

Parental feeding practices and dietary behaviour of children



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Getting a child to eat fruit and vegetables is one of the best guarantees of good short- and long-term health. But what is the best way to do this?

Three articles provide arguments:

The first studied the effect of breastfeeding in children aged two to 12 years: breastfeeding for six months or more and introducing fruit and vegetables instead of cereals during complementary feeding increased intake and variety.

The second focused on the most beneficial educational attitude of parents, which consisted of a coercive approach, structured practices and support for autonomy. Fruit and vegetable consumption was linked to confidence stemming from an upbringing combining incentives, example-setting and a degree of flexibility.

The third explored the impact of the example set by the father. Children's once- or twice-daily consumption of fresh fruit and vegetables was strongly correlated with that of their fathers.

Being breastfed, having persuasive and yet flexible parents who set an example, and having a father who is also committed to this model are therefore three key factors in fruit and vegetable consumption from early childhood to adolescence.

Feeding practices in infancy and fruit and vegetable consumption in childhood

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Food preferences are formed in infancy and track into adulthood. Early childhood, particularly the first 1000 days, is therefore a window of opportunity to establish healthy dietary preferences. More particularly, breastfeeding and the introduction of complementary foods can set taste preferences and shape attitudes towards food (De Cosmi, 2017; Hetherington, 2016; Barends, 2019). The health benefits of a diet rich in fruit and vegetables are very well documented with a clear consensus about their role in risk reduction of chronic diseases. However, their intake remains insufficient in many countries like the UK and the USA (Boeing, 2012).

The aim of the present study is to explore associations between feeding practices during infancy (breastfeeding and complementary feeding) and the frequency and variety of fruit and vegetables consumption.

Breastfeeding was associated with higher variety and frequency of fruit and vegetable consumption in childhood

In this study, infants who were breastfed for less than 6 months consumed less variety of fruit and vegetables during childhood

compared to those who were breastfed for 6 months.

In addition, being breastfed for less than 6 months was associated with lower frequency of fruit intake during childhood compared with being breastfed for 6 months. However, no association was observed with the frequency of vegetable intake.

Introducing first fruit or vegetables during complementary feeding was associated with higher frequency and variety of fruit and vegetable consumption in childhood

The introduction of complementary foods has a key role in setting healthy eating behaviours, as infants begin to learn tastes and textures.

According to this study, first complementary food introduced to infants was associated with the frequency of fruit and vegetable intake during childhood. In fact, children who received fruits or vegetables first ate vegetables more frequently on average than children given cereals, while those given fruit (but not vegetables) ate fruit more frequently than children given cereals.

Furthermore, children who were given vegetables (but not fruit) as their first complementary food in infancy ate a wider variety of vegetables on average than those who were given cereal. On the other hand, children who were given fruit first ate a wider variety of fruit than those who were given cereals.

Supplementing breastfeeding was not associated with fruit and vegetable consumption (frequency and variety), compared with exclusive breastfeeding to 6 months

Mean fruit and vegetable frequency as well as fruit variety were identical for children who were supplemented with solids and/or formula and those who were breastfed. Mean vegetable variety was slightly higher for children who were exclusively breastfed compared with children who were supplemented, but the difference was not significant. These findings suggest that supplementing breastfeeding with solids and/or formula before 6 months was not associated with any differences in fruit and vegetable frequency and variety during childhood, compared with exclusive breastfeeding.



KEY MESSAGES

- Infancy is an important window of opportunity for dietary intervention, as feeding practices can shape food tastes and preferences.
- Stronger evidence was found for the role of complementary feeding than for breastfeeding on childhood fruit and vegetable intake.
- Guidance to parents on infant feeding could encourage a vegetables-first approach or at the least encourage the use of fruit and vegetables rather than cereal at the early stages complementary feeding.

METHODOLOGY

- Participants were drawn from the Mothers and their Children's Health study (MatCH), which is a sub-study of the Australian Longitudinal Study on Women's Health (ALSWH), conducted in 2016/2017.
- Mothers completed the Children's Dietary Questionnaire on feeding practices in infancy (breastfeeding duration, use of formula, first complementary food) and children's fruit and vegetable frequency (number of times eaten) and variety (number of different types eaten) in the past 24 h.
- A total of 4,981 children aged 2–12 years was included in the study.

Based on: Moss KM, et al. Associations between feeding practices in infancy and fruit and vegetable consumption in childhood. *Br J Nutr.* 2020;124(12):1320-1328.

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Fruit and vegetable consumption : positive association between fathers' daily intake and children's consumption patterns

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A large scientific consensus is established about the role of an adequate daily intake of fruit and vegetables in preventing major health implications such as cardiovascular disease, cancer, premature mortality, and diabetes (Li, 2014). However, European children are not meeting the recommended fruit and vegetable intake (at least 400 g/day) (WHO, 2004). The development of children's food preferences is multifactorial, involving the complex interplay between genetics and environmental factors, including the home environment (Scaglioni, 2018). Parental influence has been identified as a key determinant of children's food choice and consumption patterns via food availability at home, role modelling, family rules, and their own dietary practices and beliefs (Scaglioni, 2011). Convincing evidence from cross-sectional studies has shown that, in families where parents consumed fruit and vegetables regularly, children also had an increased intake of healthy foods (Draxten, 2014; Jones, 2010; Rodenburg, 2012). Yet, research has focused only on the relationship between mothers' and children's eating habits, while little is known about fathers as potential agents.

Therefore, the present study aimed to explore in six European countries fruit and vegetable intake in children and the relationship between fathers' and children's fruit and vegetable intake, considering fathers' education level and family income insecurity.

European children have low fruit and vegetable intake, especially in Southern European countries

Fruit and vegetable intake among all children was low. Only 45.6% and 37.7% consumed respectively, fresh fruit and vegetables 1-2 times per day.

When compared by country, differences were observed. Children's fresh fruit intake of 1-2 times/day ranged from 61.1% in Belgium to 34% in Hungary, while vegetable intake ranged from 61.6% in Belgium to 20.1% in Greece. Overall, results indicated that a low fruit and vegetables intake was mainly observed in children from

Southern European countries (Greece, Spain and Hungary).

Regarding fathers, only 65.9% consumed fruit and vegetable daily. Belgian fathers were more likely to consume fruit and vegetables daily (79.8%) while Hungarian had the lowest percentage (43.8%).



Children with fathers consuming fruit and vegetables daily were more likely to consume fresh fruit and vegetables

Significant positive associations were observed between fathers' daily fruit and vegetables intake and children frequency of intake. In fact, when fathers consumed daily fruit and vegetable, children were 2.75 times and 2.55 times more likely to consume, respectively, fresh fruit and vegetables 1-2 times per day.

After adjusting for paternal educational level and family income insecurity, associations remained significant for fresh fruit and vegetables. However, disparities were found across countries, in Greece mainly where the positive association became nonsignificant after adjustment. This finding highlights that fathers' educational level and income insecurity might be important factors worth considering for fruit and vegetable intake in Greece.

KEY MESSAGES

- The present study showed that children with fathers consuming FV daily were more likely to consume fresh fruit and vegetables 1-2 times per day.
- Future population-based strategies promoting fruit and vegetable intake should be implemented not only in mothers, but also in fathers.
- A special attention should be given by policy makers to families dwelling in Southern European regions.

METHODOLOGY

- Cross-sectional analysis using baseline data were collected in 2016 from the multicentre Feel4Diabetes Study, a 2-year school- and community-based intervention designed to prevent type 2 diabetes in vulnerable families across Europe.
- Participants were parent dyads (fathers, n = 10,038) and school children (n = 12,041) from six European countries (Bulgaria, Hungary, Belgium, Finland, Greece and Spain).
- Socio-demographic data were collected using a self-reported questionnaire, while dietary data were evaluated using the Food-Frequency Questionnaire (FFQ).
 - Frequency of food intake was recorded as weekly or daily consumption of food items: <1 time/week, 1 or 2 times/week, 3 or 4 times/week, 5 or 6 times/week, 1 or 2 times/day, 3 or 4 times/day, 5 or 6 time/day and >6 times/ day.
 - One serving of fruit was considered to one medium-sized fruit or ½ cup, vegetables ½ cup, canned or dried fruit ½ and ¼ cup, respectively.
- Associations were assessed applying the multinomial logistic regression model.

Based on: Papamichael et al. Fathers' daily intake of fruit and vegetables is positively associated with children's fruit and vegetable consumption patterns in Europe: The Feel4Diabetes Study J Hum Nutr Diet. 2021;1-13.

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Patterns of food parenting practices regarding fruit and vegetables among parent-adolescent dyads

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Children's eating behaviours are influenced by multiple factors. Evidence shows that parental child feeding practices affect children's food preferences, consumption patterns, and self-regulation of food intake and are associated as well with their weight status (Scaglioni, 2018). Three types of parental feeding practices were proposed as a content map to guide future research (Vaughn, 2016). Structure and autonomy support are generally positively associated with healthful child dietary behaviours while coercive control is associated with negative impacts on children's eating behaviours.

The present article determines patterns of food parenting practices using a dyadic (concurrent and interdependent), person-oriented approach, according to the three parental feeding models suggested by Vaughn et al. It explores associations between patterns, parent and adolescent characteristics, and dietary intake.

Parents either use multiple fruit and vegetable parenting practices simultaneously or very few to influence their children's fruit and vegetable intake

Six parenting practices related to fruit and vegetable were measured in this study (Table 1).

Five patterns emerged from the data representing parents and adolescents who reported complete use of the six parenting practices (complete influencers), use of some of the practices (Pressure Partial Influencers, Nonpressuring Partial Influencers, and Disagreeing Influencers), and use of few practices (Indifferent Influencers) (Table 2).

Table 1: Parenting practices assessed in the study classified in the three parental feeding models defined by Vaughn et al. and items used to measure them.

Parental feeding models	Parenting practices assessed in the study	Items used to measure parenting practices
Coercive control	Pressure to eat	"Make eat fruit and vegetables"
Structure practices	Monitoring	"Eat enough fruit and vegetables"
	Availability	"Buy fruit and vegetables"
	Modeling	"Eat fruit and vegetable when child is around"
Autonomy support	Encouragement	"Try different fruit and vegetables"
	Child involvement	"Decide together fruit and vegetables amount"

KEY MESSAGES

- Distinct patterns of parenting practices exist and are associated with parent and adolescent demographic characteristics, dietary intake, and legitimacy parenting authority.
- The combination of availability, modeling, and encouragement practices may be more effective for promoting fruit and vegetable intake than the other practices measured.
- Considering that parents are not all the same in their use of parenting practices, a more personalized approach may be needed, when designing interventions to positively affect children's dietary intake.

Combination of availability, modeling, and encouragement may be the most effective for promoting fruit and vegetable intake

Complete and Nonpressuring Influencers were the classes with the highest parent and adolescent parent and adolescent fruit and vegetables intakes. They were also those who showed high use of availability, modeling, and encouragement, suggesting that the combination of those three practices may be more effective for promoting fruit and vegetable intake than the other practices measured. However, further research is needed to confirm this finding.

The odds of belonging to one of the four classes, other than Complete Influencers (reference class), were between 19% and 63% lower for every one cup equivalent in parent fruit and vegetable intake. Though, for every one cup equivalent increase in adolescent intake, there is 55% lower odd to belong to Indifferent Influencers.

Positive associations were observed between fruit and vegetable parenting practices and fruit and vegetable legitimacy of parental authority

The study's findings also suggest that the more parenting practices were perceived as used, the more likely parents and their adolescents are to agree that parents have legitimate authority to set rules about child's fruit and vegetable intake.

Table 2: Patterns that emerged from the data representing parents and adolescents who reported complete use of the six parenting practices

Patterns of parent- and adolescent- reported parenting practices regarding fruit and vegetables	Percentage of the dyads	
Complete Influencers	31%	<ul style="list-style-type: none"> • High probabilities for all parent and adolescent-reported parenting practices
Pressure Partial Influencers	24%	<ul style="list-style-type: none"> • High probabilities to report monitoring, availability, modeling, and encouragement • Low probabilities for child involvement • Some disagreement on pressure to eat (moderate parent-reported probability while adolescents reported a high probability)
Nonpressuring Partial Influencers	22%	<ul style="list-style-type: none"> • High probability to report availability, modeling, and encouragement,
Disagreeing Influencers	10%	<ul style="list-style-type: none"> • Low probability on pressure to eat and child involvement • High probability of parent-reported monitoring, availability, modeling, and encouragement.
Indifferent Influencers	14%	<ul style="list-style-type: none"> • Low probability of adolescent-reported pressure to eat, monitoring, modeling, and child involvement.

METHODOLOGY

- Dyadic survey data conducted in 2014 were used from a cross-sectional study (Internet-based), the Family Life, Activity, Sun, Health, and Eating (FLASHE) study.
- 1657 parent-adolescent dyads were included in the present analyses.
- Data were analyzed using latent class analysis.

Based on: Thomson JL, et al. Patterns of Food Parenting Practices Regarding Fruit and Vegetables among Parent-Adolescent Dyads. Child Obes. 2020;16(5):340-349.

References:

- Scaglioni S, et al. Nutrients. 2018;10(6):706.
- Vaughn AE, et al. Nutr Rev. 2016;74(2):98-117.

Community-Based Nutrition Education and Hands-On Cooking Intervention Increases Farmers' Market Use and Vegetable Servings.



American researchers evaluated the impact of the Market to MyPlate* programme on attitudes and shopping behaviours. One hundred and twenty adults and their families were randomly divided up into three groups respectively receiving: 1- nutrition education and cooking classes with fruit and vegetable allocations; 2- nutrition education and cooking classes only; or 3- control group. Their purchases at farmers' markets, the frequency at which they served vegetables to their families and their food resource management, food waste behaviours and food security were evaluated. Compared with the control group, the participants in Group 1 were more likely to purchase produce at farmers' markets. They also said they served more vegetables to their families. However, no differences were observed in terms of food security or food resource management behaviour. These findings may be useful for defining interventions that can positively influence shopping and dietary behaviours.

* *Community-based intervention programme that teaches low-income families about nutrition, cooking, shopping at farmers' markets and food resource management.*

Metcalfe JJ, *et al.* Public Health Nutr. 2022 Mar 21:1-30.

Impact of Nutrition and Physical Activity Interventions Provided by Nutrition and Exercise Practitioners for the Adult General Population: A Systematic Review and Meta-Analysis.



A healthy diet and regular physical activity help reduce the risk of chronic diseases. In this systematic review and meta-analysis (including articles from 2010 to April 2021), American researchers studied the impact of nutrition and physical activity interventions provided by nutrition and exercise practitioners. Only the healthy adult general population was studied. The interventions increased the amount of physical activity (low certainty of evidence); increased vegetable intake (moderate certainty); reduced waist circumference (high certainty); and increased the likelihood of achieving 5% weight loss for overweight and obese adults (high certainty).

Nitschke E, *et al.* Nutrients. 2022 Apr 21;14(9):1729.

Fruit and vegetable intake is inversely associated with severity of inattention in a pediatric population with ADHD symptoms: the MADDY Study.



Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder affecting 8 to 10% of children in the United States. It presents with inattention and hyperactivity/impulsivity, which are frequently associated with emotional dysregulation symptoms. The aetiology of these disorders is multi-factorial and it seems that the severity of symptoms is associated with diet. A recent study examined the association between diet quality, ADHD symptoms and mood disorders in a paediatric cohort (n = 134 children between the ages of six and 12 years). It found that fruit and vegetable intake was inversely associated with severity of inattention. Children eating less fruit and vegetables were therefore likely to have more severe symptoms of inattention. Causality was not established by this cross-sectional analysis.

Robinette LM, *et al.* Nutr Neurosci. 2022 May 10:1-10.

Nature Relatedness Is Positively Associated With Dietary Diversity and Fruit and Vegetable Intake in an Urban Population.



An online survey of 317 adults conducted in Philadelphia examined the association between feeling connected to nature, or nature relatedness, and dietary behaviours. The Nature Relatedness (NR) scale was used to measure the participants' connection to nature. Dietary diversity was assessed using the FAO's standardised tool. The people most connected to nature were more likely to report greater dietary diversity. They also reported greater fruit and vegetable intake. These findings highlight the need for health promotion interventions that enhance nature relatedness, such as nature prescription initiatives, urban gardening and greening, and immersion in urban green spaces.

Milliron BJ, *et al.* Am J Health Promot. 2022 Apr 5:8901171221086941.

The Association Between Adolescents' Food Literacy, Vegetable and Fruit Consumption, and Other Eating Behaviors.



A Canadian study evaluated the relationship between the food literacy (including cooking skills), fruit and vegetable consumption and other eating behaviours of adolescents. One thousand and fifty-four students (467 boys and 570 girls) from five francophone secondary schools in New Brunswick, Canada reported (online questionnaire) their level of food literacy in terms of food skills and cooking skills, their fruit and vegetable consumption, and their eating behaviours. Better literacy and cooking skills were associated with healthier eating behaviours and greater fruit and vegetable consumption for both genders. This study suggests that public health interventions should focus on this dimension to improve adolescents' nutrition.

LeBlanc J, Ward S, LeBlanc CP. Health Educ Behav. 2022 Apr 2:10901981221086943.