

Stability and continuity of parentally reported child eating behaviours and feeding practices from 2-5 years of age.

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Abstract

Previous research suggests that many eating behaviours are stable in children but that obesigenic eating behaviours tend to increase with age. This research explores the stability (consistency in individual levels over time) and continuity (consistency in group levels over time) of child eating behaviours and parental feeding practices in children between 2 and 5 years of age. Thirty one participants completed measures of child eating behaviours, parental feeding practices and child weight at 2 and 5 years of age. Child eating behaviours and parental feeding practices remained stable between 2 and 5 years of age. There was also good continuity in measures of parental restriction and monitoring of food intake, as well as in mean levels of children's eating behaviours and BMI over time. Mean levels of maternal pressure to eat significantly increased, whilst mean levels of desire to drink significantly decreased, between 2 and 5 years of age. These findings suggest that children's eating behaviours are stable and continuous in the period prior to 5 years of age. Further research is necessary to replicate these findings and to explore why later developmental increases are seen in children's obesigenic eating behaviours.

Keywords: Child eating behaviour; Parental feeding practices; Body Mass Index; Control; Stability; Continuity.

Introduction

Previous longitudinal tracking studies have demonstrated that despite population level increases in overweight across time (Deshmukh-Taskar et al., 2006; Hesketh et al., 2004), adiposity and body mass index (BMI) are generally stable across childhood, adolescence and into adulthood (Hesketh, Wake, Waters, Carlin & Crawford, 2004; Deshmukh-Taskar, Nicklas, Morales, Yang, Zakeri & Berenson, 2006; Herman, Craig, Gauvin & Katzmarzyk, 2008). Less research has been conducted about the stability of eating behaviours that may promote overweight, particularly during childhood. The present paper focuses on exploring the stability and continuity of eating behaviours and feeding practices during early childhood that may be related to changes in weight over time.

Using quantitative genetic modelling with twin pairs, eating behaviours related to slowness in eating, satiety responsiveness, food responsiveness and enjoyment of food have been shown to be heritable (Llewellyn, van Jaarsveld, Johnson, Carnell & Wardle, 2010). Individual food preferences have also been shown to be stable in children between the ages of 2 and 8 (Skinner, Carruth, Wendy & Ziegler, 2002), and the consumption of fruits and vegetables and dietary intake is moderately stable during childhood and adolescence and into adulthood (Vejrup, Lien, Klepp & Bere, 2008; Bertheke Post, de Vente, Kemper & Twisk, 2001; Rajeshwari, Nicklas, Yan & Berenson, 2004). Although many studies show good individual stability in dietary intake, there is a general parallel increase in the intake of sugar and a decrease in fruit and vegetable intake from childhood to later adolescence (Lien, Lytle & Klepp, 2001; Larson, Neumark-Sztainer, Hannan & Story, 2007), which may help to explain rises in child adiposity over time (Reilly, 2005).

This discrepancy between finding general individual stability in food preferences coupled with group increases in unhealthy food intake can be understood using two distinct approaches to exploring the developmental trajectory of behaviours over time (Cote & Bornstein, 2003). The first is the *continuity* of the behaviour, which is evident if mean levels of behaviour are consistent across time and there is no significant difference between mean levels of the behaviour of a group of individuals at different time points. The second is the stability of behaviour, which is apparent when individual ranks on behaviours are consistent over time. This is an important distinction as these two measures of development are not synonymous and are theoretically and statistically independent (Cote & Bornstein, 2003; also see Blissett & Farrow, 2007).

Exploring the stability and continuity of eating behaviours may be useful to help to explain changes seen in food intake and weight over time. Eating behaviours have been suggested to be stable, with studies reporting continuity in eating in the absence of hunger between 5 and 7 years of age (Fisher & Birch, 2002), and in dietary restraint between 5 and 9 years of age (Shunk & Birch, 2004). Recent research by Ashcroft, Semmler, Carnell, van Jaarsveld & Wardle (2008) has also demonstrated highly significant correlations for eating behaviour between 4 and 11 years, including satiety responsiveness, slowness in eating, food fussiness, food responsiveness, enjoyment of food, and emotional over and under-eating, indicating stability in these eating behaviours. Similarly, Gregory, Paxton & Brozovic (2010) demonstrated significant correlations for food responsiveness, food fussiness and interest in food in 2-4 year old children after a period of one year. However, by comparing scores over time Ashcroft et al. (2008) also found that the group's obesigenic behaviours tended to significantly increase (e.g.

emotional overeating) whilst their obesity protective behaviours tended to significantly decrease (e.g., slowness in eating) between 4 and 11 years of age.

To date the research that has been conducted on establishing the continuity of eating behaviour in children has been conducted with children past 4 years of age. Given that eating behaviours and food preferences develop very early in childhood (Birch & Fisher, 1998) and early differences in eating behaviours have been related to later food preferences, food intake and BMI (Savage, Fisher & Birch, 2007), it is imperative to explore the stability and continuity of a full range of eating behaviours prior to 4 years of age. This is a period of great transition as many children become autonomous eaters and experience greater socialisation of eating as they begin to eat at preschools or playgroups. The first aim of the present study is to explore the stability and continuity of child eating behaviours between 2 and 5 years of age.

There is also a pressing need to understand whether the parental feeding behaviours that may influence these eating behaviours and child BMI are also stable and continuous. Common child feeding practices used to control children's eating are restricting access to certain foods, monitoring food intake and pressuring the child to eat (Savage et al., 2007; Faith & Kerns, 2005; Farrow & Blissett, 2008). Restriction of foods has been shown to increase child preference for restricted food and has been linked to greater weight gain (Fisher & Birch, 1999a; 1999b; Faith, Berkowitz, Stallings, Kerns, Storey & Stunkard, 2004). Conversely, pressure or force to eat has been related to subsequent rejection of pressured foods in childhood and adulthood (Galloway, Fiorito, Francis & Birch, 2006; Batsell, Brown, Ansfield & Paschall, 2002). Parental monitoring of food intake has also been shown to have a protective effect in reducing childhood overweight from 5 -7 years of

age (Brann & Skinner, 2005; Faith et al., 2004). Previous research has indicated that controlling parental feeding practices are stable from 1-2 years of age (Blissett & Farrow, 2007), between approximately 3 and 4 years of age (Gregory et al., 2010) and between 5-7 years of age (restriction and pressure only: Faith et al., 2004). In terms of continuity, paired sample t-tests have shown that parents describe using significantly less pressure to eat, monitoring and restriction with their children between 7 and 10 years of age (Webber, Cooke, Hill & Wardle, 2010), whilst other research has shown that when asked “do you let your child eat what he/she feels like eating?” parents report allowing the child more independence across middle childhood (between 4, 7 and 9 years: Rhee et al., 2009). However, there has been no published data about the stability and continuity of these practices in the same sample between the ages of 2 and 5 years. The second aim of this research is to explore the stability and continuity of controlling parental feeding practices during early childhood.

Hypotheses: Supporting Ashcroft et al.’s (2008) findings with older children, it was hypothesised that parental reports of children’s obesigenic eating behaviours would significantly increase over time, whilst obesity protective behaviours would significantly decrease. Given their inverse relationships with child weight (Galloway et al., 2006; Bran & Skinner, 2005), it was hypothesised that maternal monitoring and pressure to eat would significantly decrease over time. In contrast, maternal restriction of food was hypothesised to significantly increase with time, given previously established links between parental restriction and higher child weight status (e.g. Fisher & Birch, 1999a). In support of the findings of Ashcroft et al. (2008) and Faith et al. (2004) it was hypothesised that parental

feeding practices and children's eating behaviours would be significantly correlated over time, showing good stability across early childhood.

Method

Participants

Participants were taken from a small longitudinal study recruited from the West Midlands region of the U.K. in 2002. The larger study aimed to evaluate the development of normal feeding and eating behaviour in children during the first 5 years of life by exploring the impact of prenatal and postnatal factors upon maternal feeding behaviour and child eating across early childhood. Other data from this study have been published elsewhere (Farrow & Blissett, 2005; Blissett & Farrow, 2007). The data reported here are concerned with the participants who remained in the final stages of the study when their children were 5 years of age. Sixty two mothers of 31 male and 31 female children took part in this study when their children were aged 2, and 31 of these participants remained in the study for the final stages of data collection at 5 years (mothers of 15 boys and 16 girls). Reasons for discontinuing participation were varied but were predominantly because participants had moved out of the study area, had relocated without providing a forwarding address, or did not wish to take part due to time commitments or lack of interest. Independent sample t-tests confirmed that there were no significant differences between participants who continued vs. discontinued participation in the study between 2 and 5 years of age in terms of their age, their socio-economic status, their child's BMI SDS score or their reports of feeding problems at 2 years of age, suggesting there was no systematic reason for discontinuing participation.

Using participant information collected at 2 years, the mean maternal age of the sample was 30.29 years (SD=3.91). In order to gain an index of the socioeconomic breakdown of the sample women were asked to report their occupation or most recent occupation prior to motherhood. Data were coded using the Standard Occupation Classification (Office of National Statistics, 2000). The modal maternal occupation was category 2 'professional occupations' (36%) but women were from a wide range of occupations from category 1 ('senior officials': 7%) to category 7 ('elementary occupations': 3%). Ten percent of the sample reported that they had never been employed.

Ethical approval for this research was obtained from South Birmingham Research Ethics Committee, the University of Birmingham School of Psychology Ethics Committee, and Loughborough University Research Ethics Committee. The research reported was performed in accordance with the ethical standard of the Declaration of Helsinki and all mothers gave informed consent to take part in this research.

Measures

Child BMI. Children were weighed and measured in their homes by the researcher when they were approximately 5 years of age. Weight and height scores at age 2 were obtained from the child's health record (also known as the red book). Weight and height at 2 and 5 years of age were converted into BMI scores (kg/m^2). These BMI scores were then converted into standardised z scores (SDS scores) to take into account child gender and exact age. This procedure is based on the UK norms for child BMI published by Freeman et al. (1995) and Cole (1995).

The Child Feeding Questionnaire (CFQ: Birch et al., 2001). The CFQ was used to assess parental attitudes regarding child feeding and controlling feeding practices (i.e. monitoring, restriction and pressure to eat). Example questions are “How much do you keep track of the high fat foods that your child eats?” (monitoring); “I intentionally keep some foods out of my child’s reach” (restriction); and “My child should always eat of the food on her plate” (pressure to eat). Mothers completed these subscales when their children were 2 and 5 years of age. The CFQ is scored from 1-5 using a Likert scale with higher scores indicating greater levels of the construct. The CFQ is a widely used measure to assess parental control over early child feeding (Carper, Fisher, & Birch, 2000; Fisher & Birch, 2002). These subscales of the CFQ have excellent internal consistency, with Cronbach’s alpha ranging from $\alpha = .70 - .92$ (Birch et al., 2001).

The Child Eating Behaviour Questionnaire (CEBQ: Wardle, Guthrie, Sanderson & Rapoport, 2001). Mothers completed the CEBQ when their children were aged 2 and 5 years. Using this measure mothers are required to rate the frequency with which their child exhibits a range of behaviours on a scale from 1 to 5 with higher scores indicating a greater prevalence of that behaviour. The CEBQ assesses parental perceptions of their child’s eating behaviour according to the following subscales: child food responsiveness (always wanting to eat), emotional over-eating (eating when anxious, annoyed, worried, happy or bored), enjoyment of food (interest and enjoyment in food and eating), desire to drink (desire to drink throughout the day), satiety responsiveness (small appetite, easily satiated), slowness in eating (e.g. taking over 30 minutes to eat at mealtimes), emotional under-eating (eating less when angry, upset or tired) and food fussiness (refusal of new foods and eating a limited variety). The CEBQ has been shown to have good test-retest reliability and is

internally valid with α ranging from .72 - .91 (Carnell & Wardle, 2007; Wardle et al., 2001).

Data analysis

One sample Kolmogorov-Smirnov tests indicated that the data were normally distributed, therefore parametric tests were used to analyse the data. Following descriptive statistics, difference scores were calculated between 2 and 5 years of age by subtracting scores at age 2 from scores at age 5. The mean of these scores was then calculated, with a positive mean score indicating an average increase in the variable over time, and a negative mean score indicating an average decrease in the variable over time. Pearson's two-tailed correlations indicated that maternal age and occupation were not significantly correlated with the degree of change in child eating, feeding or weight scores and independent sample t-tests indicated that there were no significant gender differences in the degree of change on these variables between 2 and 5 years of age. The sample was therefore collapsed and these variables were not analysed further.

Using Cote & Bornstein's (2003) paradigm, 2-tailed Pearson's correlations were used to assess the *stability* of variables from 2 to 5 years of age and paired-sample t-tests were used to assess *continuity* between 2 and 5 years. Where variables were not continuous (as indicated by significant differences on paired sample t-tests), effect sizes (ES) were calculated by dividing the mean change score for the variable by the pooled standard deviation of the variable over time (Cohen, 1992). Using an a priori compromise power analysis for matched t-tests, set at 2-tailed, alpha at .05, power at .80 and a midpoint effect size of .5 from those reported by Ashcroft et al. (2008) a sample size of 34

was aimed for. Therefore, the retention of 31 participants in the study suggests that a reasonable sample size was achieved.

Results

Characteristics of the sample

Table 1 displays the mean and standard deviation scores for measures of child eating, parental feeding and child BMI taken at 2 and 5 years of age. Mean scores are similar to other published means from children in this age range for the Child Eating Behaviour Questionnaire and the Child Feeding Questionnaire (Farrow, Galloway & Fraser, 2009). Mean scores for child BMI SDS are close to 0, which would reflect the average BMI for the reference population (Table 1 here).

Continuity of child eating behaviours and parental feeding practices between 2 and 5 years of age

Table 1 presents the mean change scores for variables between 2 - 5 years of age, in addition to the results of paired sample t-tests used to explore continuity in measures over time. As Table 1 indicates there was significant continuity in child eating behaviours and BMI between 2 and 5 years. There was also continuity in maternal use of monitoring and restriction between 2 and 5 years of age. Conversely scores for maternal pressure to eat significantly increased between 2 and 5 years, and scores for child desire to drink significantly decreased during this period. The ES of the change indicates relatively large increases in pressure to eat between 2 and 5 years (ES=.85), and smaller decreases in desire to drink during this period (ES=.36).

Stability of child eating behaviours and parental feeding practices between 2 and 5 years of age

Table 2 presents the correlations over time for the measurements taken of child eating behaviour, parental feeding practices and child BMI SDS. With the exception of enjoyment of food and child BMI, all variables were significantly correlated over time suggesting good stability in measures of child eating and parental feeding in early childhood. Significant correlations ranged from .36 (food responsiveness) to .75 (monitoring) suggesting good stability in these variables in children of this age (Ashcroft et al., 2008) (Table 2 here).

Discussion

The aims of this research were to assess the stability and continuity of child eating behaviours and parental feeding practices in children between 2 and 5 years of age; a period where child eating behaviours are becoming established and the potential impact of parental feeding practices is significant. In this small scale longitudinal study there was good stability in individual ranks of child eating and parental controlling feeding practices between 2 and 5 years of age. There was also good continuity in mean levels of children's eating behaviours and BMI, as well as in measures of parental restriction and monitoring over time. Conversely mean levels of maternal pressure to eat significantly increased, whilst mean levels of desire to drink significantly decreased, between 2 and 5 years of age in this sample.

The results of this research suggest that children's eating behaviours are stable between the ages of 2 and 5. These findings support previous research by Ashcroft et al. (2008) who report that children's eating behaviours were significantly correlated in older children between 4 and 11 years of age. The majority of the correlation coefficients identified were above .5 suggesting very high levels of stability in these eating behaviours

over time. These findings support the suggestion that children have general styles of eating and responses to food, which begin as early as 2 years of age and are stable for at least the following 3 years of life. These findings also support the test-retest reliability of the Child Eating Behaviour Questionnaire as a measure of eating behaviour across early childhood. There was one exception to this pattern identified, with parental reports of children's enjoyment of food not demonstrating significant correlations over time. This may be linked to the concurrent increases in pressure to eat that are evident in this sample, a behaviour that has been shown to reduce enjoyment of mealtimes (Farrow & Blissett, 2006). Indeed, pressure to eat and enjoyment of food were negatively correlated at both 2 ($r=-.43, p<.05$) and 5 years of age ($r=-.38, p<.05$). Alternatively, variations in parental descriptions of children's enjoyment of food may reflect changes in the acceptance of novel foods from children as neophobia decreases with age, or increased child boredom with food as children are repeatedly exposed to the same foods over time.

Contrary to the hypotheses the results also demonstrated good continuity in children's eating behaviours over time, although not in children's levels of desire to drink. Previous research by Ashcroft and colleagues (2008) has shown that obesity protective eating behaviours, such as satiety responsiveness and slowness in eating, tend to decrease between 4 and 11 years of age; whilst those behaviours that may promote obesity, such as food responsiveness and emotional over eating, tend to increase during the same period. Their findings parallel those of others in adolescents (e.g. Lien et al., 2001; Larson et al., 2007), which support a model of children developing increasingly obesigenic eating behaviours as they progress with age. To our knowledge there is no published data concerning the age when this transition begins and children become increasingly

vulnerable to eating behaviours that promote obesity, but the findings reported here suggest that this process does not begin prior to 5 years of age. There are many possible explanations for these developmental differences. For example enjoyment of food and food responsiveness may increase as children become increasingly autonomous and able to select their own foods, whilst satiety responsiveness and slowness in eating may decrease as children become more exposed to external influences over their eating. Interactions with other children and new eating environments, which become increasingly common as children enter the school system, may also contribute to changes in child eating. Alternatively it may take time for our ‘obesigenic society’ (Bellisari, 2008) to exert an impact on children’s eating behaviours and we may only begin to see the consequences of this after age 5 when children are more autonomous. These are clearly speculative suggestions and these findings relate to a relatively small sample; further research is necessary to replicate these results and to evaluate the factors that might predict these developmental shifts in child eating.

Measures of parental monitoring, restriction and pressure to eat were stable between 2 and 5 years of age supporting previous findings that these practices are stable during infancy and again from 5 to 7 years of age (Blissett & Farrow, 2007; Faith et al., 2004). These findings add to the reliability of the Child Feeding Questionnaire as a measure of parental feeding practices over time. In terms of continuity, mean levels of maternal monitoring and restriction were continuous between 2 and 5 years of age, however measures of maternal pressure to eat were significantly higher at 5 years compared to at age 2, coupled with significant decreases in children’s desire to drink during this time. Although these data cannot elucidate why these measures changed over

time, it is possible that sample level increases in pressure to eat may reflect increasing concerns about food fussiness. In this sample, fussiness did increase between 2 and 5 years, but this trend was not statistically significant. Despite this, it is possible that parents may be responding to relatively minor developmental increases in fussy eating by exerting greater levels of pressure to eat refused foods. Sample level decreases in desire to drink may also reflect developmental changes in children's eating behaviours as many children begin to drink less milk and make the full transition from bottle to cup drinking during this period (Bonuck, Huang & Fletcher, 2010). These relationships require further investigation using larger samples and additional longitudinal designs.

The data also suggest that child BMI SDS scores were continuous over time for the group as a whole, but not individually stable, as illustrated by the non-significant correlation in child BMI SDS scores between 2 and 5 years. This suggests that there was significant variability among individual children in their BMI SDS scores between the two measurement points, with some increasing and others decreasing over time. These findings support other data with adolescents that suggests there may be significant overall consistency in group BMI's over time, although individual children may vary considerably (Crimmins et al., 2007). Previous research suggests this variability may depend on their leanness and gender. For example, across adolescence lean girls have been shown to gain more weight than lean boys over time (Crimmins et al., 2007). Further research with larger populations is warranted to explore this finding in younger children in more detail.

Although the findings of this research build upon current knowledge concerning the stability and continuity of eating behaviours and feeding practices during early childhood, it is important to note that the generalizability of the findings is limited by the small

sample size. The data reported here are from a small longitudinal study spanning over 6 years and reflect the final stage of the research where the retention of participation was most compromised. These findings reflect a relatively motivated group with a reasonably high socio-economic status and it is important to replicate this research with larger and more diverse samples to validate these findings. It is also important to note that this research relies on maternal reports of their feeding practices and their child's eating, but it is unlikely that this limitation compromises the reliability of the findings as any bias in maternal reports are likely to be consistent over time, and previous research suggests that maternal reports of both eating and feeding in childhood correspond well with actual observations of behaviour (Carnell & Wardle, 2007; Farrow & Blissett, 2005). Finally, it is important to note that child BMI at age 2 was recorded from Child Health records, whereas BMI at 5 was measured by the researcher, it is thus possible that there is greater measurement and recording error in those measurements at 2 years than at age 5, which may have contributed to the weaker correlation coefficients between these two periods

In summary in this small community sample maternal reports of their monitoring and restriction of their child's food intake and their reports of their children's eating behaviours remained both stable and continuous between 2 and 5 years of age. Conversely whilst measures of maternal pressure to eat and desire to drink remained stable over time, there were continuous increases in the use of pressure to eat, and continuous decreases in child desire to drink, between the ages 2 and 5. Further research is necessary to replicate these findings in larger and more diverse samples and also to explore the factors that predict increases in maternal pressure to eat, as well as the reasons for later developmental increases that have been reported in children's obesigenic eating behaviours.

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Table 1: Descriptive statistics and paired sample t-tests for measurements taken over time.

Variable	2 years	5 years	Mean change	t score
	Mean (SD)	Mean (SD)	2-5 years (SD)	
	N=62	N=31	N=31	
<i>Child Eating Behaviour</i>				
<i>Questionnaire:</i>				
Food responsiveness	2.42(.57)	2.41(.66)	-.01 (.70)	-.10
Emotional over eating	2.07(.52)	1.94(.67)	-.12 (.61)	-1.10
Enjoyment of food	3.73(.73)	3.98(.82)	.25 (.98)	1.42
Desire to drink	2.82(1.09)	2.44(.98)	-.38 (.97)	-2.15*
Satiety responsiveness	3.03(.68)	2.89(.85)	-.14 (.85)	-.90
Slowness in eating	2.89(.77)	2.92(.82)	.03 (.74)	.24
Emotional under eating	3.26(.86)	3.16 (.90)	-.10 (.73)	-.75
Food fussiness	2.53(.73)	2.67 (.79)	.15 (.73)	1.11
<i>Child Feeding</i>				
<i>Questionnaire:</i>				
Monitoring	4.27(.85)	4.46(.73)	.19 (.58)	1.87
Pressure to eat	2.10(.67)	2.79(.75)	.69 (.77)	4.99**
Restriction	3.27(.67)	3.25(.68)	-.02 (.64)	-.174
BMI SDS	.71(1.72)	.25(.94)	-.46 (2.17)	-.99

**p<.01, *p<.05. Positive change scores indicate variable has increased over time,
negative change scores indicate a decrease in the variable over time

Table 2: Pearson's correlations for measurements taken between 2 and 5 years of age.

Variable	r
	2-5 years
	N=31
<i>Child Eating Behaviour Questionnaire:</i>	
Food responsiveness	.36*
Emotional over eating	.50**
Enjoyment of food	.21
Desire to drink	.57**
Satiety responsiveness	.40*
Slowness in eating	.56**
Emotional under eating	.67**
Food fussiness	.54**
<i>Child Feeding Questionnaire:</i>	
Monitoring	.75**
Pressure to eat	.42**
Restriction	.55**
BMI SDS	-.27

**p<.01, *p<.05