

What I say isn't always what I do: Investigating differences in children's reported and actual snack food preferences

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Abstract: The current study sought to explore discrepancies between children's stated snack food motivations and actual food choices, using the Implicit Association Test (IAT) as a measure of implicit attitudes towards 'healthy' and 'unhealthy' foods. Participants were children aged 6-12 years ($n=118$), from two primary schools on the South Coast of NSW, Australia – a public school in a semi-rural suburb south of a sea-side city and a public school in a largely residential northern suburb of the same city. The children completed a questionnaire about motivations for snack choices, participated in an activity, completed two further questionnaires, selected snack foods from an in-class store, and participated in two rounds of an IAT 'game' pairing pictures of snack foods with positive and negative words. As hypothesized, the majority of children reported 'healthiness' as their primary motivator for snack food choice, but when faced with an actual purchase decision predominantly chose unhealthy snacks. It appears that children may have internalized the 'moral' values attributed to healthy and unhealthy foods and that this process influences both their explicit and implicit attitudes. However, their actual food choices are likely to be influenced by other factors, and thus more complex to understand and influence.

Keywords: Children, snack food, implicit association test, motivation, preferences, experiment, Australia, food choices, healthy food, purchase decision.

INTRODUCTION

The prevalence of childhood overweight and obesity is increasing in nearly every developed country [1, 2] and in many developing countries [3]. In Australia the prevalence of overweight and obesity among children aged 7-16 increased from 11% in 1985 to 21% in 1995 [4] and by 2005 25% of 5-17 year olds were classified as overweight (17%) or obese (8%) [5].

Research shows that children are eating outside the home more regularly, eating larger portion sizes, consuming more soft drinks, and eating less fruit and vegetables [6]. The 2007 Australian National Children's Nutrition and Physical Activity Survey found that a large proportion of children consumed insufficient serves of fruit and less than one-quarter consumed adequate amounts of vegetables whereas over 80% consumed more than the recommended level of saturated fat and over 60% exceeded recommended levels of sugar consumption [7]. The energy intake of Australian children aged 10–15 years increased by 12% for girls and by 15% for boys between 1985 and 1995, due to increased consumption of energy-dense, nutrient-poor foods and beverages [8].

Children's snack foods are an important contributor to their total nutritional intake and, compared to 'meals', are the food choices over which they have the most control. An analysis of data from a subsample of children in the Survey of Sugar Intake among Children in Scotland found that children ate a median of 3.3 meals and 2.0 snacks per day, and that snacks accounted for 21% of their total daily energy intake [9]. In Australia, the 1995 National Nutrition Survey (NNS) found that (on the day prior to being surveyed) just over a third of 8 to 11-year-old children ate savoury snack foods (e.g., potato crisps, corn chips, etc) and half ate confectionary [10].

A cross-sectional study of food and beverages consumed at school by 1,681 primary school children found that almost all children had some 'junk food' (biscuits, cakes, muesli/fruit bars, packaged snacks, or chocolates/lollies) in their lunchboxes, averaging three servings per child; with only 7% of children having none of these foods in their lunchbox [11]. Approximately one tenth of their respondents purchased food at school, and these children consumed significantly more cakes, fast food and soft drinks (and less bread, biscuits, fruit, and dairy). A variety of factors have been reported to influence food choice, including physiological, psychological, social, environmental, and cultural factors [12-14]. While conceptual models are limited in their capacity to predict food choice, they demonstrate the complexity of these decisions [15].

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A recent study examining the influence of magazine advertising on children's food choices found a discrepancy between what children stated was important when choosing food, and what they actually chose for themselves. While almost 90% of their participants stated that it was important or very important that the snack foods they chose were healthy, less than one-quarter chose even one healthy item (out of two) when placed in an actual choice situation; with no statistical association between stated importance of 'healthy' snack foods and the actual food choices [16]. These findings suggest that when asked directly, children are likely to report socially desirable responses i.e., those that they believe their parents, teachers or other adults want to hear, rather than their actual preferences. It is perhaps not surprising that this effect exists, given other studies which demonstrate that *parents'* reports of behaviours and intentions regarding the provision of healthy foods for their children are influenced by perceptions of value judgments associated with these food choices [17].

The present research aims to explore potential discrepancies between children's stated snack food preferences and their actual food choices using the Implicit Association Test (IAT) as a measure of implicit attitudes towards 'healthy' and 'unhealthy' foods. Understanding these discrepancies is important if we are to develop appropriate messages about food order to improve children's food choices as a key element of strategies to address childhood obesity and its sequelae.

Measuring Attitudes

Attitudes, defined as "favourable or unfavourable dispositions toward social objects, such as people, places and policies" [18] have long been studied as a potential portal through which to view consumer behaviour. Attitudes have generally been conceptualised as being comprised of three parts – affective, cognitive and behavioural – and are conceived as being consciously available [19]. Thus the study of attitudes in marketing contexts usually focuses on assessing conscious processing of marketing messages and promotions. It is thought that, excluding the possible influence of social desirability, explicit measures will uncover true attitudes, and that these may be reliably linked to consumer behaviour. However, more recent attitudinal models have come to re-formulate traditional views by postulating that some attitudes operate outside of consciousness, and that

these may also have the power to influence behaviour [18,19] and consumer choices in particular.

Explicit measures rely entirely on the person's ability to recognise their own motivations and feelings, and to be prepared to convey these to others. Thus, they are subject to both contextual and motivational influences. Accordingly, it may be difficult for some participants to accurately record their attitudes, particularly towards more sensitive issues. Implicit measures avoid these problems by tapping into attitudes that may not be readily available to conscious thought [20]. Moreover, participants are unaware that they are actually reporting an attitude, which would be expected to reduce social desirability bias [20].

Despite controversy regarding whether explicit and implicit measures are assessing different [19, 21] or similar constructs [22], an analysis of both implicit and explicit attitudes may be preferable to enhance the attitude-behaviour associations, and to circumvent social desirability bias.

The Implicit Association Test

An increasingly commonly used method for the measurement of implicit attitudes is the Implicit Association Test (IAT) [23]. The IAT can be used as a predictor of consumer behaviour, which can be correlated with explicit attitudes [24] and has been shown to relate to behavioural orientations [22]. The IAT uses response latency to reveal attitudes [25] and can be administered on paper or *via* computer. Response latency in health research is used to determine how accessible an attitude is to consciousness ('attitude accessibility'), by determining how quickly it comes to mind [25].

Latency measures assess the "strength of the linkage in memory between an attitude object and an evaluation of that object" [25; p. 290]. In this way, it is possible to measure the degree of association between the attitude object (e.g., ice cream) and evaluation words (e.g., nasty, fun, happy, sad). It is assumed that the speed with which one can match a particular attitude object with 'good' words, compared to the speed with which one can match it to 'bad' evaluative words, will give an indication of underlying attitudes towards the object [19, 26]. That is, participants who like ice-cream will be very quick to match pictures of ice-cream with words like 'happy', 'fun' and 'friend', but slower in a subsequent task where they are asked to match it with negative words like 'boring', 'sad', and 'vomit'

Participants' attitudes are evaluated by asking them to press one particular key (in a computerised administration) or tick one particular box (in a paper-and-pencil version) when they see one attitude object (e.g., ice cream) or a good word, and another key when they see the other attitude object (e.g., brussel sprouts) or a bad word. In the subsequent trial these pairs are reversed, so that one key must be pressed (or box ticked) when they see chocolate ice cream or a bad word, and another must be pressed when brussel sprouts or a good word is presented. Differences between response latency for the two trials are then examined to determine the implicit attitude [26]. If they are faster on average to respond to the first trial than the second, it is assumed that the individual must prefer chocolate ice cream to brussel sprouts. This method is sensitive to subtle differences between the two target categories, and it has been used extensively in research on health-related behaviours [20, 27] and discrimination [18].

More recent research has found that the IAT can be effectively used for research with children as young as 6 years old. For example, a study that modified the IAT for use with children provided evidence that children of ages 6 and 10 years hold implicit anti-black and pro-white racial attitudes at a level comparable to adults [26]. The IAT has also been applied to the study of consumer choices with regards to food. A series of four studies ($n=399$) examining implicit attitudes to snack foods versus fruit demonstrated the predictive validity of the IAT for food choices, with the IAT contributing unique variance to the model independent of that generated from explicit measures of attitudes [28]. Similarly, a study exploring implicit attitudes towards meat and vegetables for vegetarians and non-vegetarians showed that the IAT was a significant predictor of group membership, with vegetarians showing a more negative implicit attitude to meat and more positive implicit attitude to vegetables, than non-vegetarians [29]. Taken together, these results suggest that the IAT is suited to the study of food choices, and can also be used with children.

Aims of the Study

The aims of the current study were to confirm the existence of a discrepancy between children's stated snack food preferences and actual snack food choices [16] with a larger sample; and to better understand reasons for this discrepancy through use of the IAT. In relation to food choices, it was hypothesised that:

- H1: Consistent with previous research, children would report preferences for healthy snack foods.
- H2: Consistent with previous research, actual food choices would be inconsistent with stated preferences; with a higher proportion of unhealthy food options selected.

H1 and H2 are important in confirming that there is a difference between children's stated and actual food preferences as this has important implications for research and practice. For example, if these hypotheses are supported, researchers will need to exercise caution in drawing conclusions about factors that influence food choices – including the effectiveness of educational interventions – based on stated food preferences and food choice intentions (commonly used proxy measures for actual food choices).

In relation to underlying attitudes that drive food choices, it was hypothesised that:

- H3: Children's responses to the IAT would show an implicit positive attitude to 'unhealthy' food choices, demonstrated by a faster response time when matching pictures of confectionary to positively-valenced words.

Understanding the role of implicit attitudes in food choices similarly has important implications for research and practice. For example, if this hypothesis is supported, agencies conducting nutrition education activities – both in the school system and in parent- and community-targeted communications – will need to develop strategies that increase the positive associations with healthy foods (perhaps focusing on 'taste' and 'fun' rather than health) and decrease positive associations with unhealthy foods.

METHOD

Participants

The participants in this study were 118 primary school aged children from two different primary schools, purposively identified within the geographical area where ethics permission had been obtained. School A ($n=63$) and School B ($n=55$). School A is a public school in a semi-rural suburb south of a seaside city on the South Coast of NSW. The population of the suburb has experienced significant growth in the past ten years as it transitions from being a traditional

farming base to a site for rapidly expanding housing developments, which has brought a number of young families to the area. At the time of the research, the school had an enrollment of 525 children. School B is a public school in a largely residential northern suburb of a seaside city on the South Coast of NSW. It caters for a diverse socio-economic community. At the time of the research, the school had an enrollment of 309 children. The schools were identified to represent the diversity within the geographical area (semi-rural and residential), differences in school sizes (small and mid sized) and socio-economic groups.

The two school principals were informed of the research, and upon giving their consent they then asked teachers in their school for expressions of interest for their class' participation in the research. Two teachers in each school agreed for their students to be invited to participate in the research. These teachers were the first to express their interest in being involved to their principal and as such were the teachers (and subsequently students) the researchers

were invited to make contact with. Student participants were invited from those classes; those who provided signed consent from their parents/guardians were incorporated in data collection procedures. In School A 63 of a possible 65 children participated (one child did not return their consent form and one child was absent of the day of data collection), In School B all 55 children spread across the two classes participated. In each site, data was collected at one time by a team of three researchers. In each site, one of the two classroom teachers remained present while the researchers worked with the children. Both teachers observed the data collection with no interaction with the researchers or students.

The majority of participants were in grades three (41.0%), four (15.4%), five (11.1%) or six (27.4%), although 6 of the children (5.1%) were in grade two. The average age of the children was 9.2, and they ranged in age from six to twelve, although the vast majority (88.6%) were aged eight to eleven. Exactly half were female children ($n=59$), while the gender of

Table 1: Study Phases

| Phase | Activity | Tasks |
|-------|---------------------|---|
| One | Questionnaire One | Demographic questions Items on factors influencing snack food choice Sample item: "How important is it to you that a snack (tastes good/is healthy/is fun)" [response options 'very important,' 'a little important' and 'not important'] |
| Two | Magazine Exposure | Read a magazine (targeted at children of their age group) - 15 minutes to read the magazine at their own pace Distractor task (completing a find-a-word puzzle from the magazine). |
| Three | Questionnaire Two | Brief set of questions about magazines and magazine advertising (data not reported) Data available from authors on request |
| Four | Purchase Activity | Children given two vouchers that they could use to 'purchase' two snack foods from the 'in-class store'. 'Store' items included two unhealthy packaged food choices (two candy bars, named 'Zombie Chew' and 'Snap Crackle') and two healthy packaged food choices (mixed diced fruit 'Fruit Cups' and bite-sized crunchy rice snacks 'Rice Wheels'). Store selection was carefully designed to ensure both an equal number of 'healthy' and 'unhealthy' choices and an equivalence of portion sizes (including the specification that the packaging of the products had to be appealing to children) across the food choices. |
| Five | Questionnaire Three | Questions about the foods they chose and how healthy they thought their choices were |
| Six | The IAT | Played two 'games' (the IAT) Game One: mark 'good' words (such as 'friend' and 'fun') and foods from a plant (such as apples and mushrooms) in one column, and 'bad' words (such as 'mad' and 'yucky') and foods from a packet (such as potato crisps and candy bars) in another Game Two: mark 'good' words and foods from a packet in one column and 'bad' words and food from a plant in another (in Game Two) Approximately half of the children completed Game One first, and then Game Two, while the other half started with Game Two and then moved to Game One (to control for order effects) If a child ad marked an item as fitting into both columns, they were deemed to have incorrectly assigned that item. Before completing each game, children were given a practice game, which included five questions |

two was not reported. All data were collected in March 2010.

Procedure

The study procedure consisted of six phases (questionnaire one; magazine exposure; questionnaire two; purchase activity; questionnaire three; and finally the IAT – as shown in Table 1). The study was conducted in the hour before a break time in both schools (i.e., an hour before morning tea or lunch). This meant that the participants were unlikely to be still satiated from their breakfast/morning tea, and were likely to be moderately hungry.

Practical restrictions meant that the pencil and paper version of the IAT was utilised with the children rather than the computerized form. While the computerized version of the IAT is more commonly used, the pencil and paper version operates under the same principles, generates a similar factor structure and has been shown to have equally strong test-retest reliability as the computerized version [30]. Furthermore it is highly correlated with the computerized version and is particularly suited to testing verbal stimuli such as that used in the present research [31]. The pencil and paper version of the IAT has been used to test many different domains of implicit attitudes including anti-fat bias [32, 33], implicit self esteem [30] and in-group attitudes [34]. To appeal to the age group of the students participating in the study, the pencil was substituted with an inked stamp. This reinforced the ‘game’ nature of the task and also enabled them to respond quickly to the words and images presented.

The study protocol was approved by the University’s Ethics Committee and the NSW Department of Education and Training.

RESULTS

Reported Snack Food Choice Motivators

Consistent with previous research, the children in this study reported that it is more important to them that snack foods are healthy (61.5% answered ‘very important’ to the question “How important is it to you that a snack is healthy?”) than that they taste good (28.2%) or are fun (17.1%). Correspondingly, just 3.4% of children stated that it is not important that snack foods are healthy, compared to 13.7% and 44.4% who stated that it is not important that snack foods are tasty or fun respectively (see Figure 1). Independent samples t-tests indicated that there were no significant differences between male children and female children regarding perceived importance of snacks tasting good, being healthy or being fun.

The assertion that healthiness is the most important attribute of snack foods was somewhat contradicted by the children’s self-reported favourite snack foods (note that they were able to choose more than one). While the most common response was fruit and vegetables, chosen by 53.0% of the children as a favourite snack, the appeal of sweet snack foods was also apparent, with 48.7% choosing these as a favourite. Less desirable were takeaway foods (27.4% chose as a favourite), dairy products (24.8%) and savoury snacks (22.2%).

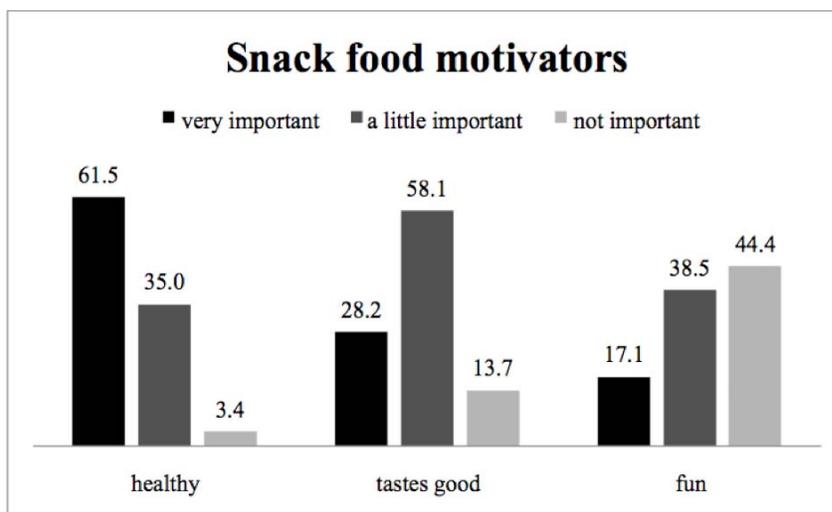


Figure 1: Stated priorities in food choices.

There were slight variations in preference by gender, although in two cases a *significant* difference was seen: male children were significantly less likely than female children to choose dairy products (such as cheese and milk; $p=0.007$) or savoury snacks ($p=0.010$) as a favourite snack food – in each case, roughly one in eight boys chose these foods as a favourite compared to one in three girls. Age had limited impact on favoured snack foods, with consistent answers seen from children across all ages and school grade levels.

Snack Food Selections

In total, the children chose 234 snack foods; 116 chose two snack foods each and two only selected one snack food. Of these 234 choices, just 40 were healthy options (28 Fruit Cups and 12 Rice Wheels), while the remaining 194 were unhealthy options (154 Zombie Chews and 40 Snap Crackle Chews). The most common choice from the children was two Zombie Chews ($n=47$ children), followed by one Zombie Chew and one Snap Crackle Chew ($n=32$) and one Zombie Chew and one 'healthy option' ($n=28$).

Did they Know they were Healthy?

The majority of children who had chosen a healthy snack knew that it was healthy (79.5%; $n=31$). There was much less uncertainty among those who had chosen an unhealthy snack, however, with 189 out of 190 (99.5%) indicating that the snack they chose was either unhealthy or very unhealthy. Four children did not answer this question.

Implicit Associations Test

As stated above, half of the children completed Game One and then Game Two, and half Game Two then Game One; the results are reported by game version.

Practice One

Practice One and Game One required children to match 'foods from a plant' to 'good words' and 'foods from a packet' to 'bad words'. The average score for

these practice questions was 4.9, with 107 of 118 children (90.7%) scoring five out of five, and just two children (1.7%) scoring three or less. This indicates that the vast majority of the sample fully grasped the concept of the game.

Game One

The children were then given 60 seconds to complete as many questions as possible, with a maximum of 24 questions. Analysis focused on two factors: how quickly the children managed to categorise the pictures and words, and their accuracy in doing so. Of the 24 questions, seven were correctly identified by all children in the sample as being either 'good' or 'bad' words, or fruit from a package or a plant (please note that this is 100% of those children *who attempted* each question – in some instances where they were towards the end of the game, not all children completed that part because of the time limit). Just one of these seven was a picture (apple), with six words: 'fun' (twice), 'happy', 'good', 'bad' and 'nice'. For every other picture or word (except one), over 96% of the children who attempted to categorise it did so correctly. The one exception was 'Rice Wheels', which 84% of the group categorised correctly (it is interesting to note that while this is 'food from a packet' it is promoted as a healthy food choice, and indeed was one of the healthy choices in the in-class store).

More than one-third of the children scored a perfect 24 from 24 (43.2%). On average, children got 20.3 of the 24 items correct ($SD=5.0$), having attempted an average of 20.7 but running out of time to complete the last 3.3 (Table 2). This equates to an accuracy of 98.1%, and it is therefore reasonable to conclude that the children were consistently capable of distinguishing between 'good' and 'bad' words, and foods from a 'plant' or a 'packet'. This level of accuracy remained very consistent across both words (97.9%) and pictures (95.0%), and 'good' (99.0%) and 'bad' (93.9%) categories. The speed at which these were completed, however, varied much more than did accuracy, with the number of questions attempted ranging from just five (in 60 seconds), to completing all 24. While more than half of the group (61.9%) attempted all questions in the

Table 2: Results from Games One and Two

| | # items | Average Attempted | Average Skipped | Average Correct (SD) | Median | Minimum Correct | Maximum Correct |
|----------|---------|-------------------|-----------------|----------------------|--------|-----------------|-----------------|
| Game One | 24 | 21.47 | 2.53 | 20.77 (4.62) | 23 | 4 | 24 |
| Game Two | 24 | 20.45 | 3.55 | 17.68 (5.78) | 18 | 3 | 24 |

game, nearly one-third (32.2%) only completed 18 or less.

Practice Two

Practice Two and Game Two required children to match 'food from a plant' to 'bad words' and 'food from a packet' to 'good words'. The children fared less well with the second practice game than the first. The average score from these five practice questions was 4.6, with 79.7% of the group scoring a perfect five from five, and 13.6% scoring three or less, a considerable increase from the 1.7% in Practice One.

Game Two

Again, the children were given 60 seconds to complete Game Two, and again there were 24 questions. The heightened difficulty of Practice Two transferred to the results of Game Two, as the speed at which they completed this game dropped from Game One, with an average of 19.6 questions attempted, and 4.4 skipped. However, despite taking more time to complete the questions in this game, their level of accuracy also dropped to 90.3%. The average score for this game was 17.7 ($SD=6.1$), nearly three below the average score from Game One (Table 1). Just 34 children (28.8%) scored a perfect 24 out of 24, a significant reduction from Game One.

None of the 24 questions were correctly categorized by all children who attempted the game. In fact, the highest success rate was for the very first question (picture of a 'Sippah Straw'; a flavouring straw for milk), which 94.9% of children correctly categorized. Only 11 of the remaining 23 questions were correctly classified by 90% of participants.

DISCUSSION

Consistent with our first hypothesis, we found that these primary-school aged participants reported a preference for 'healthy' snack foods, with healthiness reported as very important by twice as many participants as 'taste' and three times as many as 'fun'. Less than one in 20 stated that it is not important that snack foods are healthy, with no significant differences between male children and female children or across age groups.

Consistent with our second hypothesis, and previous research [16], we found that the children's actual food choices were inconsistent with their stated reasons for choosing snack foods. Only five of the 118 children chose two healthy food options; and only 40 of

the 234 snack foods 'purchased' were healthy foods. More than two-thirds of the children chose two unhealthy items, and only 32 chose one healthy and one unhealthy snack. These poor food choices were not driven by a lack of awareness of the health value of the foods chosen; 99.5% of those who chose an unhealthy item reported that that the snack they chose was either unhealthy or very unhealthy, and 79.5% of those who chose a healthy snack reported that it was healthy.

Implicit Association Test (IAT)

We used the IAT to explore children's implicit attitudes to snack foods, hypothesizing that we would find that children have positive associations with unhealthy snack foods which operate below the level of consciousness or, at least, that they are not willing to express due to the social desirability of eating healthy foods (particularly in the context of a classroom-based study). Converse to our expectations (hypothesis three), the children found Game Two (pairing positive words with unhealthy snack foods and negative words with healthy snack foods) much more difficult than Game One – they were slower to categorise the words and pictures and less accurate in their responses. It must again be noted that half of the group completed Game Two before Game One, which should have controlled for any learning effects and/or any increased difficulty or confusion in adapting to a new set of rules the second time around.

There are several possible interpretations of this counter-intuitive finding. We suspect that the most likely of these relates to the specific words chosen for this activity (which were based on previous studies using the IAT with children). On reflection we identified that a number of these words potentially have a 'moral' connotation, consistent with the way that foods are often described by parents and in the media (for example, apples are 'good' and lollipops are 'bad'). We are unable to explore this explanation based on our data as the paper-and-pencil completion of the test does not allow for calculation of item-by-item response latency. Future studies could either utilize computer-based IAT administration (allowing for measures of latency) or allocate children randomly either to test instruments which utilize words with a 'moral' connotation (such as good/bad) or to instruments which utilize morally neutral words (such as tasty/yucky).

Another possibility is that children's attitudes towards healthy versus unhealthy snacks are complex

and multifaceted and it may be overly simplistic to assume that children perceive healthy/unhealthy snack foods categorically as positive or negative. A preference for one type of snack over the other may depend on the context that the child is presented with at the time of choosing. For example, in certain situations (such as a child's birthday party or a visiting research team in their classroom) 'fun' snacks would probably be preferred over healthy snacks, but in other contexts the reverse may be expected. The present research collapsed a number of potentially different affectively charged words under the headings of 'positive' or 'negative' (e.g., 'fun' as a positive word, versus 'mad' as a negative one). These words may represent different domains of a child's attitude to healthy/unhealthy snacks, or understanding of the meanings of the words, and as noted earlier, further refinement of these testing words may be of benefit in future research.

One other explanation for seemingly contradictory findings might come from closer examination of implicit attitudes and the IAT used to measure these. While IAT data may well be accurately representing implicit attitude of the children, this does not mean that their attitude has not been formed by experience in the social world, where healthy foods are promoted as 'good' and unhealthy foods as 'bad'. It would be expected that healthy eating attitudes, which are likely to have been instilled in early life, could have become internalised to the extent that they are now automatic and beyond conscious awareness. Implicit attitudes should therefore not be perceived as simply a product of what a child spontaneously and independently 'likes/dislikes', but also as a product of a range of (possibly conflicting) experiences in their social world.

It is also important that future research find ways to explore the underlying motivators of snack food choices in this age group. While taste is an obvious factor, there is a need to explore both how these taste preferences are developed and how they are influenced by social and environmental cues. For example, while children are educated by their parents and teachers about the importance of healthy foods – and demonstrate an apparent agreement with these values – they are concurrently exposed to a raft of commercial messages that promote the 'taste' and 'fun' of packaged snack foods. There is a need to examine the role of these different influences on children's food-related knowledge, attitudes and behaviours; how

these apparently contradictory messages are processed and internalised; and, importantly, how children rationalise the apparent contradiction between their stated food values and their actual food choices.

Despite evidence suggesting a positive implicit and explicit attitude to healthy eating, children do still engage in unhealthy eating behaviours [7]. The lack of consistency between attitudes and behaviour has been long acknowledged in psychological research [35, 36] and the predictive utility of implicit versus explicit attitudes for behaviour depends on multiple factors [37]. The link between implicit and explicit attitudes and actual behaviour was not measured as part of this research but remains an important topic for future research.

Limitations

Our study utilized a sample of 118 children from two primary schools in one regional city of New South Wales, Australia. Thus our findings may not be representative of the broader population of children in this age group. It is possible that the schools that agreed to participate had a particular interest in children's food choices, although if this were the case our results may in fact under-represent the extent to which children would choose unhealthy foods. Similarly, having children answer questions about influences on their snack food choices, and having them undertake this study with a team of researchers in a classroom environment, may have primed them to make healthier food choices; however, again, the low frequency of healthy food choices suggests that this was not the case.

While the store was set up to ensure that children made their food choices without being seen, or directly influenced, by their peers, it is entirely possible that their choices were influenced by the perception that their peers would observe them consuming their selections. It is for this reason that we suggest further research is needed to explore the range of social and environmental factors that influence children's food choices. For ethical and logistical reasons we were unable to collect height and weight details for the children, and are thus unable to comment on any association between BMI and food choice.

Implications

We believe it is important to continue such research as snack food choice has important implications for

overall nutritional intake, and the balance between energy consumption and expenditure, thus influencing children's current and future health status. Our study underlines the importance of measuring actual behaviour (food choice in a real-life situation) rather than using stated preferences or intentions as a proxy for food choice. Behavioural intentions are a commonly used outcome measure in social psychology and health research, but have been found to lack predictive and explanatory value in models of health behavior [38-40], and have long been subject of debate. While no outcome measure can be expected to have complete predictive power, behavioural intentions are subject to intervening variables and results of meta-analyses have indicated that they tend to account for between 19 and 38% of variance in behaviour [39]. Where possible, studies should seek to measure both real life behaviours and intended actions to provide a more complete explanatory model.

This study also has important implications for practice. If, as it appears, children have internalized their parents' messages about 'good' and 'bad' food, but still choose to eat unhealthy snack foods when given the opportunity, we need to find better ways to understand, and educate them about, their food choices. For example, rather than attaching moral values ('good' and 'bad') to food, and thus perhaps making children feel guilty about their food choices, we need to focus on the health-promoting and health-damaging effects of different food types and talk about moderation and balance. We also need to explore ways to make healthy food more appealing to children – particularly paying attention to the concept of 'fun' which appears to have been mastered by marketers of unhealthy food. This may include packaging healthy food differently (such as in easy to eat forms that do not require children to stop playing to consumer them) and marketing healthy food differently (focusing on the taste and enjoyment of the food rather than its 'good'-ness). The obvious counterpoint to this is the need to continue to address the marketing of unhealthy foods to children, with numerous studies showing that advertising for these foods associates their consumption with fun and excitement – including bright packaging, intensely coloured and flavoured ingredients, free gifts, competitions, and link-ups with cartoon characters, pop stars, sporting heroes and popular children's films [41-44].

CONCLUSION

It is apparent from this study that children have positive attitudes, both explicit and implicit, towards healthy food. The existence of these attitudes demonstrates that the ongoing efforts of educators, health professionals and parents to develop healthy eating patterns among children are assisting children to develop positive attitudes towards, and intentions to consume, healthy foods. The fact that, despite these positive attitudes, children still select unhealthy options when given a choice of snack foods suggests that other factors are also important in the step from intention to behaviour. Consistent with health behaviour theory, these factors are likely to include both social factors such as what children think their peers will choose and expect them to choose and environmental factors such as the packaging, marketing and advertising of unhealthy snack foods.

ACKNOWLEDGEMENT

This study was funded by an Australian Research Council (ARC) Discovery Grant, awarded to the first and second authors. The ARC had no involvement in the study design, analysis or decision to submit the manuscript.

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Received on 06-06-2012

Accepted on 28-08-2012

Published on 25-09-2012

<http://dx.doi.org/10.6000/1929-4247.2012.01.01.04>

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