Explaining school children's fruit and vegetable consumption: The contributions of availability, accessibility, exposure, parental consumption and habit in addition to psychosocial factors.

Available online at www.sciencedirect.com
ScienceDirect
Appetite 48 (2007) 248–258
Appetite
www.elsevier.com/locate/appet

Research report

Explaining school children's fruit and vegetable consumption: The contributions of availability, accessibility, exposure, parental consumption and habit in addition to psychosocial factors

Evelien Reinaerts[a,*], Jascha de Nooijer[a], Math Candel[b], Nanne de Vries[a]

[a]*Department of Health Education and Promotion, Universiteit Maastricht, Maastricht, The Netherlands*
[b]*Department of Methodology and Statistics, Universiteit Maastricht, Maastricht, The Netherlands*

Received 27 October 2005; received in revised form 7 September 2006; accepted 26 September 2006

Abstract

We studied the contributions of parental fruit and vegetable (F&V) consumption, availability and accessibility of F&V in the home, exposure to F&V, and habit, in addition to psychosocial factors, in explaining F&V consumption in 4–12-year-old children. Furthermore, we looked for effect modification by ethnicity and gender. Children's parents ($n = 1739$) completed a questionnaire assessing psychosocial and additional factors regarding their children's F&V consumption. Consumption was assessed by a food-frequency questionnaire. The model explained the children's F&V consumption better when the additional factors were included ($R^2 = .49$ and $R^2 = .50$ for fruit consumption, and $R^2 = .33$ and $R^2 = .33$ for vegetable consumption). Stepwise multi-level regression analyses revealed that habit was the most influential correlate of F&V consumption. It is concluded that nutrition education interventions aimed at stimulating F&V consumption among children should take into account that the consumption of fruit and that of vegetables are clearly different behaviors, with different influencing factors for boys and girls and children of native or non-native background. Furthermore, interventions to increase F&V consumption should include strategies aimed at making these behaviors habitual.

Keywords: Fruit and vegetable intake; School children; Psychosocial factors; Parental consumption; Availability; Accessibility; Exposure; Habit

Introduction

The Dutch National Food Council recommends that children eat at least 150 g of vegetables and two portions of fruit daily (Health-Council-of-the-Netherlands, 2002). Unfortunately, Dutch children aged 4–12 years only eat an average of 71 g of vegetables and less than one portion of fruit a day (Dutch Food Consumption Survey, 1998). Considering that the pattern of fruit and vegetable (F&V) consumption persists into adulthood (Kelder, Perry, Klepp, & Lytle, 1994; Krebs-Smith et al., 1995; Lien, Lytle, & Klepp, 2001), it is important to develop F&V-promoting interventions aimed at children and their social environment, especially their parents.

According to the Intervention Mapping framework for the design of health-promoting interventions (Bartholomew, Parcel, Kok, & Gottlieb, 2001), the first step in developing effective interventions is the assessment of key variables that influence the behavior of interest.

When explaining behavior such as F&V intake, it is important to start from theory. Theories like the Theory of Planned Behavior (TPB) (Ajzen, 1991) are used to explain F&V intake (Montano, Kasprzyk, & Taplin, 1997), and provide an initial but somewhat limited set of psychosocial factors that can influence F&V consumption. The ecological perspective is somewhat more extensive, and posits that eating behavior is influenced by intrapersonal (i.e. food preferences), social (i.e. family eating habits) and cultural factors (i.e. culture is often expressed through food), and factors in the physical environment (i.e. availability). These factors are likely to interact and

*Corresponding author. Tel.: +31 43 3882397; fax: +31 43 3671032.
E-mail address: Evelien.Reinaerts@gvo.unimaas.nl (E. Reinaerts).

0195-6663/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.appet.2006.09.007

influence behavior through different levels (Sallis & Owen, 1997). Based on this ecological perspective which also implies that children's behavior is not fully under their own control but is partly regulated by their social environment, we suggest that children's F&V consumption is also influenced by additional factors, which are of less importance in adults. Therefore, the main objective of this study was to examine whether factors other than psychosocial ones contribute to the explanation of children's F&V consumption.

According to TPB, the psychosocial concepts of attitude, subjective norm, and perceived behavioral control (or self-efficacy) determine a person's intention to engage in a certain behavior. Positive outcome expectations (attitudes) have been found to be related to children's F&V consumption (Resnicow et al., 1997; Reynolds, Hinton, Shewchuk, & Hickey, 1999). The same has been found for children's preferences (Domel Baxter & Thompson, 2002; Gibson, Wardle, & Watts, 1998; Vereecken, Van Damme, & Maes, 2005; Wind et al., 2006), which can also be regarded as (results of) outcome expectations (Birch & Sullivan, 1991). In their review, Blanchette and Brug (2005) even conclude that taste preference is probably the most important personal determinant for F&V consumption. Previous studies have found several types of social influence to be associated with children's F&V intake, namely social support (encouragement by others) towards eating F&V (Corwin, Sargent, Rheaume, & Saunders, 1999), peer normative beliefs (Weber Cullen et al., 2001) and modeling by parents (Vereecken et al., 2005; Weber Cullen et al., 2001; Wind et al., 2006), peers (Vereecken et al., 2005) and teachers (Hendy & Raudenbush, 2000). Another factor that has been shown to be related to children's F&V consumption is self-efficacy (Corwin et al., 1999; Reynolds et al., 1999; Wind et al., 2006), although conflicting results about the influence of self-efficacy have been reported (Blanchette & Brug, 2005). This concept has been operationalised as self-efficacy in difficult situations (Vereecken et al., 2005), self-efficacy towards choosing F&V as opposed to less healthy choices, and self-efficacy towards asking family members to buy or prepare F&V (Resnicow et al., 1997). According to a review by Baranowski and colleagues (Baranowski, Cullen Weber, & Baranowski, 1999), these psychosocial constructs explain only approximately 30% of the behavior. Therefore, several authors have recommended integrating constructs from other theories to increase the predictive power of the model (Achterberg & Miller, 2004; Baranowski et al., 1999).

Parental consumption is considered a relevant determinant for F&V consumption (Blanchette & Brug, 2005). A study by Gibson (Gibson et al., 1998) especially showed that parental consumption of fruit was associated with children's fruit consumption. Furthermore, a study by Kratt and colleagues (Kratt, Reynolds, & Shewchuk, 2000) showed that this is conditional on medium to high availability of F&V in the home. Although parental consumption is often used as a 'modeling' measure we argue that parental consumption could be more than just an example (model) for children.

Availability of F&V is believed to be one of the most important environmental factors for F&V consumption by children (Blanchette & Brug, 2005; Weber Cullen et al., 2001). Vereecken et al. (2005) reported an association between availability and the consumption of fruit and Wind et al. (2006) between availability at home and vegetable consumption, whereas other studies found a relationship between availability and total F&V consumption (Corwin et al., 1999; Reynolds et al., 1999; Weber Cullen et al., 2001).

A relatively new but important concept related to children's F&V consumption is accessibility or facilitation (i.e. whether foods are available in a form and at a location and time that facilitate their consumption, for example ready-to-eat pieces of apple or cucumber in the refrigerator) (Blanchette & Brug, 2005; Wind et al., 2006). A study showed that accessibility of F&V at home was especially important in explaining intake when children had a low preference for F&V (Weber Cullen et al., 2003). Children who liked F&V only needed them to be available, whereas children who disliked F&V also needed easy access in order to eat them.

Children's exposure to F&V is defined as the number of different kinds of F&V children have ever tasted (Resnicow et al., 1997). Although effects of exposure to one specific vegetable on children's consumption have been reported (Wardle et al., 2003) only the study by Resnicow et al. (1997) focused on exposure to a variety of F&V, and found a positive relation with F&V consumption.

Recently, Brug and colleagues studied the role of habit regarding fruit consumption. Their study found habit and intention to be significant predictors of consumption of two or more daily servings of fruit, identifying habit as the most influential predictor (Brug, De Vet, De Nooijer, & Verplanken, 2006).

Although the above-mentioned factors regarding F&V consumption have been studied previously, no efforts have been made to look into the contribution of each factor in combination with the others for children in such a broad age group. The current study aimed to combine traditional psychosocial factors (attitude, social influence and self-efficacy) with additional factors (parents' F&V consumption, availability and accessibility of F&V in the home, exposure to F&V and habit) to explain the F&V consumption of children aged 4–12 years.

Methods

Subjects and procedures

Data were used from a convenience sample consisting of parents of children participating in a larger longitudinal study, which focused on the F&V intake of children at primary school.

A total of 49 primary schools from the southern part of the Netherlands were selected. School boards were approached by mail and telephone and invited to take part in the study. This procedure resulted in the participation of 12 schools (a response of 25%) with a total of 2506 pupils (aged 4–12 years). The parents of these children were invited to participate in the study through an information sheet that the children took home. Questionnaires were distributed and collected by the teachers. A total of 1739 parents completed the questionnaire and handed it in at the school (a response of 69%).

Questionnaire

A written questionnaire was developed based on social cognitive theories, recent literature on factors that influence children's F&V consumption and qualitative interviews with children and parents (Reinaerts, De Nooijer, Van de Kar, & De Vries, 2006).

Background characteristics of the children included age, sex, and ethnicity. Ethnicity of the children was assessed by asking for the country of birth of both parents. Children were classified as 'of Dutch origin' when both parents had been born in the Netherlands and as 'non-native' when one or both parents had been born outside the Netherlands, based on the definition used by Statistics Netherlands (Statistics-Netherlands, 2005). In addition, the questionnaire included questions about family composition (marital status and number of siblings), educational level of the parent(s) and the weight and height of the children.

F&V Intake. Both F&V consumption were measured with frequency methods that were used in a similar Dutch national project (www.schoolgruiten.nl) and based on the pro-children questionnaire that was validated by Haraldsdóttir et al. (2005). Children's consumption of whole fruit was assessed by two questions: 'On how many days a week does your child eat fruit?' (1–7days) and 'How many portions of fruit does your child eat on a day on which he or she consumes fruit?' ranging from '$\frac{1}{2}$ portion a day' to '3 portions a day or more' on a six-point scale. *The average consumption of whole fruit* (in portions per day) was calculated by multiplying the scores for both questions and dividing the outcome by 7.

Children's vegetable consumption *frequency* was measured by three questions: 'How many times a week does the child eat (1) cooked or baked vegetables for dinner (including mixed dishes), (2) mixed dishes like pasta and (3) extra salad, like lettuce, tomato or other raw vegetables?' *Portion size* was assessed by means of photographs of plates filled with different amounts of cooked vegetables (25–50–100–150 g) or mixed dishes (75–150–300–450 g). Parents had to select the photograph that best represented the amount of the food that their children usually consumed. According to the Netherlands Nutrition Centre, the average share of vegetables in a mixed dish is one-third. The amount of extra salad or raw vegetables was calculated by multiplying frequency per week by 35 g (the weight of a small bowl of salad). Finally, *the average consumption of vegetables in grams per day* was computed as ([number of days on which the children consumed cooked or baked vegetables × portion size] + [number of days on which the children ate mixed dishes × $\frac{1}{3}$ portion size] + [number of days on which the children ate extra salad or raw vegetables × 35 g])/7 days.

Psychosocial factors. All psychosocial factors were assessed separately for fruit consumption and for vegetable consumption, using the same format. Table 1 presents the psychosocial concepts, numbers of items, range, Cronbach's α and mean scores.

Attitude. Separate confirmatory principal component analysis (PCA) with oblique rotation was used to extract one factor for attitude towards fruit consumption, with factor loadings ranging from .83 to .52, and one factor for attitude towards vegetable consumption, with factor loadings ranging from .87 to .66. The PCA for *preference for fruit* extracted two factors: preference for tropical or exotic fruit (lychees, mangoes, passion fruits, pineapples, melons, kiwi fruits, and peaches), with factor loadings ranging from .87 to .52, and preferences for traditional Dutch fruit (including apples, bananas, tangerines, oranges, pears, grapes, and strawberries), with factor loadings ranging from .71 to .39. The PCA for *preference for vegetables* revealed three factors: preference for Dutch cooked vegetables (cauliflower, broccoli, carrots, beans, cabbage, Brussels sprouts, and spinach), with factor loadings ranging from .77 to .45, preference for raw vegetables (cucumber, lettuce, and tomato), with factor loadings varying from .79 to .72, and preferences for vegetables children generally dislike (egg plant, zucchini, leek, sweet pepper, and radish), with factor loadings ranging from −.77 to −.40.

Social influence was assessed with two concepts: *modeling* by important others (mother, father, classmates, teacher, and peers) and *subjective norm*. The PCA revealed two factors for modeling of fruit consumption: modeling outside the home (teachers, friends, and classmates), with factor loadings ranging from .96 to .69, and modeling by parents, with factor loadings .91 and .66. The PCA for vegetable consumption revealed the same factors (factor loadings from .98 to .73 and from .90 and .89 for modeling outside the home and modeling by parents, respectively). Due to the low internal consistency of the items included in the modeling by parents factor ($\alpha < .48$), these were treated as separate variables in further analyses. The scores for *subjective norm* for both fruit consumption and vegetable consumption were calculated by multiplying the item that measured motivation to comply ('My child does what we tell him/her to do'; totally disagree [1] to totally agree [5]) with the item that measured normative belief towards the parents ('My child thinks we want him/her to eat more fruit or vegetables; totally disagree [1] to totally agree [5]).

Self-efficacy was assed by two items and *intention* to eat more fruit was assessed with one.

Table 1
Description of psychosocial variables, numbers of items, mean (SD), internal consistency, sample items and range

	No. of items	Mean (SD)	Internal consistency (α)	Examples of questions, answering options and ranges
Fruit consumption				
Attitude	7	.92 (.78)	.85	My child thinks that eating more fruit will make him/her more healthy; totally disagree (−2) to totally agree (+2)
Preferences for Dutch fruits	7	1.11 (.63)	.76	How much does your child like: apples, oranges, mandarins etc.; likes them a lot (+2) to does not like them at all (−2)
Preferences for tropical fruits	7	.70 (.85)	.88	How much does your child like: pineapples, melons, kiwi fruits, passion fruits etc.; likes them a lot (+2) to does not like them at all (−2)
Modeling outside the home	3	.29 (.65)	.86	My child's teacher eats fruit everyday; totally disagree (−2) to totally agree (+2)
Modeling by mother	1	.83 (1.26)	—	My child's mother eats fruit everyday; totally disagree (−2) to totally agree (+2)
Modeling by father	1	.56 (1.44)	—	My child's father eats fruit everyday; totally disagree (−2) to totally agree (+2)
Subjective norm (nb × mc)	2	2.11 (5.10)	—	—
Self-efficacy	2	.82 (.89)	.77	Do you think you child is able to increase her/his fruit consumption? Definitely not (−2) to definitely so (+2)
Intention to eat more fruit	1	.20 (.93)	—	Does your child intend to eat more fruit? Definitely not (−2) to definitely so (+2)
Vegetable consumption				
Attitude	7	.93 (.83)	.89	My child thinks that eating more vegetables will make her/him more healthy; totally disagree (−2) to totally agree (+2)
Preference for traditional Dutch vegetables	7	.55 (.74)	.76	How much does your child like the following vegetables: carrots, beans, cauliflower etc.; likes them a lot (−2) to does not like them at all (+2)
Preference for raw vegetables	3	.78 (1.00)	.73	How much does your child like the following vegetables: lettuce, cucumber, tomato; likes it a lot (+2) to does not like it at all (−2)
Preference for generally disliked vegetables	5	−.17 (.80)	.77	How much does your child like the following vegetables: egg plant, courgette etc.; likes it a lot (+2) to does not like it at all (−2)
Modeling outside the home	3	.31 (.61)	.85	My child's teacher eats vegetables everyday; totally disagree (−2) to totally agree (+2)
Modeling of mother	1	1.72 (.62)	—	My child's mother eats vegetables everyday; totally disagree (−2) to totally agree (+2)
Modeling of father	1	1.67 (.76)	—	My child's father eats vegetables everyday; totally disagree (−2) to totally agree (+2)
Subjective norm (nb*mc)	2	2.18 (5.16)	—	—
Self-efficacy	2	.12 (.92)	.81	Do you think you child is able to increase her/his vegetable consumption? Definitely not (−2) to definitely so (+2)
Intention to eat more vegetables	1	−.12 (.88)	—	Does your child intend to eat more vegetables? Definitely not (−2) to definitely so (+2)

The following *additional factors* were assessed:

Availability of F&V was assessed by two questions: 'Do you always have F&V available at home?' and 'Do you always have F&V that your child likes available at home?' ('Yes, always' [+2] to 'No, never' [−2]). Internal consistency for availability of fruit was $\alpha = .68$ and that for vegetables $\alpha = .54$.

Accessibility (*ready-to-eat availability*) was measured by one item: 'Do you or your partner prepare F&V for your child (slicing, washing, peeling)?' Respondents could

choose from four answers, namely 'my child prepares his or her own fruit' (1), 'sometimes my child prepares his/her own fruit and sometimes I prepare it' (2), 'I or my partner always prepare fruit for my/our child' and the last option was (3) 'My child never eats vegetables as a snack'. For the children that did eat vegetables as a snack, the item was dichotomized into made accessible by parents (1) or not made accessible by parents (0).

F&V exposure was assessed by asking if the child had ever tasted 14 common kinds of fruits and 15 kinds of vegetables (yes/no). Sum scores for taste exposure to fruit and to vegetables were calculated by adding the scores of all items for fruit and those for vegetables.

Habit regarding fruit or vegetable consumption was assessed by three items: 'My child eats F&V routinely', 'Eating F&V suits my child' and 'My child has been eating F&V for a long time', using five answering categories ranging from 'totally agree' to 'totally disagree' (fruit $\alpha = .83$; vegetables $\alpha = .86$). The items were selected from the Self-Report Index of Habit Strength (Verplanken & Orbell, 2003) during a preliminary study (unpublished data) of the Pro-Children Project (De Bourdeaudhuij, Klepp, Wind, Due, & Brug, 2005).They each represent one of the three features of habit strength, namely a history of repetition, automaticity and reflection of personal identity (Verplanken & Orbell, 2003).

Parental F&V consumption was assessed with a validated 10-item questionnaire in which parents were asked to indicate their consumption of citrus fruit, other fruit, and fruit juice, and cooked and raw vegetables (Van Assema, Brug, Ronda, Steenhuis, & Oenema, 2002).

Statistical analyses

Data analyses included descriptive statistics of the demographic factors and F&V consumption. To correct for skewness, the analyses used the square root transformation of the fruit and vegetable intake variables, as recommended by Tabachnick and Fidell (1996). Pearson correlations between all variables were computed to show the unadjusted relation between each variable and fruit or vegetable intake. Since we had a nested sampling design (students within classes within schools) stepwise multi-level regression analyses (Rasbash, Browne, & Goldstein, 2000) were used to identify factors associated with fruit consumption and with vegetable consumption, respectively. To identify interaction-effects with gender and ethnicity, two separate analyses were performed: (1) including all interactions with gender and (2) one including all interactions with ethnicity (separately for fruit and vegetable consumption). All analyses were done in a so-called 'top–down' procedure, starting with the most comprehensive model and leaving out the non-significant random effects. We started with the model including attitude, preferences, modeling, social influence, self-efficacy, intention, the additional factors of availability, accessibility, F&V exposure, parental consumption and habit (model 4). Subsequently, habit was left out of the model (model 3) followed by the additional factors (model 2) and intention (model 1). All models were adjusted for the following demographic variables: child's sex, age, ethnicity, BMI, siblings (yes/no), and parents' age, marital status and educational level (low–intermediate–high). A significance criterion of $p < .05$ was used for both addition and removal of variables. The explained variance of the models was computed as described by Snijders and Bosker (1999) and the models were tested against each other using the likelihood ratio test (LRT). The analyses for fruit consumption did not include the factor *preference for tropical fruit*, because of too many missing values due to the fact that most of the children had never tasted the tropical fruits. The factor *accessibility* had to be excluded from the analyses regarding vegetable consumption, because too many parents indicated that their child did not consume vegetable as a snack. *Modeling outside the home* was not included in the analyses of both F&V consumption, because most children indicated that they did not know whether the mentioned people consumed F&V everyday. Preliminary stepwise linear regression analyses using pairwise deletion indicated that none of these excluded variables contributed significantly to the explanation of F&V consumption, which makes exclusion justifiable.

Results

The questionnaires were predominantly filled out by the mothers (85%). Of the parents who filled out the questionnaire, 27% had a low educational level (primary school or basic vocational school), about half (54%) had an intermediate level of education (secondary vocational school or high school) and 19% had a high level of education (higher vocational school or university). Of their spouses, 27% had a low, 46% an intermediate and 27% a high level of education. The average age of the child for whom the questionnaire was filled out was 8 (SD 2.5) years. Of these children, 50% were male. Most of the children had one or more siblings (86%) and 38% of the children were non-native. Almost all children (93%) were part of a two-parent family. According to the Dutch BMI ranges (Hirasing, Fredriks, Buuren van, Verloove-Vanhorick, & Wit, 2001; Van Buuren, 2004) which take children's sex and age into account, 19% of the children were underweight, 67% had a normal weight and 14% were overweight. Children consumed about one portion of fruit and about 60 g of vegetables a day. Parents consumed about two and a half portions of fruit and about three tablespoons ($\cong$150 g) of vegetables a day.

Correlations of psychosocial variables and additional factors with F&V intake

All concepts except intention correlated significantly with the children's fruit intake, with correlations ranging

from −.05 to .63 ($p<.05$) (Table 2). Correlations between children's vegetable intake and the various concepts were significant. The correlations ranged from −.05 to .48 ($p<.05$). Both fruit and vegetable intake had their highest correlation with habit. Intercorrelations between all concepts ranged from −.05 to .63 ($p<.05$) for the concepts related to fruit intake and from −.05 to .57 ($p<.05$) (Table 2a) for vegetable intake (Table 2b).

Factors associated with fruit and vegetable consumption

The results of the multi-level regression analyses with respect to the children's fruit and vegetable consumption are shown in Tables 3 and 4 respectively. Table 3a and 4a show the results of the analyses including interactions with gender and Table 3b and 4b show these results for interactions with ethnicity.

Fruit consumption and gender

The first model for fruit consumption included the psychosocial variables and explained 29% of the variance. Preference for Dutch fruit, and self-efficacy were identified as most influential correlates of fruit consumption, although the latter seems more influential for girls than for boys. In Model 2, the intention to eat more fruit was added; it contributed an additional 3% of explained variance (LR = 44.05; df = 2; $p<.001$). All predictors of model 1 remained significant and intention appeared to have more influence on girls' fruit consumption. In Model 3, fruit exposure, availability and accessibility, and parental consumption were added, explaining an additional 5% (LR = 143.20; df = 4; $p<.001$), identifying availability as most influential addition to the model. Finally, habit was entered, and the resulting final model explained 50% (LR = 327.95; df = 2; $p<.001$) of the variance in fruit consumption. Furthermore, habit was found to be the most important correlate in this final model for both boys ($\beta = .19$, $p<.001$) and girls ($\beta = .13$, $p<.001$).

Fruit consumption and ethnicity

If ethnicity is taken into consideration, it appears that fruit consumption is determined by different variables for

Table 2a
Correlations between psychosocial variables, additional factors and fruit intake

	A	PDF	MM	MF	SN	SE	I	E	Acc	Av	PC	Habit
Fruit intake	.21**	.40**	.25**	.17**	−.11**	.34**	.00	.18**	−.05*	.35**	.24**	.63**
Attitude, fruit (A)	—	.26**	.14**	.07**	.19**	.26**	.23**	.08**	.04	.16**	.09**	.30**
Preference, Dutch fruit (PDF)		—	.13**	.10**	−.01	.46**	.20**	.16**	−.06**	.18**	.15**	.51**
Modeling mother (MM)			—	.32**	.10**	.08**	.04	.06**	−.01	.28**	.29**	.27**
Modeling father (MF)				—	.10**	.11**	.05*	.07**	−.09**	.16**	.19**	.19**
Subjective norm (SN)					—	.04	.27**	.03	.01	.03	.10**	−.03
Self-efficacy (SE)						—	.42**	.13**	−.11**	.15**	.11**	.48**
Intention (I)							—	.08**	−.03	.01	.14**	.09**
Fruit exposure (E)								—	−.10**	.05*	.16**.	.18**
Accessibility (Acc)									—	.04	−.03	−.13**
Availability (Av)										—	.11**	.31**
Parental fruit consumption (PC)											—	.15**

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

Table 2b
Correlations between psychosocial variables, additional factors and vegetable intake

	A	PDV	PRV	PFV	MM	MF	SN	SE	I	E	Av	PC	Habit
Vegetable intake	.22**	.36**	.30**	.34**	.13**	.14**	−.05*	.35**	.13**	.25**	.24**	.19**	.48**
Attitude, vegetables (A)	—	.26**	.18**	.19**	.07**	.08**	.16**	.27**	.26**	.06*	.19**	.06*	.33**
Preference, Dutch cooked vegetables (PDV)		—	.22**	.48**	.07**	.05*	−.07**	.44**	.22**	.04	.22**	.04	.57**
Preference, raw vegetables (PRV)			—	.41**	.00	.03	−.01	.29**	.12**	.16**	.14**	.05*	.26**
Preference, foreign vegetables (PFV)				—	.00	.04	−.04	.36**	.18**	−.04	.21**	.06*	.38**
Modeling mother (MM)					—	.61**	.02	.02	.00	.10**	.21**	.20**	.20**
Modeling father (MF)						—	.03	.02	.01	.07**	.18**	.14**	.18**
Subjective norm (SN)							—	.00	.17**	−.01	−.01	.03	−.08**
Self-efficacy (SE)								—	.54**	.12**	.25**	.03	.50**
Intention (I)									—	.05*	.14**	.02	.20**
Vegetable exposure (E)										—	.09**	.10**	.15**
Availability (Av)											—	.16**	.32**
Parental vegetable consumption (PC)												—	.07**

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

Table 3
Multilevel regression analyses explaining children's fruit consumption including interactions[a]

Variables regarding fruit consumption	Model 1 β	Model 2 β	Model 3 β	Model 4 β
(a) *With gender*				
Attitude, fruit	.04***	.05***	.04***	.01
Preference, Dutch fruit	.15***	.15***	.13***	.05***
Modeling by mother	.05***	.04***	.02***	.01
Modeling by father	.02***	.02***	.02**	.01
Subjective norm	−.01***	−.01***	−.01***	−.01***
Self-efficacy[b]	.07***/.09***	.09***/.12***	.08***/.11***	.01/.06***
Intention[b]		−.05***/−.07***	−.05**/−.08***	−.02/−.06***
Fruit exposure			.02**	.01
Accessibility			−.04	.01
Availability			.12***	.08***
Parental fruit consumption			.03***	.02***
Habit[b]				.19***/.13***
Explained variance (R^2)	.29	.32	.37	.50
(b) *With ethnicity*				
Attitude, fruit[b]	.02/.12***	0.3*/.12***	.03*/.11***	.00/.06**
Preference, Dutch fruit	.18***/.05	.17***/.05	.15***/.03	.07***/.03
Modeling by mother[b]	.04***/.08***	.04***/.08***	.01*/.06***	.00/.06***
Modeling by father	.02***	.02***	.01**	.01
Subjective norm[b]	−.01***/−.01***	−.01***/−.01***	−.00***/−.01***	−.00**/−.01***
Self-efficacy[b]	.06***/.10***	.09***/.12***	.08***/.11***	.02/.11***
Intention		−.06***	−.06***	−.04***
Fruit exposure			.02**	.01
Accessibility			−.04	.01
Availability			.12***	.08***
Parental fruit consumption[b]			.03***/.02***	.03***/.02***
Habit				.16***
Explained variance (R^2)	.28	.31	.37	.49

*$p<.05$, **$p<.01$, ***$p<.001$.
[a]All models were adjusted for baseline model variables (parents' age, educational level and marital status, child's age, sex, BMI and ethnicity; family composition [siblings and marital status]).
[b]β's are presented for (a) boys/girls and (b) native and non-native children, respectively.

native and non-native children. If we look at the first three models we see that for native children preference for Dutch fruit is the most influential correlate, whereas for non-native children this is attitude, and to a lesser degree modeling of the mother. Although self-efficacy is more important for non-native children, it is also an important correlate of fruit consumption for native children. Adding intention to the first model resulted in an additional 3% explained variance (LR = 40.17; df = 1; $p<.001$). Of the additional factors added in model 3 (LR = 124.28; df = 5; $p<.001$), availability seemed the most important for all children. The final model showed that habit was the most important correlate adding an extra 12% explained variance (LR = 332.09; df = 1; $p<.001$). No differences in the relation between habit and fruit consumption were detected for native and non-native children.

Vegetable consumption and gender

The same procedure was followed for vegetable consumption. In the first model, all psychosocial factors were entered; these explained 26% of the variance in vegetable consumption. Preferences for traditional Dutch cooked vegetables, preference for disliked vegetables and modeling by mother as most influential correlates of vegetable consumption. Intention (entered in the second model) explained a further 2% of the variance (LR = 9.50; df = 1; $p<.01$), as did the additional factors in model 3 (LR = 37.30; df = 3; $p<.001$). Of these factors only availability seemed not significantly correlated with vegetable consumption. The final model included habit and explained 33% of the variance (LR = 47.73; df = 2; $p<.001$). Habit was more influential for boys than for girls, and was also the most influential correlate in relation to vegetable consumption.

Vegetable consumption and ethnicity

If we look at ethnical differences in explaining vegetable consumption, we can conclude that the influence of preference for Dutch cooked vegetables is only significant for native children in all models. The same holds for parental consumption in models 3 and 4. All models added significantly to the explained variance; models 2 vs.1 (LR = 7.45; df = 1; $p<.01$), models 3 vs. 2 (LR = 44.00;

Table 4
Multilevel regression analyses explaining children's vegetable consumption including interactions[a]

Variables regarding vegetable consumption	Model 1 β	Model 2 β	Model 3 β	Model 4 β
(a) *With gender*				
Attitude, vegetables	.23***	.25***	.24***	.15**
Preference, Dutch cooked vegetables	.32***	.33***	.31***	.16*
Preference, raw vegetables	.24***	.24***	.22***	.18**
Preference, disliked vegetables	.31***	.30**	.31***	.28***
Modeling by mother	.34**	.34**	.24*	.17
Modeling by father	.10	.09	.07	.05
Subjective norm	−.01	−.01	−.01	−.01
Self-efficacy	.25***	.34***	.32***	.19**
Intention		−.19**	−.19**	−.15*
Vegetable exposure			.14**	.12**
Availability			−.03	−.04
Parental vegetable consumption			.14***	.14***
Habit[b]				.50***/.30***
Explained variance (R^2)	.26	.28	.30	.33
(b) *With ethnicity*				
Attitude, vegetables	.21***	.23***	.22***	.14*
Preference, Dutch cooked vegetables[b]	.48***/.06	.48***/.11	.46***/.10	.29***/−.07
Preference, raw vegetables	.23***	.23***	.22***	.18***
Preference, disliked vegetables	.33***	.32***	.34***	.27***
Modeling by mother	.33**	.33**	.23*	.15
Modeling by father	.11	.10	.09	.07
Subjective norm	−.01	−.01	−.01	−.01
Self-efficacy	.26***	.34***	.32***	.18**
Intention		−.17**	−.16**	−.13*
Vegetable exposure			.13**	−.11**
Availability			.01	−.07
Parental vegetable consumption[b]			.22***/.07	.22***/.07
Habit				.39***
Explained variance (R^2)	.27	.28	.30	.33

*$p<.05$, **$p<.01$, ***$p<.001$.
[a]All models were adjusted for baseline model variables (parents' age, educational level and marital status, child's age, sex, BMI and ethnicity; family composition [siblings and marital status]).
[b]β's are presented for (a) boys/girls and (b) native and non-native children, respectively.

df = 4; $p<.001$), and models 4 vs. 3 (LR = 43.94; df = 1; $p<.001$).

Discussion

The present study tried to identify whether factors other than psychosocial ones contribute to the explanation of children's F&V consumption. Our study found that psychosocial factors do explain F&V consumption in children, but that including additional factors such as 'availability', 'parental consumption' and 'habit' for fruit consumption and 'exposure', 'parental consumption' and 'habit' for vegetable consumption improved the proportion of explained variance in F&V intake. 'Habit' was the strongest predictor of these additional factors for both fruit and vegetable consumption, but played a more important role for boys than for girls. When 'habit' was added to the model, most psychosocial factors were less strongly correlated with fruit and vegetable consumption. Habit can be defined as perpetuated behavior that has become habitual by repetition. When a habit is well established, conscious decision-making processes no longer determine the behavior (Ouelette & Wood, 1998) and the psychosocial factors are, therefore, of less importance, since they are to a large extent already reflected in the habit. Although an important feature of habit is a history of repetition (Verplanken & Orbell, 2003), frequently repeated behavior is not yet a habit. One of the other two features of habit is that it is a form of automaticity, which means that it is deliberate in its behavioral origin, controllable to a limited extent, executed without awareness, and efficient (Bargh, 1994). The final feature of habit, that it is a reflection of someone's personal style, may not hold for all habits, but at least does so for some (Verplanken & Orbell, 2003).

The fact that habit added a further 13% of explained variance for fruit, but only 3% for vegetable consumption indicates that this factor plays a somewhat different role for these two behaviors, in that vegetable consumption may be less habitual than fruit consumption. This could be caused by the fact that vegetable consumption by children

is often a topic of argument in many households. Many children are more or less forced to 'eat their veggies'. On the other hand, fruit is mostly consumed volitionally and, therefore, has more potential to become routine. Furthermore, one of the features of habit is that it reflects someone's personal style. Whereas volitional behavior such as fruit consumption may or may not suit someone, this is unlikely for behavior that is imposed by others, such as vegetable consumption by children.

Although habit explained the largest amount of additional variance, the factors of 'exposure', 'parental consumption', and 'availability' were also particularly important in explaining children's F&V consumption. Our results support findings of similar studies (Bere & Klepp, 2004; Domel Baxter et al., 1996; Gibson et al., 1998; Resnicow et al., 1998), which found that preference is a factor that cannot be ignored in interventions to promote F&V intake. A study by Wardle (Wardle et al., 2003) showed that exposure to a particular vegetable for as little as a fortnight can increase children's liking for that vegetable. Our results showed that exposure contributes to the explanation of vegetable consumption even when controlling for preferences. Although the concept is rarely used in determinant studies, it holds important implications for intervention development. Until recently, it was believed that exposure or experience with different tastes was mediated by preference, as was claimed in a review by Birch and Fisher (1998). She found that after repeated opportunities (5–10 times) to try new foods, the liking for the new foods generally increased, leading to greater intake (Birch & Fisher, 1998). In our study, we operationalised exposure as 'the number of different kinds of F&V ever tasted', and this showed only moderate associations with preferences, but also contributed to explaining vegetable intake after correction for preferences. These results indicate that mere exposure is not only a method for the development of preferences, but that simply presenting children with different kinds of F&V, may influence consumption by familiarizing them with the products. More research into this relationship should yield valuable implications for practice.

Consistent with previous research findings (Cooke et al., 2003; Fisher, Mitcell, Smicilas-Wright, & Birch, 2002; Gibson et al., 1998; Wind et al., 2006), we found that 'parental consumption' was an important correlate of both fruit and vegetable intake, especially in native children. 'Subjective norm' also remained significant after controlling for habit, but only for fruit consumption. The key role parents play in shaping their children's dietary intake is widely documented and it is especially their role as models that is often stressed (Birch & Fisher, 1998; Golan & Crow, 2004). Results of a study that compared the influences of actual parental intake (defined as modeling) and parental control of their children's diet (using rules or rewards) on children's consumption of snack foods showed that modeling of the parents was positively related to children's intake, whereas parents' attempts to use snack food as a reward for the consumption of healthier foods was found to have an adverse effect (Brown & Ogden, 2004). Although research indicates that the way parents try to control their children's diet does not always influence intake in the way the parents intended (Johnson & Birch, 1994), parents still believe that these methods can have the desired effect (Burroughs & Terry, 1992). This indicates that health educators must recognize this misconception and develop interventions that teach parents that a parental role model may be a better method to improve children's F&V consumption than force. Availability also contributed to explaining the children's F&V consumption, as has also been found in other studies (Corwin et al., 1999; Reynolds et al., 1999; Weber Cullen et al., 2003). Unlike these studies, however, we studied fruit and vegetable consumption separately, and our results indicate that availability is only important for fruit consumption. This could be explained by the fact that vegetables are usually served for dinner. Fruit consumption is more fully under the children's control, so if a child chooses to eat fruit, availability is the factor that either facilitates or impedes this behavior.

Finally, our study showed that fruit and vegetable consumption are different behaviors, which are influenced by different factors, as has also been found in other studies (Vereecken et al., 2005; Weber Cullen et al., 2001). Consistent with a study among young adolescents (Granner et al., 2004), we showed that different factors explain F&V consumption for children of different ethnic background. For native children F&V preferences and parental consumption are important factors to consider when explaining F&V consumption, whereas for non-native children attitude, modeling of the mother and self-efficacy are important.

Some limitations of our study should be noted. All data was gathered from parents who reported on behalf of their children. This may have resulted in less reliable data on the children's food intake (Livingstone & Robson, 2000). However, we chose this method because we wanted to identify factors that influence children's F&V consumption in a broad age group (4–12 years). We realize that different factors are likely to be important for children of a young age compared to older children, for example because of higher food choice autonomy. This warrants further study. Since self-reporting food intake requires several cognitive abilities that are only found in children aged at least 8 years (Livingstone & Robson, 2000), we had to rely on the parents. Although previous research showed that perceptions of concepts could differ between children and their parents (Bere & Klepp, 2004; Van Assema, Glanz, Martens, & Brug, Submitted), it remains unclear what source is more reliable. Therefore, we decided to rely on parental reports for all children. Furthermore, the major limitation of this study is the use of a cross-sectional design. Therefore, no predictive relationships can be inferred. Insight into the predictive relationships between determinants and F&V consumption

can only be achieved through longitudinal determinant research.

The results of the current study have several practical implications for promoting F&V consumption by children. First, considering that habit plays such an important role in both fruit and vegetable consumption, interventions to motivate children to consume F&V can be made more effective by combining them with strategies to make this behavior habitual. In doing so, it must be taken into account that fruit and vegetable consumption are clearly different behaviors, with different influencing factors. Although these factors differ for gender and ethnicity, the majority of the most influential correlates, such as habit and availability for fruit and habit and taste preferences for vegetable consumption are the same among all subgroups. This justifies the development of classroom-based interventions. Second, our results concerning environment-related factors such as parental consumption, exposure to F&V, and availability not only illustrate the important role of the environment in children's F&V consumption, but also indicate that parents have to be included in interventions aimed at children.

Acknowledgement

This study was supported by a grant from the Netherlands Organisation for Health Research and Development (ZonMw).

References

Achterberg, C., & Miller, C. (2004). Is one theory better than another in nutrition education? A viewpoint: More is better. *Journal of Nutrition Education and Behavior*, *36*, 40–42.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211.

Baranowski, T., Cullen Weber, K., & Baranowski, J. (1999). Psychosocial correlates of dietary intake: Advancing dietary intervention. *Annual Review of Nutrition*, *19*, 17–40.

Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency and control in social cognition. In R. S. Wyer (Ed.), *Handbook of social cognition*, Vol. 1 (pp. 1–40). New York: New York University.

Bartholomew, L. K., Parcel, G. S., Kok, G., & Gottlieb, N. H. (2001). *Intervention mapping. Designing theory- and evidence-based health promotion programs*. New York: Mc Graw Hill.

Bere, E., & Klepp, K.-I. (2004). Correlates of fruit and vegetable intake among Norwegian schoolchildren: Parental and self-reports. *Public Health Nutrition*, *7*(8), 991–998(998).

Birch, L. L., & Fisher, J. O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics*, *101*(suppl.), 539–549.

Birch, L. L., & Sullivan, S. A. (1991). Measuring children's food preferences. *Journal of School Health*, *61*(5), 212–214.

Blanchette, L., & Brug, J. (2005). Determinants of fruit and vegetable consumption among 6–12-year-old children and effective interventions to increase consumption. *Journal of Human Nutrition and Diet*, *18*, 431–443.

Brown, R., & Ogden, J. (2004). Children's eating attitudes and behaviour: A study of the modelling and control theories of parental influence. *Health Education Research*, *19*(3), 261–271.

Brug, J., De Vet, E., De Nooijer, J., & Verplanken, B. (2006). Predicting fruit consumption: Cognitions, intention and habits. *Journal of Nutrition Education Behavior*, *38*(2), 73–81.

Burroughs, M., & Terry, R. D. (1992). Parents' perspectives toward their children's eating behavior. *Topics in Clinical Nutrition*, *8*, 45–52.

Cooke, L. J., Wardle, J., Gibson, E. L., Sapochnik, M., Sheiham, A., & Lawson, M. (2003). Demographic, familial and trait predictors of fruit an vegetable consumption by pre-school children. *Public health Nutrition*, *7*(2), 295–302.

Corwin, S., Sargent, R., Rheaume, C., & Saunders, R. (1999). Dietary behaviors among fourth graders: A social cognitive theory study approach. *American Journal of Health Behavior*, *23*(3), 182–197.

De Bourdeaudhuij, I., Klepp, K. I., Wind, M., Due, P., & Brug, J. (2005). Reliability of a questionnaire to measure personal, social and environmental correlates of fruit and vegetable intake in 10–11 year old children in 5 European countries. *Public Health Nutrition*, *8*(2), 189–200.

Domel Baxter, S., & Thompson, W. O. (2002). Fourth-grade children's consumption of fruit and vegetable items available as part of school lunches is closely related to preferences. *Journal of Nutrition Education and Behavior*, *34*(3), 166–171.

Domel Baxter, S., Thompson, W. O., Davis, M., Baranowski, T., Leonard, S., & Baranowski, J. (1996). Psychosocial predictors of fruit and vegetable consumption among elementary school children. *Health Education Research*, *11*(3), 299–308.

Dutch Food Consumption Survey. (1998). *Zo eet Nederland 1998. Resultaten van de Voedsel Consumptie Peiling 1997–1998 [Results of the Dutch Nutrition Survey 1997–1998]*. The Hague: Voedingscentrum.

Fisher, J. O., Mitcell, D. C., Smicilas-Wright, H., & Birch, L. L. (2002). Parental influences on young girls' fruit and vegetable, micronutrient, and fat intake. *Journal of the American Dietetic Association*, *102*(1), 58–64.

Gibson, E. L., Wardle, J., & Watts, C. J. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite*, *31*, 205–228.

Golan, M., & Crow, S. (2004). Parents are key players in the prevention and treatment of weight-related problems. *Nutrition Reviews*, *62*(1), 39–50.

Granner, M. L., Sargent, R. G., Calderon, K. S., Hussey, J. R., Evans, A. E., & Watkins, K. W. (2004). Factors of fruit and vegetable intake by race, gender, and age among young adolescents. *Journal of Nutrition Education Behavior*, *36*(4), 173–180.

Haraldsdóttir, J., Thórsdóttir, I., de Almeida, M. D. V., Maes, L., Pérez Rodrigo, C., Elmadfa, I., et al. (2005). Validity and reproducibility of a precoded questionnaire to assess fruit and vegetable intake in European 11- to 12-year-old schoolchildren. *Annals of Nutrition and Metabolism*, *49*, 221–227.

Health-Council-of-the-Netherlands. (2002). *Voedingsnormen energie, eiwitten, vetten en verteerbare koolhydraten [Dietary reference intakes: Energy, proteins, fats and digestible carbohydrates]*. Den Haag, in Dutch.

Hendy, H. M., & Raudenbush, B. (2000). Effectiveness of teacher modeling to encourage food acceptance in preschool children. *Appetite*, *34*, 61–76.

Hirasing, R. A., Fredriks, A. M., Buuren van, S., Verloove-Vanhorick, S. P., & Wit, J. M. (2001). Toegenomen prevalentie van overgewicht en obesitas bij Nederlandse kinderen en signalering daarvan aan de hand van internationale normen en nieuwe referentiediagrammen [Increased prevalence of overweight and obesity among Dutch children and identification according to international standards and new reference-diagrams]. *Nederlands Tijdschrift voor Geneeskunde*, *145*(27), 1303–1308.

Johnson, S. L., & Birch, L. L. (1994). Parents' and children's adiposity and eating style. *Pediatrics*, *94*, 653–661.

Kelder, S. H., Perry, C., Klepp, K.-I., & Lytle, L. (1994). Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *American Journal of Public Health*, *84*(7), 1121–1126.

Kratt, P., Reynolds, K., & Shewchuk, R. (2000). The role of availability as a moderator of family fruit and vegetable consumption. *Health Education and Behavior*, *27*(4), 471–482.

Krebs-Smith, S. M., Heimendinger, J., Patterson, B. H., Subar, A. F., Kessler, R., & Pivonka, E. (1995). Psychosocial factors associated with fruit and vegetable consumption. *American Journal of Health Promotion*, *10*(2), 98–104.

Lien, N., Lytle, L. A., & Klepp, K.-I. (2001). Stability in consumption of fruit, vegetables and sugary foods in a cohort from age 14 to Age 21. *Preventive Medicine*, *33*, 217–226.

Livingstone, M. B. E., & Robson, J. (2000). Measurement of dietary intake in children. *Proceedings of the Nutrition Society*, *59*, 279–293.

Montano, D. E., Kasprzyk, D., & Taplin, S. H. (1997). The theory of reasoned action and the theory of planned behavior. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education* (2nd ed, pp. 85–112). San Francisco: Jossey-Bass Inc.

Ouelette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, *124*(1), 54–74.

Rasbash, J., Browne, W., & Goldstein, H. (2000). *A user's guide to MlwiN, version 2.1*. London: Institute of Education, University of London.

Reinaerts, E. B. M., De Nooijer, J., Van de Kar, A., & De Vries, N. K. (2006). Development of a school-based intervention to promote fruit and vegetable consumption: Exploring perceptions among four-to-twelve year old children and their parents. *Health Education*, *5*.

Resnicow, K., Davis, A., Smith, M., Lazarus-Yaroch, A., Baranowski, T., Baranowski, J., et al. (1998). How best to measure implementation of school health curricula: A comparison of three measures. *Health Education Research*, *13*(2), 239–250.

Resnicow, K., Davis, M., Smith, M., Baranowski, T., Lin, L. S., Baranowski, J., et al. (1997). Social-cognitive predictors of Fruit and Vegetable Intake in Children. *Health Psychology*, *16*(3), 272–276.

Reynolds, K., Hinton, A. W., Shewchuk, R., & Hickey, C. A. (1999). Social cognitive model of fruit and vegetable consumption in elementary school children. *Journal of Nutrition Education*, *31*(1), 23–30.

Sallis, J. F., & Owen, N. (1997). Ecological models. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education: Theory, research and practice* (2nd ed, pp. 403–424). San Francisco: Jossey-Bass Inc.

Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel modeling: An introduction to basic and advanced multilevel modeling*. London: Sage.

Statistics-Netherlands. (2005). *Standard for ethnicity (CBS)*. Retrieved 23-03-2005, from 〈http://www.cbs.nl/nl/cijfers/statline/index.htm〉.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using Multivariate Statistics* (3rd ed.). Northridge: Harper Collins College Publishers.

Van Assema, P., Brug, J., Ronda, G., Steenhuis, I., & Oenema, A. (2002). A short Dutch questionnaire to measure fruit ad vegetable intake: Relative validity among adults and adolescents. *Nutrition and Health*, *16*, 85–106.

Van Assema, P., Glanz, K., Martens, M. K., Brug, J. (Submitted). Differences between parents'and adolescents'perceptions of family food rules and availability.

Van Buuren, S. (2004). Afkapwaarden van de 'body-mass index' voor ondergewicht van Nederlandse kinderen [Body Mass Index-standards for underweight regarding Dutch Children]. *Nederlands Tijdschrift voor Geneeskunde*, *148*(40), 1967–1972.

Vereecken, C. A., Van Damme, W., & Maes, L. (2005). Measuring attitudes, self-efficacy, and social and environmental influences on fruit and vegetable consumption of 11- and 12-year-old children: Reliability and validity. *Journal of the American Dietetic Association*, *105*, 257–261.

Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology*, *33*(6), 1313–1330.

Wardle, J., Cooke, L. J., Leigh Gibson, E., Sapochnik, M., Sheiham, A., & Lawson, M. (2003). Increasing children's acceptance of vegetables; a randomized trial of parent-led exposure. *Appetite*, *40*, 155–162.

Weber Cullen, K., Baranowski, T., Owens, E., Marsh, T., Rittenberry, L., & deMoor, C. (2003). Availability, accessibility, and preferences for fruit, 100% fruit juice, and vegetables influence children's dietary behavior. *Health Education and Behavior*, *30*(5), 615–626.

Weber Cullen, K., Baranowski, T., Rittenberry, L., Cosart, C., Hebert, D., & de Moor, C. (2001). Child-reported family and peer influences on fruit, juice and vegetable consumption: Reliability and validity of measures. *Health Education Research*, *16*(2), 187–200.

Wind, M., de Bourdeaudhuij, I., te Velde, S. J., Sandvik, C., Due, P., Klepp, K. I., et al. (2006). Correlates of fruit and vegetable consumption among 11-year-old Belgian-Flemish and Dutch school-children. *Journal of Nutrition Education and Behavior*, *38*(4), 211–221.