Parenting styles, family structure and adolescent dietary behaviour

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Abstract

Objective: To examine associations between parenting styles, family structure and aspects of adolescent dietary behaviour.
Design: Cross-sectional study.
Setting: Secondary schools in the East Midlands, UK.
Subjects: Adolescents aged 12–16 years (*n* 328, 57% boys) completed an FFQ assessing their consumption of fruit, vegetables, unhealthy snacks and breakfast. Adolescents provided information on parental and sibling status and completed a seventeen-item instrument measuring the general parenting style dimensions of involvement and strictness, from which four styles were derived: indulgent, neglectful, authoritarian, authoritative.
Results: After controlling for adolescent gender and age, analysis of covariance revealed no significant interactions between parenting style and family structure variables for any of the dietary behaviours assessed. Significant main effects for family structure were observed only for breakfast consumption, with adolescents from dual-parent families ($P < 0.01$) and those with no brothers ($P < 0.05$) eating breakfast on more days per week than those from single-parent families and those with one or more brother, respectively. Significant main effects for parenting style were observed for all dietary behaviours apart from vegetable consumption. Adolescents who described their parents as authoritative ate more fruit per day, fewer unhealthy snacks per day, and ate breakfast on more days per week than those who described their parents as neglectful.
Conclusions: The positive associations between authoritative parenting style and adolescent dietary behaviour transcend family structure. Future research should be food-specific and assess the efficacy of strategies promoting the central attributes of an authoritative parenting style on the dietary behaviours of adolescents from a variety of family structures.

Dietary behaviour is a major determinant of chronic disease and the promotion of healthful dietary behaviours in all populations, including adolescents, is a public health priority. It is widely acknowledged that adolescents eat fewer fruits and vegetables than is recommended for health[1,2], and studies have shown that many adolescents engage in health-compromising behaviours such as frequent dieting, meal skipping and consumption of foods high in fats, sodium and sugar[3]. Diets rich in fruit and vegetables have important short- and long-term health-protective effects[4,5], whereas diets including high intakes of unhealthy snacks, and frequent breakfast skipping, have been associated with detriments to health, such as higher BMI[6,7]. Dietary behaviours established in adolescence are more likely to persist into adulthood[8,9]. Examining the influences on adolescent dietary behaviours is integral for the development of targeted intervention strategies.

The family environment has been identified as a critical context for the development of eating behaviours[10]. Research suggests that within the family environment the quality of the parent–adolescent relationship has a significant impact on the development of adolescent health-risk behaviours[11]. Such research has found parental warmth and involvement, emotional support, appropriate granting of autonomy, and clear, bidirectional communication to be positively associated with more healthful behaviour in children and adolescents[12,13]. This clustering of parental attributes is known as 'authoritative' parenting, one of several styles of parenting identified by Baumrind[14,15]. Parenting style is a global concept regarded as the general emotional climate for parent–adolescent interactions

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across a wide range of situations and is classified according to two dimensions of parental behaviour – 'strictness', or parental control, and 'involvement', or parental warmth and acceptance[13] – resulting in four parenting styles: authoritative (parents who are strict but also involved), authoritarian (parents who are strict but uninvolved), indulgent (parents who are involved, but not strict) and neglectful (parents who are neither strict nor involved). Within these general parenting styles, parents also display more specific parenting practices, which are typically context-specific behaviours[16] (e.g. rules about the consumption of certain foods).

Research examining the influence of food-related parenting practices has yielded conflicting results. Several studies show that strict parenting practices may have adverse effects, such as increasing preference for and intake of the restricted foods[17,18], whereas other studies suggest that adolescents have a healthier diet when they report more food-related rules in their family[19,20]. Such conflicting results suggest that the influence of parenting practices may differ depending on the general style of parenting. In fact, Darling and Steinberg[16] have argued that the effectiveness of specific parenting practices is moderated by the general parenting style. The influence of parenting style on adolescent dietary behaviours has not been comprehensively explored, yet such characteristics could affect adolescent dietary behaviours by influencing the context in which adolescents experience certain foods. For example, encouraging adolescents to eat a healthy breakfast may be successful for parents who combine strictness and involvement in the interactions with their child (i.e. authoritative parenting style) and unsuccessful for parents with a different parenting style. Understanding the influence of certain parenting styles on adolescent dietary behaviours will allow for a greater understanding of the emotional climates within which positive and negative health behaviours are borne.

The current literature examining associations between parenting styles and adolescent dietary behaviour is limited to fruit and vegetable consumption and has shown equivocal results. Three studies found no association between parenting style and fruit and vegetable consumption among children and adolescents[21–23], while some evidence has shown a positive association between an authoritative parenting style and fruit and vegetable consumption in adolescents[24,25]. While these studies tell us whether positive parent–adolescent interactions contribute to adolescents' development of fruit and vegetable eating behaviours, they do not reveal whether the parental processes that are important in one family context (e.g. dual-parent families) are equally so in others (e.g. single-parent families). In light of the changed and changing demography of youth, research that takes into account the wider context within which parent–adolescent interactions occur is imperative. There is good reason to believe that the effects of specific parenting styles on adolescents' eating behaviours may be moderated by the larger context in which adolescents live[26].

Each parenting style reflects different patterns in parental behaviours, values and practice, which are, in turn, influenced by aspects of the wider family environment in which parents and adolescents live (e.g. marital status, sibling status). Research has shown that marital relationships exert considerable influence on parenting processes and behaviours, and that adolescents from single-parent homes are likely to have more responsibility, independence and decision-making power than those in dual-parent families[27]. Similarly, the number of children in a family, and the gender of siblings, influence parent–adolescent interactions[28]. Adolescent dietary behaviours are also known to vary as a function of the family structure in which they live. For example, research has shown that adolescents from dual-parent families are more likely to regularly eat breakfast[29] and are less likely to increase their consumption of unhealthy snacks over a 2-year period[30] compared with those in single-parent families.

The aim of the present study is to build on the limited body of research examining associations between parenting styles, family structure and adolescent dietary behaviour. Parenting is a learned process and the identification of parenting styles that are associated with positive dietary behaviours in adolescents across various family structures is fundamental for identifying target groups and for developing tailored intervention strategies to promote healthy eating. This may help identify potential moderators of intervention effectiveness. Therefore the present study aims to examine cross-sectional associations between parenting styles, family structure and adolescent consumption of fruit, vegetables, unhealthy snacks and breakfast.

Methods

Sample and procedure

Cross-sectional data were collected between October 2007 and June 2008. Study procedures were approved by the Ethical Advisory Committee of the host university. Data were obtained from adolescents (12–16 years) recruited from three secondary schools in the East Midlands region of the UK. Staff at participating schools selected a subset of their classes for participation. All students from nominated classes (*n* 363) were eligible and received written information on the project. Consent was sought from parents prior to the study and adolescent participants provided assent before completing written surveys during class. In total, 328 pupils provided consent and completed the survey (90 % response rate).

Measures

Family structure
Participants completed questionnaires during Physical Education or Personal, Social and Health Education lessons,

under the supervision of trained researchers and class teachers. Specific characteristics of family structure, including whom the adolescents lived with at home and the number of brothers and sisters, were assessed. Parental status was dichotomized as dual-parent (i.e. lived with mother and father or *de facto*) or single-parent (i.e. lived with only mother or only father). Sibling status was categorised into 'none' or 'one or more' siblings, 'none' or 'one or more' brothers and 'none' or 'one or more' sisters. Demographic information, including date of birth and ethnicity, was provided by the school. Socio-economic position was determined using the Index of Multiple Deprivation, a measure of compound social and material deprivation, calculated from a variety of data including income, employment, health, education and housing. It is based on the postcode of the participant's home, and thus represents an area-level approximation of socio-economic position.

Parenting styles

Adolescents completed a seventeen-item instrument, based on previous work[20,24,31,32], measuring the general parenting style dimensions of involvement and strictness[33]. The involvement scale was measured by ten items (Cronbach's $\alpha = 0.85$), for example: 'When I have a bad result at school, my parents encourage me to do better'. Strictness was measured by seven items (Cronbach's $\alpha = 0.73$), for example: 'My parents know exactly where I am after school'. Response categories for both scales were 'strongly disagree', 'disagree', 'neither agree nor disagree', 'agree' and 'strongly agree'. Based on the median value of both scales, four parenting categories were defined. Authoritative parents (n 124) were those who scored in the upper half on both involvement and strictness, whereas neglectful parents (n 91) scored in the lower half on both dimensions. Authoritarian parents (n 59) scored in the lower half on involvement and in the upper half on strictness. Indulgent parents (n 53) scored in the upper half on involvement and in the lower half on strictness.

Adolescent dietary behaviour

Adolescent food intake was assessed using a thirty-item FFQ, based on the previously validated Youth/Adolescent Food Frequency Questionnaire (YAQ)[34]. Adolescents were asked how often they ate ten different fruits, twelve different vegetables, and eight different unhealthy snacks or types of unhealthy snacks (e.g. crisps, chocolate) in the past month. Responses to questions on the frequency of consumption of specific fruits, vegetables and snacks were summed to assess average total daily consumption. Breakfast consumption was assessed with a single item asking adolescents how often they ate breakfast in the past 7 days.

Statistical analyses

All analyses were conducted using the SPSS statistical software package version 16·0 (SPSS Inc., Chicago, IL,

USA). Descriptive statistics were used to summarise the sociodemographic and dietary characteristics of the sample. Pearson's χ^2 tests were used to examine gender and age group differences in parenting style and family structure variables. Independent t tests were performed to examine gender and age group differences in mean fruit, vegetable and snack consumption per day and mean breakfast consumption per week. As there were some significant differences in behaviours by gender and age group, gender and age were entered as covariates in all further analyses.

Two-way analysis of covariance (ANCOVA) was performed to examine whether fruit consumption, vegetable consumption, unhealthy snack consumption and breakfast consumption differed between the four parenting styles and between the family structure variables. For each analysis, the main effect of parenting style, the main effect of family structure and the interaction between parenting style and family structure are reported in the tables. *Post hoc* tests were used to detail specific differences between the four types of parenting style for each of the outcome variables. A significance level of 0·05 was applied for all analyses.

Results

Sample characteristics

Most of the sample was white British (97%) and upper socio-economic position (67%). Over half of the sample were boys (57%) and younger adolescents (52%). The mean age of the younger adolescents was 13·3 years and the mean age of the older adolescents was 15·6 years. Table 1 presents the distribution of parenting styles and family structure variables by gender and age group. A higher proportion of boys, compared with girls, had one or more sister ($P < 0.01$). A higher proportion of older adolescents, compared with younger adolescents, described their parents as neglectful and a higher proportion of younger adolescents, compared with older adolescents, described their parents as authoritative ($P < 0.001$).

Adolescent dietary behaviours

Significant differences in dietary behaviours were found between genders (Table 2). Compared with girls, boys reported eating more snacks per day and reported eating breakfast on more days per week ($P < 0.01$). Dietary behaviours were also associated with age group. Compared with younger adolescents, older adolescents reported eating more vegetables per day ($P < 0.01$).

Relationship between parenting styles, family structure and adolescent dietary behaviours

After controlling for gender and age of the adolescent, ANCOVA revealed no significant interactions between parenting style and family structure variables for any of

Table 1 Frequency of parenting styles and family structure variables according to gender and age group of adolescents, East Midlands, UK, October 2007 to June 2008

	Total sample (%) (n 328)	Gender (%)		Age group (%)	
		Boys (n 186)	Girls (n 142)	Younger adolescents (n 170)	Older adolescents (n 158)
Parenting style					
Indulgent	16·2	18·8	12·7	10·0	22·8
Neglectful	27·7	30·7	23·9	20·0	36·1***
Authoritarian	17·9	15·6	21·1	20·6	15·2
Authoritative	38·2	34·9	42·3	49·4	25·9***
Parental status					
Single parent	15·5	15·1	16·2	16·5	14·6
Dual parents	84·5	84·9	83·8	83·5	85·4
Sibling status					
None	30·8	33·3	27·5	29·4	32·3
One or more	69·2	66·7	72·5	70·6	67·7
Brother status					
None	36·3	36·6	35·9	34·1	38·6
One or more	63·7	63·4	64·1	65·9	61·4
Sister status					
None	42·1	36·0	50·0	40·6	43·7
One or more	57·9	64·0	50·0**	59·4	56·3

Younger adolescents, age range 12–15·5 years, mean age 13·3 years; older adolescents, age range 14·6–16·5 years, mean age 15·6 years.
Values were significantly different from those of younger adolescents (Pearson's χ^2 test of significance): **$P < 0.01$, ***$P < 0.001$.

Table 2 Mean daily consumption of fruit, vegetables and unhealthy snacks, and mean weekly breakfast consumption, among younger and older adolescent boys and girls, East Midlands, UK, October 2007 to June 2008

	Boys (n 186)		Girls (n 142)		Younger adolescents (n 170)		Older adolescents (n 158)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Fruit consumption (portions/d)	2·5	1·7	2·5	1·6	2·4	1·7	2·7	1·7
Vegetable consumption (portions/d)	2·1	2·1	2·2	1·5	1·9	1·7	2·5**	2·0
Unhealthy snack consumption (times/d)	3·5	3·5	2·5**	2·5	2·9	3·1	3·2	3·4
Breakfast consumption (d/week)	5·4	2·4	4·5**	2·7	5·2	2·5	4·7	2·6

Mean values were significantly different from those of boys or younger adolescents (independent sample *t* test): **$P < 0.01$.

the dietary behaviours assessed (Table 3). Significant main effects for family structure were only observed for breakfast consumption. Adolescents from dual-parent families ($P < 0.01$) and adolescents with no brothers ($P < 0.05$) ate breakfast on more days per week than those from single-parent families and those with one or more brother, respectively.

Significant main effects for parenting style were observed for all dietary behaviours assessed except for vegetable consumption. For fruit consumption, across parental status ($P < 0.001$), sibling status ($P < 0.001$), brother status ($P < 0.01$) and sister status ($P < 0.01$) adolescents who described their parents as authoritative ate more fruit than those who described their parents as neglectful. In addition, across sibling ($P < 0.05$), brother ($P < 0.05$) and sister status ($P < 0.05$) adolescents who described their parents as indulgent ate more fruit than those who described their parents as neglectful.

For unhealthy snack consumption, across parental status ($P < 0.05$), sibling status ($P < 0.01$), brother status ($P < 0.01$) and sister status ($P < 0.01$) adolescents who described their parents as authoritative ate fewer unhealthy snacks than those who described their parents

as neglectful. In addition, across sibling status ($P < 0.05$), brother status ($P < 0.05$) and sister status ($P < 0.05$) adolescents who described their parents as authoritarian ate fewer unhealthy snacks than those who described their parents as neglectful.

For breakfast consumption, across parental status ($P < 0.001$), sibling status ($P < 0.001$), brother status ($P < 0.001$) and sister status ($P < 0.001$) adolescents who described their parents as authoritative ate breakfast on more days per week than those who described their parents as neglectful. In addition, across sibling status ($P < 0.05$), brother status ($P < 0.05$) and sister status ($P < 0.05$) adolescents who described their parents as authoritative ate breakfast on more days per week than those who described their parents as indulgent.

Discussion

The present study examined associations between parenting styles, family structure and adolescent dietary behaviours and the interaction of parenting styles and family structure variables with regard to adolescent dietary

Table 3 Differences in adolescent dietary behaviours between the four parenting styles and family structure variables, East Midlands, UK, October 2007 to June 2008

	Authoritative (Av) (n 125)		Authoritarian (At) (n 59)		Neglectful (Ng) (n 91)		Indulgent (In) (n 53)		Main effect: parenting style (F value)	Main effect: family structure (F value)	Interaction effect (F value)	Post hoc tests: Bonferroni contrasts
	Mean	SD	Mean	SD	Mean	SD	Mean	SD				
Fruit consumption (portions/d)												
Parental status												
Single parent	2·98	1·07	2·61	2·03	1·39	1·21	2·45	1·66				
Dual parents	2·86	1·84	2·33	1·56	2·06	1·54	2·73	1·67	5·40***	0·003	2·41	Av > Ng***
Sibling status												
None	3·06	2·01	1·58	1·45	1·84	1·10	2·81	1·83				
One or more	2·60	1·64	2·77	1·67	2·12	1·66	2·86	1·60	5·87***	1·67	2·49	Av > Ng*** In > Ng*
Brother status												
None	2·96	1·92	2·67	1·39	1·82	1·13	2·68	1·82				
One or more	2·79	1·67	2·75	1·68	2·00	1·71	2·71	1·59	5·44***	2·46	2·12	Av > Ng** In > Ng*
Sister status												
None	2·53	1·77	2·46	1·83	1·98	1·59	2·99	1·68				
One or more	3·16	1·73	2·54	1·62	1·88	1·47	2·49	1·66	4·23**	0·42	1·69	Av > Ng** In > Ng*
Vegetable consumption (portions/d)												
Parental status												
Single parent	2·04	1·14	2·09	1·35	1·21	1·07	2·34	1·52				
Dual parents	2·51	1·94	1·88	1·64	1·94	1·89	2·48	2·21	1·35	0·85	0·61	
Sibling status												
None	2·15	1·72	1·73	1·62	2·34	2·08	3·22	2·79				
One or more	2·39	1·93	1·95	1·58	1·71	1·59	2·28	1·71	2·31	1·68	1·87	
Brother status												
None	2·29	1·77	1·78	1·55	2·11	2·06	2·88	2·71				
One or more	2·55	1·94	1·99	1·59	1·62	1·56	2·18	1·73	2·92	0·67	2·40	
Sister status												
None	2·68	2·06	1·69	1·08	1·87	1·77	2·00	1·63				
One or more	2·25	1·66	2·09	1·85	1·73	1·79	2·83	2·44	2·79	0·69	1·68	
Unhealthy snack consumption (times/d)												
Parental status												
Single parent	1·91	1·24	2·45	1·81	3·58	4·40	1·86	1·70				
Dual parents	2·59	2·24	2·64	2·38	4·23	4·56	3·04	3·07	3·21*	2·21	0·48	Av < Ng*
Sibling status												
None	2·34	1·91	2·28	1·53	3·71	3·02	3·33	3·51				
One or more	2·53	2·24	2·66	2·45	4·34	5·07	2·78	2·77	3·91**	0·30	0·36	Av < Ng** At < Ng*
Brother status												
None	2·52	2·39	2·53	1·56	3·98	4·65	3·33	3·48				
One or more	2·47	1·99	2·85	2·47	4·19	4·46	2·65	2·73	4·58**	0·01	0·51	Av < Ng** At < Ng*
Sister status												
None	2·76	2·45	2·30	2·41	3·84	5·13	2·10	1·79				
One or more	2·28	1·82	2·88	2·14	4·26	4·18	3·41	3·63	4·24**	0·82	1·27	Av < Ng** At < Ng*

Table 3 *Continued*

	Authoritative (Av) (*n* 125)		Authoritarian (At) (*n* 59)		Neglectful (Ng) (*n* 91)		Indulgent (In) (*n* 53)		Main effect: parenting style (*F* value)	Main effect: family structure (*F* value)	Interaction effect (*F* value)	*Post hoc* tests: Bonferroni contrasts
	Mean	SD	Mean	SD	Mean	SD	Mean	SD				
Breakfast consumption (d/week)												
Parental status												
Single parent	4·98	2·59	3·85	3·06	2·27	2·82	4·87	3·32				
Dual parents	5·82	1·91	5·25	2·54	4·66	2·72	4·93	2·50	6·87***	8·09**	1·26	Av > Ng*** Dual > single**
Sibling status												
None	6·15	1·68	5·80	2·24	4·51	3·07	4·83	2·23				
One or more	5·58	2·11	4·65	2·77	3·95	2·85	4·63	2·70	6·23***	3·23	0·19	Av > Ng*** Av > In*
Brother status												
None	5·97	1·84	5·61	2·29	4·58	2·91	4·88	2·22				
One or more	5·57	2·09	4·78	2·79	3·85	2·92	4·56	2·71	6·34***	3·75*	0·21	Av > Ng*** Av > In* No brother > has brothers*
Sister status												
None	5·52	2·13	5·18	2·44	4·33	2·81	4·23	2·85				
One or more	5·85	1·89	4·91	2·85	4·08	2·99	4·99	2·25	6·07***	0·004	0·66	Av > Ng*** Av > In*

Significance (analysis of covariance, analyses adjusted for gender and age of adolescent in the study): $*P < 0.05$, $**P < 0.01$, $***P < 0.001$.

behaviours. Regardless of their family structure, adolescents who described their parents as authoritative had more favourable dietary behaviours than adolescents who described their parents as authoritarian, indulgent or neglectful.

A higher proportion of younger adolescents, compared with older adolescents, described their parents as authoritative and a higher proportion of older adolescents, compared with younger adolescents, described their parents as neglectful. Such findings support previous research[35] and suggest that approaches to intervene with parents and their adolescents should be age-specific because greater parental strictness and involvement is evident in earlier adolescence. Consistent with previous research, adolescent girls ate breakfast on fewer days per week compared with adolescent boys[30,36,37]. This may be a chosen method of weight control for girls, and in some individuals is associated with body dissatisfaction, dieting or disordered eating[36]. In the present study, adolescent boys ate more unhealthy snacks per day compared with girls. Furthermore, older adolescents ate more vegetables per day compared with younger adolescents. In contrast, review-level evidence has shown a negative association between age and fruit and vegetable consumption[38]. Contrasting findings may reflect a difference in the methodologies employed to assess fruit and vegetable consumption. Such differences in adolescent dietary behaviour suggest the importance of gaining an increased understanding of gender and age differences in specific dietary behaviours. Interventions aimed at promoting healthy dietary behaviours should target specific dietary behaviours by age and gender.

Adolescents who described their parents as authoritative ate more fruit, fewer unhealthy snacks per day and ate breakfast on more days per week than adolescents who described their parents as neglectful. Findings of the present study support previous research showing that adolescents raised in authoritative homes have higher fruit and vegetable consumption[24,25] than adolescents raised in different types of household. An authoritative parenting style has also been positively associated with physical activity levels in girls[39] and inversely associated with prevalence of overweight in children[40]. The association between an authoritative parenting style and positive dietary behaviours among adolescents may explain some of the contradictory findings in the literature on the influence of food-specific parenting practices, and in particular food rules, on adolescent dietary behaviours. General parenting style can be viewed as the emotional climate within which parenting practices occur. The emotional climate created by authoritative parents is one of high strictness and high involvement, responsiveness and warmth. It may be this combination of strictness, involvement and warmth in the interactions between parent and child that leads to positive dietary behaviours. Future research should assess the efficacy of

strategies promoting the central attributes of an authoritative parenting style in an effort to support healthy dietary behaviours among young people. Drawing on tenets of self-determination theory, the encouragement and creation of autonomy-supportive environments could provide a useful starting point for parent education interventions[41].

There were additional differences between parenting styles that differed by food type. Consistent with previous research, adolescents who described their parents as indulgent ate more fruit per day than those who described their parents as neglectful[24]. Parental fruit consumption is positively associated with adolescent fruit consumption[42] and it may be that parents with attributes of an indulgent parenting style (warm and involved) are positive role models to their children without being strict about fruit consumption. On the other hand, adolescents who described their parents as authoritarian ate fewer unhealthy snacks per day than adolescents who described their parents as neglectful. Such findings support previous research where more food rules and more restrictiveness (attributes of an authoritarian parenting style) were related to less sweets, snacks and soft drinks[19,20]. It may be the case that greater strictness is required to restrict unhealthy snack consumption, particularly when such snacks are likely to be highly available and reinforcing. However, long-term behaviour change may require a shift to more autonomy-driven behaviour of the adolescent. But this strategy has not been tested previously. For vegetable consumption, there were no significant main effects of parenting styles across any of the family structure variables. This could be related to how vegetables are available in households. It is expected that vegetable consumption is less regulated by the adolescent because servings will be provided by the parent as part of the meal. For breakfast consumption, adolescents who described their parents as authoritative ate breakfast on more days per week than those who described their parents as indulgent. Indulgent parents are warm and involved but not strict and may be more inclined to let their child decide on whether or not they want to eat breakfast than those parents who are strict and involved. Our findings offer support to previous research suggesting that influences vary by food type[43], and reinforce the need for future research to be food-specific.

Consistent with findings from a recent systematic review, adolescents from dual-parent families ate breakfast on more days per week than those from single-parent families[29]. Such findings should be taken into consideration when designing programmes aimed at improving breakfast behaviours among adolescents. Also consistent with previous research, adolescents with no brothers ate breakfast on more days per week compared to those with one or more brother[30]. Such findings suggest the importance of gaining an increased understanding of the mechanisms underpinning associations

between the presence of brothers and adolescent break-fast behaviours, as well as the mechanisms underpinning differences in breakfast behaviours of adolescents from single- and dual-parent families.

There were no significant interactions between parenting styles and family structure with adolescent dietary behaviours. The general absence of such interactions suggests that the benefit of authoritative parenting and the detriment of neglectful parenting transcend family structure for adolescent dietary behaviours. Such findings support previous research where, regardless of their ethnicity, class or parental marital status, adolescents with authoritative parents were more integrated at school, earned higher grades, were more self-reliant, reported less anxiety and depression, and were less likely to engage in delinquent behaviours, compared with those having neglectful parents[26,32,35]. Findings suggest that the most significant differences between families of differing structures may be in the resources available to facilitate healthy eating, rather than in the specific constellations of attitudes, values and beliefs.

Strengths of the present study include its high response rate and the analyses of individual dietary behaviours. Also the study is innovative in that it examined differences in adolescent dietary behaviours according to parenting styles and multiple indicators of family structure. However, findings should be viewed in light of the following limitations. Several studies have identified overestimation of fruit and vegetable intake when using FFQ[24,44]. Although the YAQ is probably the most suitable and well-tested[34,45] tool for assessing dietary intake among adolescents, there are problems inherent to assessing dietary intake with self-reported measures. Given that the fruit and vegetable consumption levels reported by participants in the present study are higher than the national averages for England[46], it may be that adolescents have over-reported because such behaviours are perceived as healthy and socially desirable[24]. The study is also limited by its cross-sectional design and the generalisability of the results is limited because participants were predominantly white and of upper socio-economic position, and so does not represent the population at large. Future research should investigate the associations between parenting styles, family structure and adolescent dietary behaviour in a sample with lower socio-economic position. The study used adolescent-reported general parenting style whereas future research may benefit from using aggregated information obtained from both parents and adolescents.

In summary, adolescents who described their parents as authoritative had more positive dietary behaviours than adolescents who described their parents as neglectful. The positive associations between authoritative parenting style and adolescent dietary behaviour transcend family structure. Future research should be food-specific and assess the efficacy of strategies promoting the central attributes of an authoritative parenting style on the dietary behaviours of adolescents from a variety of family structures.

References

1. Currie C, Robert C, Morgan A et al. (2004) *Young People's Health in Context. Health Behaviour in School-aged Children (HBSC): International Report from the 2001/2002 Survey. WHO Health Policy Series: Health Policy for Children and Adolescents* no. 4. Copenhagen: WHO Regional Office for Europe.
2. Guenther PM, Dodd KW, Reedy J et al. (2006) Most Americans eat much less than recommended amounts of fruits and vegetables. *J Am Diet Assoc* **106**, 1371–1379.
3. Story M & Neumark-Sztainer D (1999) Promoting healthy eating and physical activity in adolescents. *Arch Pediatr Adolesc Med* **10**, 109–123.
4. World Health Organization (2002) *The World Health Report. Reducing Risks, Promoting Healthy Life.* Geneva: WHO.
5. World Health Organization (2003) *Diet, Nutrition and the Prevention of Chronic Diseases. Report of a Joint WHO/FAO Expert Consultation.* Geneva: WHO.
6. Rennie KL, Johnson L & Jebb SA (2005) Behavioural determinants of obesity. *Best Pract Res Clin Endocrinol Metab* **19**, 343–358.
7. Crossman A, Anne Sullivan D & Benin M (2006) The family environment and American adolescents' risk of obesity as young adults. *Soc Sci Med* **63**, 2255–2267.
8. Mikkila V, Rasanen L, Raitakari OT et al. (2004) Longitudinal changes in diet from childhood into adulthood with respect to risk of cardiovascular diseases: the Cardiovascular Risk in Young Finns Study. *Eur J Clin Nutr* **58**, 1038–1045.
9. Lien N, Lytle LA & Klepp KI (2001) Stability in consumption of fruit, vegetables and sugary foods in a cohort from age 14–21. *Prev Med* **33**, 217–226.
10. Tinsley BJ (2003) *How Children Learn To Be Healthy.* Cambridge: Cambridge University Press.
11. Newman K, Harrison L, Dashiff C et al. (2008) Relationships between parenting styles and risk behaviors in adolescent health: an integrative literature review. *Rev Lat Am Enfermagem* **16**, 142–150.
12. Baumrind D (1991) Parenting styles and adolescent development. In *The Encyclopedia of Adolescence*, pp. 746–758 [J Brooks-Gunn, R Lerner and AC Petersen, editors]. New York: Garland.
13. Maccoby EE & Martin JA (1983) Socialization in the context of the family: parent–child interaction. In *Handbook of Child Psychology.* vol. 4: *Personality and Social Development*, pp. 1–110 [EM Hetherington, editor]. New York: Wiley.
14. Baumrind D (1971) Current patterns of parental authority. *Dev Psychol Monogr* **4**, 1 Part 2.

15. Baumrind D (1967) Child care practices anteceding three patterns of preschool behavior. *Genet Psychol Monogr* **75**, 43–88.
16. Darling N & Steinberg L (1993) Parenting styles as a context: an integrative model. *Psychol Bull* **113**, 487–496.
17. Birch LL & Fisher JO (2000) Mothers' child-feeding practices influence daughters' eating and weight. *Am J Clin Nutr* **71**, 1054–1061.
18. Fisher JO & Birch LL (1999) Restricting access to palatable foods affects children's behavioral response, food selection, and intake. *Am J Clin Nutr* **69**, 1264–1272.
19. De Bourdeaudhuij I (1997) Family food rules and healthy eating in adolescents. *J Health Psychol* **2**, 45–56.
20. van der Horst K, Kremers S, Ferreira I *et al.* (2007) Perceived parenting style and practices and the consumption of sugar-sweetened beverages by adolescents. *Health Educ Res* **22**, 295–304.
21. De Bourdeaudhuij I, Te Velde SJ, Maes L *et al.* (2009) General parenting styles are not strongly associated with fruit and vegetable intake and social-environmental correlates among 11-year-old children in four countries in Europe. *Public Health Nutr* **12**, 259–266.
22. Cullen KW, Baranowski T, Rittenberry L *et al.* (2000) Socioenvironmental influences on children's fruit, juice and vegetable consumption as reported by parents: reliability and validity of measures. *Public Health Nutr* **3**, 345–356.
23. Young EM, Fors SW & Hayes DM (2004) Associations between perceived parent behaviors and middle school student fruit and vegetable consumption. *J Nutr Educ Behav* **36**, 2–8.
24. Kremers SP, Brug J, de Vries H *et al.* (2003) Parenting style and adolescent fruit consumption. *Appetite* **41**, 43–50.
25. Lytle LA, Varnell S, Murray DM *et al.* (2003) Predicting adolescents' intake of fruits and vegetables. *J Nutr Educ Behav* **35**, 170–175.
26. Steinberg L, Mounts NS, Lamborn SD *et al.* (1991) Authoritative parenting and adolescent adjustment across varied ecological niches. *J Res Adolesc* **1**, 19–36.
27. Sessa FM & Steinberg L (1991) Family structure and the development of autonomy during adolescence. *J Early Adolesc* **11**, 38–55.
28. Berns RM (2006) *Child, Family, School, Community: Socialization and Support*, 7th ed. Belmont, CA: Thomson Wadsworth.
29. Pearson N, Biddle SJH & Gorely T (2009) Family correlates of breakfast consumption among children and adolescents: a systematic review. *Appetite* **52**, 1–7.
30. Pearson N, MacFarlane A, Crawford D *et al.* (2009) Family circumstance and adolescent dietary behaviours. *Appetite* **52**, 668–674.
31. Steinberg L, Elmen J & Mounts N (1989) Authoritative parenting, psychosocial maturity, and academic success among adolescents. *Child Dev* **60**, 1424–1436.
32. Lamborn SD, Mounts N, Steinberg L *et al.* (1991) Patterns of competence and adjustment among adolescents from authoritative, authoritarian, indulgent and neglectful families. *Child Dev* **62**, 1049–1065.
33. Den Exter Blokland EAW, Engels RC & Finkenauer C (2001) Parenting styles, self control and male juvenile delinquency: the mediating role of self-control. In *Prevention and Control of Aggression and the Impacts on Its Victims*, pp. 201–207 [M Martinez, editor]. Dordrecht/New York: Kluwer/Plenum Press.
34. Rockett HR, Breitenbach M, Frazier AL *et al.* (1997) Validation of a Youth/Adolescent Food Frequency Questionnaire. *Prev Med* **26**, 808–816.
35. Shucksmith J, Hendry LB & Glendinning A (1995) Models of parenting: implications for adolescent well-being within different types of family contexts. *J Adolesc* **18**, 253–270.
36. Keski-Rahkonen A, Kaprio J, Rissanen A *et al.* (2003) Breakfast skipping and health-compromising behaviors in adolescents and adults. *Eur J Clin Nutr* **57**, 842–853.
37. Rashidi A, Mohammadpour-Ahranjani B, Karandish M *et al.* (2007) Obese and female adolescents skip breakfast more than their non-obese and male peers. *Cent Eur J Med* **2**, 481–487.
38. Rasmussen M, Krolner R, Klepp KI *et al.* (2006) Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part I: quantitative studies. *Int J Behav Nutr Phys Act* **3**, 22.
39. Schmitz KH, Lytle LA, Phillips GA *et al.* (2002) Psychosocial correlates of physical activity and sedentary leisure habits in young adolescents: the Teens Eating for Energy and Nutrition at School study. *Prev Med* **34**, 266–278.
40. Rhee KE, Lumeng JC, Appugliese DP *et al.* (2006) Parenting styles and overweight status in first grade. *Pediatrics* **117**, 2047–2054.
41. Williams GC (2002) Improving patients' health through supporting the autonomy of patients and providers. In *Handbook of Self-determination Research*, pp. 233–254 [EL Deci and RM Ryan, editors]. Rochester, NY: The University of Rochester Press.
42. Pearson N, Biddle SJH & Gorely T (2008) Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. *Public Health Nutr* **12**, 267–283.
43. Baranowski T, Cullen KW & Baranowski J (1999) Psychosocial correlates of dietary intake: advancing dietary intervention. *Annu Rev Nutr* **19**, 17–40.
44. Van Assema P, Brug J, Ronda G *et al.* (2002) A short Dutch questionnaire to measure fruit and vegetable intake: relative validity among adults and adolescents. *Nutr Health* **16**, 85–106.
45. Rockett HRH, Wolf AM & Colditz GA (1995) Development and reproducibility of a food frequency questionnaire to assess diets of older children and adolescents. *J Am Diet Assoc* **95**, 336–340.
46. The Information Centre for Health and Social Care (2006) *Health Survey for England 2006*. London: The Stationery Office.