Attentional biases toward familiar and unfamiliar foods in children: The role of food neophobia

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Abstract

Familiarity of food stimuli is one factor that has been proposed to explain food preferences and food neophobia in children, with some research suggesting that food neophobia (and familiarity) is at first a predominant of the visual domain. Considering visual attentional biases are a key factor implicated in a majority of fear-related phobias/anxieties, the purpose of this research was to investigate attentional biases to familiar and unfamiliar fruit and vegetables in 8 to 11 year old children with differing levels of food neophobia. To this end, 70 primary aged children completed a visual-probe task measuring attentional biases towards familiar and unfamiliar fruit/vegetables, as well as the food neophobia, general neophobia and willingness to try self-report measures. Results revealed that as an undifferentiated population all children appeared to demonstrate an attentional bias toward the unfamiliar fruit and vegetable stimuli. However, when considering food neophobia, this bias was significantly exaggerated for children self-reporting high food neophobia and negligible for children self-reporting low food neophobia. In addition, willingness to try the food stimuli was inversely correlated with attentional bias toward the unfamiliar fruits/vegetables. Our results demonstrate that visual aspects of food stimuli (e.g. familiarity) play an important role in childhood food neophobia. This study provides the first empirical test of recent theory/models of food neophobia (e.g. Brown & Harris, 2012). Findings are discussed in light of these models and related anxiety models, along with implications concerning the treatment of childhood food neophobia.

Key Words: Food neophobia; children; attentional biases; familiar and unfamiliar foods; anxiety; novelty

Introduction

The benefits of eating a diet rich in fruit and vegetables is well-documented (Wengreen, Madden, Aguilar, Smits & Jones, 2013). Containing a range of vitamins, minerals, electrolytes, antioxidants etc., fruits and vegetables are nutrient dense as well as a recommended source of dietary fibre. Given this it is no wonder that across a range of countries (e.g. Canada, the UK, the United States) the recommended daily guide is to consume four to six portions of fruits and vegetables per day (Slavin & Lloyd, 2012). However, increasingly, low energy density foods such as fresh fruit and vegetables are being replaced by high fat, high sugar, snack, drink and meal products, which may lead to increased obesity and its related disorders (Kaufman, 2002). In the USA alone, it is suggested that the number of obese 6-11 year old children has increased from 7% in 1980 to nearly 18% in 2010 (Ogden, Carroll, Kit & Flegal, 2012); and that fewer than one in five children between the ages of 4-13 are consuming the recommended five or more daily portions suggested (Guenther, Dodd, Reedy & Krebs-Smith, 2006). In the UK, the Department of Health (2013) reports that almost 30% of children between the age of 2 and 15 are now obese. In a bid to understand food preferences in children a wide variety of factors have been investigated. These include, but are not limited to: i) the social-affective context the food is presented in (Birch, Zimmerman & Hind, 1980); ii) the interaction between preference and genetic predisposition; iii) food availability and child-feeding practices (see Birch, 1999 for review); iv) the educational level of the mother (Cooke, Wardle & Gibson, 2003); and, more recently, v) the familiarity of the food (e.g. Dovey et al., 2012; Mustonen, Oerlemans & Tuorila, 2012; Dovey, Staples, Gibson & Halford, 2008).

The influence of familiarity on food preference is commonly investigated through studies of ‘neophobia’, with Dovey et al., (2008) proposing that this factor is one of, if not the main, predictor of childhood eating behaviours. Food neophobia is defined as a personality characteristic in which foods that are uncommon or unknown to the individual are rejected or avoided on sight, i.e. before tasting (Cooke et al., 2003). Namely, those who have higher food neophobia are likely to persistently reject food items, before tasting them, as compared to others. It is suggested that food neophobia is a predominant of the visual domain, and necessarily developed to evoke rejection of a food prior to tasting it, as the latter behaviour could lead to poisoning (e.g. Cashdan, 1998). Thus adults and children demonstrating increased neophobia are more likely to reject food items before tasting them based on ‘what they look like’. Consistent with this, Mustonen et al., (2012) have demonstrated that in 8 to 11 year old children, food neophobia predicts the number of foods tried, with children scoring low on the Food Neophobia Scale (FNS) familiar with a larger number of foods than those scoring high on this scale. Despite this, the cognitive mechanisms underlying food neophobia are not well understood. Correlations between food neophobia and a child’s actual ‘willingness to try’ a novel food are weak (Tuorila, Lähteenmäki, Pohjalainen, & Lotti, 2001) or inconsistent (Dovey et al., 2008). For instance, Dovey & Shuttleworth (2006) found that whilst food neophobia in rural children was higher than in urban children, these children were *more* willing to try unfamiliar vegetables than urban children. This perplexing paradox indicates that yet further factors are involved in food preferences and the acceptance or rejection of novel foods in their first instance.

One such factor that has received limited investigation in child food preference research is the role of visual attentional biases. Yet visual attentional biases have been observed to be related to stimulus familiarity, stimulus saliency/threat (i.e. phobias) *and* eating behaviours. For example, there is now a body of literature demonstrating that individuals with eating disorders such as anorexia and bulimia, or a proneness to obesity, show a bias toward food, body shape and weight stimuli (see Faunce, 2002 for a review; see also Castellanos et al., 2009). This is consistent with the idea that visual attentional biases are linked to motivational systems (Mogg, Bradley, Miles & Dixon, 2004). Indeed, phobias have been linked with patterns of 'vigilance' and 'avoidance' toward threat-related stimuli (see Cisler & Koster, 2010 for review), and in adult populations research has consistently found strong associations between biases toward threatening visual stimuli (i.e. vigilance) and levels of anxiety (MacLeod, Matthews & Tata, 1986; Mogg, Holmes, Garner & Bradley, 2008), levels of attachment insecurity (Dewitte & De Houwer, 2008) and low self-esteem (Dandeneau, Baldwin, Baccus, Sakellaropoulo & Pruessner, 2007). Moreover, Waters, Lipp & Spence (2004) have found that whilst a bias to fear or phobic related stimuli is common to both adults and children in general, in anxious children this bias (or vigilance) is exaggerated. Thus there appears to be a natural bias to prioritise attention and processing resources toward threatening rather than positive or rewarding stimuli (e.g. Simione et al., 2014; Maratos, 2011; LeDoux, 2003; Ohman, Lundqvist & Esteves, 2001).

Comparatively, Johnston, Hawley, Plew, Elliott & DeWitt (1990) have demonstrated that novel stimuli capture attention more readily than familiar stimuli. They suggest that vigilance to such stimuli enables rapid detection and identification of environmental change, which is of benefit to the individual. Perhaps of most relevance, however, Brown & Harris (2012) have recently proposed a model of food neophobia in early childhood in which it is the *perceptual* attributes of food stimuli that drive early food neophobic responses. They argue that these perceptual biases are innate and have developed to ensure that non-recognisable food stimuli (e.g. novel foods) are rejected to avoid unknown ingestion consequences (e.g. poisoning) prior to full cognitive understanding of disgust/contagion; the latter occuring in later childhood.

Considering the above research it is perhaps surprising that the role of perceptual attentional biases in food preferences has received limited investigation. Certainly, if food preferences are related to familiarity and neophobia, and neophobia is not only a predominant of the visual system but also a substantial predictor of childhood eating behaviours, then it seems logical that perceptual attentional biases may be implicated in childhood food preferences. In other words, high neophobic children may demonstrate a visual attentional bias, or ‘vigilance’, toward unfamiliar foods. Thus the aim of the present study was to explore attentional biases to familiar and unfamiliar fruits and vegetables in a child population. To do so, we used a computerised visual probe task in which participants’ reaction times to probes replacing familiar or unfamiliar photographs of fruits and/or vegetables were measured. Consistent with Johnston et al., (1990) we predicted that all children would demonstrate an attentional bias towards ‘novel’ food stimuli i.e., the unfamiliar fruits and vegetables. However, consistent with phobic/anxiety literature (both in adults and children), we further predicted that this bias would be exaggerated in children who reported high food neophobia.

Methods

Participants

Participants were 70 children between the ages of 8 to 11 years (35 boys) recruited from two primary schools in the East Midlands of England. All participants had normal or corrected-to-normal vision and informed written consent was obtained via parental consent.

Materials

Food and General Neophobia Scale

The food neophobia scale (FNS) (Pliner & Hobden, 1992) is a 10-item questionnaire that measures a person's willingness to 'try' novel foods. Responses to the questions were recorded on a five-point scale.

The general neophobia scale (GNS) (Pliner & Hobden, 1992) is an 8-item questionnaire that measures a person's willingness to 'approach' novel situations. Responses to the questions were recorded on a five-point scale.

Both measures are reliable (α=0.8 to 0.91 for the FNS; α=0.76 to 0.86 for the GNS) and have been used in children as young as seven years (Koivisto & Sjöden, 1997). Although originally designed for use with adults, it has been shown that children can complete both scales if given in the form of an interview and if they are given clarification on aspects that they do not understand (Koivisto & Sjöden, 1997). On the whole, the children understood all of the questions and utilised all five points for each scale.

Fruit and Vegetable Stimuli

The selection of fruit and vegetable stimuli were adapted from a stimulus set by Dovey and Shuttleworth (2006). For this study, the stimulus set was developed by showing 40 primary aged children pictures of a range of fruits/vegetables and asking them whether they knew what the fruit or vegetable was (by name). Fruit and vegetable stimuli identified by more than 80% of the children and eaten at least once were characterised as familiar and those identified by fewer than 20% were characterised as unfamiliar. In the current study this resulted in photographs of ten familiar and ten unfamiliar fruits and vegetables serving as the experimental stimuli. These were *Apple-Mango; Strawberry-Dragonfruit; Grapes-Starfruit; Grapefruit-Passion fruit; Pear-Kiwifruit; Turnip-Chowchow; Runnerbean-Okra; Courgette-Bittermelon; Carrot-Sweet Potato; Redpepper-Butternutsquash* (where the first in the pair indicates the familiar). The photographs of the stimuli were displayed as JPEG images. Jasc Paint Shop Pro 7 was used to equate the luminance, contrast and background grey (mean luminance = 14 cd/m^2) of all stimuli. All pairings were designated based on the visual similarity of the different fruit/vegetables i.e. colour and shape.

'Willingness to try' Scale

'Willingness to try' the fruit and vegetable stimuli was measured on a computerised five point likert type scale with a happy and sad face positioned at the extremities. The faces were used to signify 'I would like to try it a lot' to 'I do not want to try it at all', respectively. If the child pointed towards the happiest face when asked their 'willingness to try' the fruit or vegetable, this was scored as a 5 and if they pointed to the saddest face this was scored as a 1.

Procedure

The experimental session consisted of three phases: i) completion of the GNS and FNS; ii) a computerised visual probe (VP) task; and iii) a computerised willingness to try task.

Following completion of the GNS and FNS (as described above), participants completed a VP task designed to measure attentional biases to the familiar vs. unfamiliar fruit/vegetable stimuli. In this task, participants had to identify which side of the screen a ‘yellow star’ stimulus (i.e. the probe) appeared on by using a hand-held button box positioned approximately 40cm in front of the monitor. Each trial began with a central fixation point that, after 500ms, was replaced with a pair of fruit or vegetable stimuli. After a further 500ms the stimulus pair was removed and the probe star appeared in place of one of the stimuli. This probe remained upon screen until the participant made their response, following which a new trial was initiated after an inter-stimulus interval of 500ms. As with previous visual-probe methodologies the location of the familiar and unfamiliar (i.e. neophobic) stimuli and probes were counter-balanced across trials. Both response time and accuracy of responses were recorded. Since we were using a child population we adopted a simple probe identification as opposed to probe discrimination task, as well as pairing of the familiar together with the unfamiliar, rather than each with neutral stimuli (i.e. familiar with neutral; unfamiliar with neutral). We took these measures to control for task-complexity and task length (i.e. attention and fatigue).

In total the visual probe task consisted of 94 trials comprised of 10 practice trials and two blocks of 40 experimental trials (preceded by two dummy trials in each block). The experimental trials consisted of each familiar vs. unfamiliar food pairing being shown four times (per block), with the probe counter-balanced across presentations. That is, the probe replaced the familiar and unfamiliar stimuli on two occasions, once in the left- and right- side of space. All trials were randomly ordered and the visual probe task took a child no longer than ten minutes to complete. Following the visual probe task each participant was presented with the photographs of the food stimuli and asked: i) If they new what the food was; and ii) 'how willing' they would be to try the food in the photograph (as described in the Measures section). For each participant the display of food pictures was randomised.

Data Screening

For the visual probe task data, trials in which participants made errors in responding were discarded as were data from trials where RTs of: i) less than 200 ms; or ii) greater than 3000 ms were recorded. In total, this was less than 4% of trials.

Note also that as data violated assumption of skewness, which is typical of RT data (see for example Rasmussen & Dunlap, 1991) non-parametric statistics were used.

Results

Familiarity Manipulation

In initial analyses we investigated the extent to which children recognised and identified the familiar and unfamiliar fruit and vegetable stimuli. For the unfamiliar fruit and vegetables, children were significantly more likely to respond with the answer 'do not know' as compared with the familiar fruit and vegetable stimuli (56 % vs. 18 % respectively, $t = -4.68$, $df = 9$, $p=0.001$). In addition, children were significantly less likely to be able to correctly name the unfamiliar fruit and vegetable stimuli than the familiar fruit and vegetable stimuli, (21% vs. 80% respectively; t =

-8.617, df = 9, p<0.001). The latter is comparable to the data obtained by Dovey & Shuttleworth (2006), on which our stimulus set choice was based.

Reaction Time Data

In the visual probe task, a quicker reaction time to a probe replacing the 'critical' stimulus (in this case the unfamiliar fruits/vegetables) as compared to its paired stimulus (in this case the familiar fruits/vegetables) is interpreted as a bias, or vigilance, to the critical stimulus. In the present study, the overall mean RT when the probe replaced the familiar fruits or vegetables was 999.55 ms (SE = 34.36 ms) as compared to a mean of 982.02 ms (SE = 34.96 ms) when the probe replaced the unfamiliar fruits or vegetables. A Wilcoxon signed ranks test revealed this difference to be significant (z=-1.92, p=0.028, r = -0.23; one-tailed). Of the 70 children in the sample, 41 responded faster to the probes which replaced the *unfamiliar* fruit or vegetable stimuli compared with 29 who responded faster when the probes replaced the familiar fruit or vegetable stimuli (see Figure 1 left-panel).

To investigate the impact of food neophobia on responding we then analysed the data according to 'attentional bias' score and FNS quartile cut-off. For these analyses we calculated each participant's mean attentional bias scores by subtracting their mean RT to the unfamiliar fruit/vegetable stimuli from their mean RT to the familiar fruit/vegetable stimuli. We adopted this quartile approach as analyses revealed the FNS data to be binomially distributed. That is, utilising R, Hartigan's DIP Test of unimodality (Hartigan and Hartigan, 1985) revealed a significant bimodal distribution (Dip = 0.0643, [1]p = .025), with modes of 23 and 32. Thus in our quartile analyses (N = 35) we entered data from participants scoring below 23 (i.e. 16 'low

[1] Probability values were derived using Monte Carlo sampling (sampling rate = two million permutations).

neophobic' children) and above 30 (i.e. 19 'high neophobic' children) on the FNS. A Mann-Whitney test revealed that those who scored highly on the FNS had significantly higher mean ranks (20.68) than those who scored low on the FNS (14.81) (U=101, p=0.045, r = -0.20, one-tailed). As shown in Figure 1 (right panel), those scoring highly on the food neophobia scale demonstrated an attentional bias toward the unfamiliar fruit and vegetable stimuli (mean=27.21ms, SE=16.47ms), whilst those scoring low on this scale appeared to demonstrate an attentional bias toward the familiar fruit and vegetable stimuli (mean = -13.76ms, SE=12.60 ms).

****Figure 1 about here****

To further investigate this finding, difference from zero was also assessed (see Dandeneau et al., 2007). That is, Wilcoxon signed rank tests were conducted for both the high and low neophobic children by comparing their mean attentional bias scores to "0" (the theoretical *non*-bias score reference point). A bias score of "0" represents equal reaction times to critical vs. non-critical stimuli, thereby indicating *no* bias toward or away from either stimulus type. Analyses showed that the scores of low neophobic children did not differ significantly from 0 (z=-0.98, p=0.16, one-tailed), whereas a trend was apparent for the high neophobic children (z=-1.59, p=0.06, r= -0.35, one-tailed). This result supports our primary finding that the high neophobic child demonstrated an initial attentional bias towards the unfamiliar fruit and vegetable stimuli.

Of importance whilst FNS was significantly and positively correlated with GNS (r = +.539, p < 0.001, n= 70), a similar analysis of general neophobia on RT bias revealed no significant differences (U=155, p=0.33, one-tailed). That is, those scoring below 19 (20 children) or above 25 (18 children) on this measure demonstrated no significant differences in bias score (low GNS = 12.84 ms, SE = 8.42; high GNS = 23.88, SE = 18.86).

In a final exploratory analysis we calculated each child's mean willingness to try (WTT) score for all food stimuli (i.e. familiar and unfamiliar) and correlated this, using sphearman's rho, with their attentional bias score. We observed a significant negative correlation: r = -0.275, n = 70, p = 0.021. That is, the less willing a participant was to try the various fruit and vegetable stimuli per se, the more likely they were to demonstrate an attentional bias toward the unfamiliar fruits and vegetables. This was regardless of the familiarity of the food they were asked to try, i.e. the WTT/attentional bias correlation was r = -0.248, n = 70, p = 0.038 for the familiar fruits/vegetables and r = -0.367, n = 70, p = 0.002 for the unfamiliar fruit/vegetables. Note there was no significant difference between these correlations (p = 0.175).

Discussion

The purpose of the present research was to investigate the role of perceptual attentional biases to familiar compared with unfamiliar foods in a sample of primary aged children varying in their neophobic tendencies. Results revealed that, as an undifferentiated sample, children typically orientated towards the unfamiliar fruits and vegetables. However, this bias was exaggerated in those children who reported high food neophobic tendencies (as compared to those reporting low food neophobic tendencies) and was also independent of general neophobia. Finally, in exploratory analyses, it was further observed that 'willingness to try' was correlated with perceptual attentional biases; that is, the more unwilling any child was to try the pictured food per se, the greater their bias to look toward the unfamiliar fruit and vegetable stimuli.

The finding that all children typically displayed a bias towards the unfamiliar food stimuli is new. However, it is consistent with early research by Johnston et al., (1990) in which ‘novel’ stimuli are reported to capture attention more readily than familiar stimuli. Here Johnston et al., argue that vigilance towards novel stimuli allows for faster detection, which in turn allows for a ‘said’ benefit to the individual. In the context of novel food stimuli, one explanation for this ‘novelty’ bias is that it allows for a more detailed (and faster) analysis of the specific food’s relative value (e.g. poison-ness vs. nutritional), and therefore whether the particular food item should be avoided or eaten. Of perhaps more importance, however, was the finding that this bias towards unfamiliar foods was exaggerated in the high food neophobic children as compared to the low food neophobic children. To our knowledge, this is the first study to demonstrate such a result, but it accords well with: i) findings from phobic/anxiety literature; ii) the theoretical model of child food neophobia put forward by Brown & Harris (2012); and iii) the idea that neophobia is a predominant of the visual domain (Dovey et al., 2008).

Within the anxiety literature there is now considerable evidence to suggest that phobic and/or anxious adults (as well as children) orient attention towards their stimulus of fear (see Koster, Crombez, Verschuere, Van Damme & Wiersema, 2006 for review). In line with this, most cognitive and neurobiological models of anxiety include an initial component related to ‘vigilance/facilitated’ engagement. Here the majority of models posit that this perceptual bias is independent of cognitive control and heightened in anxious individuals. To expand, whilst each specific model differs slightly in its detailed description, they all posit that there is a rapid (and automatic) perceptual route to stimulus identification that has evolved to allow for the quick identification of potentially dangerous and/or life-threatening stimuli (for obvious reasons). In the anxious individual or child, this processing route displays heightened sensitivity, which manifests as vigilance toward the said phobic stimuli. Given that we observed a similar bias in the food neophobic children this would suggest that, in part, automatic perceptual attentional biases play a role in at least the maintenance (if not the development) of childhood food neophobia.

Indeed, the visual aspect of food stimuli may play a more important role in personality characteristics than previously recognised. According to the theoretical model of Brown & Harris (2012), it is the visual elements of food that are likely to become salient to small children and infants (i.e. those under three years of age), as it is this visual input that initially allows food items to be recognised (or otherwise) prior to the infant eating them. In their model, Brown & Harris opine that if neophobia is a mechanism to avoid poisoning, then prior to cognition this needs to be informed by an intuitive, perceptually driven response directed towards specific foods. Thus early in life children display an ingrained and intuitive perceptual bias towards food-like stimuli (especially that which is novel/unfamiliar); then, over time, this is replaced with cognitive reasoning strategies. In some children, however, neophobia (i.e. anxiety) towards food begins to occur. Brown & Harris argue that this occurs, and is maintained, via heightened sensitivity of the perceptual route, rather than the learning of adult-like reasoning skills. While this model displays similarities to key anxiety models, it again attests to the importance of perceptually driven biases in the development and maintenance of food neophobia in childhood and offers an explanation for our current findings. This is echoed by the research of Dovey et al. (2008) who also argue that neophobia is a predominant of the visual domain.

Taken as a whole, the current findings, together with recent theory provide a clear rationale for the further investigation of the role of visual attentional biases in childhood food neophobia. Our research indicates that the same cognitive mechanisms suggested to underlie phobic and anxiety disorders (i.e. automatic visual attentional biases) may also underlie the development and/or maintenance of food neophobia in children. In addition, our data indicate a role for visual attentional biases in neophobic children at a much later age than hypothesised in the Brown & Harris (2012) model. Consequently, it could be hypothesised that this automatic visual attentional bias is one factor that drives certain children to continue selective eating when in others cognitive reasoning strategies are beginning to predominant.

Related to this, a further finding of the present study was that the more unwilling a child was to try a pictured food item *per se*, the greater their bias to look toward the unfamiliar fruit and vegetable foods. Whilst this finding is novel and will require future investigation/replication, it suggests that *un*willingness to try food stimuli generally is associated with a heightened bias to unfamiliar (or novel) foods. This again accords well with phobic literature where ‘vigilance’ to a feared stimulus is observed. That is, it could be reasoned that the less willing a child is to try a food the more ‘fearful’ or ‘disgusting’ they find it, which in turn leads to a natural heightened vigilance for such foods, especially those that are unfamiliar or novel (given novelty also increases stimulus saliency). This hypothesis somewhat fits with the research findings of Mustonen, Oerlemans & Tuorila (2012) in children of a similar age. Here, they observed a tripartite relationship between neophobia, pleasantness of food and familiarity, where high food neophobia was found to lower the pleasantness of food ratings and was further associated with reduced familiarity of the specific food stimuli presented. Taking all results together, it could be that children generally show an aversion and/or ‘vigilance’ toward novel or unfamiliar foods but that as cognitive reasoning strategies increase over time, combined with the introduction of new unfamiliar foods by parents/care-givers, potential ‘fears’ are attenuated. In a small number of children, however, food neophobia and/or decreased willingness to try continues (or increases over time) and this is associated with the same vigilance, or attentional biases, seen in individuals with phobic/anxiety disorders.

Considering this, in future research we tentatively suggest that attentional bias paradigms could be used as ‘training games’ to increase familiarity with food neophobic stimuli to see if they impact upon a child’s decision to try the presented food stimuli. Certainly, in the anxiety literature, attentional bias modification (ABM) training has been used to great success in treating anxiety/phobias (see Hacamata et al., 2010 for review), and in the neophobia literature, the repeated introduction of specific food stimuli has been shown to reduce food neophobia (Dovey et al., 2012; Pliner, Pelchat & Grabski,. 1993). Thus, it could be beneficial to incorporate ABM training into existing CBT practices for neophobic children.

This said, in reviewing our findings, a clear limitation of the present study is that we did not actually give children samples of the presented food stimuli to try. Whilst using behavioural measures to assess eating behaviours is common practice (e.g. Mustonen et al., 2012), one could potentially question the reliability of this data, for example by our use of happy/sad faces as anchor points. Again, whilst anchoring using emotional faces is not uncommon when gaining rating data from children (e.g. Buchanan, 2005; Liu et al., 2007), it could be that such faces questioned the validity of the scale (e.g. for food that was familiar to a child, the child mistakenly reported how much they ‘liked’ the food rather than their ‘willingness to try’ it). Thus in further research using images from validated scales may be preferable.

In addition, in future research with children it may be useful to: i) include non-food stimuli that are perceptually matched to the food stimuli; and ii) manipulate the familiar food (e.g. perceptually) to form the ‘novel’ or unfamiliar food. For example, a slice of tomato paired with a red button (familiar pairing) compared to a slice of tomato (modified to a blue colour) paired with a blue button (unfamiliar pairing). Such a manipulation would not only provide greater control of any perceptual confounds, but would also allow for the exploration of the persistence of visual attentional biases over time. That is, a comparison of the rate attentional biases diminish (or change) over time as a function of both stimulus type (i.e. familiarity) and reported food neophobia.

To sum the present study is, to our knowledge, the first to demonstrate a role for perceptual attentional biases in food neophobia in a child sample. This knowledge could now be used to further refine and investigate current models of childhood neophobia as well as possibly inform treatment. For example, does increasing familiarity with unfamiliar/neophobic food substances via ABM training impact upon eating behaviours? In addition, whether these visual attentional biases are involved in the development of food neophobia or simply its maintenance through childhood (and indeed into adulthood) is also an area of future exploration.

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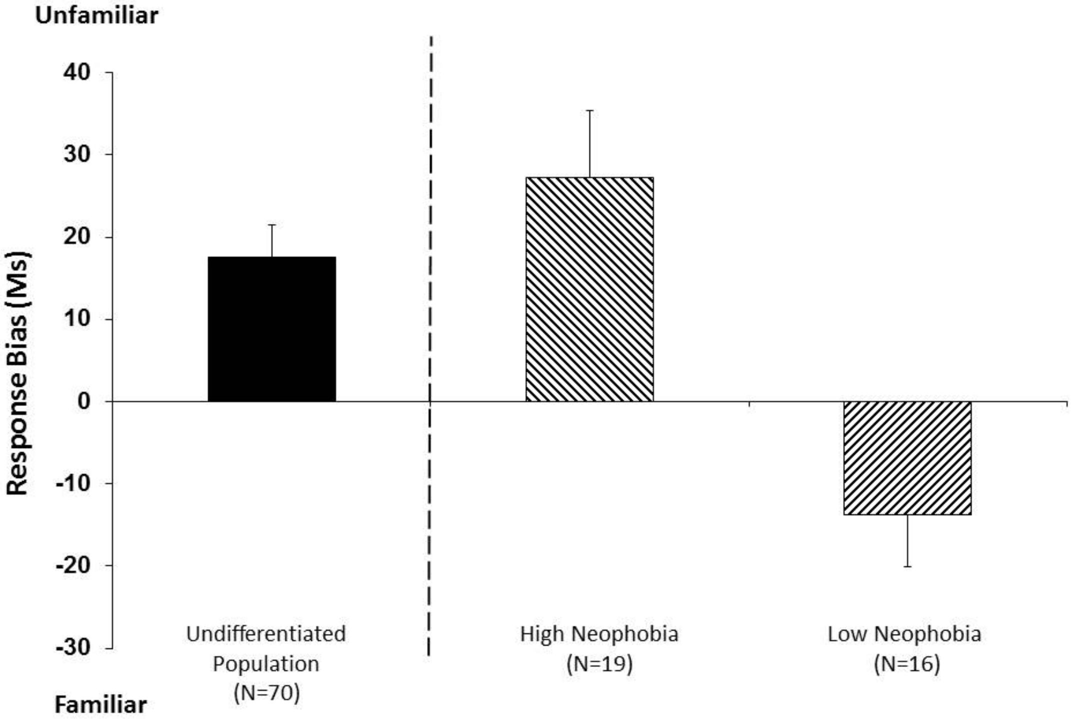
Figure 1



Caption: Attentional biases toward the food stimuli as a function of child population. Positive scores reflect a bias towards the unfamiliar fruit and vegetables whereas negative scores reflect a bias towards the familiar fruit and vegetables.