

Social and individual influences on eating in pre-adolescents: The role of friends' eating behaviours and individual anxiety and depression

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Abstract

Background: Friends are important role models for the formation of social norms and behaviour comparisons, particularly in children. This study examined the similarities between pre-adolescent children's own eating behaviours with the eating behaviours of those in their friendship group. It also evaluated whether symptoms of anxiety and depression were related to eating behaviours in this age group.

Methods: Three hundred and forty three children (mean age 8.75 years) completed questionnaires designed to measure dietary restraint, emotional eating and external eating, as well as general and social anxiety, and symptoms of depression. Children also provided details about their friendship groups.

Results: Pre-adolescents' dietary restraint was positively predicted by the dietary restraint of members of their friendship groups, and their individual levels of anxiety and depression. The levels of general anxiety exhibited by pre-adolescents predicted emotional and external eating behaviours. Younger children were significantly more likely to report higher levels of emotional and external eating than older children, and boys were more likely to report more external eating behaviours than girls.

Conclusions: These results suggest that greater dieting behaviours in pre-adolescents are related to their friends' reports of greater dieting behaviours. In contrast, greater levels of eating governed by emotions, and eating in response to external hunger cues, are related to greater symptoms of anxiety in pre-adolescent children. Such findings underline the importance of friends' social influences on dieting behaviours in this age group and highlight the value of targeting healthy eating and eating disorder prevention interventions at pre-adolescents.

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Introduction

Feeding problems and under-eating are common in childhood [1], with research suggesting that eating and dieting concerns established in childhood are associated with the development of disordered eating in later childhood and adulthood [2-4]. In girls, eating concerns and dieting behaviours have been evidenced from as young as five years of age [5]. Worldwide,

the prevalence of childhood obesity is increasing dramatically and, as with under-eating, the eating behaviours of overweight and obese children are likely to endure into adulthood [6, 7]. Given this alarming evidence it is crucial to understand the factors contributing to problematic eating behaviours and attitudes in childhood, before these behaviours become well established and persist into later life [8].

Developmental research suggests that concerns about body image, weight loss and dieting behaviours commonly emerge during middle-to-late childhood, or pre-adolescence [9-11]. Pre-adolescence, the period between childhood and adolescence preceding puberty, commences at different ages for each individual, although is thought to occur “somewhere between eight-and-a-half and ten” years of age [12]. Maladaptive eating behaviours manifesting during this period may lead to delays in puberty, stunted growth and physical development, and may have detrimental effects on cognitive functioning [13]. A wealth of research exploring the predictors of eating in this age group has evidenced the role of parents, specifically through the home feeding environments they maintain, and their use of feeding practices with their children [14, 15]. However, recent research has also suggested a link between children’s eating behaviours and those of their friends in peer networks [16].

School-aged children spend a substantial amount of time in the company of peers and friends, and it has long been established that these individuals are a key influence on children’s developing attitudes and behaviours [12, 17] across a variety of domains (for example, risk-taking behaviours [18, 19]). Furthermore, they gradually become more influential as children grow older [20] and spend more unsupervised time in the company of friends [21]. Friendship groups are said to be found in children 8 years of age and above, with children at this age likely to have formed a close group of friends with a secure structure [22]. Yet there remains a dearth of research examining the importance of peer and friend networks in explaining eating behaviours during the important pre-adolescent period.

The normative model of eating [23] posits that adult eating behaviours are heavily influenced by social comparisons and social approval from other individuals. Since children spend a vast amount of time with their friends, this suggests that friends may play a large role in the eating behaviours displayed by children during the impressionable pre-adolescent time period. Experimental research in this field has highlighted the importance of peers and friends as role models for children’s eating by examining children’s eating behaviours when in the presence of these individuals [24-27]. Non-experimental research,

on the other hand, has focused on exposing the role of friendship networks in predicting children’s eating attitudes and behaviours. Such work has reported associations between children’s eating behaviours and their perceptions of the influence that their friends have on their eating behaviours [28-30]. More specifically, both Cullen and colleagues [28] and Oliver and Thelen [29] found that pre-adolescent children’s perceptions of how their friends’ eating behaviours influenced their own eating were associated with children’s own self-reported eating behaviours. Similarly, Wind and colleagues [30] found that children’s fruit and vegetable consumption was positively related to their perceptions of receiving food-modelling behaviours from their friends. Although findings such as this point at friends and peers as potentially influential figures for children’s eating behaviours, the results are limited as they rely on perceptions of the influences of peers, which may not be wholly accurate.

A small number of studies have explored whether children and their friends share similarities in their eating attitudes and behaviours. Using social network analysis (see [31]), whereby children report the names of the other children in their friendship group, such research can examine any similarities in the attitudes and behaviours of members of friendship groups or cliques. Paxton and colleagues [32] used social network analysis to show that adolescent girls’ individual eating behaviours and use of eating and weight loss behaviours were predicted by their friendship groups’ use of these behaviours. Similarly, Hutchinson and Rapee [33] found that adolescent girls shared similar levels of self-reported dieting, weight loss behaviours, and binge eating behaviours to girls in their friendship group. They further found that friends’ levels of the same behaviours could predict girls’ individual dieting and weight loss behaviours. To date, however, limited research has explored the similarities in friendship group eating behaviours in both boys and girls during the important period of pre-adolescence. In a study using pre-adolescents (with a mean age of 10.5 years), Farrow and colleagues [34] found that children’s reports of dieting-related eating behaviours were similar to their friends’ reports of dieting behaviours, and to their friends’ eating in response to external cues (external eating). Findings such as these suggest

that the eating behaviours of a child's friendship group may have important implications for their own eating behaviours; however, more research is needed with younger samples of children.

Research has documented the associations between problematic eating behaviours and symptoms of anxiety and depression, as work with clinical groups suggests that these symptoms often co-occur in both adults [35-37] and adolescents/children [38-40]. Two previous studies have considered anxiety or depression alongside friendship group eating behaviours in relation to children's own eating behaviours. Hutchinson and Rapee [33] found that adolescent girls' own levels of depression (and self-esteem) predicted their levels of restrained eating, as did their friends' eating behaviours. In pre-adolescent boys and girls, Farrow and colleagues [34] reported that individuals with high or moderate levels of anxiety were more likely to report similar problematic eating behaviours to their friends. To date, however, no research has considered the role of anxiety and depression, together with friends' eating behaviours, in predicting pre-adolescents' eating behaviours.

Although some research has been conducted to explore how friendship groups influence children's eating behaviours, the present study aimed to examine this in a younger sample of children than has been considered in previous work; specifically, children entering pre-adolescence. The present study aimed to examine the relationships between pre-adolescents' reports of their own eating behaviours and those reported by members of their friendship group. A further aim was to examine the role of pre-adolescents' reports of anxiety and depression symptomology in this relationship. Based on previous research with older samples [32-34], it was anticipated that friends' reports of under-eating behaviours (dietary restraint) would be related to pre-adolescents' own reported under-eating behaviours. It was further hypothesised that children's anxiety and depression levels would be positively related to general eating behaviours, as evidenced in previous work [33, 34].

Methods

Participants

Three hundred and fifty-six children were recruited via primary schools within the United Kingdom. As some children ($n=13$) did not form a part of the friendship groups identified (as described below), the final sample reported in this paper consists of 343 children, with boys and girls similarly represented (boys $n=179$, girls $n=164$ girls). The participants ranged in age from 7.25 to 10.25 years ($M=8.75$ years, $SD=0.57$), with 83% describing themselves as White British, 6% as Black/Black British, 6% as Asian/Asian British, 2% as Mixed Race, and 3% as 'Other'.

Procedure and measures

Primary schools from Staffordshire, Derbyshire, Nottinghamshire and Leicestershire were contacted by letter and invited to participate in a study investigating the influences of friendship groups on children's eating attitudes. Schools' participation was confirmed by follow-up telephone calls, with eight schools agreeing to participate in the research.

Participating schools sent letters home to parents of children in classes within the target age range (8-10 years); letters informed parents about the study and explained how they could opt out their child from participating in the study if they wished. The study was conducted as part of a class lesson. At the beginning of the lesson the study was described to each class of children and they provided verbal assent to complete questionnaire packs. Children were asked to complete the questionnaire pack on their own, and in silence, and to ask for help if they did not understand any questions. Alternative activities were provided for children who did not wish to participate, or whose parents had opted them out ($n=5$). The University Research Ethics Committee approved the research.

Participants answered a series of questions about their background, including their date of birth, gender and ethnicity. Participants also completed a series of questionnaire measures, as detailed below.

Eating Patten Inventory for Children (EPI-C)

To assess their self-reported eating behaviours, children completed three subscales of the EPI-C

survey (totalling 20 items) [41]. These subscales included: dietary restraint (e.g. “To keep my weight, I often eat less than I would actually like to”); external eating (e.g. “When I see someone eat, I also get hungry”); and emotional eating (e.g. “Eating helps me when I am disappointed”). Children responded on a four-point scale ranging from ‘not at all’ to ‘totally’. Higher scores on each subscale were indicative of higher levels of psychological dimensions of eating. The EPI-C is designed for use in both clinical and non-clinical pre-adolescent children and has been shown to have adequate factor structure [41] and good validity with pre-adolescents [34, 41]. In the present sample, the internal reliability coefficient (Cronbach’s α) scores for dietary restraint (0.85), external eating (0.78), and emotional eating (0.75) all demonstrated good levels of internal consistency.

Spence Children’s Anxiety Scale (SCAS)

The SCAS [42, 43] is a self-report measure of children’s anxiety symptoms. Two of the six subscales were used, totalling 12 items: social phobia (e.g. “I worry what other people think of me”) and generalised anxiety disorder/overanxious disorder (e.g. “I worry about things”). These two subscales were chosen owing to the well-established links between social phobia, generalised anxiety and symptoms of eating disorders [44, 45]. The SCAS is rated on a four-point scale, from ‘never’ to ‘always’, with scores summed to provide subscale totals. Higher scores signify greater levels of anxiety. Evidence suggests the SCAS is a valid and reliable measure of child anxiety [43] and has previously been used with children aged 7-17 years with good levels of internal consistency [46]. Alpha levels for the present sample were 0.71 for social phobia and 0.77 for generalised anxiety, suggesting good levels of internal consistency.

Children’s Depression Inventory: Short Version (CDI:S)

The CDI:S measures self-reported depressive symptoms in children aged 7-17 years, with the negative mood scale used in the present study. Responses are made on a three-point scale of statements and the child must select one statement per

question that best describes their mood over the previous two weeks (e.g. “I am sad once in a while”, “I am sad many times”, “I am sad all the time”). Responses are summed, with higher scores indicating greater levels of depressive symptoms. The CDI:S has previously been shown to have sound levels of internal consistency [47]; however, as the internal reliability for the current study was fairly low at 0.52, results using this measure were interpreted with caution.

Friendship cliques

To establish friendship groups, each participant was asked to ‘write down the full names of your best friends in your class. That is, the people you usually spend time with at school and enjoy being with’; a statement adapted from previous work by Paxton and colleagues [32], Hutchinson and Rapee [33] and Farrow and colleagues [34]. A software package, UCINET VI [48], was subsequently used to generate friendship groups. To be considered part of a friendship group, an individual had to have been reciprocally chosen by two or more individuals in that group. Individuals could only be part of one friendship group, to maintain independence of groups for analyses. Outputs of friendship groups obtained from the software package were checked manually and modified if the software allocated children to more than one friendship group (in which case, they were placed in the group with which they had the strongest links). Previous research has excluded dyads [32-34] since they have been shown to differ from larger groups in their levels of intimacy and conformity [49, 50]. In the present sample, no dyad friendship groups were found. In total, 74 friendship groups were established, ranging in size from 3-8 members.

Statistical analysis

To compare friendship group members’ eating behaviours and children’s own individual eating behaviours, initially, mean friendship group eating behaviour scores were calculated for each of the three subscales: dietary restraint, emotional eating and external eating. For each individual child, their friendship group’s mean score was calculated from

the mean of the scores of all of the other members in their group (excluding themselves).

Kolmogorov-Smirnov tests for normality indicated that almost all subscales were non-normally distributed; consequently, non-parametric tests were used where possible. Mann-Whitney U tests were used to examine gender differences in reports of eating behaviours, and one-tailed Spearman’s Rho correlations were used to examine relationships between age and reports of eating behaviours.

To identify the significant predictors of children’s individual eating behaviours (dietary restraint; emotional eating; external eating), a series of multiple linear regressions (Enter method) were computed. Gender and age were controlled for in Step 1 of all regressions. In Step 2 of the regression models, the following independent predictor variables were entered: corresponding friendship group eating behaviour (e.g. friends’ dietary restraint levels when predicting individual children’s dietary restraint; friends’ emotional eating levels when predicting individual children’s emotional eating; friends’ external eating when predicting individual children’s external eating); children’s individual symptoms of anxiety (general and social); and children’s individual symptoms of depression. Although the data were non-normally distributed, the use of regression in this instance was deemed acceptable since there is no non-parametric equivalent of regression.

Statistical analyses were performed using PASW Statistics 19. All tests were one-tailed due to the directional nature of the hypotheses.

Results

Descriptive statistics

Table 1 displays the mean and standard deviation (SD) scores for children’s individual eating behaviours, anxiety and depression symptoms by gender.

Mean scores for the eating behaviours measured by the EPI-C (dietary restraint, external eating and emotional eating) were slightly higher than published studies using the same measures with a similar age range of children [34, 41].

Table 1. Descriptive statistics (means and standard deviations) and tests of difference scores (z) for individual eating behaviours, anxiety and depression subscales for boys and for girls

	Mean (SD) Boys (n=179)	Mean (SD) Girls (n=164)	Mann Whitney U (z)
Eating Pattern Inventory for Children (EPI-C)			
Dietary restraint	2.03 (0.77)	2.04 (0.80)	0.15
External eating	2.46 (0.85)	2.18 (0.72)	3.07*
Emotional eating	1.93 (0.83)	1.76 (0.74)	1.82
Spence Children’s Anxiety Scale (SCAS)			
Social anxiety	6.64 (4.22)	7.71 (4.21)	2.47
Generalised anxiety	6.82 (4.21)	8.42 (4.27)	3.57*
Children’s Depression Inventory: Short (CDI:S)			
Negative mood	0.90 (1.23)	1.15 (1.45)	1.42

* $p < 0.01$, one-tailed

Mean levels of children’s anxiety (as measured by SCAS) were slightly higher than those reported in previous published studies [34, 43]; however, they were still considered to be ‘low’. A potential explanation for the marginally higher mean scores could be that the mean age of children in the present sample was slightly lower than previous studies [34]; Spence [43] reports higher symptoms of anxiety in younger children (8-year-old children compared to 9-10 year olds). Mean scores for children’s levels of depression (negative mood) were comparable to normative mean CDI:S scores reported by Kovacs [47] for children of a similar age.

Mann-Whitney U tests of difference (Table 1) showed significant differences by gender for two of the six variables of interest. Specifically, boys reported greater levels of external eating compared to girls, supporting previous research with children of a comparable age [51], while girls reported higher symptoms of general anxiety compared to boys; also similar to previous findings [52, 53]. One-tailed Spearman’s Rho correlations indicated that child age was negatively associated with external eating ($r = -0.167$, $p < 0.01$), emotional eating ($r = -0.167$, $p < 0.01$) and depression symptomology ($r = -0.183$, $p < 0.01$).

Subsequent analyses therefore controlled for gender and age.

Three multiple regression analyses were carried out in order to test the hypotheses that: 1) friends' dieting behaviours would be strong predictors of children's own reports of dieting behaviours, and 2) that children's anxiety and depression levels would also positively predict eating behaviours.

Predictors of pre-adolescent dietary restraint

Multiple regression (Enter method) using gender and age in Step 1, and friends' levels of dietary restraint, individual symptoms of social anxiety, general anxiety and depression in Step 2, produced a significant model: $F(6, 342)=12.47, p<0.01$, accounting for 17.0% of the variance in dietary restraint (adjusted $R^2=0.17$). Table 2 shows the contributions of the predictor variables entered into the model.

Table 2. Multiple regression analyses to predict children's individual levels of dietary restraint.

Variable	β	SE	t
Gender	-0.09	0.08	-1.14
Age	-0.02	0.07	-0.22
Friends' dietary restraint	0.19	0.09	2.20*
Social anxiety	0.05	0.01	3.66***
General anxiety	0.03	0.01	2.03*
Depression	0.06	0.03	0.01*

* $p<0.05$; ** $p<0.01$; *** $p<0.001$, one-tailed

Friends' levels of dietary restraint, individual levels of social and general anxiety symptoms, and depression significantly predicted children's individual dietary restraint. Social anxiety was the predictor accounting for the most variance. All significant predictors were positive, such that greater levels of each predicted greater levels of dietary restraint behaviours. Gender and age did not significantly predict dietary restraint.

Predictors of pre-adolescents' external eating

Multiple regression (Enter method) using gender and age in Step 1, and friends' levels of external eating, individual symptoms of social anxiety, general anxiety and depression in Step 2, produced a significant model: $F(6, 342)=6.35, p<0.01$, which accounted for 10.0% of the variance in external eating (adjusted $R^2=0.10$). Table 3 illustrates the contributions of the model's predictor variables.

Table 3. Multiple regression analyses to predict children's individual levels of external eating.

Variable	β	SE	T
Gender	-0.35	0.09	-3.97***
Age	-0.23	0.08	-2.99***
Friends' external eating	-0.02	0.10	-0.17
Social anxiety	0.00	0.01	0.14
General anxiety	0.04	0.01	2.82**
Depression	0.01	0.04	-0.35

* $p<0.05$; ** $p<0.01$; *** $p<0.001$, one-tailed

Gender, age, and children's symptoms of general anxiety significantly predicted children's individual external eating. Gender was the predictor accounting for the most variance, suggesting that being male was the strongest predictor of engaging in external eating. Being younger and reporting greater symptoms of general anxiety also significantly predicted greater external eating. There were no other significant predictors of external eating.

Predictors of pre-adolescents' emotional eating

The final multiple regression (Enter method) used gender and age in Step 1, and in Step 2, friends' levels of emotional eating, individual symptoms of social anxiety, general anxiety, and depression, to predict children's individual levels of emotional eating. A significant model was found: $F(6, 342)=7.07, p<0.01$, accounting for 11.0% of the variance in emotional eating (adjusted $R^2=0.11$). Table 4 illustrates the contributions of the model predictor variables.

Table 4. Multiple regression analyses to predict children’s individual levels of emotional eating.

Variable	β	SE	T
Gender	-0.26	0.09	-3.10***
Age	-0.23	0.07	-3.02***
Friends’ emotional eating	-0.04	0.10	-0.45
Social anxiety	0.00	0.01	0.31
General anxiety	0.05	0.01	3.23***
Depression	0.01	0.04	0.29

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, one-tailed

Similar to external eating, gender, age and symptoms of general anxiety significantly predicted children’s levels of emotional eating. General anxiety was the highest predictor of emotional eating, suggesting that higher levels of general anxiety predicted higher levels of emotional eating. The predictive value of gender and age suggested that being younger and male predicted greater reports of emotional eating behaviours. No other factors were identified as significant predictors of emotional eating.

Discussion

The present study sought to expand our understanding of the child and friend variables predicting eating behaviours in pre-adolescent children, specifically by examining the eating behaviours of the members of children’s friendship groups, and children’s individual levels of anxiety and depression. The hypothesis that friends’ under-eating behaviours would be strong predictors of children’s own under-eating behaviours was supported by the results of the study. The anticipated results that children’s reports of greater anxiety and depression would predict higher self-reported levels of problematic eating behaviours were also partially supported.

Friendship groups’ reports of dietary restraint were significant predictors of pre-adolescents’ dietary restraint. Conversely, neither emotional nor external eating was predicted by friendship group reports of such behaviours. The finding that external (eating governed by external cues) and emotional eating

(eating governed by emotions) were not predicted by friends’ levels of these behaviours, but dietary restraint was, is consistent with previous research in adolescents and older pre-adolescents where similarities have been found in individual and friendship group scores for dieting behaviour [32-34, 54]. It is plausible that in the younger pre-adolescent sample reported on in this study, emotional and external eating behaviours are influenced more by parental factors. Furthermore, friends may have less influence on these eating behaviours because children of this age are more exposed to parental feeding strategies in the home environment than are older pre-adolescents and adolescents, who may spend more time eating away from the home environment.

Dietary restraint was most strongly predicted by pre-adolescents’ levels of social anxiety, such that more socially anxious pre-adolescents reported higher levels of dietary restraint. High levels of general anxiety also predicted greater levels of dietary restraint, external and emotional eating. These results share similarities with those of Hutchinson and Rapee’s [33] study of adolescent girls, and also with the findings of Farrow and colleagues [34], who reported that general anxiety moderated the relationship between children’s individual eating and that of their friends. Interestingly, social anxiety only predicted dietary restraint, which was also the only eating behaviour predicted by friends’ reports of this behaviour. This suggests that, when compared to external and emotional eating, dietary restraint may be an eating behaviour that is more susceptible to social influences in general, which may be linked to affective factors such as anxiety. It is also plausible that the physiological experience associated with social anxiety (e.g. anxiety is often described as the feeling of ‘butterflies in the stomach’) may, in children, be misconstrued as having stomach ache, which may result in them restricting their dietary intake. This could also explain the similar result, whereby dietary restraint was also predicted by greater levels of depression in this pre-adolescent sample. The low reliability level of the depression measure with the current sample could imply that the measure chosen was too complex for the children in this study, as they were at the lower age range of the measure’s age scope [47]. A measure that is more

sensitive and specific to younger children would enhance future research.

Pre-adolescents' emotional and external eating behaviours were predicted both by gender and age; specifically, these eating behaviours were higher for males and for younger children. Furthermore, gender differences in individual levels of eating behaviours indicated that boys reported higher levels of external eating compared to girls. Previous experimental research has shown that boys are more susceptible to external cues for eating than girls [55]. This is noteworthy given that some previous research has excluded males [32, 33]. However, in order to elucidate this finding, longitudinal studies exploring gender differences in eating behaviours of pre-adolescents over time - similar in design to that of Eisenberg and Neumark-Sztainer [54] - would be beneficial. This would also establish the contribution of friendship groups over time by ascertaining, in particular, whether friends' dietary restraint predicts individual dietary restraint behaviours longitudinally.

Despite identifying significant predictors of pre-adolescent children's eating behaviours, the regression models explained relatively modest amounts of the variance in children's eating behaviours. This highlights the potential role of other contributing factors that future research should consider, such as the use of parental feeding practices, child temperament and other individual factors, such as genetics. The present study is further limited by its cross-sectional nature, since we are not able to ascertain from the results whether children's eating behaviours are influenced by their friends, or if children form friendships with children who share similar eating behaviours. The self-reporting of friendship groups may have been a more complex idea for younger children, as friendships can be less stable at younger ages [56]. It is possible that children may have 'fallen out' with a friend on the day of the study, thus may not have selected each other as friends. This would have impacted on the friendship groups formed by the social network analysis techniques employed.

Despite these limitations, the current study is the first to examine whether the eating behaviours of friends and children's own levels of anxiety and depression predict eating in a young pre-adolescent sample of

boys and girls. To date, research in this area has focused on children older than those reported in the current study [33, 34], despite evidence showing body image, weight and dieting concerns in younger children [9-11]. Consistent with previous research, the results add to the body of current literature that finds links between problematic eating behaviours and anxiety in childhood [33, 34]. Furthermore, the present study expands on the literature that finds links between children's individual eating behaviours and those of their friends [32-34], illustrating that friends' eating behaviours can significantly predict pre-adolescent children's dietary restraint behaviours. This is particularly important given the criticality of the childhood and pre-adolescent periods for the development of eating and dieting concerns [57]. Unlike parental behaviours in relation to child eating, the behaviours of friends are less easy to modify. If friends are agents of change in childhood, school health interventions aimed at improving children's eating attitudes and behaviours, taking into account the impact of friendship groups as influential figures, are essential, although more research is needed to appreciate the other variables that may be implicated in this interaction.

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