Children’s snack consumption: role of parents, peers and child snack-purchasing behaviour. Results from the INPACT study

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Introduction

In many affluent countries, the prevalence of childhood obesity is both high and rising.1–3 Nevertheless, there are indications of stabilization of the overweight/obesity trends in some subsamples of adolescents in France, Ireland and Sweden,4 and also in children aged 2–10 years in the Netherlands.5 However, obesity in childhood is associated with various physical and psychosocial problems, not just in childhood, but also beyond.5–10 Furthermore, childhood obesity tracks into adulthood.9

Energy-dense snacks are often high in fat and sugars and low in nutrients, and therefore considered unhealthy. Moreover, it has been reported that more frequent consumption of energy-dense snacks is associated with higher total energy intake and a higher proportion of total energy in the diet which is provided by sugars.10 Not only has an increase in children’s snacking behaviour been reported,11 dietary behaviour established in childhood also track into adulthood.12,13 To develop interventions and policy to improve children’s dietary behaviour, it is important to gain greater insight into the determinants of their unhealthy dietary behaviour, including unhealthy snack consumption.

The home environment is reported to be an important determinant of children’s dietary behaviour.14 Because parents can act as role models, set food rules and determine which foods are available at home, they influence children’s eating habits.15 Although most studies on parental factors and children’s dietary behaviour focussed on fruit and vegetable intake,16–18 some have also shown parental factors to be associated with children’s unhealthy snacking behaviour. For example, children’s snack consumption is associated with the home availability of snacks: when snacks were available at home, children consumed more snacks.19 Among boys, it was also found that a lack of food rules was associated with a higher intake of fat.20

As well as parental influence, other elements in the social environment play a role in children’s dietary behaviour. As children grow older, they spend more time with their peers, who can also influence their dietary behaviour. A recent review concluded that school friendships may be critical to shaping eating behaviour and body weight: e.g. the risk of becoming overweight was higher in children whose friends were overweight.21,22 Similarly, a positive association was found between individual and peer snack consumption: adolescents whose friends consumed many snacks ate more snacks themselves than those whose friends ate few snacks.23

As children age—and possibly receive pocket money—they gain more autonomy and decision-making power with regard to dietary behaviour.24,25 However, little is known about the role of economic factors (such as pocket money) on their dietary behaviour. It is generally assumed that parents make decisions that are influenced by economic determinants, although they leave some of these decisions to their children,25 e.g. by providing pocket money which their children can spend on items of their own choice. In the Netherlands, 83% of children aged 11 years receive pocket money.26 Although there is very little literature on the role of pocket money as a determinant of children’s dietary behaviour, a study by Jensen et al.27 found that children who rarely spend their pocket money on soft drinks have lower soft drink consumption than children who more frequently spend their pocket money on soft drinks. Similarly, two experimental studies found that peers influence children’s food-purchasing behaviour.28,29
The influence of parents and peers on children’s dietary behaviour will depend on the child’s age and life stage. Although parental influence on children probably decreases in the transition from childhood to adolescence, peer influence tends to become more important, not just generally, but also regarding dietary behaviour. In this study, our main purpose was therefore to establish the influence of parents and peers on 11-year-old children’s snack consumption. Because pocket money may help increase their autonomy and decision-making power regarding dietary behaviour, and because peers may influence children’s food-purchasing behaviour, we also examined whether children’s purchasing behaviour mediates the associations between parental and peer influences and children’s snack consumption. We hypothesized that children are more likely to buy snacks out of their pocket money if snacks are not always available at home, if there are restrictive rules on their snack consumption or if they are sensitive to peer influence. We also assume that children who buy snacks out of their pocket money would consume more snacks. Figure 1 presents our research model.

Methods

Study design and population

Data for this study were retrieved from the Dutch INPACT study, INPACT being the acronym for IVO Physical Activity Child cohort. This longitudinal study among 8- to 12-year-olds and their parents investigated modifiable environmental determinants of children’s dietary behaviour, physical activity and weight. The INPACT study had four annual data collection periods (2008–2011), in which trained research assistants visited primary schools and measured children’s height and weight. Children completed a short questionnaire at school, and parents completed a questionnaire at home. The questionnaire topics varied annually. Approval for the INPACT study was obtained by the Ethical Committee of the Erasmus Medical Centre, Rotterdam.

Participants were recruited through primary schools in the southern Netherlands (Eindhoven and surroundings), where all mainstream primary schools (n = 265) were invited to participate in the study by the Municipal Health Service. Eventually, 91 took part (34.3%). Response rates from rural and urban schools were similar. A sample of 1844 parent–child dyads (62.5%) gave informed consent. When setting up the INPACT study, we made a power calculation to determine the sample size of the cohort, based on our primary outcome measure body mass index (BMI), demonstrating a reduction in BMI point of 0.3. The power calculation was approved by the Medical Ethics Committee of the Erasmus Medical Centre.

This study was based on the data collected in its final wave (2011), which was the only wave that collected data on children’s snack-purchasing behaviour.

Measurements

Children’s snack consumption

Children’s snacks consumption refers to energy-dense foods eaten between meals. Children’s snack consumption was measured using a questionnaire based on a validated Food Frequency Questionnaires. Children reported how many days in the past 7 days they had consumed the following items between meals: (i) savoury snacks (e.g. potato chips, peanuts, sausage rolls); (ii) sweet snacks (e.g. candy bars, chocolate, candies) or (iii) cake or large biscuits. Examples of the type of foods we considered as snacks were given in the questionnaire. Answering categories ranged from ‘none or less than one day a week’ to ‘7 days a week’. Children reported the number of items they consumed on such a day for each of the 3 types of snacks, with answering categories ranging from ‘0 items a day’ to ‘10 items or more a day’. We calculated children’s total snack consumption in items per week by multiplying the consumption frequencies of savoury snacks, sweet snacks and cakes by their corresponding quantities and summing these scores.

Parental influence

Home availability of snacks

The availability of snacks at home was measured using a questionnaire based on the validated Home Environment Survey. Parents were asked to report separately how often (i) sweet snacks and biscuits, and (ii) savoury snacks were available at home. Response categories were ‘always available’, ‘usually available’, ‘sometimes available’, ‘usually not available’ and ‘never available’. We created one variable for the home availability of snacks, for which we merged the home availability of sweet snacks and savoury snacks into one variable. Because of the limited variation in these variables, we dichotomized the response categories into ‘unhealthy snacks

Figure 1 Conceptual research model
always available at home’ (at least sweet snacks and biscuits or savoury snacks were always available at home) or ‘snacks not always available at home’ (neither sweet snacks and biscuits nor savoury snacks were always available at home).

Snack-consumption rules
Parents were asked whether they had rules on the number of snacks their children were allowed to consume. The response categories were ‘yes’ and ‘no’. These questions were derived from the Endorse study.33

Peer sensitivity
To measure the influence of peers on children’s dietary intake, we presented the children with the following hypothetical situation: ‘After school, you are with some friends. You and your friends decide to go to a supermarket or fast-food restaurant. While you don’t intend to buy any snacks, you decide to join your friends. When they’re in the supermarket or fast food restaurant, all your friends buy snacks.’ We asked the children how they would act in such a situation. Two options were available: ‘Then I’ll buy some food, too’ or ‘I wouldn’t buy any food’. We named the answering categories ‘sensitive to peer influence’ (‘Then I’d buy some snacks, too’) and ‘not sensitive to peer influence’ (‘I wouldn’t buy any snacks’).

Control variables
A child’s age was calculated from the date of birth and the date of measurement. For the purpose of analysis, we dichotomized a child’s age into ≤11 years vs. >11 years. A child’s ethnicity was categorized into ‘Dutch native’ (both parents were born in the Netherlands) or ‘immigrants’ (at least one of the parents was born outside the Netherlands). Maternal educational level was used to measure a child’s SES. Maternal educational level was classified into 3 groups: ‘low educational level’ (primary school and lower secondary education); ‘intermediate educational level’ (intermediate vocational level, higher secondary school and pre-university education) and ‘high educational level’ (higher vocational education and university).

Children’s BMI was calculated on the basis of weight and height, which were measured to the nearest 0.1 cm and 0.1 kg when the child was wearing clothes but no shoes; the measurements were made by trained research assistants. Overweight and obesity were defined on the basis of BMI cut-off points for children/adolescents.34 Child BMI was then dichotomized into ‘overweight’ (‘overweight’ and ‘obesity’) vs. non-overweight (‘underweight and normal weight’).

Data analysis
Respondents who lacked data on child snack consumption, child snack-purchasing behaviour, home availability of snacks, snack-consumption rules, peer sensitivity or control variables (n = 197) were excluded from the analysis.

Descriptive analyses were performed to describe the characteristics of the study population. Baron and Kenny’s four-step approach35 was used to investigate whether children’s snack-purchasing behaviour mediated the associations between (i) parental factors (home availability of snacks and snack-consumption rules) and children’s snack consumption and (ii) peer influence and children’s snack consumption. According to Baron and Kenny, there are three criteria for mediation: (i) the predictive variable has to be associated with the outcome variable, (ii) the predictive variable has to be associated with the mediator and (iii) the mediator has to be associated with the outcome variable (adjusted for the predictive variable). If all the associations assessed in steps 1–3 are statistically significant, the criteria for mediation have been met. The fourth step in the approach is to test the mediation model, mediation being supported if the association between the predictive variable and the outcome variable changes after control for the mediation.35

As the child–parent dyads were recruited through schools, the data have a nested structure which possibly requires multi-level analyses. Therefore, we explored potential nested effects of the associations. No indication for nesting of effects was found, which eliminated the need to perform multilevel analyses. Depending on the scale of the outcome measures, logistic regression models or linear regression models were used to test the steps of the mediation approach. For the linear regression analyses, the unstandardized coefficients (B) together with the 95% confidence interval for the B are reported, and for the logistic regression analyses, the odds ratio (OR) together with the 95% confidence interval for the OR is reported.

Bootstrapping resampling techniques were used to calculate confidence intervals for the mediated effects. All regression models were adjusted for the control variables, i.e. child’s age, child’s gender, child’s SES, child’s ethnicity and child’s BMI. All analyses were performed using IBM SPSS Statistics version 20.0. The bootstrapping analyses were performed using R (2013).

Results
Characteristics of the study population
The characteristics of the study population are presented in table 1. Mean snack consumption was 9.7 items per week. Most children reported that they did not buy snacks out of their pocket money (94.1%); most parents (74.8%) reported that snacks were always available at home and most (73.9%) reported that they had rules on the amount of snacks their child was allowed to consume. A minority of the children (17.1%) were sensitive to peer influence.

Parental influence
Children consumed more snacks if there were always available at home (B = 1.03, P < 0.05) (table 2). No statistically significant association was found between snack-consumption rules and children’s snack consumption. Also, no significant associations were found between the parental variables (home availability and snack consumption rules) and children’s snack-purchasing behaviour. This lack of significant association indicates that the criteria for mediation were not met.

Peer sensitivity
Children who were sensitive to peer influence consumed more snacks (B = 3.07, P < 0.01) and bought more snacks out of their pocket money than those who were not (odds ratio = 3.27, P < 0.01) (table 3). As expected, their purchasing behaviour was also

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significantly associated with their snack consumption. The mediation analyses showed that purchasing behaviour explained 8.6% of the association between peer influence and children’s snack consumption.

**Discussion**

Although parents and peers are all likely to influence children’s dietary behaviour, their actual influence may depend on the age and life stage of the individual child. Our study investigates the influences of parents and peers on the snack consumption of 11-year-old children.

Of the parental factors explored in this study, home availability of snacks and children’s snack consumption were significantly associated—a finding that is consistent with the literature. However, studies on family food rules and children’s snack consumption yielded mixed results. Although a European study found that a lack of family food rules regarding unhealthy snacks significantly increased children’s snack consumption, other studies have not consistently reported similar findings.

In addition to parental factors, peer influence also played a role in children’s snack consumption. Children who were sensitive to peer influence tended to consume more snacks, which suggests that social factors can significantly impact dietary choices.

The mediation analyses revealed that purchasing behaviour explained 8.6% of the association between peer influence and snacking in children, highlighting the importance of understanding how environmental and social factors interact to influence healthy eating habits.
products was associated with higher fat intake in boys, an American study36 found no association between household eating rules related to unhealthy products and children’s dietary fat intake. A possible explanation for the fact that we failed to find an association between snack-consumption rules and children’s snack consumption is that children also consume snacks at school or with friends, thereby not conforming to parental rules when they are not at home.

Although peers have been reported to play an important role in children’s and adolescents’ dietary behaviour,37,38 and although our own results show a statistically significant association between peer influence and children’s snack consumption, other studies found no evidence for peer influence on children’s dietary behaviour.36,39 One possible explanation for this inconsistency is that the measurements of peer influence may have varied between these studies.

Similarly, an important role in children’s dietary behaviour may be played by economic factors, including pocket money.25,40 To our knowledge, our study is one of the first to examine the role of children’s food-purchasing behaviour as a determinant of their snack consumption. Although, as expected, it showed children’s snack-purchasing behaviour to be statistically significantly associated with their snack consumption, the number of children actually purchasing snacks out of their pocket money was relatively small because the children would have had limited opportunities to buy snacks during school time (Dutch primary schools having no canteen or vending machines). Despite this small number, children’s snack-purchasing behaviour mediated the association between peer influence and child’s snack consumption. Although this mediation effect was small, we can reasonably assume that more snacks will be bought by children at secondary school, or by children in countries where snacks can be bought during school time.

Studies examining environmental determinants of school children’s snack consumption are scarce and our study is one of the first. Our study is unique in that factors of the broader social environment (i.e. the influence of parents and peers) were investigated. However, our study has some limitations. First, our statistical analyses were based on a cross-sectional dataset, which makes it more difficult to draw conclusions on any causal relationships. Second, most of our data, except that on child BMI, were parent or child reports. This may have elicited socially desirable answers, e.g. children may have underestimated their snack consumption. Third, although the variable ‘children’s snack consumption’ was composed of three separate questions on (i) savoury snacks, (ii) sweet snacks and (iii) cake or large biscuits, the measurements of the home availability of snacks, child’s snack-purchasing behaviour and snack-consumption rules refer only to savoury snacks or sweets, and not explicitly to biscuits. This may have led to some underreporting on the availability of snacks at home, on children’s snack-purchasing behaviour or on snack-consumption rules. Fourth, we developed the questionnaire to measure peer sensitivity ourselves, as no relevant questionnaires from other studies were available. Therefore, validity and reliability of this question is unknown. The development of valid and reliable questionnaires to measure peer sensitivity needs attention in future research. Finally, we measured peer sensitivity on the basis of the children’s answers to how they would act in a hypothetical situation—we did not measure their actual behaviour when they spent time with their friends. Although it may be difficult for children to answer such questions, trained research assistants were available to help them complete the questionnaire in the classroom. Therefore, we do not believe such a difficulty will have affected our results substantially.

In conclusion, our study indicates that parents and peers both influence 11-year-old children’s snack consumption. As the association between peer influence and snack consumption was mediated by the children’s snack-purchasing behaviour, it might be useful to target this behaviour in health promotion. Similarly, the involvement of parents and peers may benefit interventions intended to reduce children’s snack consumption and to promote healthy eating habits. Finally, as parents’ and peers’ influence on children’s dietary behaviour may differ between younger and older children, these influences should be further examined in the different age groups.

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Conflicts of interest: None declared.

Key points

- Children consumed more unhealthy snacks when these were always available at home.
- Children who were sensitive to peer influence consumed more unhealthy snacks and bought more unhealthy snacks out of their pocket money than those who were not sensitive to peer influence.
- The association between peer sensitivity and children’s snack consumption was partly explained by children’s snack purchasing behaviour.
- Interventions aimed to reduce the consumption of unhealthy snacks among school children may benefit from targeting both parents and peers.

References


