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Individual, behavioural and home environmental factors associated with eating behaviours in young adolescents

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ABSTRACT

This study aimed to examine individual, behavioural and home environmental factors associated with frequency of consumption of fruit, vegetables and energy-dense snacks among adolescents. Adolescents aged 11–12 years (n = 521, 48% boys) completed a paper-based questionnaire during class-time which included a Food Frequency Questionnaire assessing their consumption of fruit, vegetables, and energy-dense (ED) snacks, and items assessing habits, self-efficacy, eating at the television (TV), eating with parents, parenting practices, and home availability and accessibility of foods. Multiple linear regression analyses showed that eating fruit and vegetables while watching TV and home availability and accessibility of fruit and vegetables were positively associated with frequency of fruit consumption and vegetable consumption, while home accessibility of ED snack foods was negatively associated with frequency of fruit consumption. Habit for eating ED snack foods in front the TV, eating ED snack foods while watching TV, and home availability of ED snacks were positively associated with frequency of ED snack consumption. This study has highlighted the importance of a healthy home environment for promoting fruit and vegetable intake in early adolescents and also suggests that, if snacking while TV viewing occurs, this could be a good opportunity for promoting fruit and vegetable intake. These findings are likely to be useful for supporting the development of multi-faceted interventions and aid us in knowing what advice to give to parents to help them to help their young adolescents to develop and maintain healthy eating habits.

1. Background

Adolescence is a significant developmental life stage where health behaviours are often established and become habitual. Unhealthy eating behaviours including snacking on energy-dense foods and low intakes of fruit and vegetables are particularly common characteristics of many adolescents' diets, and have a significant impact on both immediate and long term physiological and mental health conditions including obesity indicators (Piernas & Popkin, 2010), cancers (Colditz & Frazier, 1995; Maynard, Gunnell, Emmett, Frankel, & Davey Smith, 2003), and mental health disorders (Jacka et al., 2011, 2013). Eating behaviours and habits developed during adolescence tend to persist into adulthood (Craigie, Lake, Kelly, Adamson, & Mathers, 2011), and thus decreasing the consumption of energy-dense foods and increasing the consumption of fruits and vegetables during adolescence are important targets for nutrition interventions. Identifying potentially modifiable factors of adolescent eating behaviours is imperative for the design of successful interventions. Furthermore, identifying eating behaviours that share modifiable factors is potentially useful as eating behaviours do not occur in isolation and such data could underpin dietary interventions aiming to change multiple eating behaviours.

Many potential correlates of adolescent eating behaviours have been identified. For example, review level evidence suggests that habit can determine food choices and eating behaviours (Reinaerts, de Nooijer, Candel, & de Vries, 2007; van't Riet, Sijtsema, Dagevos,

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& De Bruijn, 2011), and that repeated (habitual) food choices and eating behaviours are often associated with environmental cues – e.g., coming home from work or school (Neal, Wood, Labrecque, & Lally, 2012). Self-efficacy is another correlate of eating behaviour, with evidence suggesting that higher levels of self-efficacy, that is, feeling confident in one's ability to successfully undertake a task, are related to health behaviour changes such as healthier eating behaviours (Pearson, Ball, & Crawford, 2011a, 2011b).

Although adolescence is associated with increased autonomy, parents still typically provide foods for children and are responsible for mealtimes (Neumark-Sztainer, Larson, Fulkerson, Eisenberg, & Story, 2010). Eating meals as a family and parental role modelling have both been associated with healthier adolescent eating behaviours (Fink, Racine, Mueffelmann, Dean, & Herman-Smith, 2014; Gillman et al., 2000). Availability and accessibility of foods are powerful predictors of consumption, with greater availability and accessibility of fruits and vegetables being related to greater intake in children and adolescents (Cook, O'Reilly, DeRosa, Rohrbach, & Spruijt-Metz, 2015; Loth, MacLehose, Larson, Berge, & Neumark-Sztainer, 2016; Pearson, Biddle, & Gorely, 2009). Furthermore, not making unhealthy foods available or accessible, i.e. employing covert restriction, has been linked to lower intake of such foods (Ogden, Reynolds, & Smith, 2006).

Food-related parenting practices are commonly used by parents of adolescents (Loth, MacLehose, Fulkerson, Crow, & Neumark-Sztainer, 2013) and also relate to adolescents' eating behaviours. Pressure to eat certain foods, or finish meals, has been associated with lower consumption of healthy pressured foods (e.g., soup (Galloway, Fiorito, Francis, & Birch, 2006)) but greater consumption of unhealthy foods (e.g., unhealthy snacks (Brown & Ogden, 2004);) in children and to less healthy eating attitudes and behaviours (Haycraft, Goodwin, & Meyer, 2014) and greater weight (Loth et al., 2013) in adolescents. Restriction of foods can be associated with greater subsequent intake, particularly if the restriction has been overt (e.g., "No, you can't have another biscuit") or if food has been used as a reward (Birch & Fisher, 1998). Parental use of restriction has also been linked to higher adolescent weight (Loth et al., 2013).

Other health behaviours have been found to play an important role in determining eating behaviours. Behaviours – such as watching television whilst eating – have been related to increased food consumption (Blass et al., 2006; Pearson et al., 2011a, 2011b) which, in turn, can lead to weight gain. For example, adolescents who watch TV whilst eating meals have been found to have less healthy diets than those who do not watch TV whilst eating meals (Feldman, Eisenberg, Neumark-Sztainer, & Story, 2007) and TV viewing has been linked to greater unhealthy snack food consumption in children and adolescents (Gebremariam et al., 2013; Pearson & Biddle, 2011).

While numerous factors have been identified as impacting eating behaviours, it is unlikely that these exert their effects individually. Given that theoretically based nutrition interventions have been shown to be more effective than those without a theoretical underpinning (Cerin, Barnett, & Baranowski, 2009; Glanz & Bishop, 2010), behavioural theories should be utilised to provide a framework for studying factors associated with eating behaviours. There is support for the use of social–ecological models in understanding health behaviours (Golden & Earp, 2012). These posit that factors at the individual (e.g. habits), social (parental modelling) and physical (e.g. availability of foods at home) environmental levels interact to influence health behaviour (McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis, Owen, & Fisher, 2008). Few studies have examined the influence of correlates across multiple levels, and/or have examined the same correlates for multiple eating behaviours, both of which are likely to be beneficial for the development of multifaceted interventions to promote healthy eating. Furthermore, where studies have examined correlates at multiple levels of the social-ecological model, it is typical that factors significant in a univariate model are entered into a multivariate model regardless of their 'level'. We are unaware of any study that has examined the effect of correlates of multiple eating behaviours at each level separately (e.g. factors significant at the individual level all entered into a multivariate model to determine the contribution of each factor at the individual level) before combining into one model. Such information is important for providing modifiable determinants to target in a multi-level intervention. Using a social–ecological framework, the present study aimed to examine individual, behavioural and home environmental factors associated with the frequency of consumption of fruit, vegetables and energy-dense snacks among young adolescents aged 11–12 years.

2. Methods

2.1. Study procedure and participants

Cross-sectional data were collected between May 2013 and June 2014. Study procedures were approved by the Ethical Advisory Committee of the host university. Data were obtained from young adolescents in their first year (Year 7) of secondary school (aged 11–12 years) recruited from four secondary schools in the East Midlands region of the UK. All students in Year 7 of participating schools were eligible and received an information leaflet to take home for a parent or guardian with details of the study (n = 683). Under existing ethical guidelines, it was necessary to seek consent from parents for each child's participation, and no information could be accessed regarding characteristics of non-respondents. Adolescent participants provided assent before completing written questionnaires during class time. In total, 562 pupils provided parental consent (82% response rate) and 521 were present on the data collection days and completed the questionnaire (76% response rate).

2.2. Measures

Participants completed paper-based questionnaires during a school lesson under the supervision of trained researchers and class teachers. Participants provided their date of birth and gender.

2.2.1. Eating behaviours

Food intake was assessed using a Food Frequency Questionnaire (FFQ). This FFQ was based on previously validated indices of food intake (Rockett et al., 1997) but options were reduced to focus on the specific foods of interest (namely, fruit, vegetables, and energy-dense snacks) and assessed intake frequency during the past week. Students indicated how frequently they consumed eighteen food items during a usual week. Seven response categories ranged from 'never' to 'more than three a day'. The frequency of consumption of the eighteen food items in the past month was converted to a daily equivalent, which is an established method (Willett, 1998; Neumark-Sztainer, Wall, Perry, & Story, 2003; Pearson et al., 2011a, 2011b). Daily equivalents were calculated as follows: never (0·00 per d); one-two days a week (0·2 per d); 3–4 days a week (0·5 per d); five-six days a week (0·7 per d); once a day (1.0 per d); twice a day (2.0 per d); three or more a day (3.0 per d). The daily intake of fruit, vegetables, and energy-dense snacks was calculated by summing the daily equivalents for the food items in each food group. The estimated daily intake of 'fruit' included the summed equivalence of five fruit items (apples, bananas, oranges, grapes and other fruit), the daily equivalent of 'vegetables' included the summed equivalence of five vegetable items (carrots, peas, broccoli, salad and other vegetables), the daily equivalence of 'energy-dense