Nutritional knowledge and the recognition and acceptability of fruit and vegetables amongst primary school children: age and gender differences

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ABSTRACT

With the consumption of fruit and vegetables amongst primary school children in the UK being one of the lowest in Europe (Gregory et al., 2000), the need for research into the determinants of fruit and vegetable intake is essential in order for future interventions to be successful in increasing fruit and vegetable consumption (Rasmussen et al., 2006). This study, therefore, aimed to investigate possible gender and age differences amongst primary school children's nutritional knowledge, and their recognition and acceptability of commonly available fruit and vegetables. In total, 73 children aged 8-11 years from Ellesmere Primary School in Shropshire, UK, took part. Both quantitative and qualitative measures were employed. A Chi Square Test revealed that only the acceptability of pineapple increased significantly with age, and a two-way ANOVA for the recognition of fruit and vegetables revealed no significant main effects for age or gender, or an interaction between the two variables. Analysis of the transcripts revealed that nutritional knowledge seemed to increase with age. Overall, few age and gender differences were found; however, future research should look to employ wider age ranges to identify where changes in acceptability of fruit and vegetables occur, in order for interventions to be appropriately tailored.

KEY WORDS:	FRUIT AND VEGETABLE	NUTRITIONAL KNOWLEDGE	RECOGNITION	ACCEPTABILITY	GENDER	AGE

Introduction

It is widely acknowledged that nutrition is an important factor in the promotion of our physical, mental and behavioural well-being (Gesch, 2005). Understandably, research has predominantly focused on improving the health and nutrition of children, as it is well established that a diet high in a variety of nutrients is beneficial for bone development (Tylavsky, 2004; New, 2001), physical growth, and can reduce the likelihood of obesity later in childhood and adolescence (Buttriss, 2002).

A diet rich in fruit and vegetables seems particularly beneficial in childhood, as not only does it promote good health and development, it is commonly associated with the prevention of chronic diseases in adulthood such as cardiovascular disease (World Health Organisation, 2003), coronary heart disease (Joshipura et al., 2001) and some cancers; in particular, oral, oesophagus and stomach cancer (Riboli & Norat, 2003; Key, Schatzhin, Willett, Allen, Spencer & Travis, 2004). In addition, eating habits established in childhood seem predictive of those in adulthood (Resnicow, Smith, Baranowski, Baranowski, Vaughan & Davis, 1998; Mikkilä, Räsänen, Raitakari, Pietinen & Viikari, 2004) hence, implementing effective interventions in early childhood seem most appropriate in order to achieve long-term health of the individual (Perry et al., 1998; Venter & Harris, 2009).

The World Health Organisation (2003) suggests that individuals should consume at least 400 grams of fruit and vegetables per day; equivalent to five servings. However despite the known health benefits (Knai, Pomerleau, Lock & McKee, 2006), the UK has one of the lowest fruit and vegetable intakes in Europe, with one in five children aged between 4 and 18 years eating no fruit at all, and the average consumption of fruit and vegetables in this group being less than half the recommended amount of five portions per day (Gregory et al., 2000). As a result, increasing the fruit and vegetable consumption of children has been identified as an important health issue in recent literature (Knai et al., 2006).

However, to date, nutritional interventions have only been moderately successful in promoting adequate consumption of fruit and vegetables in young children (Davis et al., 2000). In a recent review of interventions aiming to increase fruit and vegetable intake, Knai et al., (2006) suggested that more in-depth, longitudinal research is needed in order to examine the overall effectiveness of such interventions and programmes. In order to achieve this, an understanding of the complexity of factors influencing fruit and vegetable consumption in children is essential (Taylor, Evers & McKenna, 2005; Rasmussen et al., 2006).

Many attempts have been made to identify the possible determinants of fruit and vegetable consumption in children (Wardle, Herrera, Cooke & Gibson, 2003). Much research has identified a possible link with environmental factors, and more specifically, it appears that the availability and accessibility of fruit is positively associated with consumption amongst children (Cullen, Baranowski, Owens, Marsh, Rittenberry & de Moor, 2003; Reinaerts, de Nooijer, Candel and de Vries, 2007). In part, this could be due to recent changes in government policies, as a number of schemes have been implemented within the last decade in order to increase fruit intake amongst primary school children. For example, ‘The National School Fruit Scheme’ aimed to increase availability by delivering a variety of fruit for infants at UK

primary schools, with the hope to shape longer-term eating behaviours (Department of Health, 2002). Following implementation of the scheme, it has been found that children are consuming a higher amount of fruit, indicating that the scheme has been somewhat successful (Blenkinsop et al., 2007). Alongside new nutritional standards for school meals (School Food Trust, 2009), and community projects to improve the acceptability of fruit and vegetables, such as the 'Food Dudes' programme (Lowe & Horne, 2000), the government is taking a vital step towards improving children's health.

Alternatively, the role of individual determinants may play a vital role in the fruit and vegetable intake of children, and factors such as gender and age (Cooke & Wardle, 2005), taste preferences (Brug, Tak, de Velde, Bere & de Bourdeaudhuij, 2008) and nutritional knowledge (Edwards & Hartwell, 2002) have been discussed within the literature and have found varying results, yet have rarely been discussed simultaneously.

From an evolutionary point of view, food preferences are not hard-wired and must therefore be learnt in infancy and childhood (Venter & Harris, 2009). Consequently, through exposure, children learn to consume the foods that they have a greater preference for (Brug et al., 2008, Cooke, 2007). However, taste preferences can often lead to poor food choices, as Taylor et al., (2005) acknowledged that a dislike for fruit and vegetables is one of the most important predictors of low fruit and vegetable consumption amongst young children. Research has implied that there may be a gender difference in taste preferences, with females having a higher preference for sweet foods, and males having a higher preference for sour, bitter tastes (Liem, Bogers, Dagnelie & de Graaf, 2006). This therefore has implications for determining the fruit and vegetable intake of children, as this indicates that females should prefer fruit which tend to be of a sweeter taste, whereas males should show an increased liking for vegetables, which are often more sour, bitter tasting foods.

Bere, Brug and Klepp (2007) suggested that males tend to have a lower preference for fruit and vegetables than females, but rather than this being due to the taste preferences of sweet and sour foods, it may be due to males' greater liking for energy-dense foods due to their greater physical demands, or it could be due to females' stronger attachment to the importance of dieting and healthy eating (Wardle, Haase, Steptoe, Nillapun, Jonwutiwes & Bellisie, 2004). Furthermore, foods such as fruit and vegetables are commonly attributed to the female identity whereas meat and energy-dense foods are more associated with strength, and are therefore attributed to the male identity (Kiefer, Rathmanner & Kunze, 2005). As previously mentioned, food preferences seem to positively correlate with consumption, as it is well established that children eat what they have a preference for (Brug et al., 2008; Cooke, 2007). Therefore, due to the lack of research concerning gender and age differences in the acceptability of fruit and vegetables, it is worth considering research that focuses on actual intake, as this is likely to be a good indicator of fruit and vegetable preference.

Some literature has led researchers' to believe that no or very few gender differences exist in fruit and vegetable intake amongst children (Lytle, Seifert, Greenstein & McGovern, 2000; Wardle, Sanderson, Gibson & Rapoport, 2001), whereas other research has found contradictory findings. Firstly, a recent review has

suggested that females and younger children tend to have a higher intake of fruit and vegetables than males and older children, indicating possible age and gender differences (Rasmussen et al., 2006). However, the review also highlighted that a number of studies have put forward the notion that males have a higher intake of fruit and vegetables than females (e.g. Rojas, 2001 as cited in Rasmussen et al., 2006). Nevertheless, it must be stressed that these studies are not based on UK samples, hence, differences in fruit and vegetable consumption may be a cause of differing health practices amongst societies rather than actual gender differences. Further research has suggested that males eat less fruit and vegetables than females (Cooke & Wardle, 2005; Bere, Brug & Klepp, 2007), which has been reported in very young children (Cooke, Wardle, Gibson, Sapochnik, Sheiham & Lawson, 2003) and also in other cultures (Le Bigot Macaux, 2001; Reynolds et al., 1999; Diehl, 1999; Lien, Lytle & Klepp, 2001). Nevertheless, it is important to emphasise that such literature constitutes a wide age range, usually from toddler years to late adolescence and even early adulthood. Hence, it is difficult to determine at what age these gender differences are more prominent.

Therefore, research investigating the possible age differences in fruit and vegetable consumption would also be of importance, yet there are also diverse findings. For example, Cooke and Wardle (2005) found that the liking for fruit reached a peak at 8-11 years, and declined thereafter. Similar findings have also been reported, with the consumption of apples and pears peaking at 7-10 years and declining through adolescence, for both females and males (Gregory et al., 2000). However, other research has led us to believe that there is no association between age and fruit consumption (Cooke et al., 2003), and that it is only vegetable consumption that increases significantly with age. Gregory et al., (2000) show support for this finding, as they found that both males' and females' vegetable intake increases with age, particularly consumption of leafy green vegetables. According to Ton Nu, MacLeod and Barthelemy (1996), most changes in food preference occur at around the age of 10, and may be a result of the onset of puberty and a reduction of the reluctance to eat, or avoidance of new foods, often referred to as 'neophobia' (Dovey, Staples, Gibson & Halford, 2008). Therefore, it is not surprising to find that the willingness to try unfamiliar foods that are often disliked, such as fruit and vegetables, generally increases with age (Cooke & Wardle, 2005), and may be a possible explanation for why these slight age differences in fruit and vegetable consumption occur, especially in the pre-adolescent stage.

Children's fruit and vegetable intake could also be influenced by their ability to correctly recognise fruit and vegetables and, therefore; their nutritional knowledge (Baker & Wardle, 2003). Nutritional knowledge levels tend to be lower in younger children as they have a weaker understanding of the relationship between food choices, physical activity and health (Taylor et al., 2005), and it seems that females tend to have a greater knowledge of nutrition than males (Hart, Bishop & Truby, 2002). Edwards and Hartwell (2002) found that recognition amongst a large sample of primary school children aged 8-11 years was better for fruit than for vegetables, and that recognition significantly increased with age. It was also found that the acceptability of fruit and vegetables increased with age, illustrating that a greater nutritional knowledge could be associated with higher consumption of fruit and vegetables. Wardle, Parmenter and Waller (2005) show support for this finding, as they found that 52% of individuals with a higher nutritional knowledge ate the

recommended five servings of fruit and vegetable per day in comparison to 11% of those with a lower nutritional knowledge. Nevertheless, such research has relied heavily on the use of questionnaires and self-report dietary instruments in order to determine the frequency of intake of certain foods. Although nutritional knowledge was significantly correlated with the intake of fruit and vegetables, this study's findings may not be totally reliable, due to the possibility of social desirability bias (Miller, Abdel-Maksoud, Crane, Marcus & Byers, 2008).

Therefore to reduce the possibility of gaining unreliable results in this research study, both quantitative and qualitative methodologies will be employed in order to investigate possible age and gender differences amongst primary school children's ability to recognise common fruit and vegetables, their acceptability of these foods, and their nutritional knowledge. Such research is warranted as the importance of tailoring nutritional messages to the appropriate level of knowledge and understanding of males and females and different aged primary school children in order to enhance effectiveness has been emphasised (e.g. Blanchette & Brug, 2005); and it is therefore likely to compliment other research within the area.

Therefore, it is hypothesised that the acceptability of commonly available fruit and vegetables will increase with age, which is in accordance with previous findings (Cooke & Wardle, 2005; Cooke et al., 2003; Gregory et al., 2000). Furthermore, Ton Nu et al., (1996) suggested that most changes in food preferences occur around the age of 10 due to the onset of puberty and a reduction of neophobia, hence, it is possible to expect the acceptability for fruit and vegetables to increase with age amongst 8-11 year olds. Furthermore, females will show a greater preference for commonly available fruit and vegetables than males, as although Liem et al., (2006) proposed that females have a higher preference for sweet tasting foods such as fruit, and males have a higher preference for sour tasting foods such as vegetables, much research has implied that females actually show a greater liking for both fruit and vegetables than males (Rasmussen et al., 2006; Cooke & Wardle, 2005; Bere, Brug, & Klepp, 2007); especially during pre-adolescent years (Gregory et al., 2000).

It is also hypothesised that the recognition of commonly available fruit and vegetables will increase with age, as will nutritional knowledge, as it has been put forward that younger children tend to have a weaker understanding of the associations between food choices and health (Taylor et al., 2005). What's more, Edwards and Hartwell (2002) found that amongst children aged 8-11 years, the recognition of fruit and vegetables significantly increased with age. Finally, females will be able to recognise more commonly available fruit and vegetables and demonstrate a higher nutritional knowledge than males, as previous research has found that females tended to show a greater understanding of nutrition than males, and gave more accurate responses, especially in correctly identifying fattening foods (Hart, Bishop, & Truby, 2002). This seems to correspond with the assumption that girls have a stronger attachment to the importance of dieting and healthy eating than males (Wardle et al., 2004), and may explain why research tends to find that older females have a greater understanding of nutrition than males (Wardle, Parmenter & Waller, 2005).

Method

Sample

The study was undertaken at Ellesmere Primary School, located in Shropshire, UK. Data was collected from three consecutive year groups comprising children aged 8-11 years. This age group was chosen as children of this age are more likely to work quietly and independently, and are more able to generate their own thoughts, and are therefore less likely to introduce interviewer bias (Edwards & Hartwell, 2002). Children of a younger age however, would be more likely to ask for assistance during the written tasks, and would perhaps rely more heavily on closed ended questions during the discussions, thus producing more biased results.

Table 1
Sample characteristics

	Male	Female	Total
8-9 Years	11	13	24
9-10 Years	11	14	25
10-11 Years	12	12	24
	34	39	73

Data collection took place over three days in January 2010, in which three groups of 6-8 pupils from each year group participated. A total of 82 pupils were invited to take part in the study; however nine pupils were unable to participate due to lack of parental consent, and therefore a total of 73 pupils participated.

Materials

In each focus group, a total of 12 A5 laminated photographs of individual fruit (Appendix A) and vegetables (Appendix B) were required per participant, which were presented in a sealed brown envelope. The fruit and vegetables were purchased from Tesco's supermarket, and the photographs were taken by the researcher. Each participant was provided with a pencil at the beginning of the discussion to allow completion of the two question sheets; Task One (Appendix C) and Task Two (Appendix D). Task One was used to assess children's acceptability of commonly available fruit and vegetables, whereas Task Two was used to assess children's ability to correctly recognise these fruit and vegetables. Semi-structured questions which were prepared prior to data collection were then used to form the short discussion, which aimed to assess children's nutritional knowledge, and included questions of food classification, food grouping and diet-related diseases. A digital voice recorder was used to record each discussion and a computer and PASW Version 17.0 were required during analysis.

Procedure

Following the Head-Teacher's permission (Appendix E), letters were sent to the children's parents explaining the aim of the research and allowing them to exclude their children from the research by returning a signed slip to their child's teacher as soon as possible (Appendix F). It was assumed that if no reply was heard four weeks after the letters were sent, parents were happy for their child to participate and their child was therefore invited to take part in the research. Pupils were reminded prior to the study that they did not have to participate if they did not wish, and it was reiterated during the study that they could withdraw at any time and would face no punishment if they decided to do so, although all children were willing to participate.

Also prior to data collection, the researcher attended an informal meeting with the Deputy Head-Teacher to discuss certain elements of the research. In particular, simplicity of the questions in both the tasks and during the discussion was considered important due to the nature of the sample. Therefore, it was important to ensure that both questions and instructions were easily understood by all year groups, and both tasks were presented in a format that could be completed in a limited period of time to prevent possible fatigue effects. During this meeting, it was noticed that where the study would be taking place, the desks were of close proximity. It was decided that the task assessing children's ability to recognise commonly available fruit and vegetables would be coded prior to the study, in order to reduce the possibility of deliberate similarity amongst answers. Therefore, the multiple choice answers were arranged in three different orders, and the question sheets were presented correspondingly.

Data collection took place over three days in January 2010, and the researcher ensured that she was dressed appropriately in order to maintain a high level of professionalism. Groups of 6 to 8 children were accompanied from their timetabled lesson by the researcher, to a quiet room where the focus groups took place. Participants were then presented with a question sheet headed "Task One". The researcher read aloud the instructions stated on the sheet to account for differences in reading abilities amongst participants. It was also stated that participants were able to ask for clarification of spellings if they were at all unsure. Participants were asked to give their gender and their ages in the boxes provided, but were asked not to write their name on the piece of paper in order to maintain confidentiality. They were then provided with a brown, sealed envelope consisting of 12 laminated pictures of individual fruit and vegetables. Participants were instructed to look at the pictures, and circle the relevant name of the fruit or vegetable. Numbers were placed in the top right-hand corner of each picture which corresponded to the relevant question, allowing participants to easily identify which picture was needed to answer each question. The researcher clearly stated that if they were unsure of the answer, they should simply take a guess and that it did not matter how many answers they got correct. On completion of the task, participants were asked to sit quietly until the researcher had collected all of the question sheets.

Participants were then provided with a question sheet headed "Task Two", which again, was read aloud by the researcher. This task involved participants rating the particular fruit and vegetables in terms of acceptability, and participants were instructed to tick the box that corresponded with how they felt about each fruit and

vegetable. There were three measures in total; Like, Dislike and Never Tried, which were accompanied by pictorial smiling, neutral and sad faces to assist the younger children. Once again, they were able to ask for clarification of spellings, and were asked to sit quietly until all of the sheets had been collected.

Finally, the participants were asked to take part in a short discussion. Participants were informed at this stage of the study that their answers would be audio-taped, and if they felt uncomfortable about the topics being discussed, they were able to return back to their classroom at any time during the study, although all children felt comfortable to take part. The discussion involved a series of semi-structured questions that were formed by the researcher prior to data collection. Questions were directed towards the whole group, and participants were encouraged to openly discuss their opinions on the topics which included general questions on consumption and acceptability, parental rules at home, food grouping, food classification and diet-related diseases (see Tables 9 & 10). Following each discussion, participants were fully de-briefed in language that could be easily understood, were giving the opportunity to ask any questions about the research, and were thanked by the researcher for participating in the study.

Design and Analysis

This study was an independent measures design. There were two independent variables; age with three levels; 8-9 years, 9-10 years and 10-11 years, and gender with two levels; male and female. The dependent variables were the children's responses. The numerical data accumulated from the question sheets were entered into a password-protected computer system at the University of Chester, and were then transferred into PASW Version 17.0 for analysis.

A Two-way Analysis of Variance (ANOVA) (2x3) was conducted to account for any significant differences or interactions between gender and age and the recognition of commonly available fruit and vegetables. A Pearson's Chi-Square Test was conducted to account for any gender and age differences for the acceptability of fruit and vegetables, and a Fisher's Exact Test was used on occasions where cells had an expected frequency of 5 or less. Statistical significance at $p \leq 0.05$ was maintained for all tests.

In order to achieve an understanding of children's awareness of healthy eating, the audio-tapes from each discussion were transcribed. The transcripts were analysed through means of framework analysis, whereby all relevant conservational discourse related to the themes of consumption and acceptability, food classification, food grouping, parental control and diet-related diseases were extracted, and any gender or age differences were then identified.

Results

In order to investigate gender and age differences within the recognition and acceptability of fruit and vegetables and the nutritional knowledge of primary school children, both quantitative and qualitative methodologies were employed; each of which will be reported separately.

Quantitative: The recognition of fruit and vegetables

Table 2
The mean percentage of correct recognition of fruit and vegetables in both females and males aged between 8-11 years

Mean Correct Recognition (%)	Male			Female		
	8-9 years	9-10 years	10-11 years	8-9 years	9-10 years	10-11 years
Fruit	98.5	100	100	98.7	100	100
Vegetables	100	97	97.2	95	98	100

This table shows that both males and females aged between 9-11 years correctly identified all fruit, and children of 8-9 years correctly identified the majority of the fruit, with females recognising slightly more than males. Males aged between 8-9 years were able to correctly identify more vegetables than females of the same age. The rate of correct recognition of vegetables increased significantly for both females aged between 9-10 years, however decreased for males aged between 9-10 years. Interestingly, the correct recognition rate of vegetables remained almost the same for males of 10-11 years of age, whereas the recognition increased for 10-11 year olds females.

In order to investigate whether these slight differences were significant, a Two-way (3x2) between-subjects analysis of variance (ANOVA) was conducted in order to investigate these slight age and gender differences further (see Appendix P for PASW Output).

The statistical test revealed that there was no significant main effect for gender, $F(1, 67) = 0.285$, $p > 0.05$. The test also revealed that there was no significant main effect for age, $F(2, 67) = 0.264$, $p > 0.05$. In addition, the test revealed a non-significant main interaction between gender and age, $F(2, 67) = 0.551$, $p > 0.05$.

Quantitative: The acceptability of fruit and vegetables

Table 3
The percentage of the acceptability of fruit for both males and females aged 8-11 years, and the mean percentages for each gender and age group and also each individual fruit

		Apple	Banana	Kiwi	Pineapple	Pear	Orange	MEAN (%)
Male	8-9 Years	90.9	81.8	63.6	72.7	63.6	90.9	77.3
	9-10 Years	100	81.8	63.6	36.4	63.6	100	74.2
	10-11 Years	100	83.3	66.7	91.7	66.7	100	84.7
MEAN (%)		97	82.3	64.6	66.9	64.6	97	-
Female	8-9 Years	92.3	84.6	84.6	91.7	76.9	100	88.4
	9-10 Years	100	85.7	78.6	78.6	78.6	85.7	84.5
	10-11 Years	100	100	66.7	83.3	91.7	75	86.1
MEAN (%)		97.4	90.1	76.6	84.5	82.4	86.9	-
MEAN (%)	8-9 Years	91.6	83.2	74.1	82.2	70.3	95.5	-
	9-10 Years	100	83.8	71.1	57.5	71.1	87.5	-
	10-11 Years	100	91.7	66.7	87.5	79.2	87.5	-

This table shows that in all age groups, females like fruit more so than males and this is particularly the case for children between the ages of 8-9 years; 88.4% acceptability for females compared to 77.3% for males. It also seems that the acceptability of fruit and vegetables in males is much more varied between the age groups in comparison to females. In particular, it seems that females have a greater preference for the majority of fruit, but in particular, show a greater preference for pineapples; 84.5% compared to 66.9% for males. In addition, the acceptability of apples, bananas and pears seems to increase with age.

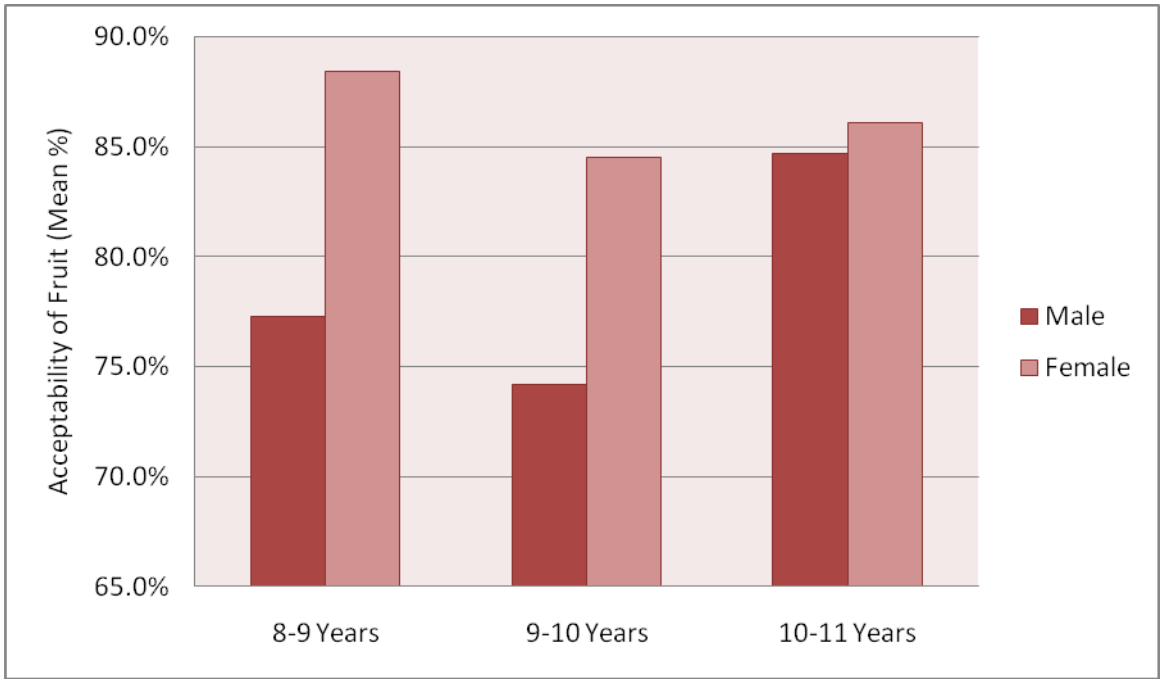

Figure 1: A graph to show the mean percentage of the acceptability of fruit for males and females aged 8-11 years

This graph demonstrates that females do show a greater preference for fruit more so than males in all age groups. It shows that the acceptability of fruit is greatest in 10-11 year olds for males, yet for females, is greatest in 8-9 year olds. Between the ages of 9-10, the acceptability of fruit is lowest for both males and females. In addition, it demonstrates that males' acceptability is much more varied between the ages of 8-11 years, whereas females' acceptability remains fairly consistent throughout all year groups.

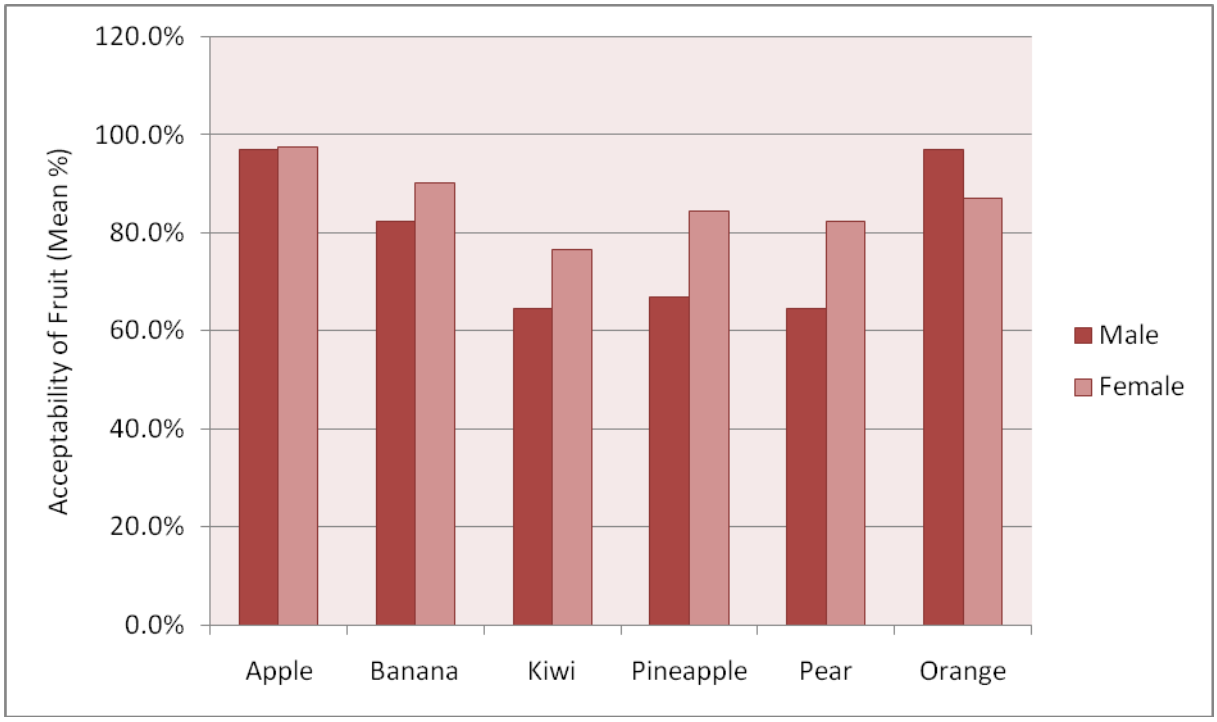

Figure 2: A graph to show the mean percentage of the acceptability of individual fruit for males and females

This graph demonstrates that for bananas, kiwis, pineapples and pears, females do show a greater preference than males. In particular, females seem to prefer pineapple and pear much more than males aged 8-11 years. However, males tend to show an increased liking for oranges in comparison to females, and the liking for apples remains almost the same for both genders.

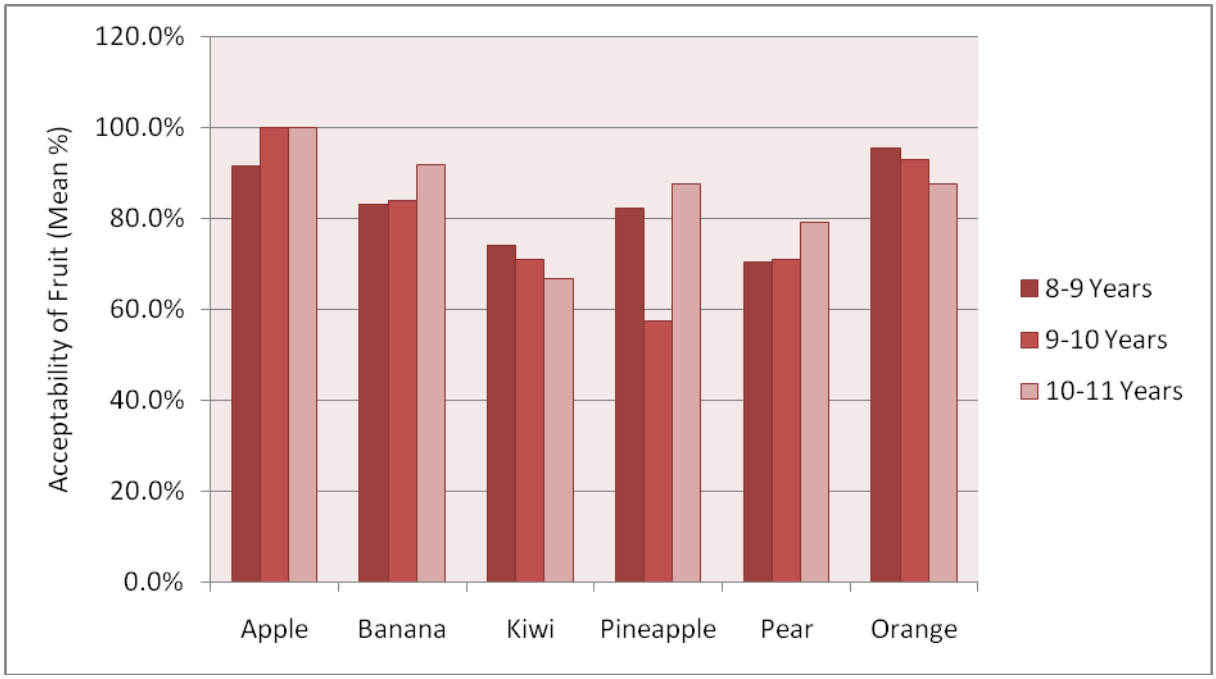

Figure 3: A graph to show the mean percentage of the acceptability of individual fruit for 8-9 year olds, 9-10 year olds and 10-11 year olds

This graph illustrates that the acceptability of apple, banana and pear does increase with age, whereas the acceptability of kiwi and orange tends to decrease with age. Children aged 9-10 years have a much lower acceptability of pineapple than children aged 8-9 years and 10-11 years. In addition, it seems that children tend to have a higher acceptability for more common fruit such as apple and banana than less common fruit, such as kiwi.

Table 4
The percentage of the acceptability of vegetables for both males and females aged 8-11 years, and the mean percentages of each individual vegetable and also each gender and age group

		Carrot	Broccoli	Cauli-flower	Sweet-corn	Cabbage	Sprouts	MEAN (%)
Male	**8-9 Years**	81.8	72.7	63.6	54.5	45.5	45.5	60.6
	9-10 Years	90.9	54.5	45.5	45.5	36.4	27.3	50
	10-11 Years	83.3	83.3	58.3	75	66.7	58.3	70.8
MEAN (%)		85.3	70.2	55.8	58.3	49.5	43.7	-
Female	**8-9 Years**	84.6	69.2	69.2	69.2	69.2	69.2	71.8
	9-10 Years	100	71.4	42.9	85.7	50	28.6	63.1
	10-11 Years	100	91.7	66.7	75	58.3	41.7	72.2
MEAN (%)		94.9	75.1	59.6	76.6	59.2	46.5	-
MEAN (%)	**8-9 Years**	83.2	70.9	66.4	61.9	57.4	57.4	-
	9-10 Years	95.5	62.9	44.2	65.6	43.2	27.9	-
	10-11 Years	91.7	87.5	62.5	75	62.5	50	-

This table shows that females have a greater preference for all vegetables in comparison to males, and this occurs in all age groups. It seems that females have a particularly increased liking for sweetcorn, as the mean acceptability is 76.6% for females in comparison to 58.3% for males. In addition, it seems that the acceptability of sweetcorn increases with age, whereas the acceptability of all other vegetables does not.

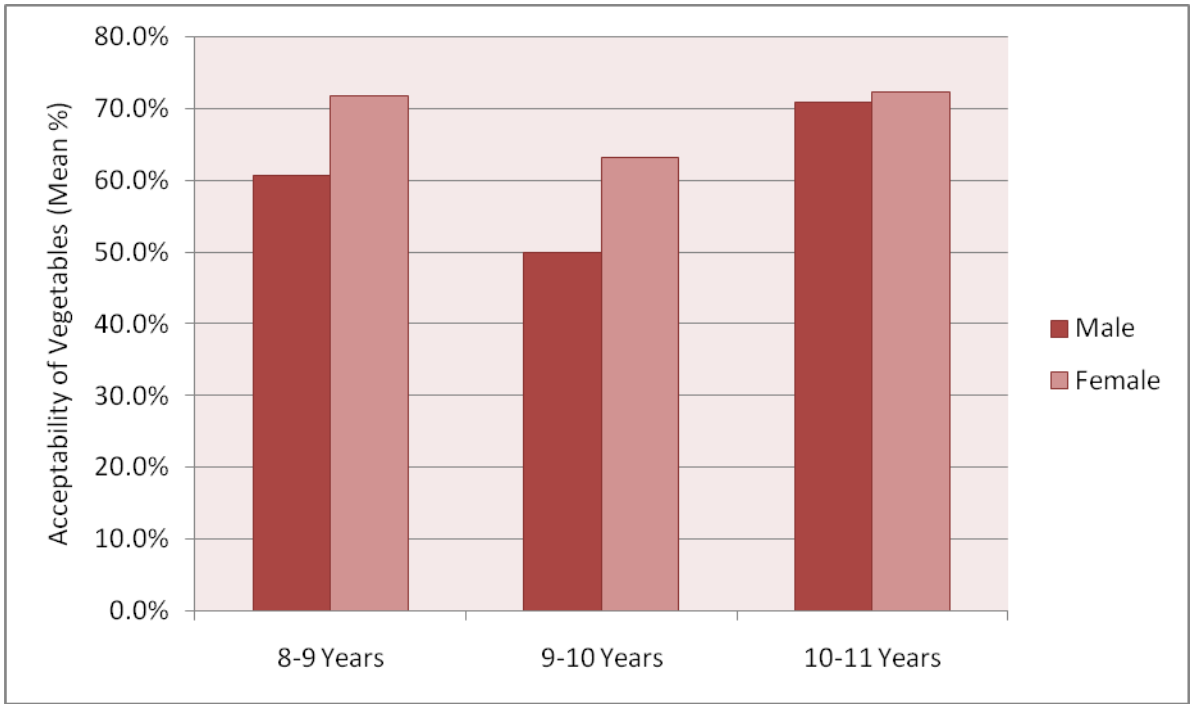

Figure 4: A graph to show the mean percentage of the acceptability of vegetables for males and females aged 8-11 years

This graph illustrates that females do show an increased liking for vegetables more so than males in all year groups. Females between the ages of 8-9 years and 10-11 years portray a similar liking for vegetables, whereas females aged between 9-10 years show a slightly lower preference. In addition, males between the ages of 9-10 years have the lowest preference for vegetables, and this increases amongst 8-9 year olds, and further still in 10-11 year olds.

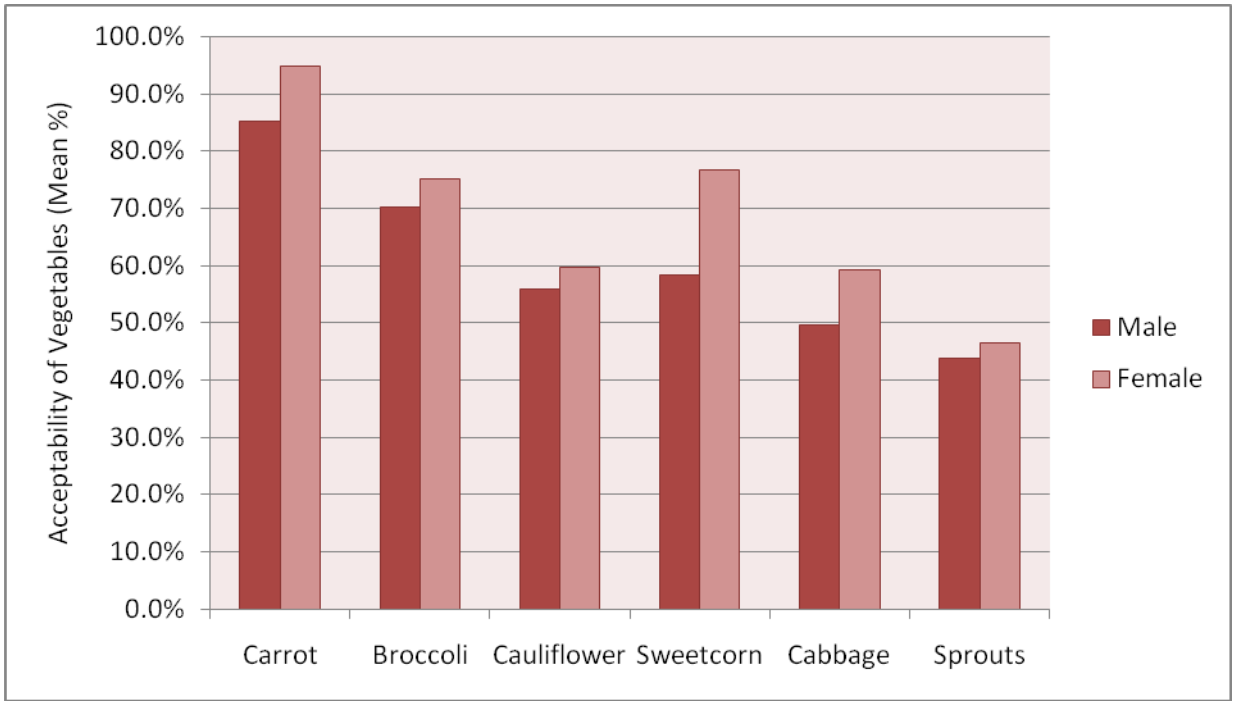

Figure 5: A graph to show the mean percentage of the acceptability of individual vegetables for males and females

This graph illustrates that females show a greater preference for all vegetables. In particular, females express a much greater liking for sweetcorn more so than males, whereas the acceptability of cauliflower and Brussels sprouts is more similar amongst both females and males.

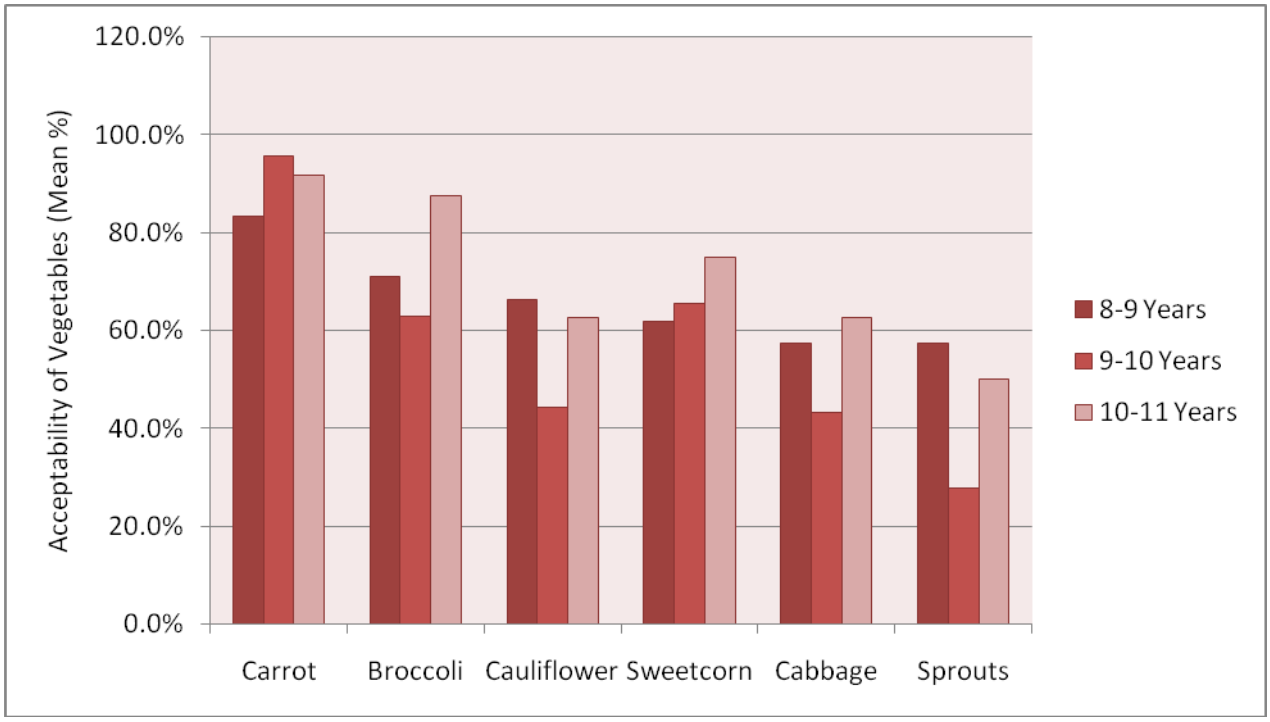

Figure 6: A graph to show the mean percentage of the acceptability of individual vegetables for 8-9 year olds, 9-10 year olds and 10-11 year olds

This graph shows that the acceptability of sweetcorn is the only vegetable to increase with age. Also, with the exception of carrots, cauliflower and Brussels sprouts, 10-11 year olds show a greater liking for vegetables than 8-9 year olds and 9-10 year olds. Surprisingly, 9-10 years show the lowest preference for the majority of vegetables, with Brussels sprouts being the least preferred.

In order to investigate the gender and age differences in the acceptability of fruit and vegetables further, a Pearson's Chi-Square test was conducted. On two occasions, the expected count was less than five and the Fisher's Exact Test was used as an alternative to the Pearson's Chi-Square Test (see Appendix P for PASW Output).

Table 5
Statistical values and levels of significance of the Pearson's Chi-Square Test (and Fisher's Exact Test where relevant) for fruit and gender

		Pearson's Chi-Square Test	Fisher's Exact Test	Significance
Fruit	**Apple**	-	0.718	p>0.05
	Banana	0.460	-	p>0.05
	Kiwi	0.336	-	p>0.05
	Pineapple	0.362	-	p>0.05
	Pear	0.181	-	p>0.05
	Orange	0.289	-	p>0.05

Table 6
Statistical values and levels of significance of the Pearson's Chi-Square Test (and Fisher's Exact Test where relevant) for vegetables and gender

		Pearson's Chi-Square Test	Fisher's Exact Test	Significance
Vegetables	**Carrot**	-	0.162	p>0.05
	Broccoli	0.302	-	p>0.05
	Cauliflower	0.821	-	p>0.05
	Sweetcorn	0.087	-	p>0.05
	Cabbage	0.278	-	p>0.05
	Sprouts	0.969	-	p>0.05

Table 7
Statistical values and levels of significance of the Pearson's Chi-Square Test for fruit and age

		Pearson's Chi-Square Test	Significance
Fruit	**Apple**	0.123	p>0.05
	Banana	0.606	p>0.05
	Kiwi	0.114	p>0.05
	Pineapple	0.022	**p<0.05**
	Pear	0.657	p>0.05
	Orange	0.451	p>0.05

Table 8
Statistical values and levels of significance of the Pearson's Chi-Square Test for vegetables and age

		Pearson's Chi-Square Test	Significance
Vegetables	**Carrot**	0.312	p>0.05
	Broccoli	0.408	p>0.05
	Cauliflower	0.479	p>0.05
	Sweetcorn	0.153	p>0.05
	Cabbage	0.564	p>0.05
	Sprouts	0.154	p>0.05

As can be seen from the above tables, the Pearson's Chi Square Test and Fisher's Exact Test revealed only one significant finding between age and the acceptability of pineapple (0.022, $p<0.05$) (see Table 7). Although it was expected to find a significant result between gender and the acceptability of sweetcorn, the finding was not quite significant (0.087, $p>0.05$), and all other effects were also non-significant at the alpha level of $p\leq0.05$ for both age and gender (see Tables 5, 6, 7 & 8).

Qualitative:

Semi-structured questions were used to form the discussions, and were based upon five themes; consumption and acceptability, food grouping, parental control, food classification and diet-related diseases, as similar themes have found interesting results in past research (Edwards & Hartwell, 2002). The transcripts were analysed through the means of framework analysis (Green & Thorogood, 2009).

Table 9
Themes used during the discussions

Theme	Description
Consumption and Acceptability	Consumption of fruit and vegetables, healthy and unhealthy foods, taste preferences etc.
Food Grouping	Which foods belong together, e.g. carbohydrates, protein and dairy foods.
Parental Control	Parental rules in the home, e.g. restrictions and encouragements of certain foods.
Food Classification	Which foods are good or bad for you, e.g. MacDonald's.
Diet-related Diseases	Which foods are commonly associated with tooth decay and obesity.

Table 10
Questions used during discussions, relating to each of the five themes

Theme	Questions
Consumption and Acceptability	How many pieces of fruit and vegetable should you eat per day? Does anybody eat 5 portions of fruit and vegetable every day? Do you prefer eating fruit or vegetables? Do you prefer eating healthy foods or unhealthy foods? Do you usually have a snack every day? When you have a snack at home or at school, what do you usually have? What is your favourite meal?
Food Grouping	What are carbohydrates? What are protein foods? What are dairy foods?
Parental Control	Does your Mum or Dad have any rules at home about what food you can eat? Do you have to ask your Mum or Dad if you can have something to eat? Do you normally eat the same evening meal as your parents? Do your parents let you choose what to have for tea?
Food Classification	What foods do you think can be called "fatty foods"? Do you think it is healthy to eat a MacDonald's every day? Do you think it is healthy to eat salad every day?
Diet-related Diseases	If you eat unhealthy foods and don't do enough exercise, what do you think will happen? What foods will make you overweight if you eat too much of them? What is tooth decay? What foods do you think can cause tooth decay?

Consumption and Acceptability

Table 11
Children's quotes illustrating their consumption and acceptability of fruit and vegetables

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Male	8-9 years	"I've done it once"	H, J2
Male	8-9 years	"I like vegetables because you can get more than fruit…"	I, J4
Female	8-9 years	"Yeah, but some vegetables might not be clean"	I, J5
Male	8-9 years	"And they have grease on them"	I, J6
Male	9-10 years	"None"	K, J2
Male	10-11 years	"I don't even eat two"	M, J2
Male	10-11 years	"I don't mind vegetables, like peas…"	M, J6

As can be seen in Table 11 above, when children were asked how many servings of fruit and vegetables they tended to eat on a regular day-to-day basis, males were more likely than females to admit to a lower intake in all age groups. It can also be seen that the majority of the children preferred fruit to vegetables, but a number of males from all year groups expressed a liking for vegetables rather than, or as well as fruit. There didn't appear to be any differences in the acceptability of fruit and vegetables amongst 9-10 and 10-11 year olds, however, some children aged 8-9 years demonstrated a lack of knowledge which may have accounted for their lower acceptability of fruit and vegetables, for example "Yeah but some vegetables might not be clean" and "And they have grease on them" (see Table 11).

Food Grouping

Table 12
Responses give by children illustrating their knowledge of carbohydrates

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Male	8-9 years	"Are they like vitamins?"	G, J10
Male	8-9 years	"Fish is a carbohydrate I think"	G, J15
Female	8-9 years	"Yes, they carbohydrate you, they're like water and stuff that can keep you healthy"	H, J6
Male	8-9 years	"Because it makes you taller"	H, J13
Female	9-10 years	"… start before a race, you'd probably have loads of carbohydrates"	J, J6
Male	9-10 years	"It's another word for fibre, and they're like bread, pasta, and it gives you energy"	K, J8
Female	10-11 years	"Are they like foods that give you energy, like bread, rice, bananas…"	N, J6
Female	10-11 years	"Bread and cereals, and other dry foods"	O, J8

As can be seen in the above table, the majority of children between the ages of 9-11 years were able to correctly identify which foods belonged to each food group, and on some occasions, were able to associate certain food groups with specific nutrients and health benefits, for example, "Are they like foods that give you energy, like bread, rice, bananas…" (See Table 12). However, children aged between 8-9 years displayed a much lower understanding of food groups, as they were more likely to confuse certain groups of food with other nutrients or other food groups.

Table 13
Children's quotes in relation to their knowledge of protein foods

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Female	8-9 years	"Is a piece of fruit protein?"	G, J13
Female	8-9 years	"They keep you going for a long time"	H, J15
Male	9-10 years	"Like fish, and meat and all that stuff"	L, J11
Female	9-10 years	"It's just all the meats that gives you protein, and the protein helps your muscles and stuff"	L, J12
Male	10-11 years	"Meat"	N, J10
Male	10-11 years	"And fish"	N, J11

Again, this table demonstrates that children aged 9-11 years were able to correctly identify which foods belong to certain categories of food, and in some instances, associate groups of food with health benefits, for example, "It's just all the meat that gives you protein, and the protein helps your muscles and stuff" (see Table 13). However, similar to the previous table, children aged 8-9 years were less able to do so, and demonstrated a much weaker understanding of these food groups.

Table 14
Children's responses regarding their knowledge of dairy foods

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Male	8-9 years	"Chocolates? That's dairy"	G, J16
Male	8-9 years	"Dairy chocolate"	H, J19
Male	9-10 years	"Stuff that comes from a cow"	J, J14
Male	9-10 years	"Ones that come from farmers"	K, J16
Female	10-11 years	"Food with milk in"	M, J13
Female	10-11 years	"Like milk and butter"	N, J12

As can be seen in Table 14, children aged 8-9 years were also more likely to perceive dairy milk chocolate as a dairy food due to its brand name, which again, demonstrates a weaker understanding of food groups. Children aged 9-11 years were more able to associate dairy foods with farm produce, and were able to give correct examples of dairy foods.

Parental Control

Table 15
Children's quotes illustrating parental control and rules

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Female	8-9 years	"I'm only allowed sweets once a week"	G, J19
Male	8-9 years	"… I'm not allowed too much chocolate"	H, J21
Male	9-10 years	"One unhealthy thing, and then I can have some fruit or something like that"	J, J16
Female	9-10 years	"I'm not allowed anything to eat half an hour before teatime"	K, J19
Male	10-11 years	"I just eat what I want"	M, J15
Female	10-11 years	"My Mum doesn't make up any rules"	M, J17
Female	10-11 years	"We usually have to have healthy things if we are going to have a snack, but we don't usually pick unhealthy foods anyway"	M, 18

As can be seen from Table 15 above, both females and males aged between 8-10 years were more likely to perceive their parents' as having restrictions on the amount of unhealthy foods they consume, yet seem to encourage the consumption of healthy foods. However, on the other hand, children aged between 10-11 years were much more likely to have no or limited parental rules. For example, "My mum doesn't make up any rules" shows no parental control, whereas "We usually have to have healthy things if we are going to have a snack, but we don't usually pick unhealthy foods anyway" demonstrates that rules are in place, but children of this age are more likely to make healthy choices for themselves regardless.

Table 16
Children's responses regarding family meals

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Male	8-9 years	"Yeah, I eat healthy, I never eat… I don't like chicken nuggets"	H, J22
Female	8-9 years	"I normally eat different foods to my family, because my Daddy comes home late, and my Mummy is on a diet, so she eats salad"	H, J24
Male	8-9 years	"… I don't usually like the foods that they eat…"	H, J25
Female	9-10 years	"It depends whether I like it or not, if I don't like it I normally have something different"	J, J19
Male	9-10 years	"I eat the same as my parents"	K, J22
Male	9-10 years	"I just eat the same because I'm not a fussy eater"	L, J16
Female	10-11 years	"I just eat what everybody else eats"	M, J20
Male	10-11 years	"I try new foods"	O, J15

Table 16 shows that the majority of children aged between 10-11 years consumed the same meals as their parents, whereas children aged between 8-10 years were less likely to eat the same meals as their parents, and this seemed to be mainly due to a dislike of certain foods.

Food classification

Table 17
Children's quotes illustrating their knowledge of MacDonald's fast food

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Female	8-9 years	"The chips and burgers are full of fat"	G, J23
Male	8-9 years	"You could get lung disease"	G, J27
Female	8-9 years	"It hasn't got any calories in it"	H, J27
Female	9-10 years	"It's not good for you everyday"	J, J26
Male	9-10 years	"Because they stuff loads of lard and that in the beef burgers"	L, J18
Female	10-11 years	"Because it's like, it's got loads of salt in it"	O, J21
Male	10-11 years	"You would have a heart attack"	N, J17

The above table demonstrates that children in all age groups were able to correctly identify fatty foods, and were also able to recognise that eating a MacDonald's every day is bad for you. Children aged 9-11 years showed a greater knowledge of the health consequences of a poor diet than children aged 8-9 years, as there seemed to be confusion about the nutritional values of fast foods and diet-related diseases amongst this age group.

Table 18
Children's responses regarding the consequences of eating salad

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Female	8-9 years	"… well you'll keep on getting addicted to eating salad every day"	G, J28
Female	8-9 years	"Because you should have a mixed diet, so if you ate too much salad you would be really skinny, but if you ate too much like of MacDonald's you'd be too fat…"	H, J35
Male	8-9 years	"You'll become really thin and everything"	I, J24
Female	9-10 years	"If you have salad every day, you might get too healthy"	J, J29
Male	9-10 years	"You need a bit of both because you need some fat food to fatten you up, and you need some thin food like lettuce or something to keep you going"	K, J28
Female	10-11 years	"Because you can have too much, you can have tomatoes…"	O, J28
Female	10-11 years	"I don't really think it's that healthy, because you need a whole variety of different foods"	O, J29
Male	10-11 years	"Because you need some fat in your body to keep you going"	N, J19

As is shown above, the majority of children were aware that it is not healthy to eat salad every day, yet some children seemed unsure as to why salad should be eaten in moderation. Females aged 8-10 years were more likely to associate eating salad every day with the effects on body image, whereas males tended to associate healthy foods as high sources of energy. It also shows that children aged 10-11 years were more inclined to consider the need for a variety of foods to maintain a balanced and healthy diet than children aged 8-10 years.

Diet-related Diseases

Table 19
Children's quotes illustrating their knowledge of the consequences of a poor diet

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Female	8-9 years	"It gives you a bad heart"	G, J26
Male	8-9 years	"You could get lung disease"	G, J27
Female	8-9 years	"It will get you blocked"	H, J33
Male	8-9 years	"You can become fat and can have a heart attack"	I, J21
Female	9-10 years	"Because if you don't do enough exercise, then you'll gain weight"	J, J24
Male	9-10 years	"And your heart rate would increase"	J, J25
Male	10-11 years	"You'd just be sick of it, it would kill you"	M, J22
Female	10-11 years	"It swells up your arteries"	N, J18

As can be seen in Table 19 above, children of all ages were aware of the health consequences of eating an unbalanced diet and not getting enough exercise, although there was more likely to be confusion regarding diet-related diseases amongst children aged 8-9 years, for example, "You could get lung disease".

Table 20
Children's quotes illustrating their knowledge of the effects of a high salt intake

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Male	8-9 years	"… the salt can kill your lungs"	I, J22
Female	8-9 years	"Not for children, because it gets stuck in your arteries"	J, J37
Male	9-10 years	"There's like these grids, where there's like 6 grams of salt per adult or something"	J, J38
Female	9-10 years	"I saw this TV programme that said, about MacDonald's and your daily allowance, it goes like three times over your daily allowance of salt"	J, J39
Male	10-11 years	"The salt will go into your blood and then it will pump round, the blood will pump through your heart, and it will make you have something like diabetes or cancer"	O, J24

As shown in Table 20, all children perceived a high intake of salt to be bad for you, although children aged 8-9 years were again, more likely to confuse certain diseases such as lung disease with a poor diet. Children aged 9-10 years showed an awareness of the recommended intake of salt, and children aged 10-11 years were able to give more sophisticated responses regarding the effects of a high salt intake.

Table 21
Responses given by the children in relation to tooth decay

Speaker		Quote	Location of Quote (Appendix & Comment Number)
Female	8-9 years	"… you rub it on your teeth where it hurts and then drink some cold water"	G, J33
Female	8-9 years	"Isn't it like when you have beef jerky, you have to chew it quite a lot because it's dry meat…"	I, J30
Male	8-9 years	"And from smoking as well, when you smoke"	I, J31
Male	9-10 years	"… it's when you eat too much sugar and all the bacteria from the sugar digs into your teeth, and then you have fillings"	J, J45
Male	9-10 years	"And your teeth go all manky and black and it's called plaque or something, and you have to have fillings for it"	K, J32
Male	10-11 years	"Tooth decay is where the sugar fizzes into your teeth"	N, J26
Female	10-11 years	"Well if you eat sugar all the time, then it tears away the like stuff and you get all plaque on your teeth, and then it gets to the nerve and that's when it starts hurting and you get toothache"	O, J35

In terms of tooth decay, males seemed to have a greater understanding of why tooth decay can occur, and children aged 10-11 years showed a much greater knowledge than children aged 8-9 years. For example, 10-11 year olds gave more precise responses, whereas responses of children aged 8-9 years were much more varied, and tended to be less accurate (see Table 21).

Discussion

Firstly, it was hypothesised that the acceptability of commonly available fruit and vegetables would increase with age, and although the results revealed that the acceptability of commonly available fruit did seem to increase with age; the acceptability of vegetables did not (see Figures 3 & 4). The Chi Square Tests revealed that only the acceptability of pineapple increased significantly with age (0.022, $p<0.05$) whereas all other acceptability analyses for age and fruit were non-significant (see Tables 7), suggesting that the hypothesis is partially supported. Despite the lack of statistical significance, these findings do seem to be in accord with Cooke and Wardle's (2005) assumption that the liking for fruit reaches a peak at 8-11 years, as this implies that the acceptability of fruit increases with age during these childhood years. However, the assumption that this preference then declines

through adolescence cannot be supported by this research study, as the sample only included children of primary school age; hence, further research with a wider age range is needed before results can be fully comparable to such literature. Nevertheless, this research study shows support for the assumption that older children are more inclined to try unfamiliar tasting foods such as fruit and vegetables due to the onset of puberty and a reduction of 'neophobia' (Ton Nu et al., 1996), as the acceptability of these foods increased with age. This, due to a greater degree of familiarity; older children are more likely to show a greater preference for these foods than younger children, and hence; is in accord with previous findings (Cooke & Wardle, 2005; Cooke, 2007).

This research suggests that interventions need to be specifically designed for different aged children, as they show different levels of acceptability of fruit and vegetables. Perhaps children of a younger age need to be more exposed to fruit and vegetables, in order to increase the appeal and acceptability of such foods, and thus, increase consumption. Following implementation of 'The National School Fruit Scheme' (Department of Health, 2002), it appears that exposing young children in UK primary schools to a variety of fruit does seem to enhance the acceptability, and therefore the consumption of fruit (Blenkinsop et al., 2007), and more scheme's such as these are needed in order to successfully improve children's health. Nevertheless, interventions also need to recognise that it is just as important to maintain the acceptability and consumption of fruit and vegetables in older children.

Secondly, it was hypothesised that females would show a greater preference for commonly available fruit and vegetables than males. It was found that females expressed a greater liking than males for the majority of fruit (see Figure 2), and expressed a greater liking than males for all of the commonly available vegetables (see Figure 5), yet no significant findings for gender were revealed (see Tables 5 & 6), suggesting that the hypothesis is again, only partially supported. However, the finding that females had a higher acceptability of fruit and vegetables than males aged 8-11 years is consistent with previous research, as this finding has been widely reported within a review of the literature (Rasmussen et al., 2006) and also in other similar studies (Cooke & Wardle, 2003; Cooke et al., 2003). Although Cooke et al., (2003) studied much younger children aged 2 to 6 years; this research demonstrates that gender differences are perhaps apparent much before primary school age and these variations seem to continue through childhood and pre-adolescent years. In addition, other cultures have reported similar gender differences in intake (Le Bigot Macaux, 2001; Reynolds et al., 1999; Diehl, 1999; Lien et al., 2000), and although different cultures are likely to have varying health promotional strategies, the acceptability of fruit and vegetables is likely to be an accurate indicator of consumption (Brug et al., 2008; Cooke, 2007), and therefore gives some confidence that these slight gender differences in acceptability are valid.

Nevertheless, such research typically employs self-report measures and food frequency questionnaires, which are often susceptible to social approval and social desirability biases (Miller et al., 2008), as children are not always familiar with adults treating them as equal, and may feel the need to please the researcher by providing socially desirable responses (Punch, 2002). In this particular study; although there was no indication of obvious social desirability bias during the tasks, children may have been more inclined to overrate their acceptability of fruit and vegetables as they

are likely to be aware that the more they say they like, the better, which questions the validity of these results. In addition, research has suggested that females may be more susceptible to social desirability bias, as they tend to be more aware that they should behave in certain ways (Miller et al., 2008; Baker & Wardle, 2003), which seems consistent with the view that females have a stronger attachment with the importance of healthy eating (Wardle et al., 2004). Again, although there were no indication of children providing socially desirable responses, females may have felt more inclined to overrate their acceptability of fruit and vegetables than males, which may have accounted for the observed gender difference. Furthermore, it must be reminded that what children say they like doesn't necessarily imply that they consume these foods on a regular basis, even though research does tend to suggest that children's food preferences are positively associated with their consumption patterns (Cooke, 2007). As a result, more extensive research is required in order to test whether or not an interaction exists between the acceptability of fruit and vegetables and actual consumption. What's more, males' lower acceptability of fruit and vegetables highlights the need for interventions to be appropriately tailored in such a way that increases the appeal of fruit and vegetables specifically for males.

Thirdly, it was hypothesised that the recognition of correctly available fruit and vegetables would increase with age, as would nutritional knowledge. Although a non-significant main effect for age and recognition was revealed ($F(2, 67)=0.264$, $p>0.05$), the rate of recognition did increase with age amongst females, yet did not amongst males. On the other hand, levels of nutritional knowledge seemed to increase with age amongst both genders, as children aged 8-9 years demonstrated a much weaker understanding of food grouping (see Tables 12, 13 & 14), food classification (see Tables 17 & 18), and diet-related diseases, in particular, tooth decay (see Table 21), than children aged 9-10 years and 10-11 years, thus suggesting that this hypothesis should be accepted.

These findings seem to be consistent with the idea that nutritional knowledge tends to be lower in younger children, as they have a weaker understanding of the association between food choices and health (Taylor et al., 2005). This was demonstrated in children aged 8-9 years, as they were less able to fully understand the health benefits of eating a balanced diet, and they were less accurate in their responses regarding diet-related diseases than were older children. Edwards and Hartwell (2002) used similar methodology to this research study in order to identify whether children aged 8-11 years were familiar with commonly available fruit and vegetables, and found that not only the recognition of fruit and vegetables increased with age, but revealed that the acceptability of these foods also increased with age, which in turn, suggests that children's acceptability of certain foods may be influenced by their ability to recognise certain fruit and vegetables, and their awareness of wider concepts regarding healthy eating. Therefore, it is not surprising to find that as the acceptability of fruit and vegetables increases with age, the levels of nutritional understanding also increase.

Consequently, this implies that if interventions aiming to increase children's awareness of nutrition are implemented in early childhood, children are more inclined to accept these foods at a much younger age. In turn, this is likely to lead to an increase in consumption of such foods, and these healthy eating behaviours are then

more likely to track into adulthood, achieving long-term health of the individual (Perry et al., 1998; Venter & Harris, 2009).

Finally, it was hypothesised that females would be able to correctly recognise more commonly available fruit and vegetables, and demonstrate a better understanding of nutrition than males. Again, a non-significant main effect for gender was revealed ($F(1.67) = 0.285$, $p > 0.05$), and it also became apparent that there was no interaction between age and gender ($F(2, 67) = 0.551$, $p > 0.05$) and the rate of recognition, yet females did generally show a higher rate of correct recognition than males. The results also showed that, although females were more likely to associate healthy eating with the effect on body image, females seemed to demonstrate a similar nutritional knowledge to males throughout the discussion, suggesting that the hypothesis is not fully supported, and does not therefore show support for the assumption that females have a greater nutritional knowledge than males (Hart et al., 2002). However, it does seem to be consistent with the view that females show a stronger attachment to healthy eating and dieting than males (Wardle et al., 2004), which is demonstrated by their concerns regarding the effects of eating an unbalanced diet on body image, for example, "… if you ate too much salad you would be really skinny, but if you ate too much like of MacDonald's, you'd be too fat…" (See Table 18). On the other hand, as Wardle et al., (2004) suggests, males tend to associate their food choices with their physical demands, for example, "I have to eat a lot of meat and fruit… so I can be energetic" (See Table 18). This also relates to the idea that meat and energy-dense foods are commonly attributed to the male identity, whereas fruit and vegetables are more attributed to the female identity (Kiefer et al., 2005), which in turn, may provide an explanation for why females in this study demonstrated a greater acceptability of fruit and vegetables.

Therefore, these findings imply that although males demonstrated a similar level of nutritional understanding to females, females are more able to correctly recognise commonly available fruit and vegetables, which seems to correspond with their higher acceptability of such foods. Future health promotional strategies that aim to increase levels of knowledge even further amongst males may detect changes in the acceptability of fruit and vegetables, and thus, an increase in consumption.

However, this research study does have its limitations. In a methodological sense, this research study relied on a simple, self-report measure to assess the children's acceptability of fruit and vegetables, and it is often suggested that this is not the most appropriate methodology to employ in research with children due to the possibility of social desirability bias (Miller et al., 2008). However, as Baker and Wardle (2003) suggests; almost all research assessing children's acceptability or intake of fruit and vegetables employ simple frequency questionnaires and self-reports, so the limitation is across the whole field rather than just in this particular study. In order for this to be overcome, future research needs to employ much more solid measures which gather data accurately and precisely, so we can be sure that any age and gender differences that are observed are valid.

Furthermore, much research within this area have used 5-point likert scales in order to assess children's acceptability of fruit and vegetables (Edwards & Hartwell, 2002; Cooke & Wardle, 2005), which this research study lacked. During this study, a minority of children became unsure of how to rate their acceptability of a particular

fruit or vegetable, as they did not 'like' nor dislike' the food. This therefore implies that this methodology may have been flawed, and a 5-point likert scale may have been more appropriate to use, as children would be more able to accurately rate their acceptability for fruit and vegetables. Although slight age and gender differences were observed for children's acceptability ratings, almost no significant differences were reported which suggests that further research using a more advanced scale may result in more significant findings.

What's more, although Punch (2002) expressed that using different methodologies with children can be more successful, the task-based approaches may have been too simple for children aged 8-11 years, as the age and gender differences that were reported were very slight. Therefore, using discussions may be more effective with children of this age, as although few differences were observed in this study, it is likely that any differences that do arise become more apparent through qualitative means rather than quantitative. This could be due to the fact that children of this age are reaching adolescence and therefore want to be treated in a similar way to adults, and are perhaps more willing to express their perceptions on issues surrounding healthy eating than children of a younger age.

Methodological issues put aside, perhaps it is the changes in government policies that have largely influence these findings, and may be a possible explanation for why they differ slightly from older research (e.g. Hart et al., 2002). Since Jamie Oliver launched his 'Feed Me Better' campaign concerning the nutritional standards of school meals in primary schools across the UK in 2004 (Oliver, 2005), the government have introduced new nutritional standards for school meals (School Food Trust, 2008) whereby minimum requirements are set for healthier foods, and restrictions for less healthier foods served at lunchtime. Furthermore, many schools; including Ellesmere Primary School where this research took place, are now part of a 'Healthy School' programme (Healthy Schools, 2009). Schools with a 'Healthy School' status must have met national criteria in four areas; personal, social, health and economic education (PSHE), healthy eating, physical activity and emotional health and well-being, which implies that children of Ellesmere Primary School are likely to have had an increased awareness of the issues being discussed prior to the study, which may have accounted for the few observed age and gender differences.

In terms of future research, the assumption that taste preferences tend to peak around the age of 8-11 years and decline through adolescence (Cooke & Wardle, 2005) would be worth considering further. Although this research study found that children's acceptability of fruit and vegetables increases with age amongst 8-11 year olds, it cannot be assumed without further research that this acceptability then decreases through adolescence as only children of primary school age were included in this research. Therefore, it would be particularly interesting to conduct a similar study using 8-14 year olds for example, which would take into account the transition to secondary school. Such research would be more able to determine whether fruit and vegetable consumption amongst primary school children should be the main focus of interventions, or whether the focus actually needs to be on adolescents. What's more, children beginning secondary school face more freedom in their food choice than primary school children and with less parental control and the influence of peers, children of this age are likely to develop potentially unhealthy, eating habits (Cooke & Wardle, 2005). As a result, more extensive research is

required within this area of literature, and needs to employ much wider age ranges to determine where possible age differences occur in the acceptability of fruit and vegetables is in accordance with Cooke and Wardle's (2005) assumption.

Conclusion

Overall, this research study demonstrated that; although statistical tests showed almost no significant differences, slight gender and age differences were apparent in the acceptability and recognition of commonly available fruit and vegetables, and nutritional knowledge. These findings suggest that if interventions and health promotional programmes are to be successful in increasing fruit and vegetable consumption, possible gender and age differences amongst the acceptability and recognition of commonly available fruit and vegetables as well as levels of nutritional understanding need to be considered as potential determinants, as addressing these potential differences may go some way to addressing the age and gender differences in fruit and vegetable intake (Baker & Wardle, 2003).

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