted with the stronger solution.

The presentation order of the three test apple slices was balanced and randomized (Carpenter et al., 2000; Meilgaard et al., 1999) after the first warm-up sample of an unadulterated apple slice. A William's Latin Square design was used so that "each product appears once in each tasting position. Each product also precedes each other product once,

and follows each other product once” (Carpenter et al., 2000, p. 102). The order of presentation, with D = diamond, S = square, T = triangle, was: DTS; DST; TSD; TDS; STD; and SDT. A different response booklet was used for each presentation order and the groups of children were rotated through the presentation orders so that approximately equal numbers of children experienced each exposure condition.

The children were asked to eat each slice of apple slowly and think about how it tasted while they were eating it because they would be asked about the taste of the apple slice afterwards. Hedonic testing requires that the food sample be kept in the mouth for at least 2 to 3 seconds to enable a more considered taste judgement to be made (Carpenter et al., 2000). Each group of children was asked if anyone had told them about what will happen in the testing session. It was planned that if a child had been told by a previously tested child that the apple slices will taste all good *or* all bad (rather than some good *and* some bad), their results would not be used in the analysis. When asked: “What have the other kids said to you about what is going to happen now?”, all of the children shrugged and/or said “nothing”.

6.2.3.3 Results

The plain apple was perceived to be pleasant tasting (‘Really Good’ or ‘Good’ with an average of 2.4 on the 9 point scale), the mild solution was mildly disliked (‘Maybe Good or Maybe Bad’ or ‘Just a little Bad’ with an average of 5.4 on the 9 point scale), and the stronger solution more disliked (‘Just a little Bad’ to ‘Bad’ with an average of 6.3 on the 9 point scale). As the responses were not normally distributed, a non-parametric test was used to compare the taste ratings. The differences were statistically significant with a Wilcoxon signed-rank test used to compare plain apple with mild salt and vinegar solution ($Z = -6.745$, $p = .000$), plain apple with strong salt and vinegar solution ($Z = -7.115$, $p = .000$) and the mild solution with the strong solution ($Z = -4.780$, $p = .000$). There were no significant differences in taste rating by gender or between age groups. It was decided to use the milder tasting solution in the main study so the children tested did not experience such an adverse taste reaction that advertising could not influence it [and were not influenced to dislike apples!].

6.2.4 Liking of apple advertisements

6.2.4.1 Research objective

The objective of this activity was to determine children's liking of the advertisements, whether a difference existed between liking of the two advertisements, and whether there were any differences by age and gender.

6.2.4.2 Testing environment, materials and procedure

After the apple slice tasting was completed, each group of children moved to the other side of the classroom and sat in chairs in front of a large TV screen. Due to time constraints, one group did not undertake the taste testing but undertook this shorter session. All of the 76 children thus participated in the likeability testing of the advertisements.

The children were given an individual response booklet to be filled in before any group discussion was allowed. This two page booklet was printed with a four point response scale ('Love it', 'Like it', 'Don't like it' and 'Hate it'.) and each child was supplied with a pencil. One page was labelled A (The 'Taste' advertisement) and one was labelled B (The 'Fun' advertisement). See Appendix 9 for a sample page of this booklet.

The children were asked to write down their own ideas and not to look at what other children were writing. They were closely observed by the candidate and the research assistant who sat with the group. The children were shown each television advertisement twice. Half started with one advertisement and half started with the other before being asked to make their rating.

After the completed rating sheets had been collected by the researchers, the children were then asked, as a group, a number of questions about the advertisements. These questions were designed to assess whether the children had understood the intended main messages in the advertising. The questions and their responses are discussed in Section 6.2.2.4.

6.2.4.3 Rating results

As the liking ratings were not normally distributed, a non-parametric test was used. The 'Fun' advertisement was significantly more liked than the 'Taste' advertisement (Wilcoxon signed-rank test $Z = -2.452$, $p = .014$). However, both advertisements were more liked than disliked by the children with at least 64.5% liking. The results by age group are presented in Table 6.3.

Table 6.3 Likeability ratings during pre-testing of two apple advertisements for each age group and for all children combined

Liking rating	Taste Advertisement % (n = 76)			Fun Advertisement % (n = 76)		
	Year 2/3	Year 6/7	Overall	Year 2/3	Year 6/7	Overall
Love it	30.2	9.1	21.1	48.8	15.2	34.2
Like it	51.2	33.3	43.4	37.2	57.6	46.1
Don't like it	18.6	51.5	32.9	7.0	24.2	14.5
Hate it	0	6.1	2.6	7.0	3.0	5.3
Total	100	100	100	100	100	100

The two negative responses ('Don't like it' and 'Hate it') were combined to produce three categories of liking response. Chi square analyses revealed no significant difference between girls and boys in their liking of the 'Taste' advertisement and the 'Fun' advertisement. However, younger children were significantly more likely to love or like both of the advertisements compared to older children ('Fun': $\chi^2 (2, N = 76) = 9.55$, $p = .008$; 'Taste' ($\chi^2 (2, N = 76) = 13.31$, $p = .001$).

6.2.4.4 Group discussion outcomes

All of the 76 children confidently participated in the group discussions. When asked, “What was that ad about?”, the children recognised the intent of both advertisements. They reported that the ‘Taste’ advertisement was communicating that “Apples are good to eat”, “yummy”, “nice”, “juicy”, “taste good”, and that “Kids like to eat apples”. Each group identified that the ‘Fun’ advertisement was about apples being “fun to play with.” One child stated that “Playing with fruit is exciting” while another child noted that “Apples can be used for entertainment”.

The children were then asked “What did that ad want you to think or do?” Most of the children responded that the ‘Taste’ advertisement wanted them to “eat apples” while a few children mentioned “Buy apples to eat.” One said: “Buy healthy food rather than fatty food.” The children all identified that the ‘Fun’ advertisement wanted them to “play with apples” with a few noting that “Apples can be used for more than just food.” This suggests that the taste appeal promotes a consumption message and that the fun appeal does not.

When asked “What did you like?” about each advertisement, the children who liked the ‘Taste’ advertisement made comments such as:

“It looks really good to eat”,

“It looks like it tastes really nice”,

“It looks like the apples were very yummy”.

Those children who liked the ‘Fun’ advertisement stated they thought it was “fun” – with most children using that specific word. Comments made by the children included:

“It shows you can have fun with apples”,

“Kids were letting go ...they were excited”,

“You can do lots of tricks with apples”,

“Really entertaining”,

“It was funnier and didn’t show saliva”,

“It was awesome, it was cool”,

“It was a new way to look at apples”.

The children were then asked “What did you dislike?” about each advertisement. The children who disliked the ‘Taste’ advertisement made comments such as:

“It was a bit boring. It was just people chomping”,

“When the camera was really close, it looked really gross”,

“They were talking with their mouths full... disgusting”,

“It was disgusting because their tongues were out”,

“Saliva”,

“It was too messy”,

“They didn’t have any patience and just ate it too quickly”.

The children who disliked the ‘Fun’ advertisement gave reasons which included:

“It was ridiculous ‘cos you can’t play with food”,

“You wouldn’t really eat it afterwards, it would be bruised”,

“Then you just throw them in the bin and it is a waste of money for the parents”,

*“Childish... annoying... because they were acting as if they were in Years 4 and 5”
(from a Year 6/7 student).*

Most of the children in both age groups liked the apple character: “He looks cute... totally cool”, “He was funny”, and “I liked the talking apple ‘cos apples don’t talk.” One child noted that: “He was happy that the kids wanted to eat him.” While another commented that: “At the end he said he tasted good and you know at the end he really tasted good. And at the end he said he was fun and he was actually fun.” Before returning to class, the children were able to choose one eraser from a variety of coloured, fruit-scented pencil erasers to thank them for their participation.

Both advertisements clearly met their communication objectives. The children perceived the ‘Taste’ advertisement as communicating the great taste of apples and the pleasure to be gained from eating them. The ‘Fun’ advertisement communicated that apples are fun and children enjoy playing with them. As both of the advertisements were generally liked, they were not changed before their use in the main study.

6.3 Stage 3: Main study

The main study was designed to answer the research outlined in Chapter 1 Sections 1.4. Specifically, the study was designed to test the following hypotheses:

1. Both the taste and fun advertisements will increase taste rating in exposed children compared with control children;
2. Both the taste and fun advertisements will have both backward and forward framing effects on taste ratings for both pleasant and unpleasant tasting apple;
3. Both the taste and fun advertisements will increase decision to eat more apple, intention to request apple purchase, and intention to use own money to purchase apples in exposed children compared with control children.

6.3.1 Main study design

The main study utilised a 2 (apple type) x 2 (advertisement type) x 2 (apple taste position) design (See Table 6.4). The apple type was either plain or painted with a salt and vinegar solution; the advertisement either emphasised taste or emphasised fun; and the apple slice was eaten either before the advertisement was shown or after it was shown.

The design also enabled consideration of the impact of age and gender, by ensuring equal numbers of boys and girls and equal numbers in two age ranges, for each of the combinations of the three main variables. Postcodes were recorded to give an estimation of the children's socio-economic status. The children's height and weight were also measured and recorded so that the children's body mass index could be considered in later analyses.

Based on power calculations (see below), 800 children were to be recruited: half aged 7 or 8 years old and half aged 11 or 12 years; half of each to be male and half female. Half of the children were to eat a slice of plain apple, and half were to eat an identical apple slice painted with the mild salt and vinegar solution.

The desired distribution of children into each of the cells is shown in Table 6.4.

6.3.2 Exposure conditions

Five videos were constructed to produce five exposure conditions:

1. a television segment containing no apple advertisements (control/comparison group);
2. an apple advertisement highlighting *taste* and presented *before* the apple slice was eaten;
3. an apple advertisement highlighting *taste* and presented *after* the apple slice was eaten;
4. an apple advertisement highlighting *fun* and presented *before* the apple slice was eaten; and
5. an apple advertisement highlighting *fun* and presented *after* the apple slice was eaten.

An equal number of participants, by age and sex, was required in the five exposure conditions for each of the two types of apple.

A power analysis ($\alpha=.05$ $\beta<.20$) suggested that 40 subjects per cell would be sufficient to detect a difference of 30% between any two intervention groups. Each cell in Table 6.4 was thus planned to contain 40 children. Note that this power analysis is based on the expectation that there is at least a 30% difference between any two exposure conditions within each age grouping in relation to the future consumption of the product (the yes/no question future consumption questions). In the absence of pilot data, one of the proportions was taken to be 50% where the standard error of the proportion is the highest. This assumption leads to a conservative sample size.

Table 6.4 Number of participants, by age and gender, required in the in the control and four advertising exposure conditions for each type of apple

Apple type	Age group	Theme of apple advertisement					Total
		No apple advertisement (Controls) Video 1	Taste		Fun		
			Timing of advertising				
			Before eating Video 4	After eating Video 2	Before eating Video 5	After eating Video 3	
Plain Apple	7-8 years	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	200
	11-12 years	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	200
Salt & Vinegar Apple	7-8 years	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	200
	11-12 years	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	20 boys 20 girls	200
Total		160	160	160	160	160	800

6.3.3 Videos used

The apple advertising was embedded into a television segment to better emulate naturalistic exposure to advertising during television viewing. The video exposure conditions are detailed in Table 6.5.

In order to present the apple advertising in the most usual program setting that children would view television advertising, the most popular television show at the time of testing was selected for use. Using a report purchased from OzTAM Pty Ltd, the official source of television audience measurement (TAM) covering Australia's five mainland metropolitan markets and nationally for free-to-air television, *The Simpsons* was chosen as the television 'vehicle' within which the advertising was presented. The school-based discussion groups (described in Section 6.1.3) also revealed that it was the most popular television show for the children who participated.

Table 6.5 Content and editing order of the video exposure conditions

Video	Group	PROGRAM	AD BREAK 1	PAUSE	PROGRAM	AD BREAK 2
1	Control	First 2 minutes Simpsons	1: Filler ad 1 2: Filler ad 2	Eat Apple	Second 2 minutes Simpsons	3: Filler ad 3 4: Filler ad 4
2	TASTE advert AFTER eating	First 2 minutes Simpsons	1: Filler ad 1 2: Filler ad 2	Eat Apple	Second 2 minutes Simpsons	3: TASTE ad 4: Filler ad 4
3	FUN advert AFTER eating	First 2 minutes Simpsons	1: Filler ad 1 2: Filler ad 2	Eat Apple	Second 2 minutes Simpsons	3: FUN ad 4: Filler ad 4
4	TASTE advert BEFORE eating	First 2 minutes Simpsons	1: TASTE ad 3: Filler ad 2	Eat Apple	Second 2 minutes Simpsons	3: Filler ad 3 4: Filler ad 4
5	FUN advert BEFORE eating	First 2 minutes Simpsons	1: FUN ad 2: Filler ad 2	Eat Apple	Second 2 minutes Simpsons	3: Filler ad 3 4: Filler ad 4

The children watched 2 minutes of a G-rated episode of *The Simpsons* children’s animated television series with one advertising break of 2 advertisements inserted before a half-way point during which the video was paused and children were invited to eat an apple slice. The children then watched a 2 minute continuation of the television program (with another advertising break of 2 advertisements).

The ‘filler’ advertisements used were the advertisements that appeared in *The Simpsons* television segment as it was recorded from free-to-air television. One advertisement was removed from this recorded sequence and replaced with the apple advertisements in the different positions required in videos 2, 3, 4 and 5. The filler advertisements did not advertise food products. The four filler advertisements promoted: men’s hair loss solutions, iPod nano, Target’s children’s book sale and a botanic park.

6.3.4 The Ad Test Centre

The main study was conducted at the Perth Royal Show over the eight days from Saturday 26th September 2009 until 3rd October 2009. The Perth Royal Show was chosen as it attracts thousands of people, largely family groups, to one location. Many people walk through the covered pavilions, seeking items for sale, product demonstrations and entertainment.



Fig 6.3 The outside of the Ad Test Centre at the Perth Royal Show

An Ad Test Centre was constructed in the *Silver Jubilee Pavilion* (See Figures 6.3 and 6.4) consisting of five testing cubicles (see Figure 6.5), a waiting area with chairs for parents, a kitchen/office space at the back and a cubicle where children's height and weight could be measured and recorded (see Figures 6.11 and 6.12). The Ad Test Centre was open from 9am to approximately 7pm over the eight days. Families with children walking past the centre were invited to enter and allow their children aged 7 and 8, or 11 and 12, to participate.



Fig 6.4. Explanatory signage outside of Ad Test Centre (with parent waiting chairs in view)

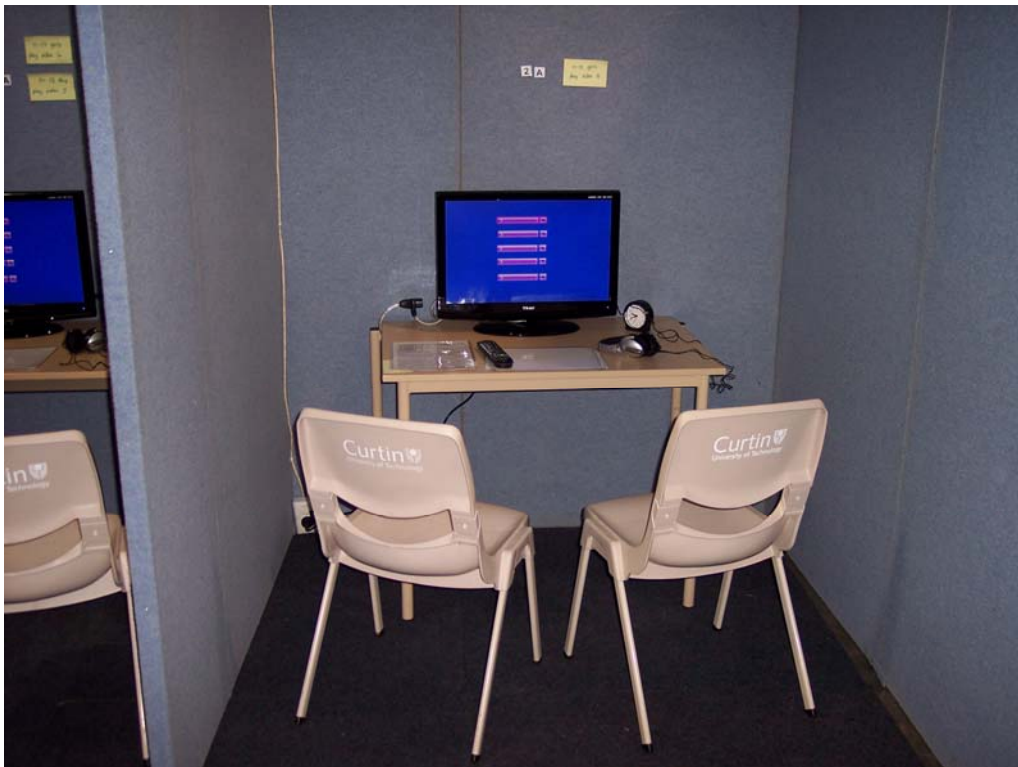


Fig 6.5. A testing cubicle and testing materials in the Ad Test Centre

6.3.5 Interviewer training and instructions

Ten professional interviewers employed by the Centre for Behavioural Research in Cancer Control, Curtin University assisted in this study. All were experienced at undertaking market research in street intercept and test centre settings. A research assistant from the WA Centre for Health Promotion Research was trained by the candidate to undertake the height and weight measurements, and also conducted some individual interviews as well. All were female and worked part time over the eight days. The interviewers started and finished work at staggered times with five staff usually present and all five cubicles in use in the middle of the day when the pavilion was the busiest.

The 11 interviewers attended a half day training session at Curtin University prior to data collection. They were familiarised with the testing materials, testing procedures and given recruitment guidelines for the study (see Appendix 10 for the recruitment guidelines). The children were required to be Australian residents. The 7 to 8 year olds could be aged from 6 years 11 months to 9 years and 1 month and the 11 to 12 year olds could be aged from 10 years 11 months to 13 years and 1 month. Precise dates of birth were provided in the handout to assist the interviewers. Only one child per family could participate. Friends could be tested at the same time by different interviewers in different cubicles. Children with any food allergies, or who attended Primary School A or B, were to be excluded. Children who were eating or drinking while walking through the pavilion were also excluded as this would impact on the reliability of the taste testing.

6.3.6 Preliminary screening and informed consent

The interviewers were required to approach parents, introduce themselves as being from Curtin University and explain briefly that they were assisting in research about apples. The interviewers all wore name badges with the Curtin University logo prominently displayed. The interviewers initially ascertained the ages of the children in the family, referring parents to the signage outside of the centre to emphasise the age ranges required. If the child or children in the family were not of the required age, the parents and children were thanked for 'stopping to talk'. If a child in the family was the required age, the interviewers handed the parent an explanatory letter. This letter served to ensure informed consent and provided the parents with information to keep. The letter also avoided a full verbal explanation of the

study objectives occurring in front of children who were possible participants (see Appendix 11 for the explanatory letter).

The parent explanatory letter noted that the research aim was to investigate which types of television advertisements encourage children to eat more fruit. It explained that, should the parent allow their child to participate, their child would watch 6 minutes of G-rated children's television which contained either an apple advertisement or no apple advertisement. Parents were informed that their child would be offered a piece of apple to eat and were asked if their child had any food allergies. Children with food allergies were excluded at this point. The interviewers also asked if the child attended Primary Schools A or B. Children attending those schools were excluded at this time. The parents were then informed, via the letter, that their child would be asked how the piece of apple tasted and if they would like that type of apple bought for them in the future. The parents were also told that their child's height and weight would be measured and that this could be written down for them to take away if they wished for a record of this information. The parents were also assured that only their child's first name, date of birth and postcode would be recorded and that no personal, family or identifying information would be collected. The parents were also assured that their child could refuse to participate at any time.

The children were then asked if they would like to enter the centre to watch some television and eat some apple. While making that decision, they were able to observe other children sitting, at a distance of two or three meters, in cubicles and parents siblings/sitting very close to them in the waiting area. They were also assured that they could stop participating at any time.

Once the child agreed to participate, the child's parents and siblings were requested to take a seat in the waiting area while the testing was undertaken. On the way to those chairs, the interviewers quickly asked the parents their child's date of birth and postcode and this information was written down at the top of the record form alongside the child's name. See Appendix 12 for the Interview Record Form used.

6.3.7 Allocation of children to exposure condition

The children were invited to sit at the chair on the right hand side of the testing cubicle. The interviewers sat at the left. The cubicle contained a wide-screen television on a small table loaded with a DVD (See Figure 6.6). The list of 5 videos appeared on the screen and the

interviewer played the video number shown on a very small card, attached via Velcro, to the wall above the television by the candidate (See Figure 6.10). Every hour, this number changed as the five cubicles rotated through the five video exposure conditions. The children were thus randomly allocated to one of five video exposure conditions depending on the cubicle they entered. As the interviewers tended to work at the same cubicle, or one of two cubicles, this ensured that they presented a regularly changing video. The apple slice presented also changed on the hour. The children were either given Apple A (plain apple) or Apple B (salt and vinegar apple). This was also indicated by a very small card attached via Velcro to the wall above the television by the candidate.

The candidate prepared the apple slices in the kitchen area and ensured that the correct type of apple slice, as indicated on the card, was presented to the interviewers. As the quotas were filled for the various exposure conditions, the candidate gave more specific instructions via small messages, written on a post-it note, placed on the wall above the television (e.g. “female age 11-12 video 4 only”).



Fig 6.6 Close up of cubicle table and testing materials

Later analysis of the interview record forms revealed that there was a random allocation of video exposure conditions to the 11 interviewers (10 professional interviewers and the research assistant). All interviewers presented all exposure conditions – with the exception of one interviewer who only worked one shift and did not present one of the exposure conditions. Appendix 13 presents the number of children in each exposure condition by each of the interviewers and demonstrates that there was no domination of any one exposure condition by any particular interviewers. Further analysis of the record forms demonstrated that there was also a successful random allocation of the apple type between interviewers (See Appendix 13).

6.3.8 Preparation of apples slices

The candidate managed the apple slice preparation area on the kitchen/office cubicle of the Ad Test Centre. (See Figure 6.7).

As in the pre-test, the apples were hygienically cut up just before use with washed and gloved hands and a clean knife and cutting board. The apples slices were served from the cutting board onto the small clean plastic serving plates using clean metal tongs. Only similar shaped slices with a mostly red strip of skin showing were used. (See Figure 6.8).

The container of salt and vinegar solution was covered with a lid to reduce changes in the composition of the mixture concentration over the day due to the volatility of the vinegar in the solution. A new container of solution was mixed at the start of the day and at least once half way through the day. The solution was shaken to re-mix it before the salt and vinegar apples were prepared and the same amount of solution was brushed onto the apple slices using a pastry brush. (See Figure 6.9). The candidate carefully undertook this process to ensure the children were presented with nearly identical apple slices with the same amount of solution painted on them.



Fig 6.7 The apple preparation table in the kitchen area of the Ad Test Centre



Fig 6.8 Cut piece of apple ready to be taken out to testing cubicle

6.3.9 Interview procedure

The interviewers were guided through the testing procedure by instruction scripts developed for Video 1, Videos 2/3 and Videos 4/5. See Appendixes 14, 15 and 16 for the scripts. These instructions were placed on the tables in the cubicles on the left side in front of the interviewers for their reference (See Appendix 12 for the interview record form).

The interviewers initially circled the child's age range, gender, the apple identifying letter and the video number on the interview record form. The children were told that they would need to work quietly so that the "other kids would not hear them" and were asked to put on the headphones so they could "hear the TV". The headphones ensured that they could listen to the video without distraction and would not hear any of the other children's spoken responses or comments from adjoining cubicles, although most of the questions required a silent finger-point response.



Fig 6.9 The salt and vinegar solution materials and equipment

Response sheets were supplied to the interviewers and the children were asked to point to their responses after the alternative choices were quietly spoken aloud by the interviewers.

The choices were spoken aloud by the interviewers in case any of the children had not yet reached the reading level expected for their age. See Appendixes 17, 18 and 19 for the response scales used. Each of the scales was printed on an A4 sheet of white paper and was laminated (See Figure 6.10).

The children being tested were initially told that they would “watch some TV, eat a bit of apple and later you will tell me how *you* think the apple tasted”. The children in the experimental conditions were told either “You will see an advertisement for the apple that I’ll give you” or that they would “see an advertisement for the apple that you just ate.” The Peryam and Kroll simplified word scale (Kroll, 1990) described in Section 6.2.3.2, was again used to rate apple taste (See Appendix 17 for the response sheet).

After the video viewing and apple tasting, the children were told: “These are words that you can use to show me how you think the slice of apple tasted. You might point to: super good, really good, good, just a little good, maybe good or maybe bad, just a little bad, bad, really bad or super bad. Whatever you point to is OK. I haven’t tried these apples so I don’t know how they taste.” The child’s response was noted on the interview record form.

To gain some qualitative insight into the children’s apple eating experience, the interviewers asked: “Can you think of any words that describe how the apple tasted?” Interviewers were to accept three or more words (writing down up to five words). If the child said one or two words, the interviewers were to prompt for more with: “Can you think of any more words?”

The children were then asked: “Would you like another one of those slices of apple right now?” with the yes/no response being circled on the interview record form. If the child said yes, the interviewers responded: “OK, you’ll get you another slice of apple in a minute” and the child was handed another slice of apple on a small plastic plate at the end of the testing, before they made their way to the body measurement cubicle.

The interviewer obtained the child’s response to the question: “Who does the food shopping at your house?”, and inserted the child’s response (X) into the following question: “Would you want X to buy those apples for you if you saw them at the shop?” The interviewers pointed to the following potential responses on the written response scale as they said: “You could point to: definitely would have X buy them, probably would have X buy them, maybe/maybe not have X buy them, probably would not have X buy them, or definitely would not have X buy them” (See Appendix 18).



Fig 6.10 A child watching an apple ad with an interviewer in a testing cubicle

The children were then asked: “Would you use your own pocket money to buy those apples if you saw them at the shop?” using the same response scale as above, pointing to the possible responses as they said: “You could point to: definitely would buy them, probably would buy them, maybe/maybe not buy them, probably would not buy them, or definitely would not buy them.”

Videos 2 to 5 included an extra inserted copy of the apple advertisement used at the very end of the video. The interviewer un-paused the video at this stage of the testing, showed the advertisement and asked: “What do you think of this apple ad?” and used the final response sheet (See Appendix 19) to elicit a response after saying “You could point to: love it, like it, neither like it or dislike it, don’t like it, or hate it.”

6.3.10 Height and weight measurement

The children were guided to the body measurement cubicle (See Figures 6.11 and 6.12) after leaving the video testing cubicles. The interviewers passed the child and their record form to the research assistant who weighed the children and then measured their height. If this assistant required a break during a quiet period, the candidate took over the measurement to ensure consistency. If children declined to have their weight and height measured, this was accepted by the researcher.

The techniques used to measure the children's weight and height were those recommended in the International Standards for Anthropometric Assessment published by the International Society for the Advancement of Kinanthropometry (International Society for the Advancement of Kinanthropometry, 2001). These standards stated that "generally the mass in minimal clothing is of sufficient accuracy." (p. 53) and required that the children stand "on the centre of the scales without support and with the weight distributed evenly on both feet." (p. 53) An A&D Personal Precision Scale UC-321 was used to weigh the children in a single layer of light clothing after they had removed their shoes and any removable clothing such as a coat or cardigan. The children stepped onto the scale once it had been activated by the research assistant. Weight was recorded in kilograms to two decimal places.

The scale was calibrated on 18th September 2009 by 'Just in Scales' (U10/45 Tomlinson Road, Welshpool, WA, 6106) who reported that it was accurate to within 50gms for the following weights: 30kg, 60kg, 90kg, 120kg and 150kg. They issued Calibration Certificate 1895 in accordance with I.S.O. Guide 25-1990 Section 13.

The children were then invited to stand with their back to the portable stadiometer placed beside the weight scale. A Mentone Educational Portable Height Scale (PE87) stadiometer was used to measure height. The technique used to measure the children's height was that recommended by the International Society for the Advancement of Kinanthropometry (International Society for the Advancement of Kinanthropometry, 2001). The children stood with their feet together and their heels, buttocks and back touching the upright metal rod at the back of the scale. The children took in a deep breath and held it for the few seconds while the sliding head board was carefully lowered to the vertex of the child's head. The children were also lightly held under the jaws to ensure their heads were in the Frankfort plane, that is with the Orbitale ® (lower edge of the eye socket) in the same horizontal plane as the Tragion ® (the notch superior to the tragus of the ear) (Kinanthropometry, 2001). A very slight upwards pressure was then applied by the researcher to gain 'stretch stature.'

Height was recorded in centimetres to one decimal place on the interview record form at the maximum point of the inward breath.



Fig 6.11 A testing cubicle, some of the parent's waiting chairs and the height and weight measurement cubicle in the Ad Test Centre

The children were able to choose a fruit-scented pencil eraser to thank them for their time and their parents could choose to put their child's contact details into the draw for one of thirty \$20 Myer vouchers. Parents were assured that their child's contact details would not be used for any other purpose.

Data from the completed interview record forms were entered into a Microsoft Excel spreadsheet for statistical analysis using SPSS Version 21.0 in Windows.



Fig 6.12 The digital scale and portable stadiometer in their cubicle in the Ad Test Centre

Chapter 7. Results

The results of the main study are presented in this section. The sample characteristics are presented first, followed by manipulation checks on taste differences between the Plain and Salt and Vinegar apples and liking for the two advertisements.

Chi square analyses are then used to explore the impact of exposure condition on the major dependent variable: the taste ratings of the apple eaten. The taste rating results are first analysed by advertisement theme (Fun vs Taste) combining across advertisement timing (Before tasting vs After tasting). The results are then analysed by advertisement timing (Before vs After) combining across advertisement themes. Taste ratings are then analysed for all four exposure conditions. For the remaining three dependent variables (i.e. desire to eat more of the apple, desire to request purchase of the apple and desire to use their own money to purchase the apple), the results are presented only for all four exposure conditions. In each case, the results are presented separately for the Plain apple and the Salt & Vinegar apple conditions. Differences by age, gender, BMI and SES were calculated for each analysis and relevant findings are presented where substantial and significant.

Finally, logistic regression analyses are used to assess the impact of exposure condition, demographics, and other variables (such as advertisement liking), on each of the dependent variables. Logistic regression was used as the dependent variables are categorical.

Note that where Table percentages are included in the text, these are rounded to whole numbers.

7.1 Sample characteristics

In total, 860 children were tested at the Ad Test Centre over the eight days of the Perth Royal Show. The interview forms of 17 children were removed from data analysis for the following reasons:

- Child's age outside of the age ranges required (7 children);
- Interviewer unsure of video number used or ambiguous recording of video number on form (8 children);
- Interviewer unsure of apple type eaten (1 child); and

- 1 child claimed to have never eaten apples before and the interviewer broke the testing protocol in order to support the child through the testing experience.

The characteristics of the remaining 843 children included in the analyses are presented in Table 7.1.

The majority of children were recorded as having a Western Australian postcode (n = 827). Six of the children were from other Australian states and the postcodes of 10 children were not recorded. The interviewers recorded their perception of each child's sex on the interview record form – the children were not asked if they were male or female.

Table 7.1 Characteristics of children included in analysis (n = 843)

Characteristic	Description	n	%
Gender	Boy	419	49.7
	Girl	424	50.3
	Missing	0	0
Age group	7-8 years	415	49.2
	11-12 years	428	50.8
	Missing	0	0
Socio-economic status	High (SEIFA 1048 and above)	370	43.9
	Medium (SEIFA 978-1047)	276	32.7
	Low (SEIFA 977 and below)	178	21.1
	Missing	19	2.3
Body Mass Index	Healthy weight / Underweight	624	74.0
	Overweight	162	19.2
	Obese	42	5.0
	Missing	15	1.8

The postcode recorded for each child was matched to the Socio-economic Indexes for Areas (SEIFA) Index of relative socio-economic advantage and disadvantage allocated to that postcode by the Australian Bureau of Statistics based on the 2006 Census (Australian Bureau of Statistics, 2008b). This index considers variables such as income, education level, employment, occupation, disability and housing (Australian Bureau of Statistics, 2008a; Pink, 2008), and “can be used to measure socio-economic wellbeing on a continuum, from the most disadvantaged areas to the most advantaged areas” (Pink, 2008, p. 6). The

resulting 'ecological fallacy' risk must, however, be acknowledged; that is: "when area level indexes are used as proxy measures of individual level socio-economic status, many people are likely to be misclassified" (Pink, 2008, p. 3). Hence this method of SES estimation can be viewed as approximate only and is therefore a limitation in the consideration of the SES variable in this study. The SEIFA cut-off points of 977 and 1047 were used to divide the children into high, medium and low SES groups. These cut-off points were chosen as they approximately divide the total Western Australian population into thirds by use of the 2006 Census SEIFA Index of relative socio-economic advantage and disadvantage for postcodes (Australian Bureau of Statistics, 2008b)

There were 19 missing cases for SEIFA categorisation: 10 children did not have their postcode recorded; one postcode was for a new suburb not listed or allocated a SEIFA code in the 2006 Census data cube (Australian Bureau of Statistics, 2008b); and eight children had a postcode recorded that did not exist – the numbers were either recorded incorrectly by the interviewers or the parents were not asked their postcode and the children, when asked, gave an incorrect number. Table 7.1 shows that the proportion of children allocated to each of the three SEIFA categories differed somewhat from the 33% expected in a representative sample of the Western Australian population. The Perth Royal Show's location in the wealthier Western suburbs of Perth, and the cost of the event, may have contributed to lower SES children being under-represented (21%) and higher SES children being over-represented (44%) in this sample of children.

The children's height and weight measurements were used to calculate their body mass index (weight/height²; BMI). This BMI was then compared to each child's birth date in order to classify the child as overweight or obese according to internationally recognised gender and age specific cut-off points (See Appendix 20) (Cole et al., 2000). There were 15 missing cases: one child declined to have his height measured and 14 children did not have their birth date recorded and so the BMI cut-off points could not be applied.

It is noted that just over 19% of the sample of children for whom BMI cut-off points could be applied were overweight and 5% were obese. Notwithstanding the SES skew in this sample, these proportions are consistent with contemporary estimated levels of overweight and obesity in Australian children. Over 4,400 children aged 2 to 16 years were measured for the *2007 Australian National Children's Nutrition and Physical Activity Survey* which revealed that 17% of Australian children were overweight and 6% were obese (Department of Health and Ageing, 2008). An analysis of the BMI of the children in the sample by gender revealed that 85 of 409 boys (21%) were overweight or obese while 119 of 419 girls (28%) were

overweight or obese. These proportions are consistent with the *Western Australian Child and Adolescent Physical Activity and Nutrition Survey 2003* which measured over 1,800 Western Australian children aged 7 to 15 years and reported that 22% of boys and 28% of girls were overweight or obese (Hands et al., 2004).

Chi-square analyses were used to compare the proportion of children overweight and obese between the different SES groups. There was a significant difference between groups when the children living in a postcode with an assigned SEIFA code below the mean were compared to those living in area with a code above the mean. A higher proportion of lower SES children were overweight or obese compared with higher SES children: 29% versus 23% respectively ($\chi^2 (1, N = 807) = 3.99, p < .05$). This is consistent with the published literature which has reported that lower SES Australian children are at higher risk of being overweight or obese (Australian Institute of Health and Welfare, 2012, 2014; O'Dea, 2003; Wake et al., 2007 ; Wake & Maguire, 2012). Overweight and obese children were not over-presented in any of the other subgroups within this study (i.e. age, gender or exposure condition).

7.2 Number of children in the advertising exposure conditions

The number of children randomly allocated to each exposure condition was monitored frequently throughout the eight day data collection phase in order to recognise, as soon as possible, when a quota had been met. As the quotas closed, the candidate guided the interviewers in their allocation of children to the video condition by way of small unobtrusive notes placed on the walls of the cubicle. The number of children in each exposure condition, after data cleaning, is presented in Table 7.2. Table 7.2 shows that with one exception, (n = 39), all cells achieved n = 40 or more participants.

Table 7.2 Number of participants, by age and gender, in the control and four advertising exposure conditions for each type of apple (n = 843)

Apple type	Age group	Theme of apple advertisement					Total
		No apple advertisement (Controls) Video 1	Taste		Fun		
			Timing of advertising				
			Before eating Video 4	After eating Video 2	Before eating Video 5	After eating Video 3	
Plain Apple	7-8 years	21 boys 21 girls	19 boys 20 girls	20 boys 23 girls	21 boys 21 girls	21 boys 21 girls	208
	11-12 years	21 boys 22 girls	20 boys 21 girls	21 boys 22 girls	21 boys 19 girls	22 boys 21 girls	210
Salt & Vinegar Apple	7-8 years	20 boys 21 girls	22 boys 22 girls	21 boys 19 girls	21 boys 20 girls	20 boys 21 girls	207
	11-12 years	22 boys 21 girls	22 boys 22 girls	21 boys 22 girls	22 boys 23 girls	21 boys 22 girls	218
Total		169	168	169	168	169	843

7.3 Manipulation check: Taste rating of apple slices

Although pre-testing showed that the Salt and Vinegar apples were less liked than the Plain apples, it was important to confirm that the slices used in the study also showed this difference. All children gave a taste rating for an apple slice on the 9-point Peryam and Kroll Simplified Word Scale (where lower numbers indicate more positive taste experience).

The children not exposed to apple advertising constituted the control groups for each type of apple: Plain (n = 85) and Salt & Vinegar (n = 84). Levene's test revealed that the variances of the two groups were not equal thus the Mann-Whitney U test was used. In the absence of any apple advertising, there was a significant difference between the taste ratings of the Plain ($M = 2.64$; $SD = 1.04$) and Salt and Vinegar ($M = 3.38$; $SD = 1.69$) apple slices ($Z = -2.67$, $p = .008$). That is, the salt and vinegar solution significantly decreased the taste rating of the apple but without rendering the taste very unpleasant.

There were no significant differences in taste rating by age, gender, SES or BMI for the Plain apple. For the Salt & Vinegar apple, there were no significant differences in taste rating by

gender, SES or BMI, but a significantly higher proportion of younger children gave a *Super/Really Good* taste rating than older children: 46% versus 14% respectively ($\chi^2 (1, N = 84) = 10.53, p = .001$).

Higher taste ratings were supported by the words that the children used to describe their taste experience. Children who gave a higher taste rating were significantly more likely to have used positive words (e.g. “yummy”, “delicious”, “nice”) than neutral words (e.g. “normal”, “ordinary”, “red”) or negative words (e.g. “bad”, “sour”, “yuck”) for both the Plain apple ($\chi^2 (6, N = 295) = 41.71, p = .000$) and the Salt and Vinegar apple ($\chi^2 (6, N = 298) = 97.06, p = .000$). (See Appendix 21 for details of the words used).

Overall, it is concluded that the taste manipulation was sufficiently successful to allow an adequate test of the research hypotheses.

7.4 Manipulation check: Liking of the advertisements

Liking of an advertisement (i.e. attitude toward the advertisement) can influence attitudes toward the product advertised, particularly hedonic sensory gratification products (Moniek Buijzen, 2007; Derbaix & Bree, 1997; Ewing et al., 1999; Pham et al., 2013; Phelps & Hoy, 1996; Rossiter et al., 1991; Smit et al., 2006; Walker & Dubitsky, 1994). It was therefore important to assess whether, and if so, to what extent the advertisements differed on liking. Hence, children exposed to the apple advertisements were presented with the following 5-point scale, *Love it, Like it, Neither like it or dislike it, Didn't like it or Hate it*, and were asked: “What did you think of the apple ad?”. Five children who were not able to choose a response were coded into the *Neither like it or dislike it* category.

Both the fun advertisement and the taste advertisement were well liked: *Fun*: 70% *Love/Like it*, *Taste*: 64% *Love/Like it*, see Table 7.3). There were no significant differences in level of liking between the two advertisements for either the Plain or the Salt and Vinegar apple conditions.

Table 7.3 Liking of the two apple advertisements – both types of apple combined

Liking of apple advertisement	Theme of apple advertisement		
	Fun (n = 337)	Taste (n = 337)	Total (n = 674)
Love it	15.4%	13.4%	97
Like it	54.6%	50.4%	354
Neither	23.1%	29.4%	177
Didn't like it	4.5%	5.6%	34
Hate it	2.4%	1.2%	12

Younger children and girls were significantly more likely to give a higher liking rating than older children and boys (Younger children: $\chi^2(2, N = 674) = 53.40, p = .000$; Girls: ($\chi^2(2, N = 674) = 17.54, p = .000$).

Overall, it was concluded that the advertisements were sufficiently equally well liked so as to allow a test of the research hypotheses unconfounded by advertisement liking.

7.5 Taste rating analyses

Given the distribution of the data, taste rating scores were collapsed into the following three categories for chi square analyses:

- *Super Good* and *Really Good* (scores 1 and 2);
- *Good* (score 3); and
- *Not Good* (scores 4 to 9) (combined the less positive, neutral and negative responses).

The percentages nominating each of these three taste rating categories for the controls and those exposed to the *Taste* and *Fun* advertisements (combined across *Before* and *After* conditions) are presented in Table 7.4 for each of the apple types. The percentages for those exposed to the *Before* and *After* conditions (combined across *Taste* and *Fun* advertisements) are presented in Table 7.5 for each of the apple types. Table 7.6 shows the percentage taste ratings for the control group and each of the four advertising conditions (i.e., *Taste-Before*; *Taste-After*; *Fun-Before*; *Fun-After*) for each apple type. All chi square analyses shown in the Tables are relative to the relevant control condition. Chi square analyses between the experimental conditions are reported in the text where relevant.

7.5.1 Taste rating by exposure to advertising

Table 7.4 shows that exposure to apple advertising significantly increased taste ratings versus controls for the Plain apple (57% *Super/Really Good* vs 39%), and substantially but not significantly increased taste ratings for the Salt and Vinegar apple (36% *Super/Really Good* vs 30%).

These data indicate that advertising can significantly enhance pleasant taste experiences but has less influence on less pleasant taste experiences.

7.5.2 Taste rating by advertisement theme: 'fun' versus 'taste'

Table 7.4 shows the taste ratings given by children viewing the Taste and Fun advertisements. There was no significant difference between the *Fun* and *Taste* conditions for the Plain apple (χ^2 (2, N = 333) = 2.091, $p = .351$). Both the *Fun* (61% *Super/Really Good*) and *Taste* (53% *Super/Really Good*) advertisements resulted in significant increases in taste ratings relative to the controls (39% *Super/Really Good*).

There was no significant difference between the *Fun* and *Taste* conditions for the Salt and Vinegar apple (χ^2 (2, N = 341) = 2.048, $p = .359$). However, those exposed to the *Taste* advertisement rated the taste substantially but not significantly greater than the control condition (39% *Super/Really Good* vs 30%), whereas there was little difference between the control (30%) and *Fun* (32%) conditions (Table 7.4).

Overall, both the *Fun* and *Taste* themes were equally effective in enhancing pleasant taste experiences, but it appears that the *Taste* theme was somewhat more effective when the taste experience was less pleasant.

Table 7.4 Taste ratings comparing the control group with each of the apple advertisement themes: *Taste* and *Fun* for each apple type

		Theme of apple advertisement			
		Controls	Taste	Fun	Combined advertising conditions
Plain Apple	Super/Really Good	n = 85 38.8%	n = 166 53.0%	n = 167 60.5%	n = 333 56.8%
	Good	44.7%	38.6%	33.5%	36.0%
	Not Good	8.4%	8.4%	6.0%	7.2%
			* $\chi^2 = 6.13$	*** $\chi^2 = 13.35$	** $\chi^2 = 11.84$
Salt & Vinegar Apple	Super/Really Good	n = 84 29.8%	n = 171 39.2%	n = 170 31.8%	n = 341 35.5%
	Good	34.5%	35.7%	40.0%	37.8%
	Not Good	35.7%	25.1%	28.2%	26.7%
			$\chi^2 = 3.60$	$\chi^2 = 1.54$	$\chi^2 = 2.77$

* $p < .05$; ** $p < .01$; *** $p \leq .0001$

7.5.3 Taste rating by advertising timing: 'before' versus 'after'

Table 7.5 shows that for the Plain apple, there was no significant difference in taste ratings by whether the advertising occurred prior to or after the taste experience (*Before* and *After* both 57% *Super/Really Good*), and both differed significantly from the control condition (39% *Super/Really Good*).

For the Salt and Vinegar apple, a greater proportion of children exposed to the advertisement *After* tasting the apple rated the taste *Super/Really Good* relative to those exposed to the advertisement *Before* tasting the apple (40% vs 32%), but this difference was not statistically significant, and neither differed significantly from the control condition (30%).

Overall, for pleasant tasting apples, these data indicate that advertising can enhance the taste experience both when the advertising occurs before the tasting and after the tasting. However, for less pleasant taste experiences, advertising occurring after the tasting may have a positive influence on taste ratings, whereas advertising occurring before the taste experience has little, if any, impact on taste ratings.

Table 7.5 Taste ratings comparing the control group with each of the two advertisement timings: *Before* and *After* for each apple type

		Timing of advertising		
		Controls	Before eating	After eating
Plain Apple	Super/Really Good	n = 85 38.8%	n = 162 56.8%	n = 171 56.7%
	Good	44.7%	34.6%	37.4%
	Not Good	8.4%	8.6%	5.8%
			* $\chi^2 = 8.08$	** $\chi^2 = 11.17$
Salt & Vinegar Apple	Super/Really Good	n = 84 29.8%	n = 174 31.6%	n = 167 39.5%
	Good	34.5%	39.0%	36.5%
	Not Good	35.7%	29.3%	24.0%
			$\chi^2 = 1.11$	$\chi^2 = 4.30$

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

7.5.4 Taste rating by the four advertising exposure conditions

To identify any interactions between advertisement theme and advertisement timing, chi-square analyses were undertaken to compare the taste ratings for each of the four advertisement exposure conditions with the control group's taste ratings for each type of apple. The results and chi squares are shown in Table 7.6.

For the Plain apple, a significantly greater proportion of children exposed to three of the four advertisement conditions rated the taste *Super/Really Good* relative to the Plain apple control condition: *Taste After* and both *Fun Before* and *After* conditions. *Taste Before* achieved substantially higher ratings than the control (50% *Super/Really Good* vs 39%), but the difference was not significant. The *Fun Before* condition had the highest taste ratings but was not significantly different from the other three advertising conditions.

For the Salt & Vinegar apple, only the *Taste After* condition was statistically significantly greater than the control condition. The *Taste After* condition was also significantly greater than the other three exposure conditions that differed little from each other (Table 7.6).

Table 7.6 Taste ratings comparing the control group with each of the four advertising conditions for each apple type

Apple type	Taste Rating	Theme of apple advertisement				
		Controls	Taste		Fun	
			Timing of advertising			
			Before eating	After eating	Before eating	After eating
Plain Apple	Super/Really Good	n = 85 38.8%	n = 80 50.0%	n = 86 55.8%	n = 82 63.4%	n = 85 57.6%
	Good	44.7%	38.8%	38.4%	30.5%	36.5%
	Not Good	16.5%	11.3%	5.8%	6.1%	5.9%
			$\chi^2 = 2.32$	* $\chi^2 = 7.39$	** $\chi^2 = 11.14$	* $\chi^2 = 8.09$
Salt & Vinegar Apple	Super/Really Good	n = 84 29.8%	n = 88 30.7%	n = 83 48.2%	n = 86 32.6%	n = 84 31.0%
	Good	34.5%	39.8%	31.3%	38.4%	41.7%
	Not Good	35.7%	29.5%	20.5%	29.1%	27.4%
			$\chi^2 = .833$	* $\chi^2 = 7.21$	$\chi^2 = .859$	$\chi^2 = 1.50$

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

Overall, these data confirm that both advertising themes enhanced pleasant taste experiences, with *Taste Before* having least impact, and that only the *Taste* theme presented *After* the experience enhanced less pleasant taste experiences.

7.5.5 Taste rating by age and gender

Chi-square analyses were undertaken by age and gender for each type of apple comparing the control group's taste ratings with the taste ratings for each of the advertisement conditions. The assumptions of chi-square analysis were not met for all of the analyses as some expected frequencies were less than five. Hence Fisher's exact test was utilised to detect statistical significance in those cases.

For the Plain apple, a greater proportion of children of each age group and each gender exposed to each of the advertisement conditions rated the taste *Super/Really Good* relative to the control condition. The *Fun* advertisement gained significantly higher taste ratings than the *Taste* advertisement for younger children ($p < .05$ FET), older children ($p < .05$ FET) and boys ($p < .01$ FET). The *After* position was statistically significant for older children ($p < .05$

FET) and girls ($p < .05$ FET). Thus *Fun* had a significant impact with children of all ages and boys while *After* had a significant impact on girls and older children.

For the Salt and Vinegar apple, only the *Taste After* condition significantly increased the proportion of children who gave a rating of *Super/Really Good* relative to the control condition for both boys ($\chi^2 (2, N = 84) = 5.99, p < .05$) and girls ($\chi^2 (2, N = 83) = 11.17, p < .01$). This *Taste After* effect was also seen in younger children, but was not statistically significant. For the older children, all of the advertising conditions resulted in increased proportions of *Super/Really Good* ratings relative to the controls, but only the *Taste After* condition for the older age group was statistically significant ($\chi^2 (2, N = 43) = 9.46, p < .01$).

Overall, these data confirm that apple advertising significantly increased taste ratings for pleasant tasting apples for both boys and girls and for both older and younger children. For the less pleasant tasting apple, only the *Taste After* condition significantly increased taste ratings for both boys and girls and for older children.

7.5.6 Section summary

These data indicate that advertising can significantly enhance pleasant taste experiences but has less influence on less pleasant taste experiences.

For Plain apples, the *Fun* and *Taste* themes presented *Before* eating the apple and *After* eating the apple were effective in enhancing the pleasant taste experience for all children.

For Salt and Vinegar apples, only the *Taste* theme presented *After* the experience enhanced less pleasant taste experience for boys and girls and for older children.

7.6 Desire to eat more apple

All but 10 children (n = 833) responded to the question: 'Would you like another piece of that apple right now?' The children's responses were recorded as: *yes*, *no* or *unsure*. The 22 children who indicated that they were *unsure* were combined with *no* into one category. The results for the control and four exposure conditions for each apple type are shown in Table 7.7.

7.6.1 Desire to eat more apple by control groups

Consistent with the Plain apple tasting more pleasant than the Salt and Vinegar apple, a higher proportion of control children wanted to eat more of the Plain apple than the Salt and Vinegar apple: 58% versus 48% respectively. However this difference was not statistically significant. There were no significant differences by age, gender, SES or BMI. However, across the two control groups combined, a significantly higher proportion of overweight or obese children wanted to eat more apple than healthy weight children, 68% versus 49% respectively ($\chi^2 (1, N = 164) = 4.71, p < .05$).

7.6.2 Desire to eat more apple by the four advertising exposure conditions

Chi-square analyses were undertaken for each type of apple, to compare responses given by the children exposed to each of the four experimental conditions with the control group's responses. The chi square results are shown in Table 7.7.

For the Plain apple, a greater proportion of children exposed to the advertisement conditions wanted to eat more apple relative to the control condition (69% vs 58%) with near statistical significance overall ($\chi^2 (1, N = 411) = 3.72, p = .054$). However, only the *Taste After* condition achieved statistical significance (75% vs 58%). There were no significant differences between responses for younger children or by gender. Older children, however, were significantly more likely to want to eat more apple for both *Taste* conditions [*Taste Before*: ($\chi^2 (1, N = 84) = 4.47, p < .05$; *Taste After*: ($\chi^2 (1, N = 84) = 8.34, p < .01$).

For the Salt and Vinegar apple, a slightly greater but non-significant proportion of children exposed to the advertisement conditions wanted to eat more apple relative to the control condition (53% vs 48%). Similarly, none of the exposure conditions differed substantially or

significantly from the control condition (Table 7.7). There were no significant differences by age or gender.

Table 7.7 Desire to eat more - comparison of the control group with combined advertising conditions and each of the four advertising conditions for each apple type

Apple type	Desire to eat more	Theme of apple advertisement					Combined advertising conditions
		Controls	Taste		Fun		
			Timing of advertising				
			Before eating	After eating	Before eating	After eating	
Plain Apple	Yes	n = 84 58.3%	n = 79 68.4%	n = 84 75.0%	n = 81 63.0%	n = 83 71.1%	n = 327 69.4%
	No/Unsure	41.7%	31.6%	25.0%	37.0%	28.9%	30.6%
			$\chi^2 = 1.76$	* $\chi^2 = 5.25$	$\chi^2 = 0.37$	$\chi^2 = 2.97$	$\chi^2 = 3.72$
Salt & Vinegar Apple	Yes	n = 83 48.2%	n = 87 51.7%	n = 83 53.0%	n = 86 53.5%	n = 83 54.2%	n = 339 53.1%
	No/Unsure	51.8%	48.3%	47.0%	46.5%	45.8%	46.9%
			$\chi^2 = 0.212$	$\chi^2 = 0.386$	$\chi^2 = 0.474$	$\chi^2 = 0.603$	$\chi^2 = 0.643$

* $p < .05$

7.6.3 Section summary

For the Plain apple, advertising increased the proportion of children who chose to eat more apple, but the difference was not significant. However, when the four advertising conditions were considered separately, the *Taste After* advertising condition significantly increased the proportion of children who wanted to eat more of the Plain apple relative to the control group.

For the Salt and Vinegar apple, neither advertising per se nor any of the four exposure conditions showed a substantial or significant impact on choosing to eat more apple relative to the control group.

Overall, this variable appears to be less influenced by advertising than the taste variable, but shows that advertising can have a significant effect over and above product sampling when the advertising occurs *after* the sampling experience.

7.7 Intention to request purchase of apples

All but one child (n = 842 of 843) responded to the question: 'Would you want Mum/Dad/Other to buy those apples for you if you saw them at the shop? The children's responses were recorded as: *Definitely would*, *Probably would*, *Maybe/maybe not*, *Probably would not* and *Definitely would not*. This five point scaled was re-coded into a three point scale: *Definitely/probably would*, *Maybe*, and *Probably/definitely would not*. The results for the control and each exposure condition for each apple type are shown in Table 7.8.

7.7.1 Intention to request purchase by control groups

Consistent with taste ratings, Table 7.8 shows that a significantly higher proportion of control children intended to request purchase of the Plain apple than the Salt and Vinegar apple: 73% versus 52% respectively ($\chi^2 (2, N = 169) = 9.70, p < .01$). There were no significant differences by age, gender, SES or BMI when the apple types were considered separately. However, with the two control groups combined, a significantly higher proportion of younger children would request purchase compared to older children ($\chi^2 (2, N = 169) = 6.09, p < .05$).

7.7.2 Intention to request purchase by the four advertising exposure conditions

Chi-square analyses were undertaken separately to compare the responses given by the children exposed to each of the four experimental conditions with the control group's responses. These chi square results are shown in Table 7.8.

Table 7.8 shows that for the Plain apple, a greater but non-significant proportion of the children exposed to apple advertising intended to request apple purchase relative to the control condition (82% vs 73%), but none of the four exposure conditions differed significantly from the control condition. There were no significant differences by gender, BMI or SES or for older children, but younger children were significantly more likely to intend to request purchase overall and in all exposure conditions except *Taste Before*.

For the Salt and Vinegar apple, Table 7.8 shows that a non-significantly greater proportion of the children exposed to the advertisement conditions intended to request apple purchase relative to the control condition (65% vs 52%). However, both the *Taste Before* and *Taste After* conditions achieved statistical significance relative to the control condition (Table 7.8).

Combining the *Before* and *After* conditions, the *Taste* theme achieved significantly more intention to purchase than the *Fun* theme: 73% versus 58% ($\chi^2 (2, N = 341) = 8.30, p < .05$).

There were no significant differences by BMI or SES or for younger children and boys. Older children and girls were significantly more likely to intend to request purchase than younger children and boys in both *Taste* conditions, but not the *Fun* conditions.

Table 7.8 Intention to request purchase - comparison of the control group with combined advertising conditions and each of the four experimental conditions for each apple type

Apple type	Purchase Request	Theme of apple advertisement					Combined advertising conditions
		Controls	Taste		Fun		
			Timing of advertising				
			Before eating	After eating	Before eating	After eating	
Plain Apple	Would	n = 85 72.9%	n = 80 80.0%	n = 85 81.2%	n = 82 84.1%	n = 85 82.4%	n = 332 81.9%
	Maybe	22.4%	16.3%	14.1%	11.0%	14.1%	13.9%
	Would not	4.7%	3.8%	4.7%	4.9%	3.5%	4.2%
			$\chi^2 = 1.15$	$\chi^2 = 1.95$	$\chi^2 = 3.89$	$\chi^2 = 2.21$	$\chi^2 = 3.86$
Salt and Vinegar Apple	Would	n = 84 52.4%	n = 88 72.7%	n = 83 72.3%	n = 86 54.7%	n = 84 60.7%	n = 341 65.1%
	Maybe	31%	18.2%	15.7%	26.7%	25.0%	21.4%
	Would not	16.7%	9.1%	12.0%	18.6%	114.3%	13.5%
			* $\chi^2 = 7.63$	* $\chi^2 = 7.46$	$\chi^2 = 0.39$	$\chi^2 = 1.20$	$\chi^2 = 4.86$

* $p < .05$

7.7.3 Section summary

For the Plain apple, advertising increased the proportion of children who intended to ask for apples to be purchased for them, with this effect being statistically significant only in younger children.

For the Salt and Vinegar apple, advertising non-significantly increased the proportion of children who intended to ask for apples to be purchased for them. However, both *Taste* conditions significantly increased the proportion of children who intended to request apple purchase.

Overall, it appears that this variable is somewhat sensitive to advertising effects over and above product sampling, and particularly to a taste advertising theme when the taste is less pleasant. It can be noted that, while the dependent variables are correlated, the experimental findings are not replicated across all outcomes. Request to purchase is not as directly moderated by advertising as taste ratings and desire to eat more apple.

7.8 Intention to use own money to purchase apples

All but three children (n = 840) responded to the question: 'Would you use your own pocket money to buy those apples if you saw them at the shop?' The children's responses were recorded as: *Definitely would*, *Probably would*, *Maybe/maybe not*, *Probably would not* and *Definitely would not*. The responses were re-coded into a three item scale for analysis: *Definitely/probably would*, *Maybe* and *Definitely/probably would not*. The results are shown in Table 7.9.

7.8.1 Intention to use own money by control groups

Table 7.9 shows that only a slightly higher proportion of Plain apple controls versus Salt and Vinegar controls indicated they would use their own money to purchase these apples: 27% versus 23%. It appears that the vast majority of these children would not spend their own money on apples regardless of taste. There were no significant differences by type of apple, gender, SES and BMI. However, a significantly higher proportion of younger children compared to older children intended to use their own money to purchase these apples for both types of apple: Plain apple: $\chi^2(1, N = 85) = 7.57, p < .01$; Salt and Vinegar: $\chi^2(1, N = 84) = 8.93, p < .01$.

7.8.2 Intention to use own money by the four advertising exposure conditions

Table 7.9 indicates that advertising per se had no effect on intention to use own money for either the Plain apple condition (28% vs 27%) or the Salt and Vinegar condition (25% vs 23%). Furthermore, for both the Plain apple and the Salt and Vinegar apple conditions, none of the experimental conditions significantly increased the proportion of children who reported that they would use their own money to buy the apple. There were no significant differences in response by age, gender, SES or BMI between the groups.

Table 7.9 Intention to use own money to purchase - comparison of the control group with combined advertising conditions and each of the four experimental conditions

Apple type	Use own money	Theme of apple advertisement					Combined advertising conditions
		Controls	Taste		Fun		
			Timing of advertising				
			Before eating	After eating	Before eating	After eating	
Plain Apple	Would	n = 85	n = 79	n = 85	n = 82	n = 85	n = 331
	Maybe	27.1%	22.8%	35.3%	28.0%	25.9%	28.1%
	Would not	27.1%	30.4%	30.6%	34.1%	20.0%	28.7%
		45.9%	46.8%	34.1%	37.8%	54.1%	43.2%
		$\chi^2 = 0.465$	$\chi^2 = 2.58$	$\chi^2 = 1.35$	$\chi^2 = 1.45$	$\chi^2 = 0.201$	
Salt and Vinegar Apple	Would	n = 83	n = 88	n = 83	n = 86	n = 84	n = 341
	Maybe	22.9%	26.1%	25.3%	20.9%	26.2%	24.6%
	Would not	24.1%	19.3%	21.7%	20.9%	31.0%	23.2%
		53.0%	54.5%	53.0%	58.1%	42.9%	52.2%
		$\chi^2 = 0.652$	$\chi^2 = 0.205$	$\chi^2 = 0.462$	$\chi^2 = 1.80$	$\chi^2 = 0.116$	

7.8.3 Section summary

The proportion of children who would use their own money to purchase these apples was equally low for both the Plain apple and the Salt and Vinegar apple conditions. Furthermore, apple advertising did not increase the proportion of children relative to controls who intended to use their own pocket money to purchase these apples. These data suggest that using their own money for food usually purchased by parents for the whole family, is not an appropriate measure of advertising impact for children at these ages.

7.9 Logistic regression analyses for dependent variables

Univariate and multivariable logistic regression models for the Plain apple and Salt and Vinegar apple conditions separately, were used to assess the effect of advertising condition, gender, age, BMI, and SES on each of the four dependent variables: taste rating; desire to eat more apple; intention to request purchase of the apple; and intention to use own money to purchase the apple.

In the univariate regression analyses, each of the four advertising exposure conditions was compared to the control group. Binary variables were constructed for each of the following: BMI: overweight/obese children versus healthy/underweight children; SES: those on or above the mean versus those below the mean; Taste rating: *Super/Really Good* versus a lower taste rating; Desire to eat more: *Yes* versus *No* and *Maybe* combined; and for each of Intention to request purchase and Use own money to purchase: *Definitely/Probably would* versus *Maybe* and *Definitely/Probably would not* combined.

7.9.1 Taste rating

The percentages of children who gave a 'super/really good' taste rating, compared to children who gave a lower taste rating, are presented in Table 7.10 for each of the advertising condition and binary variables. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on taste rating are presented in Table 7.11. The results are presented below for the Plain and Salt and Vinegar apples in turn.

For the Plain apple condition, Table 7.10 shows significantly higher proportions of children gave a *Super/Really Good* rating if they were exposed to advertising, if they were girls and if they were younger.

The univariate regression analysis (Table 7.11) confirmed the findings for gender (girls 1.6 times more likely) and age (younger 1.6 times more likely), and, as indicated earlier (Table 7.6), that only three of the four advertising exposure conditions were significantly related to an increase in taste ratings:

- *Taste After* (almost 2 times more likely);
- *Fun After* (2.1 times more likely);
- *Fun Before* (2.7 times more likely);

When all variables were considered together in a multivariable analysis (Table 7.11), these five variables remained independently significantly related to higher taste ratings:

- *Taste After* advertising condition (2.1 times more likely);
- *Fun After* advertising condition (2.2 times more likely);
- *Fun Before* advertising condition (almost 3 times more likely);
- Gender (girls were 1.7 times more likely); and
- Age (younger 1.7 times more likely).

For the Salt and Vinegar apple condition, Table 7.11 shows that significantly higher proportions of children gave a *Super/Really Good* rating if they were younger, with exposure condition approaching significance ($p = .06$) (no doubt largely due to the *Taste After* effect: 48% versus 30% control).

The univariate regression analysis confirmed the age effect (younger 2.5 times more likely) and revealed a significant impact for the *Taste After* condition (2.2 times more likely).

When all variables were considered together in a multivariable analysis, these two variables remained as independently significantly related to higher taste ratings:

- Age (younger children were 2.8 times more likely); and
- *Taste After* advertising condition (2.4 times more likely).

7.9.2 Desire to eat more apple

The percentages of children who wanted to eat more apple compared to children who did not are presented for each of the variables in Table 7.12. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on desire to eat more apple are presented in Table 7.13. The results are presented below for Plain and Salt and Vinegar apples in turn.

For the Plain apple condition, Table 7.12 shows no significant differences for any of the variables, although it can be noted that the *Taste After* condition was substantially higher than the control: 75% vs 58%. The univariate regression analysis (Table 7.13) revealed that the *Taste After* advertising condition was significantly related to an increase in desire to eat more apple (2.1 times more likely). When all variables were considered together in a multivariable analysis (Table 7.13), the *Taste After* advertising condition remained

independently significantly related to an increase in desire to eat more apple (2.3 times more likely).

For the Salt and Vinegar apple condition, neither the chi-square analyses (Table 7.12), nor the univariate and multiple variable regression analyses (Table 7.13) reveal any significant effect for any of the variables.

7.9.3 Intention to request purchase

The percentages of children who intended to ask for the apple to be purchased for them are presented in Table 7.14 for each of the regression variables. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on intention to purchase are presented in Table 7.15. The results are presented below for the Plain and Salt and Vinegar apple conditions in turn.

For the Plain apple condition, Table 7.15 shows that significantly higher proportions of children intended to ask for apple purchase if they were overweight or obese. The univariate regression analysis (Table 7.16) confirmed this finding (overweight/obese 3 times more likely). When all variables were considered together in a multivariable analysis (Table 7.16), BMI remained independently significantly related to an increase in intention to request apple purchase (overweight/obese 3 times more likely).

For the Salt and Vinegar apple condition, Table 7.15 shows that significantly higher proportions of children intended to ask for apple purchase if they were exposed to advertising (particularly the *Taste* advertisement).

The univariate regression analysis (Table 7.16) confirmed that the two *Taste* advertising exposure conditions were significantly related to an increase in purchase request intention:

- *Taste After* (2.4 times more likely); and
- *Taste Before* (2.4 times more likely);

When all variables were considered together in a multivariable analysis (Table 7.16), the advertising conditions remained independently significantly related to an increase in intention to request apple purchase:

- *Taste After* (2.5 times more likely); and
- *Taste Before* (2.3 times more likely).

7.9.4 Intention to use own money

The percentages of children who intended to use their own money to purchase the apple are presented in Table 7.16 for each of the regression variables. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on intention to use their own money to purchase the apple are presented in Table 7.17. As noted earlier, a substantial majority of children did not intend to use their own money to purchase apples.

For the Plain apple condition, Table 7.16 shows that significantly higher proportions of children intended to use their own money when they were overweight /obese, lived in a low SES area, or were younger

The univariate regression analysis (Table 7.17) confirmed that these three variables (BMI, SES, age) were significantly related to intention to use own money to purchase: healthy weight or underweight 1.8 times less likely; those who live in a high SES area 1.8 times less likely; and older 2 times less likely.

When all variables were considered together in a multivariable analysis (Table 7.17), the three variables remained independently significantly related to a decreased intention to use their own money for apple purchase:

- healthy weight or underweight: 1.8 times less likely;
- high SES: 1.9 times less likely; and
- older children: 1.9 times less likely.

For the Salt and Vinegar apple condition, Table 7.16 showed that significantly higher proportion of younger children intended to use their own money.

The univariate regression analysis (Table 7.17) confirmed this finding: older children 2.3 times less likely to use their own money. When all variables were considered together in a multivariable analysis (Table 7.17), a significant impact remained for age (older 2.3 times less likely).

7.9.5 Section summary

Advertising exposure conditions

For the Plain apple condition, multivariable regression analyses revealed that children in the *Taste After*, *Fun After* and *Fun Before* advertising conditions were significantly more likely to give a higher taste rating than controls. *Taste After* was also significantly related to an increased desire to eat more apple. None of the four exposure conditions was independently significantly related to an increased intention to request purchase or to use own money to purchase.

For the Salt and Vinegar apple condition, children in the *Taste After* advertising condition were significantly more likely to give a higher taste rating than controls and children in both the *Taste After* and *Taste Before* advertising conditions were significantly more likely than controls to intend to request apple purchase. None of the four exposure conditions was independently significantly related to an increased desire to eat more or to use own money to purchase.

Sample characteristics

For the Plain apple condition: girls and younger children were significantly more likely to give a higher taste rating; BMI significantly predicted intention to request purchase; and healthy or underweight children, children living in a high SES area and older children were significantly more likely to intend to use their own money to purchase apple.

For the Salt and Vinegar apple condition, older children were significantly more likely to intend to use their own money to purchase apple.

Table 7.10 Percentage of children who gave a Taste rating of Super/Really Good for each regression variable

Variable	Category	Taste Rating							
		Plain apple				Salt and Vinegar apple			
		Super/Really Good %	Lower rating %	Chi-square	p-value	Super/Really Good %	Lower rating %	Chi-square	p-value
Advertising exposure condition	Control	38.8	61.2	$\chi^2 = 11.73, df = 4$	$p < .05$	29.8	70.2	$\chi^2 = 8.91, df = 4$	$p = .063$
	Taste After	55.8	44.2			48.2	51.8		
	Fun After	57.6	42.4			31.0	69.0		
	Taste Before	50.0	50.0			30.7	69.3		
	Fun Before	63.4	36.6			32.6	67.4		
Gender	Boys	46.9	53.1	$\chi^2 = 6.43, df = 1$	$p < .05$	34.0	66.0	$\chi^2 = 0.29, df = 1$	$p = .866$
	Girls	59.2	40.8			34.7	65.3		
BMI	Healthy/Underweight	51.8	48.2	$\chi^2 = 1.03, df = 1$	$p = .310$	33.9	66.1	$\chi^2 = 0.28, df = 1$	$p = .599$
	Overweight/Obese	57.5	42.5			36.7	63.3		
SES	Below mean	51.6	48.4	$\chi^2 = .158, df = 1$	$p = .691$	35.3	64.7	$\chi^2 = 0.32, df = 1$	$p = .859$
	Mean or above	53.7	46.3			34.4	65.6		
Age	7 - 8 years	58.7	41.3	$\chi^2 = 5.11, df = 1$	$p < .05$	44.9	55.1	$\chi^2 = 20.01, df = 1$	$p = .000$
	11 - 12 years	47.6	52.4			24.3	75.7		

Note: shaded boxes indicate non-significant variables

Table 7.11 Univariate and multiple variable logistic regression analyses for Taste rating Super/Really Good

Variable	Category	Taste rating of Super/Really Good			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Advertising exposure condition	Control	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Taste After	1.990 (1.082 – 3.661) *	2.136 (1.129 – 4.042) *	2.195 (1.163 – 4.146) *	2.356 (1.216 – 4.563) *
	Fun After	2.145 (1.162 – 3.958) *	2.203 (1.165 – 4.166) *	1.058 (0.548 – 2.042)	0.987 (0.494 – 1.971)
	Taste Before	1.576 (0.849 – 2.924)	1.434 (0.752 – 2.735)	1.045 (0.545 – 2.003)	1.068 (0.543 – 2.101)
	Fun Before	2.731 (1.460 – 5.109) **	2.930 (1.533 – 5.599) ***	1.139 (0.595 – 2.182)	1.146 (0.582 – 2.260)
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	1.648 (1.119 – 2.428) *	1.672 (1.111 – 2.517) *	1.035 (0.694 – 1.545)	1.141 (0.745 – 1.748)
BMI	Healthy/Underweight	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Overweight/Obese	1.260 (0.806 – 1.969)	1.187 (0.724 – 1.898)	1.135 (0.708 – 1.817)	0.879 (0.529 – 1.459)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	1.089 (0.715 – 1.658)	1.098 (0.705 – 1.711)	0.962 (0.626 – 1.478)	0.890 (0.566 – 1.399)
Age	7 - 8 years	1.560 (1.060 – 2.297) *	1.667 (1.110 – 2.503) *	2.540 (1.680 – 3.839) ***	2.800 (1.819 – 4.310) ***
	11 - 12 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)

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

Note: shaded boxes indicate non-significant variables

Table 7.12 Percentage of children who wanted to Eat more apple for each regression variable

Variable	Category	Desire to eat more apple							
		Plain apple				Salt and Vinegar apple			
		Yes %	No/Unsure %	Chi-square	p-value	Yes %	No/Unsure %	Chi-square	p-value
Advertising exposure condition	Control	58.3	41.7	$\chi^2 = 6.58, df = 4$	$p = .160$	48.2	51.8	$\chi^2 = 0.76, df = 4$	$p = .944$
	Taste After	75.0	25.0			53.0	47.0		
	Fun After	71.1	28.9			54.2	45.8		
	Taste Before	68.4	31.6			51.7	48.3		
	Fun Before	63.0	37.0			53.5	46.5		
Gender	Boys	67.5	32.5	$\chi^2 = 0.20, df = 1$	$p = .887$	52.8	47.2	$\chi^2 = 0.83, df = 1$	$p = .773$
	Girls	66.8	33.2			51.4	48.6		
BMI	Healthy/Underweight	65.3	34.7	$\chi^2 = 1.61, df = 1$	$p = .204$	52.4	47.6	$\chi^2 = 0.003, df = 1$	$p = .957$
	Overweight/Obese	72.1	27.9			52.0	48.0		
SES	Below mean	63.4	36.6	$\chi^2 = 1.34, df = 1$	$p = .247$	55.1	44.9	$\chi^2 = 0.50, df = 1$	$p = .480$
	Mean or above	69.3	30.7			51.3	48.7		
Age	7 - 8 years	63.5	36.5	$\chi^2 = 2.36, df = 1$	$p = .124$	52.4	47.6	$\chi^2 = 0.014, df = 1$	$p = .906$
	11 - 12 years	70.7	29.3			51.9	48.1		

Note: shaded boxes indicate non-significant variables

Table 7.13 Univariate and multiple variable logistic regression analyses for desire to eat more apple

Variable	Category	Desire to eat more apple			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Advertising exposure condition	Control	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Taste After	2.143 (1.111 – 4.135) *	2.289 (1.151 – 4.554) *	1.213 (0.659 – 2.230)	1.201 (0.649 – 2.225)
	Fun After	1.756 (0.923 – 3.340)	1.644 (0.850 – 3.180)	1.273 (0.692 – 2.342)	1.247 (0.667 – 2.331)
	Taste Before	1.543 (0.811 – 2.934)	1.403 (0.721 – 2.729)	1.152 (0.631 – 2.103)	1.142 (0.618 – 2.108)
	Fun Before	1.214 (0.649 – 2.270)	1.173 (0.618 – 2.224)	1.236 (0.676 – 2.262)	1.203 (0.649 – 2.231)
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	0.970 (0.643 – 1.465)	0.905 (0.588 – 1.392)	0.945 (0.645 – 1.385)	0.954 (0.645 – 1.413)
BMI	Healthy/Underweight	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Overweight/Obese	1.373 (0.841 – 2.243)	1.438 (0.868 – 2.380)	0.988 (0.628 – 1.554)	1.035 (0.647 – 1.656)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	1.301 (0.833 – 2.033)	1.451 (0.913 – 2.304)	0.862 (0.571 – 1.302)	0.830 (0.546 – 1.262)
Age	7 - 8 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	11 - 12 years	1.382 (0.914 – 2.090)	1.422 (0.927 – 2.181)	0.977 (0.667 – 1.432)	0.929 (0.627 – 1.377)

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

Note: shaded boxes indicate non-significant variables

Table 7.14 Percentage of children who intended to request purchase of apple for each regression variable

Variable	Category	Intention to request purchase of apple							
		Plain apple				Salt and Vinegar apple			
		Would %	Maybe/ Would not %	Chi-square	p-value	Would %	Maybe/ Would not %	Chi-square	p-value
Advertising exposure condition	Control	72.9	27.1	$\chi^2 = 3.90, df = 4$	$p = .419$	52.4	47.6	$\chi^2 = 13.38, df = 4$	$p < .05$
	Taste After	81.2	18.8			72.3	27.7		
	Fun After	82.4	17.6			60.7	39.3		
	Taste Before	80.0	20.0			72.7	27.3		
	Fun Before	84.1	15.9			54.7	45.3		
Gender	Boys	78.7	21.3	$\chi^2 = .47, df = 1$	$p = .492$	61.3	38.7	$\chi^2 = 0.29, df = 1$	$p = .590$
	Girls	81.4	18.6			63.8	36.2		
BMI	Healthy/Underweight	76.0	24.0	$\chi^2 = 10.31, df = 1$	$p = .001$	63.7	36.3	$\chi^2 = 0.38, df = 1$	$p = .535$
	Overweight/Obese	90.6	9.4			60.2	39.8		
SES	Below mean	81.7	18.3	$\chi^2 = .49, df = 1$	$p = .483$	62.5	37.5	$\chi^2 = 0.003, df = 1$	$p = .958$
	Mean or above	78.7	21.3			62.2	37.8		
Age	7 - 8 years	83.1	16.9	$\chi^2 = 2.31, df = 1$	$p = .128$	63.3	36.7	$\chi^2 = 0.08, df = 1$	$p = .772$
	11 - 12 years	77.1	22.9			61.9	38.1		

Note: shaded boxes indicate non-significant variables

Table 7.15 Univariate and multiple variable logistic regression analyses for intention to request purchase of apple

Variable	Category	Intention to request purchase of apple			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Advertising exposure condition	Control	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Taste After	1.600 (0.775 – 3.301)	1.541 (0.730 – 3.254)	2.372 (1.246 – 4.514) **	2.496 (1.297 – 4.804) **
	Fun After	1.731 (0.830 – 3.610)	1.510 (0.707 – 3.223)	1.405 (0.762 – 2.592)	1.317 (0.704 – 2.463)
	Taste Before	1.484 (0.717 – 3.071)	1.302 (0.614 – 2.761)	2.424 (1.284 – 4.575) **	2.278 (1.197 – 4.335) *
	Fun Before	1.969 (0.919 – 4.217)	1.931 (0.885 – 4.214)	1.096 (0.599 – 2.002)	1.142 (0.616 – 2.117)
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	1.184 (0.731 – 1.916)	1.121 (0.681 – 1.848)	1.114 (0.752 – 1.651)	1.141 (0.757 – 1.719)
BMI	Healthy/Underweight	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Overweight/Obese	3.032 (1.501 – 6.124) **	3.015 (1.479 – 6.148) **	0.863 (0.543 – 1.373)	0.790 (0.486 – 1.286)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	0.826 (0.484 – 1.410)	0.895 (0.515 – 1.555)	0.989 (0.647 – 1.510)	0.947 (0.612 – 1.466)
Age	7 - 8 years	1.456 (0.896 – 2.366)	1.408 (0.853 – 2.322)	1.060 (0.715 – 1.570)	1.108 (0.734 – 1.670)
	11 - 12 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)

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

Note: shaded boxes indicate non-significant variables

Table 7.16 Percentage of children who intended to use their own money to purchase apple for each regression variable

Variable	Category	Intention to use own money to purchase apple							
		Plain apple				Salt and Vinegar apple			
		Would %	Maybe/ Would not %	Chi-square	p-value	Would %	Maybe/ Would not %	Chi-square	p-value
Advertising exposure condition	Control	27.1	72.9	$\chi^2 = 3.54, df = 4$	$p = .472$	22.9	77.1	$\chi^2 = .99, df = 4$	$p = .911$
	Taste After	35.3	64.7			25.3	74.7		
	Fun After	25.9	74.1			26.2	73.8		
	Taste Before	22.8	77.2			26.1	73.9		
	Fun Before	28.0	72.0			20.9	79.1		
Gender	Boys	23.9	76.1	$\chi^2 = 3.19, df = 1$	$p = .074$	21.2	78.8	$\chi^2 = 2.17, df = 1$	$p = .141$
	Girls	31.8	68.2			27.4	72.6		
BMI	Healthy/Underweight	24.3	75.7	$\chi^2 = 6.38, df = 1$	$p < .05$	24.3	75.7	$\chi^2 = 0.59, df = 1$	$p = .807$
	Overweight/Obese	37.1	62.9			25.5	74.5		
SES	Below mean	34.9	65.1	$\chi^2 = 5.01, df = 1$	$p < .05$	20.6	79.4	$\chi^2 = 1.79, df = 1$	$p = .181$
	Mean or above	24.2	75.8			26.6	73.4		
Age	7 - 8 years	34.8	65.2	$\chi^2 = 9.75, df = 1$	$p < .01$	31.9	68.1	$\chi^2 = 12.68, df = 1$	$p = .000$
	11 - 12 years	21.1	78.9			17.1	82.9		

Note: shaded boxes indicate non-significant variables

Table 7.17 Univariate and multiple variable logistic regression analyses for intention to use own money to purchase apple

Variable	Category	Intention to use own money to purchase apple			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Advertising exposure condition	Control	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Taste After	0.680 (0.354 – 1.307)	0.701 (0.350 – 1.405)	0.876 (0.430 – 1.787)	0.877 (0.423 – 1.819)
	Fun After	1.062 (0.537 – 2.100)	1.214 (0.592 – 2.490)	0.837 (0.413 – 1.695)	0.813 (0.391 – 1.690)
	Taste Before	1.257 (0.618 – 2.559)	1.415 (0.661 – 3.030)	0.839 (0.417 – 1.688)	0.833 (0.405 – 1.710)
	Fun Before	0.952 (0.483 – 1.877)	1.035 (0.507 – 2.011)	1.122 (0.541 – 2.326)	1.091 (0.516 – 2.307)
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	1.481 (0.961 – 2.283)	0.603 (0.378 – 0.961)	1.398 (0.894 – 2.185)	0.681 (0.428 – 1.083)
BMI	Healthy/Underweight	1.837 (1.142 – 2.957) *	1.800 (1.090 – 2.973) *	1.067 (0.634 – 1.796)	0.890 (0.512 – 1.547)
	Overweight/Obese	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	1.681 (1.064 – 2.654) *	1.876 (1.155 – 3.045) *	0.715 (0.436 – 1.171)	0.710 (0.427 – 1.180)
Age	7 - 8 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	11 - 12 years	2.000 (1.290 – 3.101) **	1.869 (1.178 – 2.965) **	2.277 (1.439 – 3.603) ***	2.307 (1.442 – 3.691) ***

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

Note: shaded boxes indicate non-significant variables

7.10 Relationships between taste and behavioural/intention dependent variables and advertisement liking

It was assumed that both taste ratings and advertisement liking would influence the behavioural/intention dependent variables. The following correlational and regression analyses attempt to establish these relationships and to assess the relative impact of taste and advertisement liking on each of the behavioural/intention dependent variables.

7.10.1 Intercorrelations between all dependent variables and advertisement liking

As the variables were not normally distributed and did not meet the assumptions of linearity and homoscedasticity required for a Pearson product-moment correlation, Spearman's rank-order correlation was used to investigate the interrelationship between taste ratings and the behavioural/intention dependent variables and advertisement liking. The results are shown in Table 7.18 for the Plain and Salt and Vinegar apple conditions separately.

Not unexpectedly, Table 7.18 shows that, with the exception of desire to eat more and advertisement liking for the Plain apple condition, all the dependent variables were positively and significantly correlated with each other and with advertisement liking, with the correlations generally higher for the Salt and Vinegar condition than the Plain condition (Table 7.18). With respect to the behavioural/intention measures, for both the Plain and Salt and Vinegar conditions, taste rating was most strongly correlated with intention to request purchase: .378 and .496 respectively. Overall it appears that a positive taste rating of the less pleasant Salt and Vinegar apple more strongly correlated with behaviour/intention measures than did a positive taste rating of the Plain apple.

It is also noted that taste rating was strongly related to advertisement liking for both the Plain (.407) and Salt and Vinegar (.368) conditions.

With one exception (Plain apple intention to use own money), correlations between taste rating and the behavioural/intention variables were greater than the correlations between advertisement liking and the behavioural/intention variables, and particularly for the Salt and Vinegar apple condition.

Table 7.18 Spearman's rank-order correlations between the dependent variables: Plain apple below diagonal; Salt & Vinegar apple above diagonal

Apple type	Variables	Taste rating	Desire to eat more	Intention to request purchase	Intention use own money	Liking of adverts	Apple type
Plain apple	Taste rating		.351 ***	.496 ***	.389 ***	.368 ***	Salt and Vinegar apple
	Desire to eat more	.215 ***		.321 ***	.195 ***	.222 ***	
	Intention to request purchase	.378 ***	.226 ***		.430 ***	.361 ***	
	Intention use own money	.215 ***	.130 **	.358 ***		.269 ***	
	Liking of adverts	.407 ***	.012	.311 ***	.266 ***		

** $p < .01$; *** $p = .000$

Note: shaded orange boxes indicate Plain apple and shaded purple boxes indicate Salt and Vinegar apple

7.10.2 Logistic regression analyses with advertisement liking

For the Plain apple and Salt and Vinegar apple conditions separately, univariate and multivariable logistic regression analyses were used to assess the effect of advertisement liking on taste ratings, and the relative impact of taste rating versus advertisement liking on each of the three behavioural/intention dependent variables: desire to eat more apple; intention to request purchase of the apple; and intention to use own money to purchase the apple. Gender, age, BMI and SES were included in the regression analyses.

Liking of the advertisement was recoded as *Loved/Liked* the advertisement versus lower liking ratings. The advertising liking variable does not apply to the control group and hence controls are not included in these analyses.

7.10.2.1 The influence of advertisement liking on taste rating

The percentages of children who gave a *Super/Really Good* taste rating, compared to children who gave a lower taste rating, are repeated in Table 7.19 for each of the socio-demographic variables, along with advertisement liking. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on taste rating are presented in Table 7.20. The results are presented below for the Plain and Salt and Vinegar apples in turn.

For the Plain apple condition, Table 7.19 shows significantly higher proportions of children gave a *Super/Really Good* taste rating if they *Loved/Liked* the advertisement they saw. The univariate regression analysis (Table 7.20) confirmed that children who *Loved/Liked* the advertisement were 3 times more likely to give a higher taste rating. When all variables were considered together in a multivariable analysis (Table 7.20), this variable remained significant: children who *Loved/Liked* the advertisement were 2.9 times more likely to give a higher taste rating.

For the Salt and Vinegar apple condition, Table 7.19 shows significantly higher proportions of children gave a *Super/Really Good* taste rating if they *Loved/Liked* the apple advertisement they saw. The univariate regression analysis (Table 7.20) confirmed that children who *Loved/Liked* the advertisement were 3 times more likely to give a higher taste rating. When all variables were considered together in a multivariable analysis (Table 7.20), this effect remained significant: children who *Loved/Liked* the advertisement were 2.6 times more likely to give a higher taste rating.

7.10.2.2 The influence of advertisement liking and taste rating on desire to eat more apple

The percentages of children who wanted to eat more apple compared to children who did not are repeated for the socio-demographic variables in Table 7.21, along with advertisement liking and taste rating. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on desire to eat more apple are presented in Table 7.22. The results are presented below for Plain and Salt and Vinegar apples in turn.

For the Plain apple condition, Table 7.21 shows significantly higher proportions of children wanted to eat more apple if they gave a taste rating of *Super/Really Good*. The univariate

regression analysis (Table 7.22) confirmed this effect: children who gave a higher taste rating were 2.3 times more likely to choose to eat more apple. When all variables were considered together in a multivariable analysis (Table 7.22), this effect remained significant: those who gave a higher taste rating were 3 times more likely to choose to eat more apple. There was no impact for advertisement liking on desire to eat more Plain apple.

For the Salt and Vinegar apple condition, Table 7.21 shows significantly higher proportions of children wanted to eat more apple if they *Loved/Liked* the apple advertisement they saw and if they gave a taste rating of *Super/Really Good*. The univariate regression analysis (Table 7.22) confirmed these effects: children who *Loved/Liked* the advertisement were 2.3 times more likely, and children who gave a higher taste rating were 3.6 times more likely to choose to eat more apple. When all variables were considered together in a multivariable analysis (Table 7.22), these two variables remained significant: children who *Loved/Liked* the advertisement were 2.4 times more likely and children who gave a higher taste rating were 3.7 times more likely to choose to eat more apple.

7.10.2.3 The influence of advertisement liking and taste rating on intention to request purchase

The percentages of children who intended to ask for the apple to be purchased for them are repeated for the socio-demographic variables in Table 7.23, along with advertisement liking and taste rating. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on intention to purchase are presented in Table 7.24. The results are presented below for the Plain and Salt and Vinegar apple conditions in turn.

For the Plain apple condition, Table 7.23 shows that significantly higher proportions of children intended to ask for apple purchase if they had given a taste rating of *Super/Really Good* or *Liked/Loved* the apple advertisement. The univariate regression analysis (Table 7.24) confirmed these effects: children who *Loved/Liked* the advertisement were 2.5 times more likely and children who gave a higher taste rating were 4.3 times more likely to intend to request apple purchase. When all variables were considered together in a multivariable analysis (Table 7.24), the taste variable remained significant, but advertisement liking did not: children who gave a taste rating of *Super/Really Good* were 4 times more likely to intend to ask for purchase.

For the Salt and Vinegar apple condition, Table 7.23 shows significantly higher proportions of children intended to ask for apple purchase if they had given a taste rating of *Super/Really Good* or if they *Loved/Liked* the advertisement they saw. The univariate regression analysis (Table 7.24) confirmed that children who *Loved/Liked* the advertisement were 3.7 times more likely and those who gave a high taste rating were 4.9 times more likely to intend to request apple purchase. When all variables were considered together in a multivariable analysis (Table 7.24), children who *Loved/Liked* the advertisement were 3.8 times more likely and children who gave a higher taste rating were 4.5 times more likely to intend to ask for purchase (Table 7.24).

7.10.2.4 The influence of advertisement liking and taste rating on intention to use own money

The percentages of children who intended to use their own money to purchase the apple, are repeated for the socio-demographic variables in Table 7.25, along with advertisement liking and taste rating. The results of the univariate and multivariable logistic regression models assessing the impact of the variables on intention to use their own money to purchase the apple are presented in Table 7.26. As previously mentioned, a substantial majority of children did not intend to use their own money to purchase apples.

For the Plain apple condition, Table 7.25 shows that significantly higher proportions of children intended to use their own money if they gave a taste rating of *Super/Really Good* or if they *Loved/Liked* the apple advertisement. The univariate regression analysis (Table 7.26) confirmed the above differences with children being significantly LESS likely to intend to use their own money if they gave a lower taste rating (2 times more likely) or did not *Love/Like* the apple advertisement (3 times more likely). When all variables were considered together in a multivariable analysis (Table 7.26), both of these variables remained significant with children being significantly less likely to use their own money if they gave a lower taste rating (1.8 times more likely) or did not *Love/Like* the apple advertisement (2.1 times more likely).

For the Salt and Vinegar apple condition, Table 7.25 shows that significantly higher proportions of children intended to use their own money if they gave a taste rating of *Super/Really Good* or *Loved/Liked* the apple advertisement. The univariate regression analysis (Table 7.26) confirmed these effects with children being significantly LESS likely to intend to use their own money if they gave a lower taste rating (3 times more likely) or did not *Love/Like* the apple advertisement (3 times more likely). When all variables were

considered together in a multivariable analysis (7.26), these variables remained significant with children being significantly less likely to use their own money if they gave a lower taste rating (2.6 times more likely) or did not *Love/Like* the apple advertisement (2 times more likely).

7.10.3 Section summary

Positive significant relationships exist between advertisement liking and the dependent variables.

Taste rating. For both the Plain apple and Salt and Vinegar apple, multivariable regression analyses revealed that children who *Loved/Liked* the apple advertisement were significantly more likely to give a higher taste rating. Advertisement liking thus impacts on taste ratings whether the taste of the food is pleasant or less pleasant.

Desire to eat more. For the Plain apple, multivariable regression analyses revealed that children who gave a *Super/Really Good* taste rating were more likely to choose to eat more apple, but advertisement liking was not significant. For the Salt and Vinegar apple, children who *Loved/Liked* the apple advertisement and those who gave a *Super/Really Good* taste rating were more likely to choose to eat more apple. These results indicate that advertisement liking becomes important when the taste of the food is less pleasant.

Intention to request purchase. For the Plain apple, multivariable regression analyses revealed that children who gave a *Super/Really Good* taste rating were more likely to intend to request apple purchase. For the Salt and Vinegar apple, children who *Loved/Liked* the apple advertisement and those who gave a *Super/Really Good* taste rating were more likely to choose to eat more apple. Hence as above, it appears that advertisement liking becomes more important when the taste of the food is less pleasant.

Intention to use own money. For both the Plain apple and the Salt and Vinegar apple, multivariable regression analyses revealed that children who gave a *Super/Really Good* taste rating and children who *Loved/Liked* the apple advertisement were more likely to intend to use their own money to purchase apple. Both taste rating and advertisement liking are important in influencing the unpopular choice of children using their own money.

Table 7.19 Advertisement liking logistic regression: Percentage of children who gave a taste rating of Super/Really Good for each regression variable

Variable	Category	Taste Rating							
		Plain apple				Salt and Vinegar apple			
		Super/Really Good %	Lower rating %	Chi-square	p-value	Super/Really Good %	Lower rating %	Chi-square	p-value
Advert liking	Loved/Liked	65.2	34.8	$\chi^2 = 22.26, df = 1$	$p = .000$	42.9	57.1	$\chi^2 = 17.04, df = 1$	$p = .000$
	Lower rating	37.5	62.5			20.2	79.8		
Gender	Boys	50.9	49.1	$\chi^2 = 4.56, df = 1$	$p < .05$	35.9	64.1	$\chi^2 = .024, df = 1$	$p = .878$
	Girls	62.5	37.5			35.1	64.9		
BMI	Healthy/Underweight	54.6	45.4	$\chi^2 = 1.92, df = 1$	$p = .166$	35.2	64.8	$\chi^2 = .110, df = 1$	$p = .740$
	Overweight/Obese	63.2	36.8			37.3	62.7		
SES	Below mean	56.8	43.3	$\chi^2 = .000, df = 1$	$p = .996$	35.2	64.8	$\chi^2 = .021, df = 1$	$p = .885$
	Mean or above	56.7	43.2			36.0	64.0		
Age	7 - 8 years	62.7	37.3	$\chi^2 = 4.68, df = 1$	$p < .05$	44.6	55.4	$\chi^2 = 11.69, df = 1$	$p < .01$
	11 - 12 years	50.9	49.1			26.9	73.1		

Note: shaded boxes indicate non-significant variables

Table 7.20 Advertisement liking logistic regression: Association between independent variables and a taste rating of Super/Really Good

Variable	Category	Taste rating of Super/Really Good			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Advert Liking	Loved/Liked	3.122 (1.928 – 5.055) ***	2.895 (1.720 – 4.871) ***	2.967 (1.749 – 5.034) ***	2.653 (1.503 – 4.685) **
	Lower rating	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	1.607 (1.038 – 2.487) *	1.311 (0.815 – 2.109)	0.996 (0.620 – 1.505)	0.938 (0.582 – 1.513)
BMI	Healthy/Underweight	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Overweight/Obese	1.428 (0.862 – 2.366)	1.285 (0.754 – 2.191)	1.094 (0.643 – 1.864)	0.938 (0.526 – 1.671)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	1.001 (0.626 – 1.602)	1.058 (0.640 – 1.750)	1.036 (0.641 – 1.674)	1.010 (0.611 – 1.669)
Age	7 - 8 years	1.618 (1.045 – 2.505) *	1.378 (0.855 – 2.219)	2.191 (1.392 – 3.447) **	1.825 (1.121 – 2.971) *
	11 - 12 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)

* $p < .05$; ** $p < .01$; *** $p = .000$

Note: shaded boxes indicate non-significant variables

Table 7.21 Advertisement liking and Taste rating: Percentage of children who wanted to eat more apple for each regression variable

Variable	Category	Desire to eat more apple							
		Plain apple				Salt and Vinegar apple			
		Yes %	No/Unsure %	Chi-square	p-value	Yes %	No/Unsure %	Chi-square	p-value
Taste Rating	Super/Really Good	77.1	22.9	$\chi^2 = 12.38, df = 1$	$p = .000$	72.7	27.3	$\chi^2 = 29.11, df = 1$	$p = .000$
	Lower rating	59.0	41.0			42.2	57.8		
Advert Liking	Loved/Liked	68.2	31.8	$\chi^2 = .381, df = 1$	$p = .537$	59.9	40.1	$\chi^2 = 12.63, df = 1$	$p = .000$
	Lower rating	71.6	28.4			39.5	60.5		
Gender	Boys	69.6	30.4	$\chi^2 = .003, df = 1$	$p = .955$	54.7	45.3	$\chi^2 = .354, df = 1$	$p = .552$
	Girls	69.3	30.7			51.5	48.5		
BMI	Healthy/Underweight	68.4	31.6	$\chi^2 = .192, df = 1$	$p = .61$	54.4	45.6	$\chi^2 = .609, df = 1$	$p = .435$
	Overweight/Obese	70.9	29.1			49.3	50.7		
SES	Below mean	66.7	33.3	$\chi^2 = .688, df = 1$	$p = .407$	54.6	45.4	$\chi^2 = .086, df = 1$	$p = .769$
	Mean or above	71.2	28.8			52.9	47.1		
Age	7 - 8 years	63.6	36.4	$\chi^2 = 5.16, df = 1$	$p < .05$	52.1	47.9	$\chi^2 = .123, df = 1$	$p = .726$
	11 - 12 years	75.2	24.8			54.0	46.0		

Note: shaded boxes indicate non-significant variables

Table 7.22 Advertisement liking and Taste rating: Association between independent variables and desire to eat more apple

Variable	Category	Desire to eat more apple			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Taste Rating	Super/Really Good	2.344 (1.451 – 3.787) ***	2.992 (1.752 – 5.107) ***	3.652 (2.255 – 5.914) ***	3.728 (2.211 – 6.287) ***
	Lower rating	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Advert Liking	Loved/Liked	0.850 (0.509 – 1.422)	0.736 (0.406 – 1.335)	2.291 (1.444 – 3.636) ***	2.418 (1.419 – 4.120) **
	Lower rating	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	0.987 (0.616 – 1.579)	0.926 (0.553 – 1.551)	0.878 (0.573 – 1.346)	0.821 (0.509 – 1.324)
BMI	Healthy/Underweight	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Overweight/Obese	1.128 (0.657 – 1.938)	1.178 (0.663 – 2.094)	0.815 (0.437 – 1.363)	0.922 (0.521 – 1.631)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	1.238 (0.747 – 2.052)	1.329 (0.778 – 2.271)	0.933 (0.589 – 1.480)	0.884 (0.537 – 1.458)
Age	7 - 8 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	11 - 12 years	1.733 (1.075 – 2.793) *	2.087 (1.239 – 3.521) **	1.079 (0.704 – 1.652)	1.610 (0.969 – 2.673)

* $p < .05$; ** $p < .01$; *** $p = .000$

Note: shaded boxes indicate non-significant variables

Table 7.23 Advertisement liking and Taste rating: Percentage of children who intended to request purchase of apple for each regression variable

Variable	Category	Intention to request purchase of apple							
		Plain apple				Salt and Vinegar apple			
		Would %	Maybe/ Would not %	Chi-square	p-value	Would %	Maybe/ Would not %	Chi-square	p-value
Taste Rating	Super/Really Good	91.0	9.0	$\chi^2 = 23.87, df = 1$	$p = .000$	85.1	14.9	$\chi^2 = 33.09, df = 1$	$p = .000$
	Lower rating	70.1	29.9			54.1	45.9		
Advert Liking	Loved/Liked	86.7	13.3	$\chi^2 = 10.36, df = 1$	$p < .01$	75.4	24.6	$\chi^2 = 29.71, df = 1$	$p = .000$
	Lower rating	72.1	27.9			45.6	54.4		
Gender	Boys	80.6	19.4	$\chi^2 = .387, df = 1$	$p = .534$	61.8	38.2	$\chi^2 = 1.66, df = 1$	$p = .197$
	Girls	83.2	16.8			68.4	31.6		
BMI	Healthy/Underweight	78.1	21.9	$\chi^2 = 6.85, df = 1$	$p < .01$	65.9	34.1	$\chi^2 = .093, df = 1$	$p = .760$
	Overweight/Obese	90.8	9.2			64.0	36.0		
SES	Below mean	81.7	18.3	$\chi^2 = .004, df = 1$	$p = .951$	64.8	35.2	$\chi^2 = .000, df = 1$	$p = .989$
	Mean or above	81.4	18.6			64.9	35.5		
Age	7 - 8 years	85.5	14.5	$\chi^2 = 2.76, df = 1$	$p = .097$	65.1	34.9	$\chi^2 = .000, df = 1$	$p = .987$
	11 - 12 years	78.4	21.6			65.1	34.9		

Note: shaded boxes indicate non-significant variables

Table 7.24 Advertisement liking and Taste rating: Association between independent variables and intention to request purchase of apple

Variable	Category	Intention to request purchase of apple			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Taste Rating	Super/Really Good	4.282 (2.320 – 7.905) ***	3.892 (2.020 – 7.496) ***	4.857 (2.756 – 8.559) ***	4.481 (2.425 – 8.281) ***
	Lower rating	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Advert Liking	Loved/Liked	2.526 (1.421 – 4.492) *	1.769 (0.923 – 3.389)	3.664 (2.272 – 5.908) ***	3.798 (2.181 – 6.614) ***
	Lower rating	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	1.194 (0.682 – 2.091)	0.870 (0.465 – 1.630)	1.341 (0.858 – 2.097)	1.208 (0.724 – 2.017)
BMI	Healthy/Underweight	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Overweight/Obese	2.776 (1.260 – 6.113) *	2.513 (1.102 – 5.728) *	0.920 (0.538 – 1.573)	0.828 (0.452 – 1.515)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	0.981 (0.537 – 1.792)	1.098 (0.705 – 1.711)	1.003 (0.620 – 1.622)	1.068 (0.625 – 1.827)
Age	7 - 8 years	1.615 (0.914 – 2.851)	1.084 (0.581 – 2.022)	0.996 (0.638 – 1.556)	0.528 (0.305 – 0.916)
	11 - 12 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)

* $p < .05$; ** $p < .01$; *** $p = .000$

Note: shaded boxes indicate non-significant variables

Table 7.25 Advertisement liking and Taste rating: Percentage of children who intended to use their own money to purchase apple for each regression variable

Variable	Category	Intention to use own money to purchase apple							
		Plain apple				Salt and Vinegar apple			
		Would %	Maybe/ Would not %	Chi-square	p-value	Would %	Maybe/ Would not %	Chi-square	p-value
Taste Rating	Super/Really Good	34.6	65.4	$\chi^2 = 9.04, df = 1$	$p < .01$	38.8	61.2	$\chi^2 = 20.40, df = 1$	$p = .000$
	Lower rating	19.6	80.4			16.8	83.2		
Advert Liking	Loved/Liked	34.1	65.9	$\chi^2 = 13.37, df = 1$	$p = .000$	30.8	69.2	$\chi^2 = 12.60, df = 1$	$p = .000$
	Lower rating	14.6	85.4			13.2	86.8		
Gender	Boys	24.5	75.5	$\chi^2 = 2.01, df = 1$	$p = .156$	21.8	78.2	$\chi^2 = 1.50, df = 1$	$p = .220$
	Girls	31.5	68.5			27.5	72.5		
BMI	Healthy/Underweight	24.5	75.5	$\chi^2 = 5.09, df = 1$	$p < .05$	24.9	75.1	$\chi^2 = .006, df = 1$	$p = .940$
	Overweight/Obese	37.2	62.8			25.3	74.7		
SES	Below mean	35.6	64.4	$\chi^2 = 4.64, df = 1$	$p < .05$	19.4	80.6	$\chi^2 = 2.57, df = 1$	$p = .109$
	Mean or above	24.1	75.9			27.6	72.4		
Age	7 - 8 years	33.3	66.7	$\chi^2 = 4.47, df = 1$	$p < .05$	30.7	69.3	$\chi^2 = 6.46, df = 1$	$p < .05$
	11 - 12 years	22.9	77.1			18.9	81.1		

Note: shaded boxes indicate non-significant variables

Table 7.26 Advertisement liking and Taste rating: Association between independent variables and intention to use own money to purchase apple

Variable	Category	Intention to use own money to purchase apple			
		Plain apple		Salt and Vinegar apple	
		Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)	Univariate Odds-ratio (95% CI)	Multivariable Odds-ratio (95% CI)
Taste Rating	Super/Really Good	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Lower rating	2.170 (1.302 – 3.617) **	1.859 (1.060 – 3.261) *	3.141 (1.889 – 5.223) ***	2.575 (1.504 – 4.408) **
Advert Liking	Loved/Liked	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Lower rating	3.032 (1.643 – 5.595) ***	2.153 (1.092 – 4.244) *	2.938 (1.592 – 5.422) **	1.972 (1.020 – 3.813) *
Gender	Boys	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Girls	0.706 (0.435 – 1.144)	0.787 (0.461 – 1.343)	0.734 (0.447 – 1.205)	0.722 (0.424 – 1.230)
BMI	Healthy/Underweight	1.829 (1.079 – 3.101) *	1.644 (0.941 – 2.871)	1.023 (0.566 – 1.848)	0.966 (0.509 – 1.832)
	Overweight/Obese	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
SES	Below mean	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Mean or above	1.740 (1.048 – 2.888) *	1.818 (1.055 – 3.133) *	0.635 (0.363 – 1.110)	0.595 (0.331 – 1.069)
Age	7 - 8 years	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	11 - 12 years	1.684 (1.036 – 2.737) *	1.252 (0.732 – 2.141)	1.908 (1.155 – 3.153) *	1.446 (0.833 – 2.510)

* $p < .05$; ** $p < .01$; *** $p = .000$

Note: shaded boxes indicate non-significant variables

Chapter 8. Discussion

This chapter firstly revisits the research aims and hypotheses. Secondly, the manipulations of the salt and vinegar apple taste and advertising liking variables are considered. The results of the main study are then discussed. The taste rating results are discussed first, followed by discussion of the other dependent variables: children's decision to eat more apple in the immediate situation; intention to request apple purchase; and intention to use their own money to purchase apples. The study aims and hypotheses are addressed as they pertain to each section of this discussion. The unique contributions of this study to the literature are then outlined and the limitations of the study acknowledged. The implications for social marketing practice and public health advocacy are then explored. The section concludes with a summary and recommendations.

8.1 Aims and hypotheses of the main study

The main study design aims were to determine:

1. whether the use of liked, professionally-made advertising is able to increase children's taste ratings of apple slices;
2. whether advertising the positive taste attribute of apples or the positive fun/social experience of apples is more effective in influencing children's taste judgements;
3. whether advertising exposure before the consumption of apples ('forward framing') is able to positively influence subsequent taste judgements, even if the taste experience was actually unpleasant;
4. whether advertising exposure after the consumption of apples ('backward framing') is able to positively reconstruct memories of apples consumption, even if the taste experience was actually unpleasant; and
5. whether advertising exposure increases children's decision to eat more apple in the immediate situation, intention to request apple purchase, and intention to use their own money to purchase apples.

The study tested the following hypotheses:

1. Both advertisements will increase taste rating in exposed children compared with control children;
2. Both advertisements will have both forward and backward framing effects on taste rating for both pleasant and unpleasant tasting apple;
3. Both advertisements will increase the dependent variables decision to eat more apple, intention to request apple purchase, and intention to use their own money to purchase apples in exposed children compared with control children.

The study also assessed whether there were any differences in responses according to a child's age group; gender, SES or body mass index (BMI).

8.2 Manipulation of advertisement liking and apple taste

Testing the aims and hypotheses required that each of the two advertisements was liked by the majority of children and that very few disliked each advertisement. It was also preferable that there was no significant difference in liking between the two advertisements that would necessitate controlling for advertising liking in the analyses. The manipulation check showed that both advertisements were liked by a substantial majority of children (70% *Loved/Liked* the *Fun* advertisement and 64% *Loved/Liked* the *Taste* advertisement) with very few disliking each advertisement (7% for each). There was no significant difference in liking of the two advertisements.

It was also necessary to ensure that the salt and vinegar solution was sufficient to make the apple slice taste significantly less pleasant than the plain (unadulterated) slices, but not so unpleasant as to disallow testing of the forward and backward framing effects. Pre-testing prior to the main study suggested that the chosen solution was appropriate. This was confirmed in the main study: children in the control condition rated the salt and vinegar slices significantly less pleasant tasting than the plain apple slices, but substantial numbers nevertheless considered the salt and vinegar slices taste 'good' or higher: 64% vs 92% for the plain apple slices.

8.3 Advertising influence on taste rating

This study met its first aim as it provided evidence to confirm that the use of liked, professionally-made advertising is able to increase children's taste ratings of apple slices. This evidence supports the first hypothesis that television advertising for apples can increase children's taste ratings of the apples in exposed children compared with control children. Both advertising themes, good taste and fun/social, were found to have significant effects on taste ratings when exposure occurred both before and after the product experience. The advertising effects on taste rating will be discussed in detail in the following three sections.

8.3.1 Comparison of the two advertising themes: *Taste* and *Fun*

This study has met its second aim by providing evidence about the different influence of a taste appeal and a social/fun appeal on taste ratings for apple slices.

For the Plain apple, a higher proportion of children gave a *Super/Really Good* taste rating than children not exposed to advertising for both the *Taste* and *Fun* advertisements, with *Fun* advertising having a slightly stronger effect. The regression analyses indicated that *Taste* advertisement influenced taste ratings primarily in the *After* position, whereas the *Fun* advertisement increased taste ratings in both the *Before* and *After* conditions. These results indicate that, while a message about 'great taste' can influence taste ratings for already pleasant tasting food, a fun/social approval emotional appeal that does not mention product taste, can also influence taste ratings.

For the Salt and Vinegar apple, although the *Taste* advertisement achieved substantially higher taste ratings than the controls and the *Fun* advertisement, this difference was not statistically significant. Further research is needed to assess whether this non-significant effect could be significant under other conditions.

8.3.2 Comparison of the two advertising positions: *Before* and *After* product experience

This study met its third and fourth aims by providing evidence about the influence of advertising position on taste ratings for pleasant and unpleasant tasting apple slices. The existence of both a forward framing and backward framing effect on children's taste ratings was established.

The second hypothesis was partly confirmed via these initial comparisons: both advertisements have a forward framing effect on taste rating for pleasant tasting apple; and the *Taste* advertisement has a greater effect than the *Fun* advertisement on backward framing of taste rating for pleasant tasting apple. There were, however, no significant advertising effects for less pleasant tasting apple.

For the Plain apple, a higher proportion of children gave a *Super/Really Good* taste rating than children not exposed to advertising for both *Before* and *After* advertising positions, with advertising *After* product experience having the stronger effect. For the Salt and Vinegar apple, a less pleasant product experience, there were no significant effects for either advertising position.

This study has thus provided evidence to confirm that advertising exposure before the consumption of pleasant tasting apples (forward framing) is able to positively influence subsequent taste judgements. The results also confirm that advertising exposure after the consumption of pleasant tasting apples (backward framing) is able to positively reconstruct memories of apple consumption. These forward and backward framing effects were, however, only manifested when pleasant tasting apple slices were consumed.

As predicted by the adult literature (Braun-LaTour & LaTour, 2005; Chang, 2004; Micu, 2012; Micu, 2010; Olson & Dover, 1979), advertising influences children's explicit taste ratings when the product is trialled after the advertising exposure, particularly for pleasant tasting foods where the taste experience matches the positive advertising induced expectations (Orth & De Marchi, 2007a). This larger experimental study has confirmed the forward framing effect on taste preference and product evaluation by children suggested by smaller experiment studies (E. S. Moore & Lutz, 2000; Nicklas et al., 2011; Roberto et al., 2010; T. N. Robinson et al., 2007; Smeets & Barnes-Holmes, 2003). The forward framing condition in this study, uniquely and explicitly, asked children to rate taste on a 9-point scale rather than by investigating children's brand/product attitudes, choice between two foods trialled, or rating how they think the food would taste. Notably, this study gained a significant forward framing effect when there was a time lag of a few minutes between advertising, product trial and taste judgement. The adult literature, in contrast, predicted a significantly greater forwards framing effect when the time between these events is only a few seconds in length (Braun-LaTour & LaTour, 2005).

Also as predicted by the adult literature (Braun-LaTour & LaTour, 2005; Braun-LaTour & Zaltman, 2006; Braun, 1999), advertising reconstructed children's memory of the product experience with a significant effect when a time lag of a few minutes existed between product

trial, the advertising and the memory recall event. Again uniquely, this study's backward framing condition asked children to rate their taste experience explicitly rather than asking them to rate their brand/product attitudes (E. S. Moore & Lutz, 2000), or as in the adult studies, to identify the product they had previously tasted (Braun-LaTour & LaTour, 2005; Braun, 1999). The lack of significant influence of backward framing on the unpleasant apple slices after these initial analyses was unexpected as the literature had reported that forward and backward framing effect occurred even when beverage samples were unpleasant tasting (Braun-LaTour & LaTour, 2005; Braun, 1999).

8.3.4 Interaction between advertising theme and position

Consideration of each of the four advertising exposure conditions separately revealed an interactive effect between advertising theme and position. This was revealed by significant differences resulting when the four exposure conditions were compared separately in analyses.

For the Plain apple, as indicated by the regression analyses discussed earlier, the stronger effect of *Fun* advertising on pleasant tasting food was revealed to be due to combined forward and backward framing effects. The regression analyses confirmed that children exposed to the *Fun Before* and *Fun After* conditions were more likely to give a higher taste rating for Plain apples. *Fun* advertising, while it can significantly positively influence taste memory, has the strongest effect when it is seen *Before* a child experiences a food product, building anticipation of a positive emotional and social experience in relation to product consumption. As predicted by the adult literature (Orth & De Marchi, 2007a), the positive product experience does not disconfirm the positive advertising message and so there is a stronger *Before* effect with Plain apples.

For both Plain apple and Salt and Vinegar apple, the *Taste After* condition had a significant positive effect on taste ratings. The regression analyses confirmed that children exposed to the *Taste After* condition were more likely to give a higher taste rating for both Plain apples, and Salt and Vinegar apples. This finding supported the conclusion of Braun and colleagues (Braun-LaTour & LaTour, 2005; Braun, 1999), that advertising-induced memory reconstruction of taste experience can occur whether the product experience was positive or negative when a direct taste appeal is used. A direct taste appeal after consumption influences both pleasant and unpleasant taste memory. Notably, the only advertising

condition to significantly positively influence taste rating for a less pleasant product experience was a *Taste* advertising message after the experience.

These results confirm that advertising exposure after the consumption of apples (backward framing) is able to positively reconstruct memories of apples consumption, even if the taste experience was actually unpleasant, but only when a taste appeal is used.

8.3.5 Comparison of advertising influence on younger and older children

Moore and Lutz (2000), found that advertising associated with food product experience had a significant effect only on older children's product attitude. This study thus investigated whether apple advertising influence differed by the children's age group.

Analysis of the taste rating results by age supported the wider published literature which concluded that advertising influences both younger and older children. For the Plain apple, *Fun* advertising significantly influenced taste ratings for children in both age groups and the *After* position had a significant influence on older children. For the Salt and Vinegar apple, the *Taste After* condition had a stronger effect on older children than younger children. The conclusion of Moore and Lutz (2000) was thus not supported; apple advertising did not have an overall stronger effect on older children. This study provides evidence that both younger and older children are influenced by advertising.

Younger children are thus not uniquely vulnerable to advertising due to their inexperience and lower level of cognitive development while older children are not fully protected from advertising influence by their higher level of cognitive development, awareness of advertising's persuasive intent or growing scepticism of advertising (Brucks et al., 1988; Chernin, 2008; Jeffrey et al., 1982; Livingstone & Helsper, 2006; Mehta et al., 2010; E Rozendaal et al., 2009). All children enjoy and are influenced by advertising due to emotional message framing which is processed via an unconscious, peripheral route bypassing cognitive defences (D'Alessio et al., 2009; Harris, Brownell, et al., 2009; Nairn & Fine, 2008; Rozendaal, Lapierre, et al., 2011).

The regression analyses indicated that younger children were more likely to give a higher taste rating than older children for both Plain apple and Salt and Vinegar apple, with a stronger effect in the less pleasant tasting apple. This finding confirmed the literature which reported that younger children typically give higher taste ratings than older children (Popper & Kroll, 2011).

8.3.6 Comparison of advertising influence on boys and girls

This study did not hypothesise any difference in response to advertising between boys and girls as the vast majority of the literature had not described any differences in advertising responses by gender. A few studies had, however, noted a greater influence of advertising on boys (Anschutz et al., 2009; Chernin, 2008; Jeffrey et al., 1982).

Analysis of the taste rating results for Plain apple, revealed significantly higher taste ratings from boys for the *Fun* advertisement while the *After* position was significantly higher for girls. For Salt and Vinegar apples, the *Taste After* condition was significant for both boys and girls. It is clear that the taste ratings of both boys and girls were influenced by advertising. It is possible that previous research which investigated smaller numbers of children and found a stronger response to advertising by boys, used a *Fun* appeal.

The regression analyses indicated that girls were more likely to give a higher taste rating for Plain apples only. This study thus provides evidence to suggest that girls are more likely to give a higher taste rating for pleasant-tasting foods than boys.

8.3.7 Comparison of advertising influence by BMI categories

There were no significant differences in taste ratings between healthy weight/underweight children and overweight/obese children. This study did not find that overweight and obese children showed significantly higher advertising-influenced taste ratings despite previously published studies demonstrating their increased susceptibility to food advertising effects under some experimental conditions (Halford et al., 2004; Halford et al., 2008).

8.4 Advertising influence on consumption and purchase intent

This study met its fifth aim by providing evidence about the influence of advertising on children's decision to eat more apple in the immediate situation; intention to request apple purchase, and intention to use their own money to purchase apples. This evidence provides partial support for the third hypothesis that both advertisements will increase these dependent variables in exposed children compared with control children. Television advertising did not always have a direct impact on children's decision to eat more apple, intention to request apple purchase or intention to use their own money to purchase apple. When there was a direct influence, it was usually the *Taste Before* and/or *Taste After*

advertising conditions that had a significant effect on children's post product trial decisions and intentions.

8.4.1 Decision to consume more apple

This study has provided some support for the published literature which has linked advertising exposure with children's increased consumption of the advertised foods under experimental conditions (Anschutz et al., 2009; Borzekowski & Robinson, 2001; Goldberg et al., 1978; Gorn & Goldberg, 1982; Halford et al., 2004; Halford et al., 2007; Halford et al., 2008; Harris, Bargh, et al., 2009; Jeffrey et al., 1982).

For the Plain apple, the *Taste After* condition significantly increased the proportion of children who said they would like to eat another slice of apple. For Salt and Vinegar apple, no advertising condition significantly increased children's desire to eat more apple.

These findings indicate that children, who are exposed to a positive taste appeal are significantly more likely to choose to eat more apple after the advertising message is confirmed by a pleasant taste experience. This evidence thus supports the hypothesis that, when a taste appeal is used, television advertising for apples can increase children's desire to eat more apple in exposed children compared with control children. This evidence provides partial support for one aspect of the third hypothesis: a taste appeal can increase the decision to eat more apple in exposed children compared with control children.

Interestingly, when the children who were not exposed to apple advertising (i.e. the control groups for each type of apple) were considered, significantly more overweight/obese children chose to eat more apple. This effect was only mildly significant however, and was no longer significant in the multivariable logistic regression analysis. These findings did not provide evidence that children who were overweight and obese would show a significantly higher intention to eat more apple.

8.4.2 Intention to request purchase of apple

This study has provided some support for the published literature which has linked advertising exposure with children's requests for their parents to purchase the advertised foods under experimental and observational conditions (Atkin, 1978; O'Dougherty et al., 2006; Stoneman & Brody, 1981) and via parental report (Arnas, 2006; Buijzen & Valkenburg,

2003; Campbell et al., 2007; Henry & Borzekowski, 2011; Kelly et al., 2009; Pettigrew & Roberts, 2006; K. P. Roberts & Powell, 2005; Young et al., 2003; Yu, 2012).

For the Plain apple, children exposed to each of the advertising conditions were more likely to intend to request purchase of the apple compared to children in the control condition, but this effect was not statistically significant. The regression analyses indicated that children who were overweight or obese were significantly more likely to intend to request purchase. These findings indicate that children who were overweight and obese would show a significantly higher intention to request apple purchase after product trial irrespective of advertising exposure.

For the Salt and Vinegar apple, children exposed to the *Taste Before* and *Taste After* conditions were significantly more likely to intend to request purchase of the apple, particularly older children and girls. These findings indicate that children who are exposed to a positive taste appeal before or after an unpleasant product experience (but not after a pleasant product experience), are significantly more likely to intend to request apple purchase. This evidence provides partial support for one aspect of the third hypothesis: that a taste appeal can increase children's intention to request apple purchase in exposed children compared with control children.

8.4.3 Intention to use own money to purchase apple

For both the Plain apple and Salt and Vinegar apple, no advertising condition increased children's intention to use their own money to purchase apples. Most children, in all advertising exposure conditions, did not intend to use their own money to purchase apples.

For the Plain apple, the regression analysis indicated that, while there was no advertising impact, the following groups of children were significantly less likely to intend to use their own money: boys; healthy weight children; children living in high SES areas; and older children. For the Salt and Vinegar apple, the regression analysis indicated that, while there was no advertising impact, older children were significantly less likely to use their own money.

These results provide new evidence that Western Australian children are unlikely to choose to use their own money to purchase fruit. Thus, this evidence does not confirm one aspect of the third hypothesis because both advertisements did not increase children's intention to use their own money to purchase apples in exposed children compared with control children.

8.4.4 Relationship between taste rating, consumption and purchase intent

Advertising appears to have an indirect impact on children's later product consumption and purchase decisions and intentions via influencing taste ratings. Taste rating scores were significantly influenced by advertising, and were highly and significantly correlated with children's decision to eat more apple, intention to request apple purchase, and intention to use their own money to purchase apple. This effect was significant for both Plain and Salt and Vinegar apple.

These findings suggest that advertising-enhanced taste judgements will increase children's decision to consume and intention to purchase apples, even if the apple taste was less pleasant. Advertising-enhanced product trial evaluations can therefore, positively influence children's subsequent consumption choices and purchase intentions.

8.5 Advertising liking influence on taste rating, consumption and purchase intention

This study supports the belief that advertisement liking is a mediating advertising influence on children's attitudes towards the advertised brands and their intention to request purchase of those brands (Buijzen, 2007; Derbaix & Bree, 1997; Phelps & Hoy, 1996). For both Plain and Salt and Vinegar apple, advertising liking was highly and significantly correlated with children's taste ratings, intention to request apple purchase, and intention to use their own money to purchase apple. For Salt and Vinegar apple only, advertising liking was also highly and significantly correlated with children's choice to eat more apple in the immediate situation.

For the Plain apple, if children *Loved/Liked* the advertisement they saw, a significantly higher proportion gave a *Super/Really Good* taste rating, intended to ask for apple purchase and intended to use their own money to purchase apple. The regression analyses indicated that if children *Loved/Liked* the apple advertisement they saw, they were significantly more likely to give a *Super/Really Good* taste rating and intend to request purchase. If the children did not *Love/Like* the apple advertisement they saw, they were significantly less likely to intend to use their own money to purchase apple.

For Salt and Vinegar apple, if children *Loved/Liked* the advertisement they saw, a significantly higher proportion gave a *Super/Really Good* taste rating, chose to eat more apple, intend to ask for apple purchase and intended to use their own money to purchase

apple. The regression analyses indicated that if children *Loved/Liked* the apple advertisement they saw, they were significantly more likely to give a *Super/Really Good* taste rating, choose to eat more apple, and intend to request purchase. If the children did not *Love/Like* the apple advertisement they saw, they were significantly less likely to intend to use their own money to purchase apple.

This study provides new evidence associating children's advertisement liking with a positive influence on their evaluation of product experience, decision to consume advertised foods and purchase intent.

8.6 Contribution of this study to the marketing and social marketing literature

This study contributes uniquely to the marketing and social marketing literature. The literature is limited with regard to investigations of the directly observed impact of television advertising on children's food product evaluations – particularly for fruit and vegetables.

No published experiment has previously investigated the direct impact of television advertising on actual taste judgments despite the literature identifying that taste is an important driver of food preference and consumption in children and adolescents (Baxter et al., 2000; Holsten et al., 2012; C. Noble et al., 2003; Zeinstra et al., 2007), particularly for fruit and vegetable preferences which are learned and not innate as are preferences for high sugar, fat and salt foods (Baranowski et al., 1993; Baxter & Thompson, 2002; Benton, 2004; Bere & Klepp, 2005; Bezbaruah & Brunt, 2012; Birch, 1999; Blanchette & Brug, 2005; Brug et al., 2008; Coase & Bayliss, 1995; De Bourdeaudhuij et al., 2006; Neumark-Sztainer et al., 2003; Perez-Rodrigo et al., 2003; Savage et al., 2007; Wind et al., 2006; Zeinstra et al., 2007).

It has been recommended that television advertising aiming to promote consumption of and preference for nutritious foods must utilise the same effective persuasive techniques used by EDNP foods in order to have a similar impact (Dovey et al., 2011; Goldberg et al., 1978; Gorn & Goldberg, 1982; Jeffrey et al., 1982). However, little research has investigated the efficacy this approach. Only one study, with children aged 3 to 6 years, has previously investigated the successful impact of a high-quality animated television advertisement on vegetable preferences (Nicklas et al., 2011). This was the first study to explicitly investigate the impact of television advertisements for nutritious foods that do not present risk or nutrition messages and, instead, seek to engage children with the same techniques as EDNP advertisements.

The television advertisements developed for this study, for the first time separated two appeals which are frequently found combined in television advertising for EDNP foods: taste (with children often seen eating the product with pleasure) and fun/social approval (Batada et al., 2008; Boyland et al., 2012; Byrd-Bredbenner & Grasso, 2000; Connor, 2006; Folta et al., 2006; Hebden, King, & Kelly, 2011; Herr-Wagner et al., 1999; Hill & Radimer, 1997; Kelly, Hattersley, et al., 2008; Kotz & Story, 1994; Kunkel & Gantz, 1992; Page & Brewster, 2007; Page & Brewster, 2009; Warren et al., 2008). This separation enabled comparison of the two frequently-used appeals while ensuring that both advertisements shared many other persuasive elements commonly found in television advertising for EDNP foods: animation; fast pace; action; achievement; enablement; elements of fantasy; and the depiction of strongly positive emotional experiences (Batada et al., 2008; Folta et al., 2006; Lewis & Hill, 1998; Page & Brewster, 2007; Rajecski et al., 1994; M. Roberts & Pettigrew, 2007; Warren et al., 2008). Additionally, a cartoon 'brand-character' was included in both advertisements as this was identified as desirable by children during the development of the advertisements (see Section 6.1.3). Recent research has also indicated congruent brand characters on packaging will increase children's preference for fruit and vegetables (de Droog et al., 2011; Keller et al., 2012; Kotler et al., 2012; Pires & Agante, 2011; S. Powell et al., 2011).

This study has provided evidence that television advertisements containing the same persuasive appeals and techniques used in EDNP advertisements can have a significant positive impact on fruit liking, consumption and purchase intention. The results also support the accepted methods of best practice in health communication and social marketing, that is effective messages and media are best developed and pre-tested with members of the target audience (Donovan & Henley, 2010; Hastings, 2007; Lefebvre, 2013; National Cancer Institute, 2002).

Television advertising is thus an effective medium for use in social marketing campaigns which aim to promote fruit and vegetable consumption to children. Fruit, while not as well liked by children as EDNP foods, is more liked than vegetables (Baranowski et al., 1993; Baxter & Thompson, 2002; Coase & Bayliss, 1995; Cooke & Wardle, 2005; Douglas, 1998; Edwards & Hartwell, 2002; Nu et al., 1996; Zeinstra et al., 2007). The strong significant impact of the *Fun Before* and *Fun After* advertising conditions with the pleasant tasting apple may indicate that a fun/social approval appeal may contribute to the development of peer approval and a desirable cool status for fruit, a social value currently enjoyed by EDNP foods and beverages (M. Roberts & Pettigrew, 2013; Roper & La Niece, 2009; Schor & Ford, 2007; Stead et al., 2011, p. 1137). The significant results gained by the *Taste After* advertising condition with the less pleasant tasting Salt and Vinegar apple indicates that advertising-

induced memory reconstruction of less-liked vegetable taste may prove to be an effective strategy. This study's findings indicate that maximum impact will be gained by the broadcast of combined taste and fun/social approval appeals, which will be viewed by children both before and after consumption of fruit and vegetables.

8.7 Contribution of this study to public health advocacy

This study provides new evidence to support the position of public health advocates campaigning for tighter controls over the exposure of children to EDNP food advertising.

The World Health Organization (WHO) has called on all UN member states to introduce or strengthen regulations to reduce children's exposure to EDNP food and beverage advertising and other forms of marketing (World Health Organization, 2010, 2012). A recent audit revealed that 26 of 59 surveyed countries have developed strategy documents and that 20 of these had, or were developing, statutory measures, guidelines or (most commonly) approved self-regulation (Hawkes & Lobstein, 2011).

The WHO also recommended a reduction in the "power of the marketing communication", that is the effectiveness of "the content, design and execution of the marketing message" (World Health Organization, 2010). Achievement of this final aim necessitates governments being informed as to which aspects of marketing messages are persuasive and how they function to influence children. The WHO suggested, for example, that governments "eliminate the use of licensed characters, brand mascots and celebrities, or sales promotions, such as premium offers and collector promotions" (World Health Organization, 2012, p. 20).

This study provides further insights into the role that television advertising plays in increasing children's preference for, consumption of and purchase requests for EDNP foods. Television advertising acts to enhance expectations for EDNP foods, heightening an already innate preference for foods high in sugar, fat and salt. It achieves this by its positive portrayal of the highly positive consumption experience of EDNP food, highlighting the great taste through exaggerated portrayals of a wonderful consumption experience, while communicating the ability of the food to act as a passport for vital social acceptance and approval. Children viewing such advertising before their consumption experience will have this experience enhanced by this positive anticipation.

Children, who did not enjoy the consumption experience as much as the advertising promised they would, will have their memory of the event reconstructed by advertising taste messages seen after consumption. The children will trust their product experience and trust their memories, which will then impact on their request for purchase of the food and their anticipation of their next experience with the advertised food. As advertising for EDNP foods is pervasive and repetitive, and many other marketing strategies also bring the product to a child's attention in other contexts, children find themselves caught in an unbreakable cycle of advertising-influenced attitudes and beliefs about advertised EDNP foods.

OzTAM Pty Ltd, the official source of Australian television audience measurement (TAM) reported that the number of Australian children watching commercial free to air television has reduced over the past six years since the data for this study was collected. Meanwhile, there has been a rapid increase in the exposure of children to online marketing strategies (Kelly, Bochynska, Kornman, & Chapman, 2008; E. S. Moore, 2006; E. S. Moore & Rideout, 2007; Ustjanauskas, Harris, & Schwartz, 2013; Weber, Story, & Harnack, 2006). Online and digital strategies cost less than television advertising and enable audience tracking in way that television does not (E. S. Moore, 2006). The WHO included online food marketing to children within their recommendations for the reduction of EDNP food and beverage marketing to children (World Health Organization, 2012). However, the Australian self-regulatory advertising codes do not adequately cover digital food marketing (Hebden, King, Kelly, Chapman, & Innes-Hughes, 2010; Jones & Reid, 2010).

While further research into online advertising is required, it is not unreasonable to assume that taste, fun and social appeals within online food advertisements have a similar impact on children as television food advertising. This study thus forms the basis for future research into the impact of digital marketing strategies on children's taste ratings, consumption decisions and purchase intent. Further specific evidence would strengthen future public health advocacy with regard to regulation of digital food marketing to children.

8.8 Limitations of this study

This study did not recruit participants from the full childhood age range from 7 to 12 years due to time and budget constraints. While the study was able to compare results from the two ends of this age spectrum, any patterns which may have emerged in responses over the 6 year range remain unknown. The inclusion of adolescents and adults would have greatly enriched the study as a comparison of children with adolescents and adults would have enabled the investigation of forwards and backwards advertising framing effects over the process of human development. This knowledge would further inform social marketing practice and public health advocacy actions.

This is the first study investigating advertising effects which has asked participants to provide explicit taste ratings after their product experience. Explicit taste ratings on a 9-point scale provided a quantifiable measure for this study, and will facilitate future comparisons, but have meant that children's responses in this study could not be directly compared with the adult responses in the published literature.

The variable of advertising liking was captured after the children tasted the food sample. This may have contaminated their subsequent advertising rating liking. It was felt that it was better to retain the more important uncontaminated taste rating as one question had been asked before the other.

This study did not investigate impact of different timings on forward and backward framing on children as has been previously undertaken with adults (Braun-LaTour & LaTour, 2005; Braun-LaTour & Zaltman, 2006). Manipulating timing (i.e. varying timing from a few seconds to a few minutes to a few days) would have provided useful information with regard to children's advertising responses. The decision was made, however, that it was more important to replicate a home-like environment, where eating in front of the television is common and initial intentions are thus formed, with a few minutes elapsing between advertising exposure, consumption choice and probing for initial intention.

Limitations of the experimental design mean that children responded within an artificial setting unlike the usual home environment within which they would normally view television. The scripted interaction between child and interviewer also set up a forced association between the advertising and the food product that would not normally exist (i.e. "you will see an ad for the apple you just tasted").

This study did not investigate advertising impact beyond the experimental situation due to time and budget constraints. While useful assumptions can be made based on the study

findings, it would confirm the potential impact on social marketing practice and public health advocacy action if it could be demonstrated that the advertising effects continue beyond the time of initial exposure. The decision was made, however, that it was more important to gain a large number of responses, as is possible in an intercept study with no identifying information collected, to demonstrate the existence of advertising framing effects on initial product experience evaluation, than to follow-up a smaller group of identified children over time.

Chapter 9. Conclusion and future recommendations

This study was designed to test the overall impact of taste and fun television advertising appeals, presented both before and after eating an apple slice, on children's taste ratings of the advertised apple when the apple was either plain or adulterated to taste less pleasant. It was concluded that both older and younger children are influenced by persuasive food advertising with both taste and fun appeals increasing taste ratings.

When the apple consumption experience was pleasant (i.e. plain apple), taste and fun advertising appeals, presented both before and after eating an apple slice significantly increased taste ratings. *Fun* had a stronger influence than *Taste* while *After* had a stronger influence than *Before*. When the apple consumption experience was unpleasant (i.e. salt and vinegar apple), only the Taste After condition significantly increased taste ratings. Only the *Taste After* condition was able to significantly increase children's decisions to eat more of the advertised apple, and this occurred only when the apple consumption experience was pleasant. Only the *Taste After* and *Taste Before* conditions were able to significantly increase intention to request apple purchase, and this occurred only when the apple consumption experience was pleasant. While *Fun* advertising had a greater initial impact with pleasant tasting apple, the *Taste* advertising had wider impact. *Taste* advertising, particularly in the *After* position, had a significant influence on taste rating for unpleasant tasting apple and on both decision to consume and intention to request purchase of pleasant tasting apple.

High taste ratings, which were significantly influenced by advertising, were highly and significantly correlated with children's decisions to eat more apple, their intention to request apple purchase and their intention to use their own money to buy apples. This effect occurred for both types of consumption experience: pleasant and unpleasant.

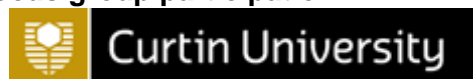
Advertising liking was shown to be an important aspect of television advertising for apples. It was highly and significantly correlated with children's taste ratings, their intention to request apple purchase and their intention to use their own money to buy apples. This effect occurred for both types of consumption experience: pleasant and unpleasant. When the consumption experience was unpleasant, advertising liking was also correlated with children's taste ratings, decision to eat more apple in the immediate situation and their intention to request apple purchase and their intention to use their own money to buy apples.

The following recommendations arise from the findings of this study:

1. Advocacy should be undertaken to obtain funding to promote fruit and vegetable consumption via television advertising and online media. This advertising must be well-liked and communicate both fun and taste appeals. The advertising should be run frequently over an extended period of time in order to ensure children view the advertising both before and after fruit and vegetable consumption.
2. The evidence provided in this study should inform public health advocacy which seeks to reduce television advertising of EDNP foods on TV. The findings should be disseminated widely among professional and community/parent advocacy groups.
3. Online advertising (particularly when a video format is used) can be assumed to have a similar impact to television advertising. Further research is required to confirm that there is a similar impact of advertising appeals and position in online food advertising targeting children.
4. Further research can usefully extend the findings of this study by investigating: children, adolescents and adults to compare responses; repeated exposures to advertising (e.g. when it is seen both before and after product trial or over subsequent days); and longer term advertising effects by following a cohort of children.

Appendixes

Appendix 1: Permission letter for focus group participation



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Faculty of Health Sciences

22 October 2008

Dear Parent,

Research on how to use television advertising to encourage children to eat more fruit

Curtin University has been awarded a Healthway Research Grant to investigate how best to advertise fruit to young children to encourage them to eat more of it. [REDACTED] Primary School has kindly agreed to assist with this research.

Students from Years 2/3, 4/5 and 6/7 are needed for the study. They will be asked, in a small discussion group, to talk about how they think fruit should be advertised on TV. (For the purpose of the study, we would appreciate it if you did not discuss fruit advertising or television advertising with your child until after they have taken part).

The research does not cover any personal or family issues and we would greatly appreciate your child being able to participate in this important research. If you are happy for your child to take part, please complete the slip below and return it to your Principal, Ms [REDACTED], by Wednesday 5th of November 2008.

Many thanks.

Yours faithfully,

A handwritten signature in blue ink, appearing to read "Linda Portsmouth".

Linda Portsmouth

A handwritten signature in black ink, appearing to read "Rob Donovan".

Professor Rob Donovan

I give permission for _____ (Child's name)
to take part in discussion groups about fruit advertising for Curtin University.

Signed: _____

Date: _____

PLEASE PRINT YOUR NAME: _____

Appendix 2: Group interview: questions, scales and activities

MEDIA

“Let’s talk about your favourite stuff to watch.”

What are your favourite movies? What do you like about it/them?
What are your favourite parts of that/those movie/s? Why?
What are your favourite TV shows? What do you like about it/them?
What are your favourite TV ads? What do you like about it/them?
What are your favourite animals that you see on TV?
What are your cartoon characters that you see on TV?

FOOD

“Now I want to talk about food.”

What is your favourite food? Why? How does it taste?
Do you eat breakfast cereal? What breakfast cereals do you eat?
What breakfast cereals do you like the best? Why? How does it taste?

“I am going to say some breakfast cereals and ask you how much you like them. Put a finger on the words to answer me. You might choose: Favourite, One of my favourites, OK, I prefer other ones or I hate them. (Word pointed to by facilitator while words are spoken. Don’t look at what the other kids are pointing at – just point to what you want to.”
(Research Assistant to tally how many for each)

(Weet Bix, Nutri Grain, Corn Flakes, Coco Pops, Sultana-Bran).

Scale:

Favourite One of my favourites OK Prefer other ones Hate them

FRUIT

Do you eat fruit? What kinds of fruit do you eat?
Do you like fruit? What fruits do you like the best? Why? How do they/it taste?

“I am going to say the names of some fruit and ask you how much you like them. Point again at the word on your paper: Favourite, One of my favourites, OK, I prefer other ones or I hate them. (Word pointed to by facilitator while words are spoken.” (Research Assistant to tally responses)

(banana, orange, pear, grapes, watermelon, mandarin, apple, rockmelon, kiwi fruit, strawberries, peaches, plums, apricots, mango)

“Now we’re going to play a game of make-believe. Pretend you are one of those fruit.”

Which one would you prefer to be? Why?
What are the good/bad things about eating fruit?
What does good fruit taste like? What fruit tastes good?

APPLES

“OK, now we are going to talk about apples. Pretend you are an apple.”

What kind of apple are you?
What colour? Size? How do you feel? Smell? Sound?
What are you thinking? Feeling?
Where did you come from?
Where are you going to?
Who is going to eat you?
What does it feel like being an apple?

“Imagine being eaten.”

What do you taste like?
Are you crunchy? Soft? Sweet? Sour?
What is the best thing about you?

“Now you are the person eating the apple.”

What are you thinking? Feeling? How does the apple taste?

Do you eat apples?

Children given a page with photos of the 5 main apple varieties sold in WA – Pink Lady (best seller), Sundowner, Fuji, Royal Gala and Granny Smith.

“Pick up your pencil. Write your name at the top of the page. Have a look at these 5 different types of apples. Put a circle around your favourite - the one you like the very best. Are there other ones you also like? Put a line under those ones.”

When do you eat apples? Breakfast? Lunch time? After school? After dinner? Weekends?

Where are you when you eat them?

How do you like them? (Whole, cut up big, cut up small, mixed up in fruit salad, with another food popped on top of the apple)

What is the best thing about apples? OR What do you love about apples?

What's the worst thing about apples? OR What do you hate about apples?

LUNCH BOX

Who brings a lunch box or bag to school? Who gets lunch orders? How often do you get lunch orders?

Activity: Children given a blank sheet of paper. “Pick up your pencil. Write your name at the top of the page. Now draw a lunch box or bag. Fill up the page - make it big so that you can fit some food in there.”

“Now have a look at these 2 pages of food that people might eat for lunch. Pick what you would like in your lunch box. Choose whatever food you would like to eat for lunch. Don't talk about it, just quietly cut out the pictures you would like and glue the food into your lunch box”

What is in your lunch box? **Each child takes turn to describe their picture.**

Is that what you really eat for lunch? Do you eat the same or different stuff? Why?

Who gets to decide what is in your lunch box?

Do you bring apples to school in your lunch box? Why? Why not?

(Kids now asked to turn sheet over so they can't see the pictures)

What lunch box food is healthy/good for you? What food is unhealthy/not good for you?

COOL

“Now I want to talk about being cool. Let say YOU are the totally coolest kids in the school.” (Write following responses on white-board)

What makes you cool?

What do you wear? What is your hair like? What do you do?

What games/toys do you have? What movies do you like? What TV show do you watch?

How can you tell when someone is cool? What makes them cool?

If you're cool, what do you eat? What is in your lunch box? What snack do you eat after school? Would a cool kid eat healthy or unhealthy food? Why/why not?

“Turn your page back over and have another look at the lunch box you made.”

Is this the coolest kid's lunch box? Why/why not?

What would a cool kid have in their lunchbox? What wouldn't a cool kid have in their lunchbox?

Which fruit is the most cool?

Would a cool kid eat apples? Why? Why not?

What would a cool kid say about apples?

THE AD

If I wanted to get kids to eat more apples, how could I do it?

If I were to make a TV ad about apples – wanting kids to want to eat them – what would that ad look like? Who would be in the ad?

What would they look like? What would they do? What would they say about apples?

What would the apples in the ad look like?

Who or what else would be in the ad? (Animals? Cartoon characters?)

Appendix 3: Picture response sheet for apple variety preference questions



Appendix 4: Final pre-filming apple advertisement scripts

**FRUIT AD SCRIPTS
FINAL PRE-FILMING DRAFT: as at December 2008**

TASTE AD	FUN AD
<p>Group of Yr 7 Kids (5 boys, 5 girls) looking very bored in class. Their teacher's voice is droning in the background. They look up at the clock on the wall. The bell goes.</p> <p>Shots:</p> <ul style="list-style-type: none"> • Wide shot of all kids bored • Close up boy's face turning to look up at clock • Clock cutaway with time of 10.30. • Close up girl's face changing from bored to a smile as the bell goes. • SFX: Bell • They all stand up as bell goes. 	
<p>They run out of the classroom door to their school bags, They rip them open and grab their lunch boxes/bags. They open them and grab whole, red, shiny pink lady apples.</p> <p>Shots:</p> <ul style="list-style-type: none"> • Wide shot of all kids running out of class room door. • Girl rummaging through her school bag. • Close up shots of boy's hand finding lunch bag and grabbing whole apple. 	
<p>Close up of child's hand holding a pink lady apple which comes alive and speaks. Boy or Girl's face looks down at hand in pleasure and amazement.</p> <p>Shots:</p> <ul style="list-style-type: none"> • Empty hand with plain background. Animated apple to be added in post production. • Face shot. 	
<p>SFX: Male cartoon character type voice for apple: "Hi! I taste so good!"</p>	<p>SFX: Male cartoon character type voice for apple: "Hi! I am so much fun!"</p>
<p>Kids eat apple appreciating taste and texture.</p> <p>Close-up and ECU shots:</p> <ul style="list-style-type: none"> • Biting into whole apples, cut up apples (in clear plastic bags) and apples cut into a 'slinky' (spiral shape). • Juice dripping down chins • Juicy dripping down apples from bite • Faces chewing with pleasure <p>MUSIC: Cheerful up-tempo beat. Sync sound: Loud crunch sounds as apples bitten. "Yum" "Mmmmm" "This is so yummy"</p>	<p>Kids play with apples and there is laughter and enjoyment.</p> <p>Mid shots and close-ups:</p> <ul style="list-style-type: none"> • Apple slinky being created at canteen. • Playing with 'slinkied' apples. • Popping apples up out of their elbows after dropping them there. • Tossing apples up and down as they walk. • Lobbing cut-up apples into clear plastic bags. • Laughing from other kids in group. <p>MUSIC: Cheerful up-tempo beat. Sync sound: Laughter. Cheering. Smacking sound as apples caught in hands.</p>
<p>Above sequences intercut with shots of year 4/5 students looking like they would like to join in.</p> <p>Shots: 3xwide shots of four kids (2 boys, 2 girls). 1: looking up (at slinky being stretched up; 2: looking left & 3: looking right) + close-ups.</p>	
<p>Cartoon apple pops out of a lunch box and speaks. Close-up ?Two shot: A boy and girl, looking down at the apple give big smiles.</p>	
<p>SFX: Apple voice "I told you I was tasty!"</p>	<p>SFX: Apple voice "I told you I was fun!"</p>

Appendix 5: Permission letter for filming participation



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Faculty of Health Sciences

2nd December 2008

Dear Parent,

Research about using television advertising to encourage children to eat more fruit

You kindly gave permission for your child to participate in a small discussion group about how they think fruit should be advertised on TV.

We got some great ideas and will be filming two apple ads at the school on Monday (8th December).

The ads will not be used on television but will be tested with children in 2009 to see which of the 2 ads is the most effective. Once the testing is completed, we would be happy to post you a DVD copy of the ad. In one ad, we would like your child to appear 'normal', looking like he or she normally does at school. In the other ad, we would like him or her to appear as an 'extra cool' kid with cool shoes, jewellery, hair gel/accessories etc. If they could bring those items to school that day, that would be most helpful. It would also be great if they could bring their lunchboxes/bags (even if they ordering lunch from the canteen that day). We will supply the shiny red apples to put into their lunchboxes to bring out and eat while we film.

If you are happy for your child to take part, please complete the slip below and return it to your Principal, Ms [REDACTED], by Friday 5th of December 2008.

Many thanks.

Yours faithfully,

A handwritten signature in blue ink, appearing to read "Linda Portsmouth".

Linda Portsmouth

A handwritten signature in black ink, appearing to read "Rob Donovan".

Professor Rob Donovan

I give permission for _____ (Child's name)
to be filmed for a Curtin University research project.

Signed: _____

Date: _____

PLEASE PRINT YOUR NAME: _____

Please write your home address on the back of this permission slip
if you would like us to post the DVD to your home in 2009.

Appendix 6: Principal, parent and child informed consent letters and forms for sensory evaluation of apples and likeability testing of advertisements



School of Public Health

GPO Box U1987

Perth Western Australia 6845

Telephone +61 8 9266 7819

Facsimile + 61 8 9266 2958

Email enquiry@health.curtin.edu.au

Web www.curtin.edu.au/curtin/dept/health/

Faculty of Health Sciences

Mr [REDACTED]
Principal
[REDACTED] Primary School
[REDACTED] Ave,
[REDACTED] WA [REDACTED]

Dear Mr [REDACTED],

Research project: Using television advertising to increase fruit consumption by WA children

My name is Linda Portsmouth and I am writing to you on behalf of Curtin University of Technology. I am conducting a research project that aims to investigate how best to promote eating fruit to children using television advertising. The project is funded by Healthway and is being conducted under the supervision of Professor Robert Donovan as part of my PhD degree at Curtin University.

I would like to invite [REDACTED] Primary School to take part in the project. This is because you have a large number of children of the ages required and your school kindly assisted in the first stage of the research in 2006. [REDACTED] Primary School is the only school in Western Australia being approached for their participation because, at this stage of the research project, I only require 50 participants and they do not need to be randomly selected.

What does participation in the research project involve?

I seek access to 50 children – 25 in Years 2 or 3 and 25 in Years 6 or 7.

The 50 children will be invited to participate in a 10 minute session in groups of 6 to 8. They will be asked to view two 30 second TV ads for apples, rate how much they like the ads and answer the following questions: What was that ad about? What did it tell you about apples? What did the ad want you to think? What did the ad want you to do?

The children will be asked to try three small apple samples and rate how they taste. In between each of the three apples samples, the children will 'cleanse' their mouths of taste with a plain cracker and a sip of water. Parents will be asked to indicate, via the consent form, that their child has no food allergies or intolerances whatsoever.

Only the children's first names and year level will be recorded on the rating scales. The group responses to these questions will be audio recorded, for the convenience of the researcher to later transcribe, but will never be made publically available.

I will keep [REDACTED] Primary School's involvement in the administration of the research procedures to a minimum. I will provide all information letters and consent forms to be sent home to the parents and children, however, it will be necessary for your school to arrange for them to be distributed to the children.

To what extent is participation voluntary, and what are the implications of withdrawing that participation?

Participation in this research project is entirely voluntary. If any parent or any child who agrees to participate and then later changes their mind, they are able to withdraw their participation at any time. There will be no consequences relating to any decision by an individual or ██████ Primary School regarding participation, other than those already described in this letter. Decisions made will not affect the relationship with the research team or Curtin University.

What will happen to the information collected, and is privacy and confidentiality assured?

Information that identifies anyone will be removed from the data collected. The data is then stored securely in a locked filing cabinet and can only be accessed by Linda Portsmouth. The data will be stored for a minimum period of 5 years, after which it will be destroyed. This will be achieved by shredding the papers.

The identity of participants and the school will not be disclosed at any time, except in circumstances that require reporting under the Department of Education and Training Child Protection policy, or where the research team is legally required to disclose that information. Participant privacy, and the confidentiality of information disclosed by participants, is assured at all other times.

The data will be used only for this project, and will not be used in any extended or future research without first obtaining explicit written consent from participants.

Consistent with Department of Education and Training policy, a summary of the research findings will be made available to the participating site(s) and the Department. You can expect this to be available by December 2009.

Is this research approved?

The research has been approved by Curtin University of Technology Human Research Ethics Committee, and has met the policy requirements of the Department of Education and Training as indicated in the attached letter.

Do all members of the research team who will be having contact with children have their Working with Children Check?

Yes. Under the Working with Children (Criminal Record Checking) Act 2004, people undertaking work in Western Australia that involves contact with children must undergo a Working with Children Check. The documents attached to this letter include a list of the research team who will be having contact with children through ██████ Primary School along with current evidence of their checks.

Who do I contact if I wish to discuss the project further?

If you would like to discuss any aspect of this study with a member of the research team, please contact me on the number provided below. If you wish to speak with an independent person about the conduct of the project, please contact Associate Professor Stephan Millet, Executive Officer of the Human Research Ethics Committee of Curtin University of Technology.

How do I indicate my willingness for the ██████ Primary School to be involved?

If you have had all questions about the project answered to your satisfaction, and are willing for the ██████ Primary School to participate, please complete the **Consent Form** on the following page. This information letter is for you to keep.

Linda Portsmouth
Lecturer, Researcher and PhD candidate
School of Public Health
Curtin University of Technology
Telephone: 9266 4404
Email: L.Portsmouth@curtin.edu.au

Faculty of Health Sciences

Consent Form

- I have read this document and understand the aims, procedures, and risks of this project, as described within it.
- For any questions I may have had, I have taken up the invitation to ask those questions, and I am satisfied with the answers I received.
- I am willing for [REDACTED] Primary School to become involved in the research project, as described.
- I understand that participation in the project is entirely voluntarily.
- I understand that children with any food allergies or intolerances whatsoever, will not be involved in the research.
- I understand that [REDACTED] Primary School is free to withdraw its participation at any time, without affecting the relationship with the research team or Curtin University of Technology.
- I understand that this research may be discussed in a PhD thesis or written in a published journal article, provided that the participants or the school are not identified in any way.
- I understand that [REDACTED] Primary School will be provided with a copy of the findings from this research upon its completion.

Name of Site Manager (printed):

Signature:

Date: / /

Faculty of Health Sciences

28th August 2009

Dear Parent/Carer,

**Research project: Using TV advertising to increase
fruit consumption by WA children**

Thank you for signing and returning the permission slip for your child to be involved in this project.

We really appreciate your support.

Since we last worked in schools, the Department of Education and Training have introduced new requirements to ensure that parents and children are fully informed about any research that they are involved in.

Please find enclosed more detailed letters and consent forms for both you and your child to read and sign.

These need to be returned your child's teacher or the school office before I am able to proceed with inviting your child to watch our two TV ads and try our apple samples.

If you can return the two signed consent forms By Monday 7th September, that would be wonderful as I plan to visit the school on Wednesday 9th September and Wednesday 16th September.

Yours faithfully,

Linda Portsmouth
Lecturer, Researcher and PhD candidate
School of Public Health
Curtin University of Technology
Telephone: 9266 4404
Email: L.Portsmouth@curtin.edu.au

Faculty of Health Sciences

Dear Parent/Carer

Research project: Using television advertising to increase fruit consumption by WA children

My name is Linda Portsmouth and I am writing to you on behalf of Curtin University of Technology. I am conducting a research project that aims to investigate how best to promote eating fruit to children using television advertising. The project is funded by Healthway and is being conducted under the supervision of Professor Robert Donovan as part of my PhD degree at Curtin University.

I would like to invite your child to take part in the project. This is because your child is in year 2, 3, 6, or 7. [REDACTED] Primary School is the only school in Western Australia being approached for their participation because, at this stage of the research project, I only require 50 participants. Your child has also been provided with a letter from us that we encourage you to discuss with him/her.

Participation in the project will involve your child participating in a 10 minute session with a group of 5 to 7 other children in a spare classroom at the school. They will be asked to view two 30 second TV ads for apples and answer some simple questions about how much they like the ads and what the ads were telling them about apples. The children will be asked to try three small pieces of apple and say how they taste. In between each of the three apples samples, the children will 'cleanse' their mouths of taste with a plain cracker and a sip of water. No children with any food allergies or intolerances are able to participate. No personal or family information will be asked or collected. Only your child's first name and year level will be written down.

Participation is voluntary and your decision will be respected. Your decision will not affect your family's relationship with your child's teacher or the school. If a decision is made to participate, it will need to be made by Tuesday 15th September 2009 (at the latest) for your child to be included in the project. Once a decision is made to participate, either you or your child can change your mind at any time.

The privacy and confidentiality of participants is assured. Information that identifies anyone will be removed from the data collected. The data is then stored securely in a locked filing cabinet and can only be accessed by Linda Portsmouth. The data will be stored for a minimum period of 5 years, after which it will be destroyed. This will be achieved by shredding the papers.

Participant privacy and the confidentiality of information disclosed by participants, is assured except in circumstances that require reporting under the Department of Education and

Training *Child Protection* policy, or where the research team is legally required to disclose that information.

The data will be used only for this project, and will not be used in any extended or future research without first obtaining explicit written consent from both you and your child.

It is intended that the findings of this study will be written in a PhD thesis and published in journals. A summary of the research findings may be requested on completion of the project. You can access this by contacting Linda Portsmouth and expect it to become available in December 2009.

The research has been approved by Curtin University of Technology Human Research Ethics Committee, and has met the policy requirements of the Department of Education and Training as indicated in the attached letter.

All persons undertaking research activities on Department sites must complete a Confidential Declaration. Also, under the *Working with Children (Criminal Record Checking) Act 2004*, people undertaking research that involves contact with children must undergo a Working with Children Check. Evidence that these checks are current for each member of the research team has been provided to the Principal of [REDACTED] Primary School.

If you would like to discuss any aspect of this study please contact me on the number provided below. If you wish to speak with an independent person about how the project is conducted please contact Associate Professor Stephan Millet, Executive Officer of the Human Research Ethics Committee of Curtin University of Technology.

If you and your child are both willing for him/her to be involved, please complete the **Consent Form** on the following page. Your child is also asked to complete the Consent Form attached to his/her letter.

This project information letter is for you to keep.



Linda Portsmouth
Lecturer, Researcher and PhD candidate
School of Public Health
Curtin University of Technology
Telephone: 9266 4404
Email: L.Portsmouth@curtin.edu.au

Faculty of Health Sciences

Consent Form

- I have read and understood the information letter about the project, or have had it explained to me in language I understand.
- I have taken up the invitation to ask any questions I may have had and am satisfied with the answers I received.
- I understand that participation in the project is entirely voluntarily.
- I am willing for my child to become involved in the project, as described.
- My child has no food allergies or intolerances whatsoever.
- I have discussed with my child what it means to participate in this project. He/she has explicitly indicated a willingness to take part, as indicated by his/her completion of the child consent form.
- I understand that both my child and I are free to withdraw that participation at any time without affecting the family's relationship with my child's teacher or my child's school.
- I give permission for the contribution that my child makes to this research to be written a PhD thesis or written in a published journal, provided that my child or the school is not identified in any way.
- I understand that I can request a summary of findings after the research has been completed.

Name of Child (printed): _____

Name of Parent/Carer (printed): _____

Signature of Parent: _____

Date: / /

Faculty of Health Sciences

Dear Year 6 or 7 Student,

My name is Linda Portsmouth and I am from Curtin University of Technology. I would like to invite you to take part in a research project that I am doing. It is about how to advertise apples to children on television.

I am asking for your help with the project because you are in Year 6 or 7 and I would like to find out about what children your age think about the apple TV ads that I have made. I have asked [REDACTED] Primary School to be involved in the research.

What would I be asked to do?

If you agree to take part, you would be asked to come to the Italian classroom and watch two TV ads. We would ask you if you liked them and what you thought about them. You would also try some pieces of apple and tell us how they tasted.

Do I have to take part?

No. You are completely free to say yes or no. I will respect your decision whichever choice you make.

What if I wanted to change my mind?

If you say no, but then change your mind and want to take part, please let your teacher know. You can stop at any time, even if you have said yes. Just let your teacher or mum (or dad, or the person who looks after you) know, and they will tell me. If you change your mind after you have come the Italian classroom, that is OK too. Just tell me, and you can go back to class.

What if I say something during the project that I don't want anyone else to know?

I may have to tell someone like your teacher if you tell me that you have been hurt by someone lately. But for all other things you tell me, I won't repeat them to anyone else. **We will not be asking you to tell us anything except what you think about the TV ads and how the pieces of apple taste.**

What will you do with the information I give you?

I collect what each student has given to the project, and then I will write it up so I can let other people know which TV ads for apples are best. When I do this, I won't write or tell anyone your name, or the names of any other students or your school.

How do I get involved?

You have already talked with your mum or dad, or the person who looks after you, about what it means to take part in the project. Now you get to say for yourself. If you **do** want to be a part of the project, please read the next page and write your name in the space provided.

This letter is for you to keep.

Linda Portsmouth (Curtin University of Technology)

Faculty of Health Sciences

Consent Form for Year 6 and 7 children

- I know that I don't have to be involved in this project, but I would like to be.
- I know that I will be watching two TV ads for apples and tasting some pieces of apple as part of the project.
- I know that I can stop when I want to.
- I understand that I need to write my name in the space below, before I can be a part of the project.

Your name: _____

Today's Date: / /

Faculty of Health Sciences

Hello Year 2 or 3 student,

My name is Linda and I have a project that you might like to help me with.

The project is about getting to know what TV ads for apples that children like and how they think apple tastes.

Would you like to help me for about 10 minutes?

If you want to stop at anytime, that's OK, you can.

I won't tell anyone what you say while helping me with the project, unless I need to tell someone like your teacher if you tell me that you have been hurt by someone lately. But I will only be asking you about apples.

Your parents, or the person who looks after you, has talked with you about helping with the project.

If you would like to help with the project, please print your name and draw a circle around the word YES on the next page.

If you don't want to help with the project – that's OK too.

Linda Portsmouth

Curtin University of Technology

Faculty of Health Sciences

Consent Form for Year 2 and 3 children

- I know I have a choice whether or not I want to do this project
- I know that I can stop whenever I want.
- I know that I will be watch two TV ads for apples and taste apples as part of the project.
- I know that I need to print my name and draw a circle around the word YES on this page before I can help with the project.

YES

NO

I would like to help with
the project

I do not want to help
with the project

Name of child: _____

Today's Date: / /

Appendix 7: Sample page from 4 page booklet for pre-testing apple taste



Super Good	Really Good	Good	Just a little Good	Maybe Good or maybe Bad	Just a little Bad	Bad	Really Bad	Super Bad
-----------------------	------------------------	-------------	---------------------------------------	--	--------------------------------------	------------	-----------------------	----------------------

Appendix 8: Script for sensory evaluation of apples

Hi, everyone. Great to meet you. I'm Linda and you have met Nicole.

First of all, what we are doing needs you all to be very quiet. You are not able to make any sounds at all while you sit here at these desks. Quietly find the desk that has a paper on it with your name on it. Sit down and get comfortable. Don't touch anything on your desk until I say that you can. You need to wait so that we do it all together. Thanks for waiting.

You will be helping us out today by eating these pieces of apple and telling us how *you* think they taste. What have the other kids said to you about what is going to happen now? What we are going to do is a secret. You can't talk about it with anyone else until after school. OK?

These apple slices have no name so we are calling them circle, triangle, diamond and square.

You are going to try all these pieces of apple and tell me how they taste to you. After each piece of apple, you will drink some water and eat a bite of cracker biscuit so that your mouth is cleaned out and ready to try the next piece of apple. If you want to stop trying apple, that is OK. You are able to stop any time you want to.

After you have eaten a piece of apple, you might say that the apple tasted: super good, really good, good, just a little good, maybe good or maybe bad, just a little bad, bad, really bad or super bad (tester points to each of the words/phrases on the poster she is holding as it is spoken). You have the same words to choose from on the paper in front of you. After you have tasted the piece of apple, you will be asked to pick up the pencil and put a mark on the words that say how you think the apple tasted. Whatever you say is OK. We haven't tried these apples so we don't know how they taste.

First of all, have some water and eat a bit of the cracker.

When the child is finished the above: Now let's try the circle one.

Testers quickly check that the children have all picked up the circle piece correctly.

Chew it slowly and really think about how it tastes.

When the child is finished the above: Now pick up your pencil and find the circle on the paper with all the writing on it. Look at what is written there under the circle. The words say: Super good, really good, good, just a little good, maybe good or maybe bad, just a little bad, bad, really bad or super bad. Think about how the apple tasted to you. Put a circle around the words that say how the apple tasted to you.

When all of the children have responded: Thank you. Now clean out your mouth with some water and another bite of the cracker.

Great, now turn the page and find the place where you write down how the triangle apple tastes.

This process is then repeated for triangle, square and diamond in the order determined by the children's response booklets.

When testing has been completed: That's the end of the apples. Thanks for your help. Sorry that some of those apples didn't taste very nice. Eat another cracker biscuit and drink some more water to take the taste away.

It is time to go and sit over her and watch the TV but – remember what you just did is a secret. You can talk to mum and dad about it but don't talk about it with other kids until after they have all done it next Wednesday.

Appendix 9: Sample page from 2 page booklet for testing liking of advertisement

A

Love it	Like it	Don't like it	Hate it
----------------	----------------	--------------------------	----------------

Appendix 10: Interviewer information sheet

INTERVIEWER INFORMATION SHEET

Curtin University of Technology

School of Public Health

Apple advertising research

CHILD PARTICIPANT SELECTION CRITERIA:

RESIDENCY:

Child needs to be an **Australian resident** and can reside in any Australian state. Just note their **postcode**.

AGE:

7-8 year olds can be aged 6 years 11 months to 9 years 1 month

(i.e. approx. DOB from 26 Aug 2000 to 26 Oct 2002)

11-12 year olds can be aged 10 years 11 months to 13 years 1 month

(i.e. approx. DOB from 26 Oct 1998 to 26 Aug 1996)

NO SIBLINGS:

We cannot test more than one child from a family but it is OK to test friends.

NO FOOD ALLERGIES:

Children must have no food allergies whatsoever.

SCHOOL:

Children from [REDACTED] Primary School and [REDACTED] Primary School in [REDACTED] cannot be selected as they were involved in making and testing the apple ads.

EATING & DRINKING:

Do not select any child who is actively eating and drinking as they walk around the show. This will affect the apple taste testing.

Appendix 11: Parent information sheet



Professor Rob Donovan
& Ms Linda Portsmouth
Faculty of Health Sciences
Curtin University of Technology
Bentley, Western Australia 6102
Telephone: (08) 9266 4404
Email: L.Portsmouth@curtin.edu.au

School of Public Health

Television advertising of fruit to children

PARENT INFORMATION

This research is investigating which types of TV advertisements encourage children to eat more fruit.

Your child will watch 6 minutes of G-rated children's TV which will contain one apple ad or no apple ad at all (so we can compare).

Your child will then be given a piece of apple to taste. Please let us know if your child has any food allergies whatsoever. We will then ask your child how the piece of apple tasted and if they would like you to buy that type of apple in the future.

We will then measure their height and weight. If you would like to know their measurements, just ask and we will record this for you on a slip of paper.

We will be asking only your child's first name, date of birth and postcode. We will NOT be asking any personal, family or identifying information.

Your child can refuse to participate and return to you at any time.

Participation will take 10 minutes of your child's time. We ask you to wait for your child so that we can safely return them to you and they do not get lost in the crowd.

If you have any questions at a later time, please contact Linda Portsmouth at the School of Public Health, Curtin University of Technology on 9266 4404 or L.Portsmouth@curtin.edu.au.

This information letter is for you to keep. Thank you for supporting this research.

Linda Portsmouth and Professor Rob Donovan

School of Public Health

To thank your child for their participation, we invite them to enter our prize draw.

PRIZE DRAW at 8pm Saturday 3rd October: WIN one of 30 prizes of a \$20 Myers voucher.

Child's name:

Address:---

Place this entry form in the box in the School of Public Health Apple Advertising Test Centre in the Silver Jubilee Pavilion while your child is participating in our research.

Appendix 12: Interview record form

Child's first name:

CURTIN UNIVERSITY – APPLE ADVERTISING STUDY INTERVIEW RECORD FORM

1. ID no: _____ 2. Date of birth: _____ 3. Postcode: _____

At least one parent has read the information sheet, given verbal assurance of absence of any food allergies and permission for testing and body measurements. Child also verbally agrees to participate.

4. Interviewer name: _____

Signature: _____

5. Date: _____

6. Time: _____ AM / PM

Please circle:

7. Age group

7-8 years ₁ 11-12 years ₂

8. Gender

Male ₁ Female ₂

9. Apple sample tasted:

A ₁ B ₂

10. Video used: 1. 2. 3. 4. 5.

11. Taste rating:

super good ₁	really good ₂	good ₃	just a little good ₄	maybe good or maybe bad ₅	just a little bad ₆	bad ₇	really bad ₈	super bad ₉	NR, DK or Unsure ₀
-------------------------	--------------------------	-------------------	---------------------------------	--------------------------------------	--------------------------------	------------------	-------------------------	------------------------	-------------------------------

12. 13. 14. Can you think of any words that describe how the apple tasted?

(If they say 1 or 2 words, ask: 'Can you think of any more words?' Accept 3 words, but note down up to 5 words).

.....

15. Would you like another piece of that apple right now? Y ₁ N ₂ Unsure ₃

16. Would you want Mum/Dad/Other to buy those apples for you if you saw them at the shop?

definitely would ₁	probably would ₂	maybe/ maybe not ₃	probably would not ₄	definitely would not ₅	NR, DK or Unsure ₀
-------------------------------	-----------------------------	-------------------------------	---------------------------------	-----------------------------------	-------------------------------

17. Would you use your own pocket money to buy those apples if you saw them at the shop?

definitely would ₁	probably would ₂	maybe/ maybe not ₃	probably would not ₄	definitely would not ₅	NR, DK or Unsure ₀
-------------------------------	-----------------------------	-------------------------------	---------------------------------	-----------------------------------	-------------------------------

18. What did you think of the apple ad? (Video 2, 3, 4 & 5 only)

love it ₁	like it ₂	neither like it or dislike it ₃	didn't like it ₄	hate it ₅	NR, DK or Unsure ₀
----------------------	----------------------	--	-----------------------------	----------------------	-------------------------------

Height: _____ cm

Weight: _____ kg

Appendix 13: Allocation of exposure condition to interviewer

Table 15.1 Videos presented by each interviewer

Interviewer	Video shown					Total
	1	2	3	4	5	
1	34	29	39	24	33	159
2	42	25	26	43	16	152
3	29	37	14	23	32	135
4	17	19	28	24	11	99
5	16	7	19	12	27	81
6	8	11	14	7	18	58
7	9	13	8	9	7	46
8	3	7	7	5	12	34
9	5	4	10	5	7	31
10	4	9	0	11	2	26
11	2	7	4	5	4	22
Total	169	168	169	168	169	843

Table 15.2 Apple type presented by each interviewer

Interviewer	Apple type		Total
	Plain	Salt & vinegar	
1	68	91	159
2	78	74	152
3	63	72	135
4	43	56	99
5	43	38	81
6	33	25	58
7	23	23	46
8	19	15	34
9	17	14	31
10	15	11	26
11	16	6	22
Total	418	425	843

Appendix 14: Video 1 script - CONTROL GROUP

Thanks for coming to our TV watching area. First of all, we need to be very quiet in here. We can't let any of the other kids hear what we are doing, OK? As you heard me say to your Mum/Dad/Other, you are going to watch some TV, eat a bit of apple and later you will tell me how *you* think the apple tasted.

OK, let's start by watching some TV.

You need to wear these headphones to hear the TV.

- Place headphones on child.
- Choose video number (see small sign on wall).
- Pause video at black screen which says: 'Taste apple'
- Place small plate with apple slice A or B (see small sign on wall) on the table in front of child.

Now try this slice of apple.

When child has finished the apple: **OK, let's watch some more TV.**

- Restart video. Watch until end.

Now, I want to know how the apple tasted to you.

- Taste rating response sheet is placed in front of child. Tester points to each word or phrase as it is said.

These are words that you can use to show me how you think the slice of apple tasted. You might point to: super good, really good, good, just a little good, maybe good or maybe bad, just a little bad, bad, really bad or super bad.

Whatever you point to is OK. I haven't tried these apples so I don't know how they taste.

After child has chosen: **Thank you. Now I want you to think more about how the apple tasted.**

Can you think of any words that describe how it tasted?

Child says 3 or more: **Great, thanks.** Child says 1 or 2 words: **Can you think of anymore words?**

Child can't think of any: **Never mind, that's OK (smile).**

Q: Would you like another one of those slices of apple right now?

If the child responds 'Yes': **OK, you'll get you another slice of apple in a minute.**

Now I have got a few quick questions to ask you.

Q: Who does the food shopping at your house? (Use child's response in next question)

- Purchase intent response sheet is placed in front of child.

These are words that you can use to show me your next answers.

Q: Would you want Mum/Dad/Other (X) to buy those apples for you if you saw them at the shop?

- Tester points to each phrase as it is said.

You could point to: definitely would have X buy them, probably would have X buy them, maybe/maybe not have X buy them, probably would not have X buy them, or definitely would not have X buy them.

Q: Would you use your own pocket money to buy those apples if you saw them at the shop?

- Tester points to each phrase as it is said.

You could point to: definitely would buy them, probably would buy them, maybe/maybe not buy them, probably would not buy them, or definitely would not buy them.

Thanks for answering my questions. Now it is time for you to go over there (tester points to height/weight testing cubicle) and to have your height and weight measured. Tester hands form and child over to person who is weighing and measuring.....and gets the child another bit of apple on their plate if they wanted one!

Appendix 15: Video 2 & 3 script - TASTE AFTER

Thanks for coming to our TV watching area. First of all, we need to be very quiet in here. We can't let any of the other kids hear what we are doing, OK? As you heard me say to your Mum/Dad/Other, you are going to watch some TV, eat a bit of apple and later you will tell me how *you* think the apple tasted.

OK, let's start by watching some TV.

You need to wear these headphones to hear the TV.

- Place headphones on child.
- Choose video number (see small sign on wall).
- Pause video at black screen which says: 'Taste apple'
- Place small plate with apple slice A or B (see small sign on wall) on the table in front of child.

Now try this slice of apple.

When child has finished the apple:

OK, let's watch some more TV. You will see an advertisement for the apple that you just ate.

- Restart video. Watch until told to 'pause to ask questions'.

Now, I want to know how the apple tasted to you.

- Taste rating response sheet is placed in front of child. Tester points to each word or phrase as it is said.

These are words that you can use to show me how you think the slice of apple tasted. You might point to: super good, really good, good, just a little good, maybe good or maybe bad, just a little bad, bad, really bad or super bad.

Whatever you point to is OK. I haven't tried these apples so I don't know how they taste.

After child has chosen: **Thank you. Now I want you to think more about how the apple tasted.**

Can you think of any words that describe how it tasted?

Child says 3 or more: **Great, thanks.** Child says 1 or 2 words: **Can you think of anymore words?**

Child can't think of any: **Never mind, that's OK (smile).**

Q: Would you like another one of those slices of apple right now?

If the child responds 'Yes': **OK, you'll get you another slice of apple in a minute.**

Now I have got a few quick questions to ask you.

Q: Who does the food shopping at your house? (Use child's response in next question)

- Purchase intent response sheet is placed in front of child.

These are words that you can use to show me your next answers.

Q: Would you want Mum/Dad/Other (X) to buy those apples for you if you saw them at the shop?

- Tester points to each phrase as it is said.

You could point to: definitely would have X buy them, probably would have X buy them, maybe/maybe not have X buy them, probably would not have X buy them, or definitely would not have X buy them.

Q: Would you use your own pocket money to buy those apples if you saw them at the shop?

- Tester points to each phrase as it is said.

You could point to: definitely would buy them, probably would buy them, maybe/maybe not buy them, probably would not buy them, or definitely would not buy them.

Now let's have a look at the apple ad again. Un-pause video to show apple ad repeated at the end.

What do you think of this apple ad?

- Ad liking response sheet is placed in front of child. Tester points to each phrase as it is said.

You could point to: love it, like it, neither like it or dislike it, don't like it, or hate it.

Thanks for answering my questions. Now it is time for you to go over there (tester points to height/weight testing cubicle) **and to have your height and weight measured.** Tester hands form and child over to person who is weighing and measuring.....and gets the child another bit of apple on their plate if they wanted one!

Appendix 16: Video 4 & 5 script - TASTE BEFORE

Thanks for coming to our TV watching area. First of all, we need to be very quiet in here. We can't let any of the other kids hear what we are doing, OK? As you heard me say to your Mum/Dad/Other, you are going to watch some TV, eat a bit of apple and later you will tell me how *you* think the apple tasted.

OK, let's start by watching some TV.

You will see an advertisement for the apple that I'll give you.

You need to wear these headphones to hear the TV.

- Place headphones on child.
- Choose video number (see small sign on wall).
- Pause video at black screen which says: 'Taste apple'
- Place small plate with apple slice A or B (see small sign on wall) on the table in front of child.

Now try this slice of apple.

When child has finished the apple: **OK, let's watch some more TV**

- Restart video. Watch until told to 'pause to ask questions'.

Now, I want to know how the apple tasted to you.

- Taste rating response sheet is placed in front of child. Tester points to each word or phrase as it is said.

These are words that you can use to show me how you think the slice of apple tasted. You might point to: super good, really good, good, just a little good, maybe good or maybe bad, just a little bad, bad, really bad or super bad.

Whatever you point to is OK. I haven't tried these apples so I don't know how they taste.

After child has chosen: **Thank you. Now I want you to think more about how the apple tasted.**

Can you think of any words that describe how it tasted?

Child says 3 or more: **Great, thanks.** Child says 1 or 2 words: **Can you think of anymore words?**

Child can't think of any: **Never mind, that's OK (smile).**

Q: Would you like another one of those slices of apple right now?

If the child responds 'Yes': **OK, you'll get you another slice of apple in a minute.**

Now I have got a few quick questions to ask you.

Q: Who does the food shopping at your house? (Use child's response in next question)

- Purchase intent response sheet is placed in front of child.

These are words that you can use to show me your next answers.

Q: Would you want Mum/Dad/Other (X) to buy those apples for you if you saw them at the shop?

- Tester points to each phrase as it is said.

You could point to: definitely would have X buy them, probably would have X buy them, maybe/maybe not have X buy them, probably would not have X buy them, or definitely would not have X buy them.

Q: Would you use your own pocket money to buy those apples if you saw them at the shop?

- Tester points to each phrase as it is said.

You could point to: definitely would buy them, probably would buy them, maybe/maybe not buy them, probably would not buy them, or definitely would not buy them.

Now let's have a look at the apple ad again. Un-pause video to show apple ad repeated at the end.

What do you think of this apple ad?

- Ad liking response sheet is placed in front of child. Tester points to each phrase as it is said.

You could point to: love it, like it, neither like it or dislike it, don't like it, or hate it.

Thanks for answering my questions. Now it is time for you to go over there (tester points to height/weight testing cubicle) **and to have your height and weight measured.** Tester hands form and child over to person who is weighing and measuring.and gets the child another bit of apple on their plate if they wanted one!

Appendix 17: The Peryam and Kroll Simplified Word Scale

Super Good	Really Good	Good	Just a little Good	Maybe Good or maybe Bad	Just a little Bad	Bad	Really Bad	Super Bad
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Appendix 18: Purchase request intent scale

definitely would	probably would	maybe/ maybe not	probably would not	definitely would not
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Appendix 19: Advertisement liking scale

love it	like it	neither like it or dislike it	don't like it	hate it
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Appendix 20. International BMI cut off points for overweight and obesity

Table 22.1 International cut off points for body mass index for overweight and obesity by sex between 2 and 18 years (Cole et al., 2000, p. 4).

Age (years)	Body mass index 25 kg/m ²		Body mass index 30 kg/m ²	
	Males	Females	Males	Females
2	18.41	18.02	20.09	19.81
2.5	18.13	17.76	19.80	19.55
3	17.89	17.56	19.57	19.36
3.5	17.69	17.40	19.39	19.23
4	17.55	17.28	19.29	19.15
4.5	17.47	17.19	19.26	19.12
5	17.42	17.15	19.30	19.17
5.5	17.45	17.20	19.47	19.34
6	17.55	17.34	19.78	19.65
6.5	17.71	17.53	20.23	20.08
7	17.92	17.75	20.63	20.51
7.5	18.16	18.03	21.09	21.01
8	18.44	18.35	21.60	21.57
8.5	18.76	18.69	22.17	22.18
9	19.10	19.07	22.77	22.81
9.5	19.46	19.45	23.39	23.46
10	19.84	19.86	24.00	24.11
10.5	20.20	20.29	24.57	24.77
11	20.55	20.74	25.10	25.42
11.5	20.89	21.20	25.58	26.05
12	21.22	21.68	26.02	26.67
12.5	21.56	22.14	26.43	27.24
13	21.91	22.58	26.84	27.76
13.5	22.27	22.98	27.25	28.20
14	22.62	23.34	27.63	28.57
14.5	22.96	23.66	27.98	28.87
15	23.29	23.94	28.30	29.11
15.5	23.60	24.17	28.60	29.29
16	23.90	24.37	28.88	29.43
16.5	24.19	24.54	29.14	29.56
17	24.46	24.70	29.41	29.69
17.5	24.73	24.85	29.70	29.84
18	25	25	30	30

Appendix 21. Words used by children to describe taste experience

The children, after they had rated the taste of the apples, were asked: “Can you think of any words that describe how the apple tasted?” The children were encouraged to say more words if only one or two were spoken. 601 of the 843 children who gave a taste rating responded to this question with: one word/phrase only (n = 111); two word/phrases (n = 214); or three words/phrases (n = 276). In total, 1 367 words or phrases were used by the 601 children to describe apple taste.

235 original words/phrases were used to describe the apple sample eaten. The most common words used (alone or within a phrase) were: juicy (n = 242), sweet (n = 174), crunchy (n = 113), yum/yummy (n = 95), sour (n = 87), delicious (n = 59), tasty (n = 57) and nice (n = 56). The words/phrases were then divided into three categories and assigned to each of the 601 children.

Children who made all positive comments were assigned to the *positive comment* category, children who made all neutral comments were assigned to the *neutral comments* category while those who made all negative comments were assigned to the *negative comment* category. Children who made comments from different categories were assigned to more than one category, thus the numbers of comment types totals 834 - more than the 601 expected if each child had made only one comment from one category.

The 834 comments were assigned as follows:

- 522 positive comments (86.9%), for example, “yummy”, “delicious”, “nice”;
- 108 neutral comments (18.0%), for example, “appleish”, “normal”, “ordinary”, “red”; and
- 204 negative comments (33.9%), for example, “bad”, “sour”, “bitter”, “weird”, “yuck”.

Negative comments were deemed to also include all words/phrases that identified the apple taste as “salt” and/or “vinegar”. The descriptors “crunchy” and “juicy” were categorised as positive comments as they described positive characteristics of apples even though they did not describe the apple’s taste. See Appendix 22 for the full list of the comments assigned to each category.

Appendix 22. Categorisation of words used to describe apple taste

Positive	Neutral	Negative
1 a bit good	5 a bit plain	2 a bit hard
4 a bit of crunch	19 and a little bit something else	3 a bit more sour than most apples
9 a bit sweet	20 apple	6 a bit soft and bad
11 a little bit sweet	21 apple + vinegar	7 a bit sour
14 a real apple	22 apple juice	8 a bit sour where the peel was
18 alright	23 apple taste	10 a little bit sour
28 at first it was kind of sour, then normal then nice	24 appleish	12 a little lemony aftertaste
29 awesome	25 apples	13 a little sour
31 beautiful	26 appley	15 a teeny bit bitter
32 best ever	27 appley taste	16 acidic
33 better than normal	40 bland	17 acidy
43 brilliant	42 bright red	30 bad
45 but nice	44 brown	34 bicarby
49 cleansing	46 chewy	35 bit salty
51 could have been sweet and juicy	47 chewy skin	36 bit sour
53 creamy	48 cinnamon	37 bitter
54 crisp	50 cold	38 bittery
55 crispy	52 covered in something then started to taste like a normal apple	39 blaah
56 crunch	61 didn't taste like anything I knew	41 boring
57 crunchier	62 different	63 disgusting
58 crunchy	66 efficient	64 dry
59 delicious	73 fizzy	65 dry skin taste
60 delightful	83 had a different flavour	77 funny
67 excellent	84 half sweet, half salty	82 gross
68 extraordinary	85 hard	103 kind of sour
69 fabulous	86 hard and soft	104 lemon
70 fantastic	87 hardish	105 lemony
71 filling	89 honeyish	111 like oil
72 firm	90 icypole	113 like vinegar
74 fresh	95 it's round	114 little salty
75 fresh piece of apple	99 just like a normal apple	115 little sour
76 fruity	100 just like a normal piece of fruit	119 maybe lemon
78 good	102 just taste normal	131 not as juicy as normal
79 good quality	106 like a normal apple	132 not crunchy
80 good texture	107 like apple	133 not fresh
81 great	108 like apple juice	134 not like normally eat
88 healthy	109 like it had sauce on it	135 not much
91 interesting	110 like nashi pear	136 not much good
92 irresistible	112 like peach	137 not so sweet
93 it tasted good	128 normal	142 odd
94 it was yum	129 normal apple	143 oily
96 juice	130 normal apple juice as well	145 on the skin a little sour
97 juicier	146 orangey	148 outside is hard to chew
98 juicy	147 ordinary	149 outside sour
101 just right	159 red	151 plastic
116 little sweet	168 savoury on outside	155 really gross
117 lots of flavour	170 simple	163 rotten
118 magnificent	171 smooth	164 salt
120 moist	172 soft	165 salt & vinegar

121 more juicy	180 spicy	166 salty
122 mouth watering	181 sticky	174 sour
123 natural	185 strong	175 sour (a tiny bit)
124 nice	193 surprising, not what you would expect	176 sour than normal
125 nice at end	197 taste slowly comes	177 sourish
126 nice texture	200 tasted just like an apple	178 soury
127 nice to eat	201 tasted like a lot of apple	183 strange
138 not soury	202 tastes like apple from the tree	184 strange tasting
139 not too crunchy	205 The TV made the apple taste different because of the apple ad	198 tasted a little like vinegar at the beginning
140 not too sour	206 unimaginable	216 vinegar
141 not too sweet	207 unusual	217 vinegar coated
144 OK	208 usual apple	218 vinegar dressing
150 perfect	230 yogurt mixed with apple	219 vinegarish
152 pretty good		220 vinegary
153 quite yummy		221 water
154 really good		222 waterish
156 really nice		223 watery
157 really really good		224 weird
158 really yummy		225 weird tang
160 refreshing		226 weird taste
161 remarkable		227 wet
162 ripe		228 wetish
167 satisfying		231 yuck
169 scrumptious		232 yucky
173 sort of nice		233 yik
179 special		
182 still yummy		
186 succulent		
187 sugar burst		
188 sugary		
189 super		
190 super good		
191 superdooper		
192 super good		
194 sweet		
195 sweetness		
196 tangy		
199 tasted good		
203 tasty		
204 tender		
209 very delicious		
210 very good		
211 very nice		
212 very sweet		
213 very tasty		
214 very yum		
215 very yummy		
229 wonderful		
234 yum		
235 yummy		

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