



## **EXECUTIVE SUMMARY**



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**EPPI-Centre**

# **Children and healthy eating: a systematic review of barriers and facilitators**



**Evidence for Policy and Practice  
*Information and Co-ordinating Centre***

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A searchable database which includes the studies reviewed in this report will be available on the EPPI-Centre website (<http://eppi.ioe.ac.uk>).

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# EXECUTIVE SUMMARY

## Background and aims

Healthy eating is encouraged amongst children in the belief that they will benefit from the long term physiological consequences of a good diet in childhood, and that healthy eating in childhood is more likely to lead to healthy eating later in life. An over-consumption of energy-dense foods has been linked with obesity, and the proportion of children classed as obese is rising. Diets high in fruit and vegetables have been associated with reductions in a range of diseases including certain cancers, cardiovascular heart disease, hypertension and tooth decay. Recent surveys have found that British children are eating less than half the recommended five portions of fruit and vegetables per day. There is evidence to suggest that material and social context affect children's intake, with children living in low-income households eating less fruit and vegetables than those living in high-income households.

This report describes a systematic review aiming to survey what is known about the barriers to, and facilitators of, healthy eating amongst children aged four to 10 years old. It focuses in particular on barriers and facilitators in relation to fruit and vegetables. It is the second of two reviews concerned with children aged four to ten years; the first focused on physical activity. This review also advances systematic review methodology. It is the first systematic review (as far as we are aware) to integrate, in a rigorous and systematic way, the findings of a statistical meta-analysis with the findings from a synthesis of qualitative research. These methodological advances provide a much more trustworthy basis for policy-making, avoiding the partial picture likely to be revealed by relying on syntheses of any one type of research in isolation.

## Methods

We carried out the review in two stages: a mapping and quality screening exercise which described the characteristics of all the relevant research we identified; and an in-depth review synthesizing the findings of a particular sub-set of studies. The review was restricted to studies focused on children aged four to 10 years old, and to those studies published in the English language. We sought evaluations of the effects of interventions to promote healthy eating amongst children ('outcome evaluations') carried out in any country from around the world. We also sought 'non-intervention' research aiming to describe factors influencing healthy eating amongst children in the UK; evaluations looking at the processes involved in implementing interventions ('process evaluations'); and previous systematic reviews. Literature searches of multiple sources were undertaken to identify such research.

The narrower focus of the in-depth review, chosen in consultation with users of research, was on the barriers to, and facilitators of, children's consumption of fruit and vegetables. We therefore only reviewed in-depth intervention studies that had measured fruit and vegetable outcomes. There was also an interest in including studies that had examined children's own perspectives on food and eating to assess how these might illuminate fruit and vegetable barriers and facilitators. Statistical

meta-analysis was used to pool the effect sizes from outcome evaluations (supported by specialist software developed at the EPPI-Centre) and qualitative analysis techniques were used to synthesise the findings of studies of children's views (supported by the specialist software NVivo). A final stage of the in-depth review involved a cross-study synthesis to integrate the findings from the two types of studies.

## **Findings**

The searches produced a substantial amount of potentially relevant literature – 660 full text reports were retrieved after screening 9947 titles and abstracts. After screening full reports, a total of 272 reports of 193 separate studies were available for inclusion in the mapping exercise.

### ***Results of the mapping exercise***

The majority of the 193 studies were outcome evaluations (n=141) carried out in 12 different countries (15 were from the UK). Thirty-three UK non-intervention studies were also identified, alongside nine process only evaluations, which were all carried out in the USA. Most of the studies focused on children in general (n=120) rather than more specific groups such as those from families on a low income or ethnic minorities; and focused on other aspects of healthy eating (n=138) rather than fruit and vegetables. We also identified 10 systematic reviews. None of these had the same population and topic scope as this review.

Forty-one studies met the inclusion criteria for in-depth review: eight studies of children's or parents' views and 33 outcome evaluations.

### ***Synthesis of effectiveness findings from outcome evaluations***

Three of the 33 outcome evaluations studied interventions to encourage children to try unfamiliar fruit and vegetables. Of the 30 which studied interventions to increase children's consumption of any fruit and vegetables, 19 were entered into a statistical meta-analysis (11 were excluded on the grounds that methodological problems meant that their findings could not be relied on).

The types of interventions evaluated by these studies were largely school-based, and often combined learning about the health benefits of fruit and vegetables with 'hands-on' experience in the form of food preparation and taste-testing. The majority targeted parents and/or involved them in intervention delivery alongside teachers and health promotion practitioners. Some included environmental modification involving, for example, changes to the foods provided at school. Some interventions targeted more than one outcome (for example, fruit and vegetable consumption, fat intake, knowledge, self-efficacy, Body Mass Index (BMI) and physical activity).

The results of the meta-analysis revealed that these kinds of interventions have a small, but significant positive effect. Pooled estimates from the nineteen studies suggest that implementation of these interventions will, on average, increase children's fruit intake by one-fifth of a portion per day and their vegetable intake by a

little less than one-fifth of a portion per day. These are averages though, and different interventions produced different effects. Bigger effects are associated with targeted interventions for parents with risk factors for cardiovascular disease (increasing fruit and vegetable intake by almost two portions) and with those interventions which do not 'dilute' their focus on fruit and vegetables by trying to promote physical activity or other forms of healthy eating (for example, reduced intake of sodium and fat) in the same intervention (effects sizes were three times higher in these studies). Single component interventions, such as classroom lessons alone or providing fruit only tuck shops, were not effective.

Two main messages emerged from the findings of studies that conducted integral process evaluations: promoting healthy eating can be an integral and acceptable component of the school curriculum; and effective implementation in schools requires skills, time and support from a wide range of people.

The results of the meta-analysis suggest that it is easier to increase children's consumption of fruit than vegetables. Three outcome evaluations studied interventions that attempted to address children's apparent greater dislike for vegetables by 'exposing them' to new or previously disliked vegetables. Their results revealed that it is possible to get children to try these vegetables (although allowing them a choice appears to be more effective than enforcing or rewarding this behaviour), but it is unclear whether such strategies would lead to increases in children's everyday consumption of vegetables.

### ***Synthesis of children's views studies***

Children were able to provide valuable insights into their perspectives on food, eating and healthy eating. Looking for barriers and facilitators within these perspectives led to the emergence of six main contextual issues which any programmes to promote healthy eating amongst children need to consider: (1) children do not see it as their role to be interested in health; (2) children do not see messages about future health as personally relevant or credible; (3) fruit, vegetables and confectionery have very different meanings for children; (4) children actively seek ways to exercise their own choices with regard to food; (5) children value eating as a social occasion; and (6) children see the contradiction between what is promoted in theory and what adults provide in practice. Nine implications for appropriate interventions for promoting fruit and vegetables to children were derived from these themes. Implications ranged from simple strategies such as 'branding fruit and vegetables as tasty rather healthy' or 'do not promote fruit and vegetables in the same way' to more challenging strategies such as 'make health messages relevant and credible to children' and 'create situations for children to have ownership over their food choices'.

These findings were generated from eight studies involving 1091 children (aged five to 11 years old) and 92 mothers living in Scotland or England (the south, middle and north). Children from families of both lower and higher socio-economic status were represented, but the representation of children from ethnic minority groups was unclear. Three of the eight studies were judged to be of a poorer quality, meeting six or less of the 12 criteria used to assess their quality. We decided not to exclude these studies, however. When we checked, their findings did not contradict those from studies of a higher quality. However, these studies had very little to contribute to the synthesis.

## **Cross-study synthesis**

Our chosen methods for combining qualitative and quantitative studies in our cross study synthesis compared interventions studied by sound or other outcome evaluations to the nine implications for appropriate interventions derived from studies of children's views. This process revealed a number of matches, mismatches and gaps. When there were sufficient numbers of sound studies evaluating interventions with components matching children views, a meta-analysis was conducted in order to explore whether these interventions led to bigger effects than studies evaluating interventions which did not match.

Of those interventions with components matching children's views, some were clearly effective, some were unclear in their effects, but none were ineffective or harmful. Those interventions which led to bigger increases in fruit and/or vegetables consumed included one or more of the following components which matched children's views: the promotion of fruit and vegetables in separate interventions or in different ways within the same intervention; a reduction in the emphasis on health messages; or the promotion of fruit and vegetables in educational materials accompanied by access to fruit and vegetables. However, the effectiveness of interventions with the following components matching children's views is unclear, and further evaluation is required: branding fruit and vegetables as exciting or child-relevant products; and encouraging situations for children to express choice.

Gaps between evaluated interventions and children's views revealed the following opportunities for developing and evaluating innovative interventions based on children's views. These included: branding fruit and vegetables as 'tasty' rather than 'healthy'; creating opportunities for children to influence the social context in which they eat; and making health messages credible for children.

## **Conclusions**

Our review has uncovered a relatively solid evidence-base for informing policy and practice for the promotion of fruit and vegetables to children aged four to 10. Pooling the findings from good quality trials indicated that interventions can have a small, but significant positive effect, increasing children's fruit intake by one-fifth of a portion per day and their vegetable intake by nearly one-fifth of a portion per day. Assessing the significance of these effects requires their translation into estimates of health gain and clinical significance together with their potential savings for health care services. Our synthesis of effectiveness research has indicated the types of interventions and their components which lead to larger or smaller effects (e.g. those which targeted families at high risk for cardiovascular disease had higher effect sizes; those intervention which diluted their focus on fruit and vegetables by trying to promote physical activity or other forms of healthy eating tended to have lower effect sizes).

Clear implications regarding the development of appropriate interventions were derived from studies eliciting children's own perspectives on food, eating and healthy eating. Moreover, within our cross-study synthesis we found a relationship between what children say is important and intervention effectiveness. We were able to use these findings to identify further intervention components that lead to larger effects (e.g. interventions which did not emphasise the health benefits of fruit and vegetables showed larger effects than those which did). These patterns in effectiveness form the basis of our recommendations for policy and practice.

Our cross study synthesis also highlighted a number of promising directions for the future development and testing of interventions to promote fruit and vegetables. In particular, there is scope to explore the effect of interventions which brand fruit and vegetables as being tasty rather than healthy and in creating opportunities for children to influence the social context in which they eat. Additionally, one challenging implication calls for health messages to be made relevant and credible for children. Future evaluations need to involve researchers, practitioners, children and their parents working in partnership, and employ rigorous evaluation methods.

There remains, however, a weakness within the evidence-base regarding inequalities in health. Whilst the studies we identified for this review included children from diverse groups (e.g. ethnic minority groups and children from areas of social and economic deprivation), the studies had little to say about reducing health inequalities. None set out to evaluate the impact of interventions in reducing inequalities in this area, or reported their data in such a way as to enable others to evaluate this (i.e. results were not reported according to different sub-groups of children). This is an area that needs to be taken forward in any future research agenda on this topic.