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Research report

Relationships between sensory sensitivity, anxiety and selective eating in children

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ABSTRACT

The present study examines whether parental reports of child selective eating are associated with child anxiety and sensitivity to sensory stimuli in their environment. Parents of 95 children aged 5–10 completed questionnaires about child eating behavior, child anxiety and sensory sensitivity. Results indicated that both anxiety and sensory sensitivity were associated with selective eating. In addition, child sensory sensitivity fully mediated the relationship between anxiety and selective eating in children suggesting that it is greater sensitivity to sensory information which explains why more anxious children are more likely to be selective eaters. Further research is necessary to better understand these relationships and indicate whether gradual exposure interventions with children who are sensory sensitive may help to prevent or reduce selective eating.

Introduction

Selective eating (also known as picky or fussy eating) in children can be defined as the consumption of "an inadequate variety of foods" (Galloway, Fiorito, Lee, & Birch, 2005, p. 542). Selective eating is a common complaint reported by many caregivers (Carruth, Ziegler, Gordon, & Barr, 2004; Mascola, Bryson, & Agras, 2010) which can have significant adverse effects for child dietary variety (Galloway et al., 2005), weight gain (Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007; Wright, Parkinson, Shipton, & Drewett, 2007), health and general well being (Jacobi, Schmitz, & Agras, 2008). Selective eating, like other feeding problems, can also create a significant amount of stress and anxiety for parents and caregivers (Hagekull & Dahl, 1987).

Research exploring the development of selective eating has focussed on the role of both the parent and the child in influencing children's eating behaviours. Selective eating has been associated with experiential characteristics such experiencing pressure to eat (Galloway et al., 2005), a shorter period of breast-feeding, and lower levels of maternal dietary variety (Galloway, Lee, & Birch, 2003). In addition, more intrinsic and temperamental based child characteristics have also been shown to predict selective eating in children. For example, boys are more likely to report not eating fruits and vegetables compared to girls (Cooke & Wardle, 2005) and selective eaters have also been shown to display more temperamental difficulties (Farrow & Blissett, 2006; Hagekull, Bohlin, & Rydell, 1997; Jacobi et al., 2008). Therefore, there is some indication that selective eating is associated with inherent characteristics in the child. There is starting to be some evidence, mainly from clinical reports that selective eating may be associated with child anxiety and sensitivity to sensory information in the environment (Bryant-Waugh, Markham, Kreipe, & Walsh, 2010).

Child anxiety has been shown to be a significant predictor of children's eating behaviour, being related to irregular eating patterns and food aversions in children (McDermott et al., 2008; Smith, Powell, & Ross, 1955), to food neophobia (Galloway et al., 2003; Pliner & Hobden, 1992), and levels of eating psychopathology in adolescents (Raney et al., 2008). In clinical case reports of children presenting with selective eating, anxiety and obsessive–compulsive behaviours have also been found to be commonly comorbid (Nicholls, Christie, Randall, & Lask, 2001; Timimi, Douglas, & Tsiftsopoulou, 1997; Williams, Gibbons, & Schreck, 2005) in both feeding and non-feeding situations. Relaxation techniques are widely used to increase the range of foods eaten by clinical groups of children with severely restricted diets (e.g., Nicholls et al., 2001). The experience of anxiety in the feeding situation may cause physiological changes, such as sickness, retching and appetite suppression, as well as cognitive changes such as hypervigilance, which can cause individuals to focus on, and then avoid, the aversive or feared stimulus (Pflugshaupt et al., 2005). Obviously clinical groups are skewed on the basis that they represent the extreme end of any spectrum of behaviour, and parents may be more likely to seek

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help if their children have concomitant problems. However, the same pattern is observed in non-clinical samples where neophobia, or reluctance to eat new foods, has been found to be associated with child anxiety (Galloway et al., 2003).

The anticipated sensory properties of food are often cited as one of the main reasons for rejection of novel foods (Martins & Pliner, 2005), however there is increasing evidence that there are individual differences in how we perceive and evaluate sensory information. Sensory sensitivity (also known as sensory over reactivity) can be defined according to individual differences in the detection of, and reaction to, sensory information, including information from the taste, touch, vision and smell senses (Dunn, 1999). Sensory sensitivity is believed to be an inherent characteristic (Dunn, 1999), which has been associated with physiological markers. For example, neuroimaging methods to measure the processing of sensory stimuli in the brain indicate that children with sensory processing difficulties demonstrate different brain processing mechanisms to control children (Davies & Gavin, 2007), and children with sensory processing problems are often unable to filter out responses to repeated sensory information (Davies, Chang, & Gavin, 2009). In addition sensory sensitivity has been associated with other characteristics, with adults who are more sensory sensitive being described as more anxious (Liss, Timmel, Baxley, & Killingsworth, 2005). The process of eating involves integration across a variety of sensory modalities and differences can be seen in individual's sensitivity to the different qualities of food, such as how bitter a food is (Bell & Tepper, 2006) and it's texture (Smith, Roux, Naidoo, & Venter, 2005).

Children with higher levels of tactile and taste/smell sensitivity have been shown to eat less fruits and vegetables and to be more reluctant to eat new foods (Coulthard & Blissett, 2009). Children who are more sensory sensitive have lower thresholds for detecting sensory information and are more able to detect subtle changes in the sensory properties of foods. Coulthard and Blissett (2009) propose that these children are more likely to reject new foods or fruits and vegetables because fruits and vegetables are vulnerable to differences in their sensory properties (e.g., variations in look or taste). It is also quite likely that children who are more sensory sensitive will be pickier eaters in response to these sensitivities and will refuse to eat more new foods, or foods that they have tasted before.

Previous research suggests that child anxiety and sensory sensitivity appear to both related to eating behaviour in children and further that anxiety and sensory sensitivity may be related in young adults (Liss et al., 2005). It is imperative that we begin to understand exactly why more anxious children are more selective about the foods that they will eat, and how it is that more anxious children process and respond to information about foods in ways that lead to food rejection. It may be that heightened sensitivity to sensory information in more anxious children may mediate the relationships between anxiety and selective eating. This understanding would provide evidence to inform future interventions with children who are selective eaters.

This study has two aims, first to explore whether parental reports of selective eating in children are related to their descriptions of child anxiety and child sensory sensitivity. It was hypothesised that children with higher levels of tactile, taste and visual/auditory sensory sensitivity would also have higher scores on selective eating scales. It was also hypothesised that more anxious children would have higher scores on selective eating scales. The second aim was to explore whether child sensory sensitivity mediates the relationship between anxiety and selective eating in children. It was hypothesised that child sensory processing would fully mediate the relationship between anxiety and selective eating in children.

Method

Participants

Parents of 95 children (aged 5–10 years) participated. Parents responded concerning 43 male and 50 female children (gender not disclosed for 2 children) with a mean age of 7.34 years (SD = 2.00). Mean child BMI *z*-score was .13 (SD = 1.56). Ninety-one of the parents were mothers and 4 were fathers.[1] Their mean age was 38 years (SD = 5.10). Eighty-six parents described their ethnicity as White; 5 as Black or Black British; 2 as Asian or Asian British and 2 as 'Other'. Parents reported a mean of 4.83 years of education after the age of 16 years (SD = 2.82). Parental occupation (or most recent occupation prior to parenthood) was coded using the Office of National Statistics Coding Scheme (Office for National Statistics, 2000); parents were from a wide range of occupations ranging from category 1 (13%: Managers and senior professionals) to category 9 (2%: Elementary Occupations), with the modal occupation being category 2 (33%: Professional occupations). No parents reported that their children had medical or organic feeding concerns, or had ever been hospitalised for a feeding related problem.

Procedure

A series of schools in the Leicestershire area of the United Kingdom were invited to distribute letters and questionnaire packs to parents inviting them to take part in this research study. Approximately 250 questionnaires were distributed to parents, 98 were returned rendering a response rate of approximately 39%. Three questionnaires were removed because there were significant amounts of missing data (e.g., full subscales or complete pages unanswered). Where single items were missing the data was coded as missing in SPSS. Families were given no incentive to take part. Each pack contained a pre-paid envelope with which parents could return the questionnaire confidentially to the researcher in. Ethical approval for this research was obtained from Loughborough University Ethical Advisory Committee and the research was performed in accordance with the Declaration of Helsinki, all participants gave informed consent to participate in this research.

Measures

Each questionnaire contained a demographics questionnaire where parents reported their child's gender, birth date, weight, and height. Parents were asked to report height and weight data only if they had accurate scores and not to estimate measurements (64% of the sample provided such data). Child weight and height was converted to a BMI *z*-score to standardise for child age and gender using the Child Growth Foundation Package (1996) which standardises to UK norms. Parents also described their age, education, occupation and ethnicity. They were then asked to complete the following questionnaires:

Short Sensory Profile (SSP; Dunn, 1999)

The SSP is a 38 item, seven sub-scale, questionnaire used to assess children's responses to sensory stimuli. Three subscales of the questionnaire were used to assess parent's perceptions of child tactile sensitivity (e.g., 'avoids going barefoot, especially in sand or grass'), taste/smell sensitivity (e.g., 'avoids tastes or food smells that are typically part of a children's diet') and visual/auditory sensitivity (e.g., 'covers eyes, or squints to protect eyes from light'). In addition a total sensory sensitivity score was computed from the

[1] The results remain consistent if the analysis is repeated excluding fathers and using mothers only.