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Interventions for increasing fruit and vegetable consumption in children aged five years and under (Review)

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[Intervention Review]

Interventions for increasing fruit and vegetable consumption in children aged five years and under

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ABSTRACT

Background

Insufficient consumption of fruits and vegetables in childhood increases the risk of future chronic diseases, including cardiovascular disease.

Objectives

To assess the effectiveness, cost effectiveness and associated adverse events of interventions designed to increase the consumption of fruit, vegetables or both amongst children aged five years and under.

Search methods

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library, MEDLINE, Embase Classic and Embase to identify eligible trials on 30 September 2016. We searched CINAHL and PsycINFO in July 2016, Proquest Dissertations and Theses in November 2016 and three clinical trial registers in November 2016 and June 2017. We reviewed reference lists of included trials and handsearched three international nutrition journals. We contacted authors of included studies to identify further potentially relevant trials.

Selection criteria

We included randomised controlled trials, including cluster-randomised controlled trials and cross-over trials, of any intervention primarily targeting consumption of fruit, vegetables or both among children aged five years and under, and incorporating a dietary or biochemical assessment of fruit or vegetable consumption. Two review authors independently screened titles and abstracts of identified papers; a third review author resolved disagreements.

Data collection and analysis

Two review authors independently extracted data and assessed the risks of bias of included studies; a third review author resolved disagreements. Due to unexplained heterogeneity, we used random-effects models in meta-analyses for the primary review outcomes where we identified sufficient trials. We calculated standardised mean differences (SMDs) to account for the heterogeneity of fruit and vegetable consumption measures.We conducted assessments of risks of bias and evaluated the quality of evidence (GRADE approach) using Cochrane procedures.

Main results

We included 50 trials with 137 trial arms and 10,267 participants. Thirty trials examined the impact of child-feeding practices (e.g. repeated food exposure) in increasing child vegetable intake. Eleven trials examined the impact of parent nutrition education in increasing child fruit and vegetable intake. Eight studies examined the impact of multicomponent interventions (e.g. parent nutrition education and preschool policy changes) in increasing child fruit and vegetable intake. One study examined the effect of a nutrition intervention delivered to children in increasing child fruit and vegetable intake.

Thirteen of the 50 included trials were judged as free from high risks of bias across all domains; performance, detection and attrition bias were the most common domains judged at high risk of bias of remaining studies.

Meta-analysis of trials examining child-feeding practices versus no intervention revealed a positive effect on child vegetable consumption (SMD 0.38, 95% CI 0.15 to 0.61; n = 1509; 11 studies; very low-quality evidence), equivalent to a mean difference of 4.03 grams of vegetables. There were no short-term differences in child consumption of fruit and vegetables in meta-analyses of trials examining parent nutrition education versus no intervention (SMD 0.11, 95% CI -0.05 to 0.28; n = 3023; 10 studies; very low-quality evidence) or multicomponent interventions versus no intervention (SMD 0.28, 95% CI -0.06 to 0.63; n = 1861; 4 studies; very low-quality evidence).

Insufficient data were available to assess long-term effectiveness, cost effectiveness and unintended adverse consequences of interventions.Studies reported receiving governmental or charitable funds, except for two studies reporting industry funding.

Authors' conclusions

Despite identifying 50 eligible trials of various intervention approaches, the evidence for how to increase fruit and vegetable consumption of children remains sparse. There was very low-quality evidence child-feeding practice interventions are effective in increasing vegetable consumption of children aged five years and younger, however the effect size was very small and long-term follow-up is required. There was very low-quality evidence that parent nutrition education and multicomponent interventions are not effective in increasing fruit and vegetable consumption of children aged five years and younger. All findings should be considered with caution, given most included trials could not be combined in meta-analyses. Given the very low-quality evidence, future research will very likely change estimates and conclusions. Such research should adopt more rigorous methods to advance the field.

This is a living systematic review. Living systematic reviews offer a new approach to review updating, in which the review is continually updated, incorporating relevant new evidence as it becomes available. Please refer to the Cochrane Database of Systematic Reviews for the current status of this review.

PLAIN LANGUAGE SUMMARY

Interventions for increasing eating of fruit and vegetables in children aged five years and under

Background

Consuming not enough fruit and vegetables is a considerable health burden in developed countries. Eating fruit and vegetables is associated with a reduced risk of future chronic disease. Early childhood represents a critical period for the establishment of dietary habits. Interventions to increase consumption of fruit and vegetables in early childhood may therefore be an effective strategy in reducing this disease burden.

Review question

To assess the impact of interventions designed to increase eating of fruit or vegetables or both among children aged five years and under.

Methods

We searched various electronic databases and relevant journals to find studies. We contacted authors of included trials for additional potentially relevant trials. Any randomised trial (participants have the same chance of being assigned to treatment or control) was eligible of interventions aiming to increase the intake of fruit or vegetables or both by children aged five years and under that measured intake. Two review authors independently searched for and extracted information from studies. The evidence is current to September 2016.

Results

We include 50 trials with 10,267 people taking part. Thirty examined child-feeding interventions, 11 examined parent nutrition education interventions, eight examined multicomponent interventions and one examined a child nutrition education intervention. Child-feeding interventions (e.g. repeated exposure to vegetables) were effective in increasing children's intake of vegetables in the short term (less than 12 months). Parent nutrition education and multicomponent interventions (e.g. combining preschool policy changes with parent education) were not effective in increasing children's eating of fruit and vegetables. There was not enough information to assess long-term effectiveness, cost effectiveness and unintended harms. Studies reporting funding support received governmental or charitable funds, except for two studies that received industry funding.

Conclusions

The evidence for effective interventions to increase eating of fruit and vegetables by children aged five and under remains sparse. Child-feeding interventions appear to increase the eating of vegetables by children (by 4.03 grams), but this conclusion is based on very low-quality evidence and is very likely to change when future research is undertaken.

This is a living systematic review. Living systematic reviews offer a new approach to review updating, in which the review is continually updated, incorporating relevant new evidence as it becomes available. Please refer to the Cochrane Database of Systematic Reviews for the current status of this review.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON [Explanation]

Child feeding interventions compared to no intervention for children aged 5 years and under

Patient or population: children aged 5 years and under
Setting: Various: Preschool (n = 2), School (n = 1), Home + Lab (n = 2), Child health clinic (n = 1), Home (n = 4), Home + health facility (n = 1)
Intervention: Child-feeding interventions
Comparison: no intervention

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with no intervention	Risk with Child feeding interventions				
Short-term impact (< 12 months) child vegetable intake	The mean vegetable intake was 7.7 grams[1]	The mean vegetable intake (grams) in the intervention group was **4.03 higher** (1.59 higher to 6.47 higher)	-	1509 (11 RCTs)	⊕◯◯◯ VERY LOW [2,3,4]	Scores estimated using a standardised mean difference of 0.38 (0.15 to 0.61) and a standard deviation of 10.61.[1] The mean duration of follow up post-intervention for studies included in the meta-analysis was 4.6 weeks 2 studies that compared 1 or more child-feeding practice interventions to a no-treatment control could not be synthesised in meta-analysis; both reported a significant increase in fruit or vegetables or both

Short-term impact (< 12 months) cost effectiveness - not reported	No child feeding interventions reported this outcome	-	-	-	-
Short-term impact (< 12 months) unintended adverse events	One trial (Spill 2011a) reported no adverse effects on amount of meal consumed	-	39 (1 RCT)	⊕◯◯◯ VERY LOW [5,6,7]	-

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI)

__CI:__ Confidence interval

GRADE Working Group grades of evidence
High quality: We are very confident that the true effect lies close to that of the estimate of the effect
Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

[1]We used the post-intervention mean and standard deviation of the control group from Wardle 2003a for the risk with no intervention and to re-express the SMD in terms of grams of intake.
[2]Downgraded one level for unexplained heterogeneity: Analysis 1.1 (main analysis): I^2 = 73%; Analysis 1.2 (excluding studies at high risk of bias): I^2 = 14%; Analysis 1.3 (excluding studies that did not state primary outcome): I^2 = 76%; Analysis 1.4 (excluding studies with high attrition and no ITT analysis) I^2 = 27%; Analysis 1.5 (subgroup analysis of face-to-face studies) I^2 = 77%).
[3]Downgraded one level for risk of bias: Fewer than half of the included studies were rated at low risk of bias for 3 of 4 criteria.
[4]Downgraded one level for high probability of publication bias: Most included studies were not combined in meta-analysis.
[5]Downgraded one level for risk of bias: assessed as high risk of bias for number of domains.
[6]Downgraded one level for imprecision: total sample size was < 400.
[7]Downgraded one level for high probability of publication bias: no other studies reported assessing adverse events, so selective reporting suspected.

BACKGROUND

Description of the condition

Chronic diseases are illnesses which are typically prolonged in duration, do not resolve spontaneously and are rarely cured completely (Australian Institute of Health and Welfare 2017). Insufficient consumption of fruits and vegetables is associated with a range of chronic diseases, such as cancer and cardiovascular disease (World Health Organization 2003; World Health Organization 2011). Globally, 2.8% of all deaths and 1.0% of all disability-adjusted life years (DALYs) each year are attributable to inadequate fruit and vegetable intake (World Health Organization 2017). Low fruit and vegetable consumption is responsible for 14% of gastrointestinal cancer deaths, 11% of all ischaemic heart disease and 9% of all stroke deaths (World Health Organization 2017). Increasing global fruit and vegetable intake therefore represents a public health priority and has the capacity to reduce the burden of coronary heart disease by 31%, oesophageal cancer by 20%, and Ischaemic stroke by 19% (Lock 2005).

To reduce the risk of chronic diseases, consumption of at least 400 grams a day of fruit and vegetables is recommended (World Health Organization 1997; World Health Organization 2017). Nationally representative surveys, however, indicate that throughout most regions of the globe, daily consumption of fruits and vegetables is well below such recommendations (Lock 2005).

Population surveys of children indicate the need to increase the intake of fruits and vegetables (Lock 2005; World Health Organization 2004a; Yngve 2005). For example, less than a third of school-aged children from European nations report consuming vegetables on a daily basis (World Health Organization 2004a). Data from younger children is similar. A survey conducted in 2007 to 2010 in the USA reported 33% of children aged one to three years met fruit recommendations and 13% met vegetable recommendations (National Cancer Institute 2015). A national survey in 2011 to 2012 in Australia reported 90% of children aged two to eight years consume the recommended number of fruit serves a day, and 49% of children aged two to three years consume the recommended serves of vegetables (Australian Bureau of Statistics 2014). Globally, the mean intake of fruit and vegetables is below the World Health Organization (WHO) recommendations across all WHO regions. South American, African, and South East Asian nations report the lowest quantities of child fruit and vegetable intake, where school-aged children typically consume less than 300 grams a day (Lock 2005).

There is some evidence from longitudinal studies to suggest that eating behaviours established in childhood are likely to persist into adulthood (Lien 2001; Mikkilä 2004). Additionally, longitudinal studies have shown that fruit and vegetable consumption in childhood is associated with reductions in chronic diseases in adulthood (Maynard 2003; Ness 2005). Encouraging healthy eating among children may therefore represent an effective primary prevention strategy for reducing the risk of chronic diseases (Boeing 2012; Centers for Disease Control and Prevention 2011; Maynard 2003; Ness 2005; World Health Organization 2004b). Thirty-seven-year follow-up data from the Boyd Orr cohort study of British children, for example, found lower rates of all-cause cardiovascular mortality among children with greater intake of vegetables in childhood (Ness 2005). Adequate fruit and vegetable intake during childhood may also have a number of immediate benefits, including reducing the risk of micronutrient deficiencies and a number of respiratory illnesses (Antova 2003; Boeing 2012; Forastiere 2005; World Health Organization 2003).

Description of the intervention

The aetiology of fruit and vegetable consumption is complex, involving the dynamic interaction of a variety of factors. Given such complexity, a number of frameworks have been produced to guide the development of interventions to increase fruit and vegetable intake (Centers for Disease Control and Prevention 2011; Klepp 2005; Miller 2000; World Health Organization 2004b). The conceptual framework developed for the international Pro Children Project suggests that interventions targeting a variety of cultural, physical and social environment factors, as well as those targeting personal factors, may be effective in positively influencing fruit and vegetable intake among children (Klepp 2005).

Despite the range of potential intervention targets, including primordial prevention interventions that target the risk factors of chronic disease before they occur (compared to primary prevention interventions that treat risk factors of chronic disease), previous trials have tended to focus on those determinants more amenable to intervention, such as nutrition knowledge and skills, or the food environment of settings such as schools (Hector 2008). Among school-aged children, systematic reviews suggest that the strongest evidence exists for the efficacy of multicomponent interventions with elements such as curriculum, parental engagement, policy and food environment changes (Blanchette 2005; De Sa 2008; Jaime 2009; Knai 2006; Van Cauwenberghe 2010). Previous reviews in children aged five years and younger (Campbell 2007; Hesketh 2010; Tedstone 1998) have similarly found some evidence for multicomponent interventions. Primordial prevention interventions targeting preschool-aged children also demonstrate consistent evidence. For example, an intervention aiming to prevent the onset of cardiovascular disease in preschoolers targeted multiple risk factors, including child fruit and vegetable consumption (Peñalvo 2013a; Peñalvo 2013b). The multicomponent intervention including curriculum, school environment and family components successfully improved preschoolers' fruit and vegetable habits, which were also maintained over time (Peñalvo 2013a; Peñalvo 2013b; Peñalvo 2015).

How the intervention might work

A number of theories have been used to explain a mechanism by which interventions may influence children's fruit and vegetable consumption (Rasmussen 2006). In most instances, psychosocial theories such as Social Cognitive Theory (Bandura 1986), the Theory of Planned Behaviour (Ajzen 1991), or the Stages of Change Trans-theoretical Model (Prochaska 1984) have been used to explain possible causal pathways to fruit and vegetable consumption (Rasmussen 2006). Collectively, such theories assert that changes in attitudes, knowledge and skills and perceived norms and expectancies are required for behavioural change. The international Pro Children Project incorporated Social-Ecological Theory in its conceptual theoretical framework of determinants of children's fruit and vegetable consumption (Klepp 2005). Interventions derived from Social-Ecological Theory recognise the importance of more structural influences on children's intake of fruit and vegetable consumption, for example, the availability or accessibility of fruit and vegetables in the home or in settings such as schools which children frequent.

Why it is important to do this review

Previous reviews have identified a number of factors associated with fruit and vegetable consumption among children (Blanchette 2005; Pearson 2008; Rasmussen 2006; Van der Horst 2007). While such reviews provide important information for the development of interventions, only systematic reviews of intervention trials can determine the efficacy of strategies to increase child fruit and vegetable consumption. A number of such reviews have been published (Burchett 2003; Ciliska 2000; Delgado-Noguera 2011; De Sa 2008; Evans 2012; French 2003; Hendrie 2017; Howerton 2007; Knai 2006; Savoie-Roskos 2017; Van Cauwenberghe 2010). However, only a few have focused specifically on children aged five years and under (Campbell 2007; Hesketh 2010; Tedstone 1998). Of these, most lacked important information relevant to practice, such as the effectiveness of interventions for various subpopulations (such as minority groups), the cost effectiveness of interventions, or the presence of any unintended adverse effects of the intervention. Similarly, as positive impacts of health behaviour interventions may not be sustained, an examination of the longer-term effectiveness of interventions (more than 12 months post-intervention) is important for policy-makers and practitioners to assess the potential health benefits of fruit and vegetable interventions (Fjeldsoe 2011; Jones 2011). Previous reviews have not specifically examined the impact of interventions based on the length of post-intervention follow-up. A comprehensive systematic review on this issue is therefore required to provide guidance for practitioners and policy-makers interested in implementing strategies to promote the consumption of fruits and vegetables in early childhood.

Following the publication of this 2017 update of the review, we will maintain it as a living systematic review, as a pilot up until the end of March 2018. This means we will be continually running the searches and rapidly incorporating any newly-identified evidence into the review (for more information about the living systematic review approach being piloted by Cochrane, see Appendix 1). We believe a living systematic review approach is appropriate for this review, for three reasons. First, the review addresses a particularly important public health issue; the growing burden of disease and mortality attributable to low fruit and vegetable intake. Insufficient consumption of fruits and vegetables is associated with a range of chronic diseases such as cancer and cardiovascular disease, and in most regions of the globe current daily consumption of fruits and vegetables is well below the recommended intake to reduce the risk of chronic diseases. Early childhood represents a critical period for the establishment of healthy eating behaviours, such as fruit and vegetable intake, as dietary habits developed early are likely to persist into adulthood. It is therefore important to better understand how to improve intake of fruits and vegetables during childhood. Secondly, there remains uncertainty in the existing evidence; despite the 2017 update identifying a further 45 studies for the review, no high-quality evidence exists of effective interventions to increase the fruit and vegetable consumption of children. Thirdly, we are aware of multiple ongoing trials in this area of research that will be important to incorporate, and we expect that future research will have impact on the conclusions.

OBJECTIVES

To assess the effectiveness, cost effectiveness and associated adverse events of interventions designed to increase the consumption of fruit or vegetables or both among children aged five years and under.

METHODS

Criteria for considering studies for this review

Types of studies

Eligible trials were randomised controlled trials (RCTs), including cluster-randomised controlled trials (C-RCTs) and cross-over trials, that:

1. Compared two or more alternative intervention programmes to increase the consumption of fruit or vegetables or both of children aged five years and under;
2. Compared an intervention programme to increase the consumption of fruit or vegetables or both of children aged five years and under with a standard-care or no-intervention control group.

We excluded trials which did not include fruit or vegetable intake as a primary trial outcome, to avoid the potential confounding effects of other interventions, and because publication bias and selective outcome reporting are more predominant among secondary trial outcomes (or outcomes that were not otherwise stated). We included trials that did not state a primary trial outcome but did assess an eligible fruit or vegetable intake outcome. We included eligible cross-over trials in the review, as we deemed them a suitable and common method for assessing the effect of interventions to increase the fruit and vegetable consumption of children.

Types of participants

Participants could include:
1. Children aged five years and under. Trials including children older than five years were included only if the mean age of the study sample at baseline was five years or less;
2. Parents, guardians and families responsible for the care of children aged five years and under;
3. Professionals responsible for the care of children aged five years and under, including childcare staff and health professionals.

Types of interventions

We considered any educational, experiential, health promotion and/or psychological or family or behavioural therapy or counselling or management or structural or policy or legislative reform interventions, designed to increase consumption of fruit or vegetables or both in children aged five years and under (as defined in types of participants). Interventions could be conducted in any setting including the home, childcare/preschool services, health services, or community settings.

Comparison: Any alternative intervention to encourage fruit and vegetable consumption as described above, or a no-intervention control, usual care, or attention control or wait-list control. Attention controls in randomised trials for behavioural interventions are those that include clinical attention and induce the expectation of therapeutic benefit for control for non-specific effects of the intervention (Freedland 2011). Wait-list control groups that are also designed to control for non-specific effects involve participants being allocated to receive an intervention at study conclusion (delayed start) (Whitehead 2004).

Types of outcome measures

We include studies with evaluated outcomes measuring biomedical or dietary indices or both.

Primary outcomes

The primary outcome was children's fruit and vegetable intake. Fruit and vegetable intake could be assessed using a variety of measures, including:

1. Change in the number of portions or serves of daily fruit or vegetable or both at follow-up, as measured by diet recalls, food diaries, food frequency questionnaires or diet records completed by an adult on behalf of the child. We grouped the interventions by short-term effects (less than 12 months post-intervention) and long-term effects (at least 12 months post-intervention);
2. Change in grams of fruit or vegetables or both at follow-up, as measured by diet recalls, food diaries, food frequency questionnaires or diet records completed by an adult on behalf of the child. We grouped them by short-term effects (less than 12 months post-intervention) and long-term effects (at least 12 months post-intervention);
3. Changes in biomedical markers of consumption of fruit or vegetables or both, such as α-carotene, β-carotene, cryptoxanthin, lycopene and lutein. We grouped them by short-term effects (less than 12 months post-intervention) and long-term effects (12 months or more post-intervention).

Outcomes of fruit or vegetable juice intake alone were not eligible. Outcomes that included child fruit and vegetable juice intake as part of an aggregate measure of child fruit or vegetable intake were eligible.

Secondary outcomes

1. Estimates of absolute costs and cost effectiveness of interventions to increase the consumption of fruits and vegetables reported in identified studies.
2. Any reported adverse effects of an intervention to increase the consumption of fruits and vegetables reported in identified studies. This could include any physical, behavioural, psychological or financial impact on the child, parent or family, or the service or facility where an intervention may have been implemented.

Search methods for identification of studies

This review represents the first update of a previously published review (Wolfenden 2012).

Electronic searches

We conducted a search of the following electronic databases:

- Cochrane Central Register of Controlled Trials (CENTRAL) Issue 8, 2016 in the Cochrane Library (searched 30 September 2016);
- Epub Ahead of Print, In-Process & Other Non-Indexed Citations, MEDLINE Daily and MEDLINE (Ovid, 1946 to 30 September 2016) (searched 30 September 2016);
- Embase Classic and Embase (Ovid, 1947 to 2016 week 39) (searched 30 September 2016);
- CINAHL (EBSCO, 1937 to 5 July 2016) (searched 5 July 2016);

- PsycINFO (Ovid,1806 to June week 5 2016) (searched 5 July 2016).

The search strategies are described in Appendix 2. We applied the sensitivity-maximising version of the Cochrane RCT filter (Lefebvre 2011) to MEDLINE, and adaptations of it to the other databases except for CENTRAL. We imposed no restrictions by date or language of publication.
As a living systematic review we will run the following electronic database searches monthly:

- CENTRAL
- Epub Ahead of Print, In-Process & Other Non-Indexed Citations, MEDLINE Daily and MEDLINE
- Embase

We will set up auto-alerts (where possible) to deliver a monthly search yield by email.
We will review search methods and strategies approximately yearly, to ensure they reflect any terminology changes in the topic area, or in the databases.

Searching other resources

We searched the reference lists of included articles and hand-searched all articles published between 2006 and September 2016 in three relevant international peer-reviewed journals (*Journal of Nutrition Education and Behavior, Public Health Nutrition,* and *Journal of the Academy of Nutrition and Dietetics* (previously titled *Journal of the American Dietetic Association)*).
We searched the metaRegister of clinical trials (www.controlled-trials.com/mrct/) and the WHO International Clinical Trials Registry Platform (www.who.int/ictrp/) in November 2016, and www.clinicaltrials.gov on 14 June 2017. We searched a database of published dissertations, Proquest Dissertations and Theses, in November 2016, to identify eligible studies. We conducted a 'grey literature' search in GoogleScholar on 14 June 2017, of which we screened the first 200 citations for eligibility. We contacted the authors of included studies to try to obtain other eligible trials published in peer-reviewed journals, as well as ongoing trials. We describe ongoing studies, where available, detailing the primary author, research question(s), methods and outcome measures (Characteristics of ongoing studies).
We are now running monthly trial registry searches of WHO International Clinical Trials Registry Platform and clinicaltrials.gov. We will set up auto-alerts (where possible) to deliver a monthly search yield by email.
We will conduct selected searches of other resources (articles published in three relevant international peer-reviewed journals: *Journal of Nutrition Education and Behavior, Public Health Nutrition,* and *Journal of the Academy of Nutrition and Dietetics*; database of published dissertations; and 'grey literature' in GoogleScholar) manually every six months.
As additional steps to inform the living systematic review, we will contact corresponding authors of ongoing studies as they are identified and ask them to advise when results are available, or to share early or unpublished data. We will contact the corresponding authors of any newly-included studies for advice as to other relevant studies. We will conduct citation tracking of included studies in Web of Science Core Collection on an ongoing basis. For that purpose, we have set up citation alerts in Web of Science Core Collection. We will manually screen the reference lists of any newly-included studies and systematic reviews. Also, we will use the 'Related citation' feature in PubMed to identify additional articles.
We will review search methods and strategies approximately yearly, to ensure they reflect any terminology changes in the topic area, or in the databases.

Data collection and analysis

Selection of studies

Pairs of review authors (from RH, RW, FS, SY, NN) independently screened titles and abstracts of identified papers. Review authors were not blinded to the details of the study author or journal. Review authors applied a standardised screening tool to assess eligibility. Articles were screened against the eligibility criteria of participants (mean age of children more than five years), outcome (primary outcome was not fruit and vegetable intake), comparator (was not a no-intervention, usual care, attention or wait-list control), intervention (did not aim to increase child fruit or vegetable intake) and study type (was not RCT, C-RCT or cross-over trial with random allocation to group). Based on the title and abstract, we excluded papers which clearly did not meet the eligibility criteria of the review. Pairs of review authors (from FS, RH, NN, RS, SY) then independently examined the full text of all remaining articles. We documented Information regarding the reason for the ineligibility of any paper for which we reviewed the full text, and present it in the table 'Characteristics of excluded studies'. A third review author with expertise in review methodology (LW) resolved any disagreements between review authors on study eligibility. For those papers which did not provide sufficient information to determine eligibility, we contacted the study authors for clarification.
We will immediately screen any new citations retrieved by the monthly searches. As the first step of monthly screening, we will apply the machine learning classifier (RCT model) (Wallace 2017), available in the Cochrane Register of Studies (CRS-Web) (Cochrane 2017a). The classifier assigns a probability (from 0 to 100) to each citation of being a true RCT. For citations that are assigned a probability score of less than 10, the machine learning classifier currently has a specificity/recall of 99.987% (Wallace 2017). We will screen in duplicate and independently all citations assigned a score from 10 to 100 . Citations that score 9 or less will be screened by Cochrane Crowd (Cochrane 2017b). Any citations that are deemed to be potential RCTs by Cochrane Crowd will be returned to the authors for screening.

Data extraction and management

Pairs of review authors (from EJ, RW, RH, KB, KO, ER, TCM, RS) independently extracted data from each included trial. Review authors were not blinded to the details of the study author or journal. We recorded data on data extraction forms designed and piloted specifically for this review. Consultation with a third review author with expertise in review methodology (LW) resolved discrepancies between review authors about data extraction. We tried to contact authors of included papers in instances where the information required for data extraction was not available from the published report, or was unclear. One review author entered extracted data into the systematic review software Review Manager 5 (RevMan) (RH) and another review author checked it (KO). Where available, we extracted the following information from included trials:

1. Information on the study, research design and methods, such as the study authors; date of publication; date of study initiation; study duration; setting; number of participants; participants' age, gender, ethnicity, and socioeconomic position.
2. Information on the experimental conditions of the trial, such as the number of experimental conditions; intervention and comparator components; duration; number of contacts; modalities; interventionist; and integrity.
3. Information on the trial outcomes and results, such as rates of recruitment and attrition; sample size; number of participants per experimental condition; mean and standard deviation of the primary or secondary outcomes described above; any subgroup analyses by gender, population group or intervention characteristics; and analyses (including whether studies appropriately adjusted for clustering).

Assessment of risk of bias in included studies

Two review authors (FS and FT) independently assessed the risks of bias in the included studies. We consulted a third review author (RH) with expertise in review methodology to resolve any disagreements between review authors. Review authors used the tool outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011) to assess the risks of bias. The tool requires an explicit judgement by the review authors, based on trial information, about the risks of bias attributable to the generation of the random sequence, the allocation concealment, the blinding of participants, personnel and outcome assessors, the completeness of outcome data, selective reporting, and any other potential threats to validity. We also judged recruitment bias, baseline imbalance, loss of clusters and incorrect analysis for C-RCTs. Judgements on the risks of bias for each trial are recorded in the 'Risk of bias' tables accompanying the review.

Measures of treatment effect

Where meta-analyses were performed, we expressed the intervention effect as a mean difference (MD) where outcomes were reported using a standard metric (such as grams), and as a standardised mean difference (SMD) where outcomes were reported using different methods or metrics of fruit and vegetable intake (such as grams, grams per kilogram of body weight, and serves per day).

Unit of analysis issues

We assessed cluster-randomised trials in the review for unit-of-analysis errors. Where cluster-randomised studies did not account for clustering, we contacted study authors to provide intra-class correlation coefficients (ICCs) to allow calculation of design effects and effective sample sizes to enable individual-level pooling. Where ICCs were not available, we estimated a mean ICC from reported ICCs of included studies, and used it to calculate effective sample sizes.

Dealing with missing data

Where available, we reported outcomes of trials using an intention-to-treat analysis. If studies did not report intention-to-treat analyses, we reported as-treated analysis of trial outcomes. We explored the impact of including as-treated trial outcomes in meta-analysis for studies with a high rate of attrition (more than 20% for short-term outcomes) in sensitivity analyses (see below Sensitivity analysis). We contacted study authors to obtain any missing data (e.g. standard deviations).

Assessment of heterogeneity

We assessed statistical heterogeneity by visual inspection of forest plots of the included trials, and calculation of the I^2 statistic where data from included trials could be pooled. Subgroup analyses by trial characteristics (e.g. type of participants, intervention or outcomes) to identify the source of substantial heterogeneity (defined as I^2 greater than 50%) was not able to be conducted due to the similarity in trial characteristics.

Assessment of reporting biases

We checked for reporting bias by visual inspection of the funnel plots.

Data synthesis

We assessed trial outcomes using a variety of dietary assessment tools and reported in various metrics, including vitamin C from fruit, fruit or vegetable serves, and grams of fruit and/or vegetable consumption. We calculated standardised mean differences (SMDs; to account for variable outcome measures) for each comparison, using the generic inverse variance method in a fixed-effect meta-analysis model (where there was no or low statistical heterogeneity in the primary analysis) or a random-effects meta-analysis model (where there was unexplained heterogeneity in the primary analysis), using the RevMan software. We selected post-

intervention values over change-from-baseline data for inclusion in meta-analysis, to reduce the risk of selective reporting and to maximise the number of studies that could be pooled.

We synthesised studies that provided data suitable for pooling in meta-analyses grouped by intervention type (infant feeding, parent nutrition education, and multicomponent interventions). When studies reported multiple fruit or vegetable outcomes, we selected the stated primary trial outcome for inclusion in our meta-analyses, or if a primary outcome was not stated we selected the first reported outcome for inclusion. For studies which reported multiple follow-up points, we extracted data from the longest follow-up period for inclusion in meta-analyses.

We selected reported study estimates that adjusted for potential confounding variables for inclusion in meta-analysis over reported estimates that did not adjust for potential confounding variables. Similarly, for C-RCTs that reported study estimates that were unadjusted and adjusted for clustering, we preferred estimates that adjusted for clustering for inclusion in meta-analyses. For C-RCTs that did not report post-intervention study estimates (and a relevant measure of variance) that accounted for clustering, we calculated a design effect and effective sample size using study data (number of clusters, number of participants analysed) and a reported ICC from one of the included studies (vegetable intake: ICC 0.014, fruit intake: ICC 0.016; De Bock 2012). For such C-RCTs (De Coen 2012; Martinez-Andrade 2014; Namenek Brouwer 2013; Nicklas 2017; O'Connell 2012; Roset-Salla 2016; Verbestel 2014; Williams 2014), we entered the reported post-intervention outcome data (e.g. mean and standard deviation) and author-calculated effective sample sizes into Revman to calculate individual-level adjusted study estimates to enable inclusion in meta-analyses. We tried to pool studies separately that compared two or more alternative interventions.

For cross-over trials, we tried to synthesise results separately from parallel RCTs, by pooling results from paired analyses that adjust for within-individual comparisons. If such data were not available, we combined results by pooling data from the first cross-over period (i.e. essentially a parallel RCT) with parallel RCTs.

In all instances where we could not combine data in a meta-analysis, we have provided a narrative summary of the trial findings according to the review objectives.

Whenever we find new evidence (i.e. studies, data or information) meeting the review inclusion criteria, we will extract the data, assess risks of bias and incorporate it into the synthesis every three months, as appropriate.

We will incorporate any new study data into existing meta-analyses using the standard approaches outlined in the Data synthesis section.

We will not adjust the meta-analyses to account for multiple testing, given that the methods related to frequent updating of meta-analyses are under development (Simmonds (in press)).

Summary of Findings table and GRADE

We created 'Summary of findings' tables using the following outcomes:

1. Child fruit and vegetable intake. This could include changes in the number of portions or serves or grams of daily fruit or vegetable or both at follow-up, as measured by diet recalls, food diaries, food frequency questionnaires or diet records completed by an adult on behalf of the child; or changes in biomedical markers of consumption of fruit or vegetables or both, such as α-carotene, β-carotene, cryptoxanthin, lycopene and lutein.
2. Estimates of absolute costs and cost effectiveness of interventions to increase the consumption of fruit and vegetables reported in the included studies;
3. Any reported adverse events of an intervention to increase the consumption of fruit and vegetables reported in the included studies. This could include any physical, behavioural, psychological or financial impact on the child, parent or family, or the service or facility where an intervention may have been implemented.

We have produced four 'Summary of findings' tables, one for each of the following comparisons:

1. Child-feeding interventions compared to no-intervention control;
2. Parent nutrition education interventions compared to no-intervention control;
3. Multicomponent interventions compared to no-intervention control;
4. Child nutrition education interventions compared to no-intervention control.

We used the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias) to assess the quality of a body of evidence as it relates to the studies which contribute data to the meta-analyses for the prespecified outcomes. We used methods and recommendations described in Section 8.5 and Chapter 12 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011), using GRADEpro software (gradepro.org/). We justified all decisions to downgrade the quality of studies using footnotes, and made comments to aid the reader's understanding of the review where necessary. For each comparison where we had calculated a SMD, we re-expressed it based on the instrument used in the lowest risk of bias in that comparison (e.g. grams of vegetable intake or serves of vegetables a day), by multiplying the post-intervention standard deviation of the control group by the pooled SMD.

Two review authors (RH and NN), working independently, judged the quality of the evidence, with disagreements resolved by discussion or by involving a third review author (LW). We justified, documented and incorporated the judgements into the reporting of results for each outcome.

We extracted study data, formatted our comparisons in data tables and prepared a 'Summary of findings' table before writing the results and conclusions of our review.

Subgroup analysis and investigation of heterogeneity

Where possible, we conducted subgroup analyses of interventions for the following subgroups, which we had planned a priori:

1. Interventions targeting boys and girls (not conducted);
2. Interventions targeting minority groups including indigenous populations (not conducted, described narratively);
3. Interventions delivered in various settings including health and children's services (conducted where possible for some comparisons and settings);
4. Interventions of varying intensities, defined in terms of the number and duration of intervention contacts or components (not conducted);
5. Interventions delivered in different modes, such as by telephone, the Internet or face-to-face (conducted for some comparisons and modalities, otherwise described narratively).

Sensitivity analysis

Where possible, we conducted sensitivity analyses to explore the impact on the overall assessment of treatment effects:

1. Excluding studies at high risk of bias (defined a priori);
2. Excluding studies not reporting an intention-to-treat analysis, with high rates of participant attrition defined as greater than 20% (defined a priori);
3. Excluding studies that did not have a primary outcome of child fruit and vegetable consumption (post hoc).

For the sensitivity analysis excluding studies that did not have a primary outcome of child fruit and vegetable consumption, we considered studies to have a primary outcome of children's fruit and vegetable intake even when this was not explicitly stated if: children's fruit and vegetable intake was the only reported outcome, a sample size calculation for children's fruit and vegetable intake was reported, or children's fruit and vegetable intake was the first reported outcome.

Other

We will review our scope and methods if appropriate in the light of potential changes in the topic area, or the evidence being included in the review (e.g. additional comparisons, interventions or outcomes, or new review methods available).

We are piloting this review as a living systematic review up until March 2018.

RESULTS

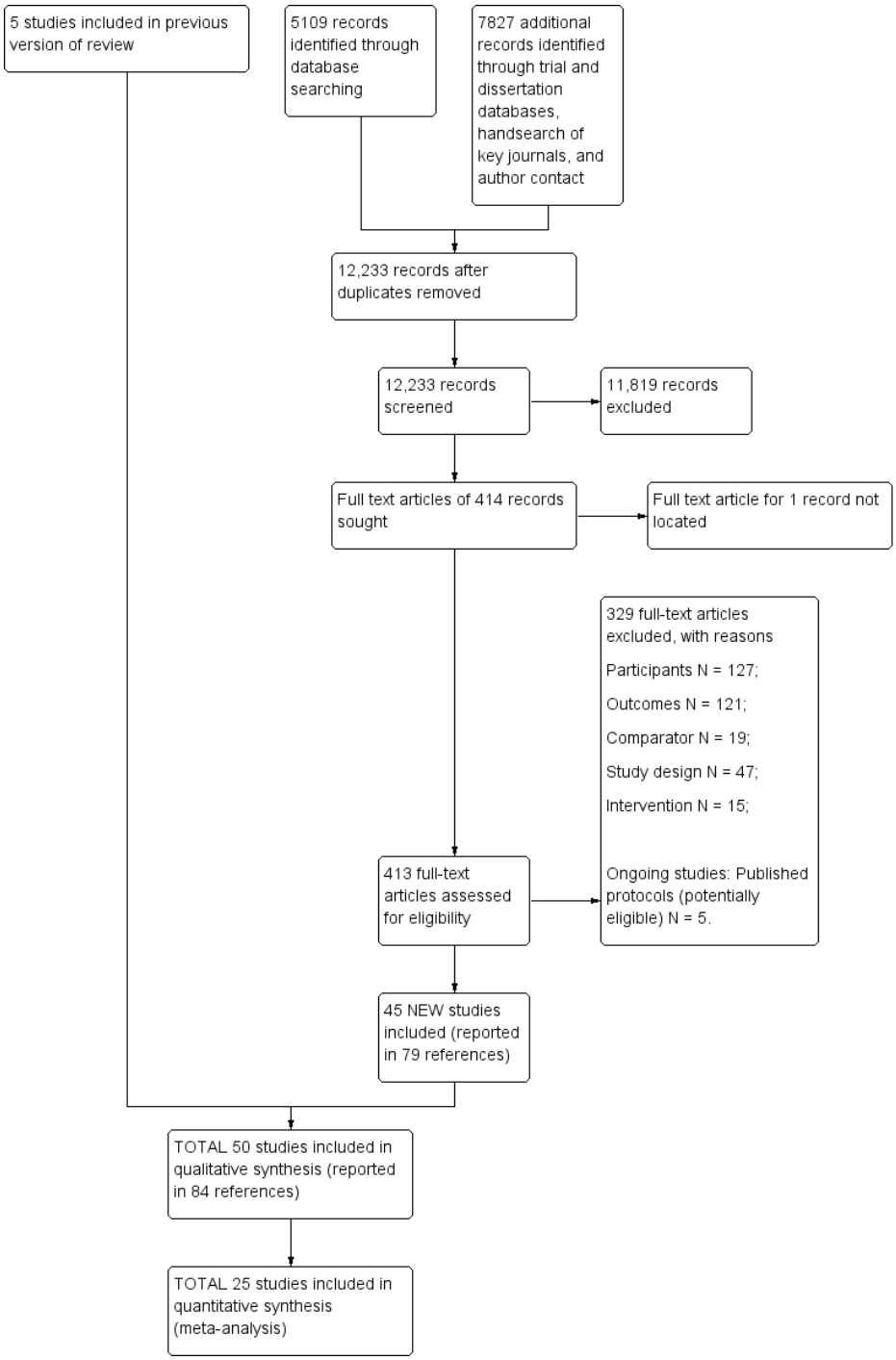
Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of ongoing studies.

Results of the search

We ran searches for the original review (Wolfenden 2012) and for the review update, which together generated 22,953 citations (10,720 original review; 12,233 review update). Screening of titles and abstracts from the review update identified 414 papers (558 in total, including 144 from original review) for formal inclusion or exclusion. (See Figure 1). Of these, 50 trials (Anzman-Frasca 2012; Barends 2013; Baskale 2011; Black 2011; Blissett 2016; Campbell 2013; Caton 2013; Cooke 2011; Correia 2014; Cravener 2015; Daniels 2014; De Bock 2012; De Coen 2012; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Duncanson 2013; Fildes 2014; Fildes 2015; Fisher 2012; Haire-Joshu 2008; Harnack 2012; Hausner 2012; Hetherington 2015; Keller 2012; Martinez-Andrade 2014; Menella 2008; Namenek Brouwer 2013; Natale 2014a; Nicklas 2017; O'Connell 2012; Remington 2012; Remy 2013; Roe 2013; Roset-Salla 2016; Savage 2012; Skouteris 2015; Spill 2010; Spill 2011a; Spill 2011b; Staiano 2016; Tabak 2012; Verbestel 2014; Vereecken 2009; Wardle 2003a; Watt 2009; Williams 2014; Witt 2012; Wyse 2012) met the inclusion criteria. We contacted authors of the included trials for any missing outcome data, to permit meta-analysis.

Figure 1. Study flow diagram.



Included studies

There were 137 trial arms and 10,267 participants randomised across the 50 included trials. We give full details of the trials in the Characteristics of included studies table. Twenty-two trials were undertaken in the USA, eight in the United Kingdom, five each in Australia and the Netherlands, three in Belgium, and one each in Turkey, Germany, Denmark, Mexico, France and Spain, and one study that was undertaken in the United Kingdom, Greece and Portugal. Twenty-three of the included studies were RCTs, of which 14 compared an intervention to a no-treatment control group; 18 were C-RCTs, of which 15 compared an intervention to a no-treatment control group; and nine were cross-over trials. The unit of randomisation in C-RCTs included childcare centres or preschools (n = 12), parent groups (n = 2), preschool classrooms (n = 1), primary schools (n = 1), primary school classrooms (n = 1), and primary care clinics (n = 1). Twenty-six trials were conducted in a preschool or school setting; 11 in a home setting; five in a health setting (e.g. primary care); two in a laboratory setting; three in a home and laboratory setting; two in a preschool and home setting; and one in a home and health setting. Included studies examined the impact of various types of interventions to increase child fruit and vegetable consumption. Forty-seven of the included studies assessed intake of vegetables, and 25 assessed intake of fruit. Various objective and subjective measures were used to assess fruit and vegetable intake, such as ad libitum intake and mean daily intake as reported by parents. Information on the reliability and validity of selected fruit and vegetable intake outcome measures were reported by 10 studies. Post-intervention follow-up periods ranged from immediate to 3½ years. Of the 50 included studies, 11 did not report whether funding support was received to undertake the trial, one study reported no funding support (Baskale 2011), and the remaining 38 studies reported a source of funding. Funding support for such studies were governmental or charitable, with the exception of two studies that reported receiving funding from food industry sources (Fisher 2012; Tabak 2012).

Thirty trials tested the impact of specific feeding-practice interventions (e.g. repeated exposure) in increasing children's intake of fruits or vegetables (Anzman-Frasca 2012; Barends 2013; Blissett 2016; Caton 2013; Cooke 2011; Correia 2014; Cravener 2015; Daniels 2014; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Fildes 2014; Fildes 2015; Fisher 2012; Harnack 2012; Hausner 2012; Hetherington 2015; Keller 2012; Menella 2008; O'Connell 2012; Remington 2012; Remy 2013; Roe 2013; Savage 2012; Spill 2010; Spill 2011a; Spill 2011b; Staiano 2016; Wardle 2003a). Of the trials testing the impact of specific feeding-practice interventions, 18 compared the effectiveness of two or more interventions and 12 trials compared one or more interventions with a no-treatment control group; nine of these were cross-over trials. Thirteen trials examined the effect of repeated exposure compared to alternative interventions, of which five compared the effect of a repeated exposure intervention to one or more alternative interventions (including associative conditioning, flavour-flavour learning, flavour-nutrient learning, choice of vegetable versus no choice) (Anzman-Frasca 2012; Barends 2013; Caton 2013; Hausner 2012; Remy 2013), one compared the effect of repeated exposure choice offering of vegetable to no choice (De Wild 2015a), and one study compared the effect of repeated exposures and variety (Menella 2008). The other five trials examined the effect of a repeated exposure intervention compared to no-treatment control, of which one trial each examined the effect of repeated exposure alone (O'Connell 2012), taste exposure plus rewards (Fildes 2014), exposure plus social reward and exposure plus tangible reward (Remington 2012), exposure and nutrition information (Wardle 2003a), and exposure plus tangible reward, exposure plus social reward and exposure alone (Cooke 2011). Two trials examined the effect of flavour nutrient learning, of which one trial compared the effects of low-energy vegetable soup versus high-energy vegetable soup (De Wild 2013), and the other trial compared incorporation of vegetable puree into meals at three different levels of energy density (Spill 2011a). Four trials examined the effect of parent feeding interventions, one trial compared the effects of advice to the parent about introducing vegetables to no-treatment control (Fildes 2015), one trial compared the effects of an early feeding intervention targeting complementary feeding practices to a no-treatment control (Daniels 2014), one trial compared the effects of early and repeated exposure to vegetables during complementary feeding to a no-treatment control (Hetherington 2015), and the other trial compared parent prompting and modelling, parent prompting alone and modelling alone (Blissett 2016). Four trials examined the effect of pairing fruit and vegetables with positive stimuli; one trial compared pairing vegetables with stimuli such as stickers and cartoon packaging to a no-treatment control (Cravener 2015), one trial compared pairing fruit and vegetables with character branding to a no-treatment control (Keller 2012), one trial compared pairing of vegetable with a modelling DVD to a non-food DVD and a no-DVD control group (Staiano 2016), and the fourth trial compared the effect of pairing passive and interactive story-telling (about a character that eats carrots) featuring either a product-congruent (a rabbit) or product-incongruent (a turtle) character across four experimental groups compared to a control group (De Droog 2014). Three trials examined the effect of pairing target vegetables with liked foods (Correia 2014; De Wild 2015b; Fisher 2012). Two trials examined the effect of varying serving sizes (Savage 2012; Spill 2011b). The remaining three trials examined the effect of different serving methods; one trial compared serving fruit and vegetables first before other menu items to a specific plate of prepared food

(Harnack 2012), one trial compared three different portion sizes of vegetables served at the beginning of a meal to a control meal (Spill 2010), and the third trial of eight arms compared the impact of a single type of vegetable, a variety of vegetables, a single type of fruit, and a variety of fruits on consumption (Roe 2013).

Eleven studies tested the impact of parent nutrition education interventions in increasing children's intake of fruit or vegetables (Black 2011; Campbell 2013; Duncanson 2013; Haire-Joshu 2008; Martinez-Andrade 2014; Roset-Salla 2016; Skouteris 2015; Tabak 2012; Verbestel 2014; Watt 2009; Wyse 2012). Four trials were conducted in a health setting: one trial compared a parenting practices intervention to a maternal diet and physical activity intervention to control (Black 2011), one trial compared a dietitian-delivered intervention in a first-time parents' group regarding infant feeding, physical activity and sedentary behaviours to control (Campbell 2013), one trial compared a six-week parent intervention on obesity awareness and prevention to control (Martinez-Andrade 2014), and the fourth trial compared a multistrategy parent intervention including health snack exposure to control (Skouteris 2015). Four trials were conducted within a home setting: one trial compared the provision of an interactive nutrition education CD and parenting DVD to parents to waitlist control (Duncanson 2013), one trial compared a parent intervention inclusive of a tailored newsletter, home visits and materials to usual care (Haire-Joshu 2008), one trial compared a dietitian-delivered parent intervention on vegetable availability, picky eating, modelling and family meals to control (Tabak 2012); and the fourth compared a parent intervention on infant-feeding practices to usual care (Watt 2009). Three trials were conducted in a preschool setting; one trial compared a parent education intervention on dietary knowledge and changing habits to control (Roset-Salla 2016), one trial compared a parent intervention including a poster with guidelines and tips, and tailored feedback about child dietary behaviours versus control (Verbestel 2014), and the third trial compared a parent intervention including a resource kit and telephone calls to improve parent knowledge and skills about the home food environment versus control (Wyse 2012).

Eight studies tested the impact of multicomponent interventions (e.g. teacher and parent education, preschool policy changes) in increasing children's intake of fruit or vegetables (De Bock 2012; De Coen 2012; Namenek Brouwer 2013; Natale 2014a; Nicklas 2017; Vereecken 2009; Williams 2014; Witt 2012). Four trials were conducted in a preschool setting; one trial compared an intervention combining familiarisation, preparation and cooking of meals with children, teachers and parents and parent education regarding modelling and nutrition needs of children to control (De Bock 2012); one trial compared a garden-based intervention and curriculum materials about targeted fruits or vegetables to control (Namenek Brouwer 2013); one trial compared a teacher curriculum, parent curriculum, and preschool policy intervention to control (Natale 2014a); and the fourth trial compared a nutrition education targeting children, parents and preschool staff to control (Williams 2014). Two trials were conducted in a school setting; one trial compared a community, school and parent intervention for nutrition and physical activity health targets to control (De Coen 2012); and the other trial compared a preschool environment, child, parent and teacher intervention to control (Vereecken 2009). One trial, conducted in both a school and a home setting, compared an interactive education intervention about physical activity and healthful eating inclusive of teacher guides and parent newsletters to control (Witt 2012). An additional trial, conducted in both a preschool and a home setting, compared a motivational theatre intervention which included the screening of four DVDs of a puppet show aimed at persuading children to increase vegetable consumption, and provision of resources to parents including ingredients for a vegetable snack, to a no-intervention control (Nicklas 2017).

One study tested the impact of an intervention involving the delivery of nutrition education to children within nursery classrooms in increasing child fruit and vegetable intake (Baskale 2011).

Excluded studies

Following an assessment of study titles and abstracts, the full texts of 414 articles in the update were sought for further review for study eligibility (558 in total, when combined with 144 from the original review) (Figure 1). The full texts of 413 articles were able to be located (535 in total, when combined with 122 from the original review). We considered 329 studies to be ineligible for the review update following the trial screening process (reasons for exclusion included participants n = 127; outcomes n = 121; comparator n = 19; intervention n = 15; study design n = 47). See Characteristics of excluded studies for further details.

Studies awaiting classification

We could not determine the eligibility of one trial, as no full text was available. See Characteristics of studies awaiting classification.

Ongoing studies

We identified five ongoing trials with a published protocol (Characteristics of ongoing studies), for which neither published nor unpublished data were available. These include a C-RCT (Belanger 2016) testing the effect of a multicomponent intervention involving community partnerships and healthy eating training for staff in early childcare centres compared to a no-intervention control; a RCT (Horodynski 2011) testing the effect of a child-feeding intervention focused on maternal self-efficacy during feeding and appropriate feeding styles compared to usual care; a C-RCT (Østbye 2015) testing the effect of a multicomponent home and childcare intervention compared to a no-intervention control; a RCT (Sobko 2016) testing the effect of a multicomponent healthy lifestyle programme delivered to parent-child dyads compared to a wait list or a no-intervention control; and a RCT(Watt

2014) testing the effect of a multicomponent intervention involving parents and childcare staff compared to a no-intervention control.

Risk of bias in included studies

None of the 50 included studies were at low risk in all risk-of-bias domains (Figure 2; Figure 3).

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

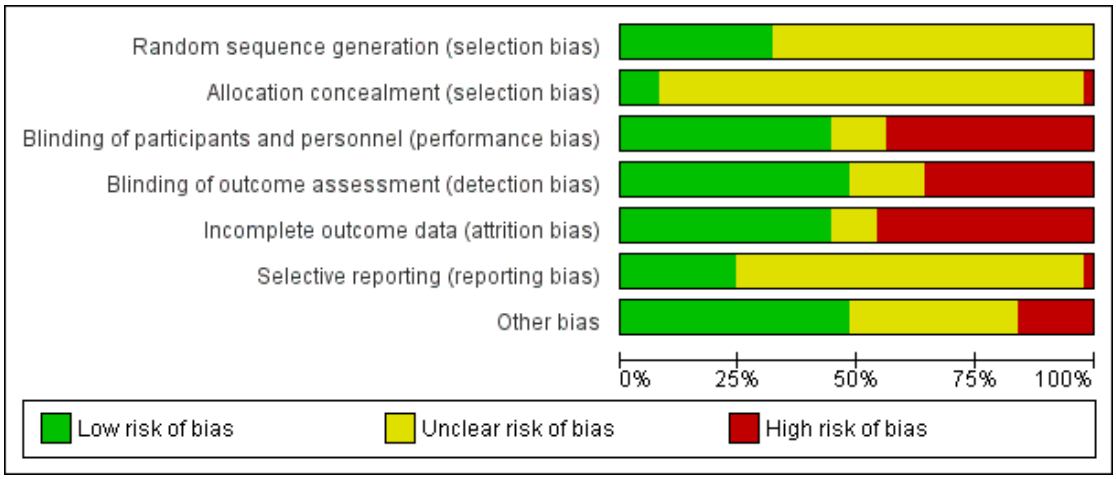
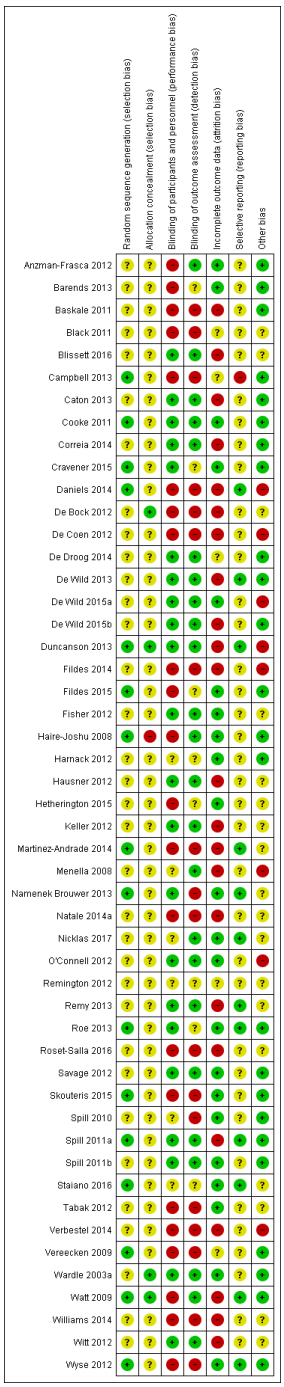


Figure 3. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



Random sequence generation

We rated 16 of the 50 studies at low risk of bias for random sequence generation, with all random-number sequences created using various computer-based software (Campbell 2013; Cooke 2011; Cravener 2015; Daniels 2014; Duncanson 2013; Fildes 2015; Haire-Joshu 2008; Martinez-Andrade 2014; Namenek Brouwer 2013; Roe 2013; Skouteris 2015; Spill 2011a; Staiano 2016; Vereecken 2009; Watt 2009; Wyse 2012). The method of sequence generation in the remaining 34 studies was unclear (Anzman-Frasca 2012; Barends 2013; Baskale 2011; Black 2011; Blissett 2016; Caton 2013; Correia 2014; De Bock 2012; De Coen 2012; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Fildes 2014; Fisher 2012; Harnack 2012; Hausner 2012; Hetherington 2015; Keller 2012; Menella 2008; Natale 2014a; Nicklas 2017; O'Connell 2012; Remington 2012; Remy 2013; Roset-Salla 2016; Savage 2012; Spill 2010; Spill 2011b; Tabak 2012; Verbestel 2014; Wardle 2003a; Williams 2014; Witt 2012).

Allocation

Only four of the 50 studies reported that participant allocation to the experimental group was concealed from those conducting the research (De Bock 2012; Duncanson 2013; Wardle 2003a; Watt 2009). We judged one study to have a high risk of selection bias (Haire-Joshu 2008), as educators were aware of site allocation when they were enrolling participants to the trial. The remaining 45 studies had an unclear risk of selection bias (Anzman-Frasca 2012; Barends 2013; Baskale 2011; Black 2011; Blissett 2016; Campbell 2013; Caton 2013; Cooke 2011; Correia 2014; Cravener 2015; Daniels 2014; De Coen 2012; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Fildes 2014; Fildes 2015; Fisher 2012; Harnack 2012; Hausner 2012; Hetherington 2015 Keller 2012; Martinez-Andrade 2014; Menella 2008; Namenek Brouwer 2013; Natale 2014a; Nicklas 2017; O'Connell 2012; Remington 2012; Remy 2013; Roe 2013; Roset-Salla 2016; Savage 2012; Skouteris 2015; Spill 2010; Spill 2011a; Spill 2011b; Staiano 2016; Tabak 2012; Verbestel 2014; Vereecken 2009; Williams 2014; Witt 2012; Wyse 2012).

Blinding

Performance bias

In 22 of the studies, we judged the potential for trial outcomes to be influenced by participants or personnel delivering the intervention to be high, due to the lack of blinding and the method used for outcome assessment (e.g. self-report) (Anzman-Frasca 2012; Barends 2013; Baskale 2011; Black 2011; Campbell 2013; Daniels 2014; De Bock 2012; De Coen 2012; Fildes 2014; Fildes 2015; Haire-Joshu 2008; Hetherington 2015; Martinez-Andrade 2014; Natale 2014a; Roset-Salla 2016; Skouteris 2015; Tabak 2012; Verbestel 2014; Vereecken 2009; Watt 2009; Williams 2014; Wyse 2012).We rated 22 studies at low risk of performance bias, due to blinding or the use of objective outcome assessments which were unlikely to be influenced by awareness of group allocation (e.g. weighing food on electronic scales) (Blissett 2016; Caton 2013; Cooke 2011; Correia 2014; Cravener 2015; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Duncanson 2013; Fisher 2012; Hausner 2012; Keller 2012; Namenek Brouwer 2013; O'Connell 2012; Remy 2013; Roe 2013; Savage 2012; Spill 2011a; Spill 2011b; Wardle 2003a; Witt 2012). For the six remaining studies the risk of performance bias was unclear (Harnack 2012; Menella 2008; Nicklas 2017; Remington 2012; Spill 2010; Staiano 2016).

Detection bias

We rated 18 studies at high risk of detection bias, due to participants or assessors not being blind to group allocation and the use of self-report measures (Baskale 2011; Black 2011; Campbell 2013; Daniels 2014; De Bock 2012; De Coen 2012; Fildes 2014; Martinez-Andrade 2014; Namenek Brouwer 2013; Natale 2014a; Roset-Salla 2016; Skouteris 2015; Spill 2010; Tabak 2012; Verbestel 2014; Vereecken 2009; Williams 2014; Wyse 2012). Blinding of assessors, or the objective measurement of child fruit and vegetable intake which is unlikely to be impacted by lack of blinding (e.g. the food was weighed or counted), meant that 24 studies had a low risk of detection bias (Anzman-Frasca 2012; Blissett 2016; Caton 2013; Cooke 2011; Correia 2014; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Duncanson 2013; Fisher 2012; Haire-Joshu 2008; Hausner 2012; Keller 2012; Menella 2008; Nicklas 2017; O'Connell 2012; Remy 2013; Savage 2012; Spill 2011a; Spill 2011b; Wardle 2003a; Watt 2009; Witt 2012). The remaining eight studies had an unclear risk of detection bias (Barends 2013; Cravener 2015; Fildes 2015; Harnack 2012; Hetherington 2015; Remington 2012; Roe 2013; Staiano 2016).

Incomplete outcome data

Seven studies reported no attrition, and therefore had a very low risk of bias (Anzman-Frasca 2012; Cravener 2015; Nicklas 2017; O'Connell 2012; Savage 2012; Spill 2010; Staiano 2016). A further 15 studies reported a low loss of participants (usually less than 10%) and similar losses across arms for cohort studies, or otherwise used a cross-sectional, pre-post design and were also considered to be at low risk (Barends 2013; Cooke 2011; De Wild 2015a; Fildes 2015; Fisher 2012; Haire-Joshu 2008; Hausner 2012; Hetherington 2015; Namenek Brouwer 2013; Roe 2013; Skouteris 2015; Spill 2011b; Tabak 2012; Wardle 2003a; Wyse 2012). Twenty-three studies had a high risk of bias due to high

attrition rates, unequal attrition across experimental arms, or an intention-to-treat analysis not being used (Baskale 2011; Blissett 2016; Caton 2013; Correia 2014; Daniels 2014; De Bock 2012; De Coen 2012; De Wild 2013; De Wild 2015b; Duncanson 2013; Fildes 2014; Hausner 2012; Keller 2012; Martinez-Andrade 2014; Menella 2008; Natale 2014a; Remy 2013; Roset-Salla 2016; Spill 2011a; Verbestel 2014; Watt 2009; Williams 2014; Witt 2012). Five studies had an unclear risk of attrition bias (Black 2011; Campbell 2013; De Droog 2014; Remington 2012; Vereecken 2009).

Selective reporting

Most studies had an unclear risk of selective reporting (Anzman-Frasca 2012; Barends 2013; Baskale 2011; Black 2011; Blissett 2016; Caton 2013; Cooke 2011; Correia 2014; Cravener 2015; De Bock 2012; De Coen 2012; De Droog 2014; De Wild 2015a; De Wild 2015b; Fildes 2014; Fildes 2015; Fisher 2012; Haire-Joshu 2008; Harnack 2012; Hausner 2012; Hetherington 2015; Keller 2012; Menella 2008; Natale 2014a; O'Connell 2012; Remington 2012; Roset-Salla 2016; Savage 2012; Skouteris 2015; Spill 2010; Spill 2011b; Staiano 2016; Tabak 2012; Verbestel 2014; Vereecken 2009; Wardle 2003a; Williams 2014; Witt 2012). We judged one trial (Campbell 2013) to be at high risk of bias due to outcomes referred to in the protocol not being reported. The remaining 11 studies reported all expected outcomes (Daniels 2014; De Wild 2013; Duncanson 2013; Martinez-Andrade 2014; Namenek Brouwer 2013; Nicklas 2017; Remy 2013; Roe 2013; Spill 2011a; Watt 2009; Wyse 2012).

Other potential sources of bias

Of the 23 RCTs, ten had a low risk of bias (Anzman-Frasca 2012; Barends 2013; Caton 2013; Cravener 2015; De Droog 2014; Fildes 2015; Savage 2012; Skouteris 2015; Wardle 2003a; Watt 2009), eight had an unclear risk of bias (Black 2011; Blissett 2016; Hetherington 2015; Keller 2012; Remington 2012; Remy 2013; Staiano 2016; Tabak 2012) and five had a high risk of bias (Daniels 2014; De Wild 2015a; Duncanson 2013; Fildes 2014; Menella 2008) for other potential sources of bias. One trial did not account for clustering in the analysis, even though the trial protocol said clustering would be accounted for (Daniels 2014). Four trials had a high risk of bias, as they reported baseline imbalances between study groups that were not accounted for in the analysis (De Wild 2015a; Duncanson 2013; Fildes 2014; Menella 2008). Of the 18 C-RCTs, six had a low risk of bias (Baskale 2011; Campbell 2013; Cooke 2011; Haire-Joshu 2008; Vereecken 2009; Wyse 2012), 10 had unclear risk of bias (De Bock 2012; Fisher 2012; Hausner 2012; Martinez-Andrade 2014; Namenek Brouwer 2013; Natale 2014a; Nicklas 2017; Roset-Salla 2016; Williams 2014; Witt 2012) and two had high risk of bias (De Coen 2012; Verbestel 2014). Both the latter had high risk of bias due to recruitment bias as communities were randomised first before schools, childcare centres and participants were invited to participate (De Coen 2012; Verbestel 2014). Of the nine cross-over trials, eight had a low risk of bias (Correia 2014; De Wild 2013; De Wild 2015b; Harnack 2012; Roe 2013; Spill 2010; Spill 2011a; Spill 2011b), and one study had high risk of bias (O'Connell 2012), due to differences in baseline vegetable consumption that were not adjusted for in the analysis.

Effects of interventions

See: **Summary of findings for the main comparison** Child feeding interventions compared to no intervention for children aged five years and under; **Summary of findings 2** Parent nutrition education interventions compared to no intervention for children aged five years and under; **Summary of findings 3** Multicomponent interventions compared to no intervention for children aged five years and under; **Summary of findings 4** Child nutrition education interventions compared to no intervention for children aged five years and under

Primary outcome: Effectiveness of interventions in increasing the consumption of fruit and/or vegetables

All the included trials reported the impact of the effectiveness of the intervention on a measure of children's fruit or vegetable intake. Variability in the measurement and reporting of intervention effects as change from baseline or final value scores precluded statistical examination of heterogeneity. Nonetheless, examination of the interventions tested, trial settings and study populations suggested that the included trials were heterogeneous and we conducted meta-analyses pooling data from trials where we considered interventions to be similar. Otherwise, we have provided a narrative synthesis of trial findings.

Child feeding practice interventions

Short-term impact (less than 12 months)

The effects of interventions targeting child-feeding practices were mixed. Meta-analysis pooling post-intervention data (follow-up period range: immediate to six months) from trials comparing child-feeding practices to no treatment (Cooke 2011; Cravener 2015; Daniels 2014; Fildes 2014; Fildes 2015; Hetherington 2015; Keller 2012; O'Connell 2012; Remington 2012; Staiano 2016; Wardle 2003a) revealed an overall positive intervention effect on vegetable consumption (SMD 0.38, 95% CI 0.15 to 0.61; n = 1509; 11 studies; I^2 = 73%; very low-quality evidence; Analysis 1.1), which was equivalent to a mean difference of 4.03 grams of vegetables. Results were similar in sensitivity analyses of studies at low risk of bias (SMD 0.23, 95% CI 0.03 to 0.44; n = 487; 5 studies; I^2 = 14%; Analysis 1.2), of studies with a primary aim of child fruit or vegetable consumption (SMD 0.47, 95% CI 0.19 to 0.76; n = 1228; 9 studies; I^2 = 76%; Analysis 1.3.), and of studies with no or low attrition and studies with high attrition that undertook intention-to-treat analyses (SMD 0.29, 95% CI 0.10 to 0.48; n = 757; 8 studies; I^2 = 27%; Analysis 1.4).

One study that compared one or more child-feeding practice in-

terventions to a no-treatment control did not report sufficient data to enable pooling. Harnack 2012 reported a significant increase in intake of fruit compared to a control group for an intervention where fruit and vegetables were served prior to a meal.

Eighteen trials compared the effectiveness of two or more child-feeding interventions that could not be synthesised in meta-analyses due to variability in the compared interventions (Anzman-Frasca 2012; Barends 2013; Blissett 2016; Caton 2013; Correia 2014; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Fisher 2012; Hausner 2012; Menella 2008; Remy 2013; Roe 2013; Savage 2012; Spill 2010; Spill 2011a; Spill 2011b).The interventions compared in these trials varied greatly; six of the 18 trials reported evidence of an increase in fruit or vegetable consumption for one intervention compared to another (De Droog 2014; De Wild 2013; Roe 2013; Spill 2010; Spill 2011a; Spill 2011b).

Long-term impact (12 months or longer)

One study testing the effect of a child-feeding practice intervention reported a long-term effect 3½ years after a complementary feeding intervention compared to usual care. There was no long-term effect of the intervention on either fruit or vegetable intake as measured by 24-hour recall (Daniels 2014).

Parent nutrition education interventions

Short-term impact (less than 12 months)

Interventions targeting parent nutrition education were generally not effective. Meta-analysis pooling post-intervention data (follow-up period range: immediate to six months) from trials comparing parent nutrition education interventions to no treatment (Campbell 2013; Duncanson 2013; Haire-Joshu 2008; Martinez-Andrade 2014; Roset-Salla 2016; Skouteris 2015; Tabak 2012; Verbestel 2014; Watt 2009; Wyse 2012) revealed no overall effect on child consumption of fruit and vegetables (SMD 0.11, 95% CI -0.05 to 0.28; n = 3023; 10 studies; I^2 = 72%; very low-quality evidence; Analysis 2.1). Results were similar in sensitivity analyses of studies with a primary aim of children's fruit or vegetable consumption (SMD 0.03, 95% CI -0.10 to 0.15; n = 2737; 7 studies; I^2 = 52%; Analysis 2.2), and of studies with no or low attrition and studies with high attrition that undertook intention-to-treat analyses (SMD 0.11, 95% CI -0.02 to 0.24; n = 2463; 6 studies; I^2 = 48%; Analysis 2.3). We did not conduct sensitivity analyses by risk of bias, as we judged all studies to be at high risk of bias in at least one domain.

One trial could not be pooled in the meta-analysis. Black 2011 found an intervention targeting parent responsivity and behaviour management to be effective in increasing total fruit intake compared to control.

Long-term impact (12 months or longer)

Four studies reported the long-term impact of a parent nutrition education intervention (Duncanson 2013; Skouteris 2015; Watt 2009; Wyse 2012). Of these, only one trial reported a significant long-term effect on children's fruit and vegetable consumption (Watt 2009). The trial examining the impact of a parent intervention targeting infant-feeding practice found a short-term effect at nine months and long-term effect at 15-month follow-up on fruit and vegetable consumption compared to usual care (Watt 2009). The other three trials reporting long-term impacts of parent interventions either reported a short-term effect that was not sustained at long-term follow-up (Skouteris 2015; Wyse 2012), or no effect at either short- or long-term follow-up on children's fruit or vegetable consumption (Duncanson 2013).

Multicomponent interventions

Short-term impact (less than 12 months)

The effects of multicomponent interventions were mixed. Meta-analysis pooling post-intervention data (follow-up period range: immediate to one month) from multicomponent intervention trials (De Coen 2012; Namenek Brouwer 2013; Nicklas 2017; Williams 2014) revealed no overall effect on child consumption of fruit and vegetables (SMD 0.28, 95% CI -0.06 to 0.63; n = 1861; 4 studies; I^2 = 79%; very low-quality evidence; Analysis 3.1). Results were similar in sensitivity analyses of three studies with a primary aim of children's fruit or vegetable consumption (SMD 0.38, 95% CI -0.20 to 0.95; n = 1167; 3 studies; I^2 = 86%; Analysis 3.2). There was, however, a positive overall effect on child consumption of fruit and vegetables sensitivity analysis of studies with no or low attrition or high attrition that undertook intention-to-treat analyses (SMD 0.70, 95% CI 0.39 to 1.01; n = 265; 2 studies; I^2 = 0%; Analysis 3.3). We did not conduct a sensitivity analysis to examine the impact of high risk of bias, as all but one study had a high risk of bias in at least one domain.

Four studies could not be pooled in meta-analysis, due to insufficient data (De Bock 2012; Natale 2014a; Vereecken 2009; Witt 2012). Three trials (De Bock 2012; Natale 2014a; Witt 2012) reported significant effects of the interventions tested on both fruit and vegetable consumption, and one trial reported significant effects of the intervention on fruit but not vegetable consumption (Vereecken 2009).

Long-term impact (12 months or longer)

No trials testing the multicomponent interventions reported long-term impact.

Child nutrition education interventions

Short-term impact (less than 12 months)

The one study that tested the effect of a nutrition education intervention targeting children (Baskale 2011) reported an increase in some of the fruits and vegetables assessed in the intervention group and no significant differences in the control group, but did not report analyses comparing treatment groups (low-quality evidence).

Long-term impact (12 months or longer)

The one study that tested the effect of a nutrition education intervention did not report long-term impact.

Subgroup analyses

Interventions targeting boys and girls

All the included studies in this review covered both boys and girls. The impact of intervention on gender subgroups was not reported

in any of the included trials, so subgroup analyses on this basis was not possible.

Interventions targeting minority groups and indigenous populations

Subgroup analyses of trials that targeted minority groups and indigenous populations was not possible, due to the limited number of included studies for each comparison; we therefore present them narratively. Six of the 50 included trials examined the impact of interventions on predominantly disadvantaged populations (Black 2011; Cooke 2011; Haire-Joshu 2008; Natale 2014a; Nicklas 2017; Watt 2009). One trial recruited participants through schools where the proportion of children who had English as a second language, came from minority ethnic backgrounds or were eligible for free school meals was above average (Cooke 2011). The study demonstrated that repeated food exposure coupled with reward significantly increased the consumption of a target vegetable. Three trials of parent interventions recruited participants from disadvantaged communities including underserved families, single or minority parent homes, those living in poverty or low-income families (Black 2011; Haire-Joshu 2008; Watt 2009). Two trials found no improvement in overall child fruit or vegetable intake based on the primary trial outcome measures (Haire-Joshu 2008; Watt 2009); the other trial found the intervention targeting parent responsivity and behaviour management to be effective in increasing total fruit intake (Black 2011). Two trials of multicomponent interventions recruited participants from subsidised childcare centres (Natale 2014a; Nicklas 2017). One found an intervention targeting teachers, parents and childcare policies to increase both fruit and vegetable consumption (Natale 2014a) and the other found a theatre performance intervention involving both parents and teachers increased vegetable consumption (Nicklas 2017).

Interventions delivered in various settings

Subgroup analyses of child-feeding practice interventions by setting revealed an overall positive effect on children's vegetable consumption for those interventions delivered in home settings (SMD 0.56, 95% CI 0.18 to 0.95; n = 474; 4 studies) and in both home and laboratory settings (SMD 0.74, 95% CI 0.09 to 1.39; n = 40; 2 studies), but no overall effect for those interventions delivered in school or preschool settings (SMD 0.18, 95% CI -0.12 to 0.47; n = 341; 3 studies). Subgroup analyses for other settings (including one set in child health clinics, and one in home or health facilities) was not possible due to the limited number of studies for each setting.

Similar to the main analysis, subgroup analyses of parent nutrition education interventions by setting revealed no overall effect for those interventions delivered in a home setting (SMD 0.06, 95% CI -0.16 to 0.27; n = 2047; 5 studies) or a preschool setting (SMD 0.43, 95% CI -0.27 to 1.13; n = 243; 2 studies). Subgroup analyses for other settings (one each in parenting groups, primary care clinics or community health centres) was not possible, due to the limited number of studies for each setting.

Similar to the main analysis, subgroup analyses of multicomponent interventions by setting revealed no overall effect for those interventions delivered in school or preschool settings (SMD 0.07, 95% CI -0.07 to 0.20; n = 1608; 3 studies). Subgroup analyses for interventions delivered in either a preschool or a home setting were not possible, due to the limited number of studies for each setting.

Interventions of varying intensities

We did not conduct subgroup analyses of trials based on interventions of varying intensities, due to the limited information across included studies about the number and duration of intervention contacts or components.

Interventions delivered in different modalities

Thirty-eight of the 50 trials used face-to-face intervention delivery only (Anzman-Frasca 2012; Barends 2013; Baskale 2011; Black 2011; Blissett 2016; Caton 2013; Cooke 2011; Correia 2014; Cravener 2015; Daniels 2014; De Bock 2012; De Droog 2014; De Wild 2013; De Wild 2015a; De Wild 2015b; Fildes 2014; Fisher 2012; Harnack 2012; Hausner 2012; Hetherington 2015; Keller 2012; Martinez-Andrade 2014; Menella 2008; Namenek Brouwer 2013; O'Connell 2012; Remington 2012; Remy 2013; Roe 2013; Roset-Salla 2016; Savage 2012; Skouteris 2015; Spill 2010; Spill 2011a; Spill 2011b; Verbestel 2014; Wardle 2003a; Watt 2009; Witt 2012), reporting mixed findings. Similar to the overall analyses, subgroup analysis of face-to-face-delivered child-feeding practice interventions versus control revealed an overall positive intervention effect on vegetable consumption (SMD 0.38, 95% CI 0.10 to 0.65; n = 1328; 9 studies; Analysis 1.5). Face-to-face-delivered parent nutrition education interventions versus control revealed no overall intervention effect on children's fruit and vegetable consumption (SMD 0.12, 95% CI -0.20 to 0.45; n = 826; 5 studies; Analysis 2.4). Face-to-face intervention delivery was used in only one multicomponent intervention (Namenek Brouwer 2013) and the only child nutrition education intervention (Baskale 2011), for which mixed results were reported.

Subgroup analyses for other modalities was not possible due to the limited number of included studies for each comparison. Eight trials used face-to-face in combination with other strategies: computer-tailored newsletters and storybooks (Haire-Joshu 2008); school-based education, training, policy and environment change (Vereecken 2009); visual and written materials (Campbell 2013); educational materials, resources (posters, brochures) and letters (De Coen 2012); a leaflet (Fildes 2015); newsletters and menu modification (Natale 2014a); printed materials and resources (Williams 2014); and DVD (Nicklas 2017). Two trials used audio/visual only: DVDs (Staiano 2016) and DVD and CD (Duncanson 2013). The remaining two trials used telephone and mail (Tabak 2012; Wyse 2012). Trials which incorporated other intervention modalities reported mixed findings.

Secondary outcome I: Cost or cost effectiveness of interventions to increase the consumption of fruit or vegetables or both

Information about intervention costs was reported in one trial (Campbell 2013; very low-quality evidence). The parent nutrition education trial reported the total estimated cost of delivering a par-

ent intervention for infant feeding, physical activity and sedentary behaviours delivered by a dietitian as approximately AUD 500 per family.

Secondary outcome II: Adverse effects of interventions to increase the consumption of fruit or vegetables or both

Two trials reported information on any adverse events or unintended adverse consequences of the intervention. One child-feeding intervention trial (Spill 2011a; very low-quality evidence) reported no adverse effects on the amount of the meal consumed following implementation of an intervention involving incorporation of vegetable puree into meals at three different levels of energy density. The other trial, on parent nutrition education, (Wyse 2012; very low-quality evidence) reported no adverse effect on family food expenditure following implementation of a multicomponent intervention delivered over the telephone to improve parental knowledge and skills about the home food environment.

ADDITIONAL SUMMARY OF FINDINGS [Explanation]

Parent nutrition education interventions compared to no intervention for children aged 5 years and under

Patient or population: children aged 5 years and under
Setting: Various: Parenting group (n = 1), Home (n = 4), Primary care clinic (n = 1), Community health centre (n = 1), Preschool (n = 2), Preschool + home (n = 1)
Intervention: Parent nutrition education interventions
Comparison: no intervention

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with no intervention	Risk with Parent nutrition education interventions				
Short-term impact (< 12 months) child fruit and vegetable intake	The mean serves of vegetables per day was 1.6[1]	The mean serves of vegetables per day in the intervention group was **0.11 higher** (0.05 lower to 0.28 higher)	-	3023 (10 RCTs)	⊕◯◯◯ VERY LOW [2,3,4]	Scores estimated using a standardised mean difference of 0.11 (-0.05 to 0.28) and a standard deviation of 1.0[1] The mean duration of follow up post-intervention for studies included in the meta-analysis was 9.8 weeks 1 trial could not be pooled in the meta-analysis; it found an intervention targeting parent responsivity and behaviour management to be effective in increasing total fruit intake compared to control

Short-term impact (< 12 months) cost effectiveness	Information regarding intervention costs was reported in 1 trial (Campbell 2013)	-	389 (1 RCT)	⊕◯◯◯ VERY LOW [5,6,7]	-
Short-term impact (< 12 months) unintended adverse events	One trial (Wyse 2012) reported no adverse effect on family food expenditure	-	343 (1 RCT)	⊕◯◯◯ VERY LOW [5,6,8]	

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

__CI:__ Confidence interval

GRADE Working Group grades of evidence
High quality: We are very confident that the true effect lies close to that of the estimate of the effect
Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

[1]We used the post-intervention mean and standard deviation of the control group from Skouteris 2015 for the risk with no intervention and to re-express the SMD in terms of serves of vegetables per day.
[2]Downgraded one level for unexplained heterogeneity: Analysis 2.1 (main analysis): I^2 = 72%; Analysis 2.2 (excluding studies that did not state primary aim): I^2 = 52%; Analysis 2.3 (excluding studies with high attrition and no ITT analysis): I^2 = 48%; Analysis 2.3 (subgroup analysis face-to-face studies): I^2 = 78%.
[3]Downgraded one level for risk of bias: Most studies were at high risk of bias for lack of blinding, and fewer than half were at low risk of bias for other methodological limitations.
[4]Downgraded one level for imprecision: the confidence intervals contained the null value.
[5]Downgraded one level for risk of bias: study assessed as high risk of bias for number of domains.
[6]Downgraded one level for imprecision: total sample size was < 400.
[7] Downgraded one level for high probability of publication bias: no other studies reported cost effectiveness, so selective reporting suspected.
[8] Downgraded one level for high probability of publication bias: no other studies reported assessing adverse events, so selective reporting suspected.

Multicomponent interventions compared to no intervention for children aged 5 years and under

Patient or population: children aged 5 years and under
Setting: Various: Preschool (n = 2), school (n = 1), preschool + home (n = 1)
Intervention: Multicomponent interventions
Comparison: no intervention

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with no intervention	Risk with Multicomponent interventions				
Short-term impact (< 12 months) child fruit and vegetable intake	The mean cups of vegetables per day was 1.08[1]	The mean cups of vegetables per day in the intervention group was **0.29 higher** (0.06 lower to 0.66 higher)	-	1861 (4 RCTs)	⊕◯◯◯ VERY LOW [2,3,4]	Scores estimated using a standardised mean difference of 0.28 (-0.06 to 0.63) and a standard deviation of 1.05[1] The mean duration of follow up post-intervention for studies included in the meta-analysis was 1.3 weeks 4 studies could not be pooled in meta-analysis. 3 reported significant increases in both fruit and vegetable consumption, and 1 significantly increased fruit but not vegetable consumption
Short-term impact (< 12 months) cost effectiveness - not reported	No studies reported this outcome		-	-	-	-

Short-term impact (< 12 months) unintended adverse events - not reported	No studies reported this outcome	-	-	-	-

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

__CI:__ Confidence interval

GRADE Working Group grades of evidence
High quality: We are very confident that the true effect lies close to that of the estimate of the effect
Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

[1]We used the post-intervention mean and standard deviation of the control group from Williams 2014 for the risk with no intervention and to re-express the SMD in terms of cups vegetables per day.
[2]Downgraded one level for unexplained heterogeneity: Analysis 3.1 (main analysis): I^2 = 79%; Analysis 3.2 (excluding studies that did not state primary outcome): I^2 = 86%; Analysis 3.3 (excluding studies with high attrition that did not undertake ITT analysis): I^2 = 0%.
[3]Downgraded one level for risk of bias: fewer than half of the included studies were rated at low risk of bias for 2 of 4 criteria.
[4]Downgraded one level for imprecision: the confidence intervals contained the null value.

Child nutrition education interventions compared to no intervention for children aged 5 years and under

Patient or population: children aged 5 years and under
Setting: Preschool
Intervention: Child nutrition education interventions
Comparison: no intervention

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with no intervention	Risk with Child nutrition education interventions				
Short-term impact (< 12 months) child fruit and vegetable intake	The mean short-term impact (< 12 months) child vegetable intake frequency score was 4 (a score of 4 corresponds to consumption of vegetables 3 - 4 times per week)	MD 0	-	238 (1 RCT)	⊕⊕◯◯ LOW [12]	The only study (Baskale 2011) reported an increase in some of the fruits and vegetables assessed in the intervention group and no significant differences in the control group The duration of follow up post-intervention was 8 weeks.
Cost or cost effectiveness - not reported	No studies reported this outcome		-	-	-	-
Unintended adverse events - not reported	No studies reported this outcome		-	-	-	-

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval

GRADE Working Group grades of evidence
High quality: We are very confident that the true effect lies close to that of the estimate of the effect
Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

[1]Downgraded one level for risk of bias: high risk of bias due to lack of blinding and loss to follow-up.
[2]Downgraded one level for imprecision: total sample size < 400.

DISCUSSION

Summary of main results

In line with the importance of encouraging fruit and vegetable consumption among children in early childhood, this updated review has identified many new RCTs of interventions investigating this health behaviour. The findings suggest that some types of interventions targeting fruit and vegetable consumption by children aged five and younger are effective. Most of the included studies examined specific child-feeding practices; whilst meta-analysis of 11 of the 30 trials suggested these interventions were effective, collectively the findings for these interventions were equivocal. The second and third most common interventions were parent nutrition education and multicomponent interventions, for which we found no evidence of effect in the short term in meta-analyses. Only one trial assessed the effect of a child nutrition education intervention. Subgroup analyses on the basis of setting and modality were generally consistent with main analyses for child-feeding practices, parent nutrition education and multicomponent interventions. Insufficient evidence was available to determine the long-term effectiveness of all approaches, or the cost effectiveness or any adverse consequences of the interventions tested.

Overall completeness and applicability of evidence

The review update identified many newly published RCTs, in line with efforts globally to increase fruit and vegetable intake (World Health Organization 2003). Such studies predominantly focused on fruit and vegetable consumption determinants such as nutrition knowledge and skills, and food environments. Only one of the included trials in this review reported cost analyses and only two reported any unintended adverse effects. These factors are important considerations for health practitioners and policy makers but are often not reported in randomised trials (Waters 2011) or examined in systematic reviews (Hopewell 2008; Wolfenden 2010b).

Furthermore, the limited number of relevant trials identified for inclusion also prevented thorough examination of the impact of the interventions by gender, indigenous or disadvantaged populations, setting, varying intensity and modality. We found a number of trial protocols (see Characteristics of ongoing studies) which may address some of these gaps in the literature, and are likely to be eligible for inclusion in future updates of the review, including a randomised controlled trial of an eight-lesson in-home intervention in economically and educationally disadvantaged parents of children aged one to three years (Horodynski 2011).

The external validity of the review findings are limited. Most of the trials were conducted in the USA, Western Europe or the United Kingdom. Study attrition varied between studies, ranging from 0% to 68%.

Quality of the evidence

We used the GRADE approach to assess the quality of the evidence for the primary outcome of fruit and vegetable intake, which was conducted separately for each intervention type. See Summary of findings for the main comparison; Summary of findings 2; Summary of findings 3; Summary of findings 4. The quality of the evidence for fruit and vegetable intake across intervention types varied from very low to low. We rated the quality of evidence for specific infant-feeding interventions as very low, downgraded for unexplained heterogeneity, methodological limitations and a high probability of publication bias (Summary of findings for the main comparison). Methodological limitations related to allocation concealment and selective reporting being at unclear or high risk for most of the trials. A high probability of publication bias related to the relatively few trials being included in the meta-analysis (11 of 30 trials) and inspection of funnels plots (Figure 4). We assessed the quality of evidence for parent nutrition education interventions as very low, downgraded for unexplained heterogeneity, methodological limitations and imprecision (Summary of findings 2; Figure 5). The methodological limitations related to most of the trials being at high risk of bias for lack of blinding, and at unclear or high risk for allocation concealment, loss to follow-up, and selective reporting. Imprecision related to the confidence intervals crossing the null value of zero.We rated the quality of evidence for multicomponent interventions as very low due, downgraded for unexplained heterogeneity, methodological limitations and imprecision (Summary of findings 3; Figure 6). The methodological limitations related to most of the trials being at high risk of bias for lack of blinding, and at unclear or high risk for allocation concealment, loss to follow-up, and selective reporting. Imprecision related to the confidence intervals crossing the null value of zero. Such assessments suggest that the true effect may be substantially different from the intervention effects reported in the review, with future research very likely to change the estimate for specific infant feeding, parent nutrition education and multicomponent interventions. We rated the quality of the evidence for child nutrition interventions for the single included study as low, downgraded for methodological limitations and imprecision (Summary of findings 4). The methodological limitations related to a high risk of bias due to lack of blinding and loss to follow-up, and imprecision related to a sample size of fewer than 400 participants. Future research is likely to change the estimate for child nutrition interventions.

Figure 4. Funnel plot of comparison: 1 Short-term impact (< 12 months) of child feeding intervention versus no intervention on child consumption of target fruit or vegetable, outcome: 1.1 Fruit and/or vegetable intake.

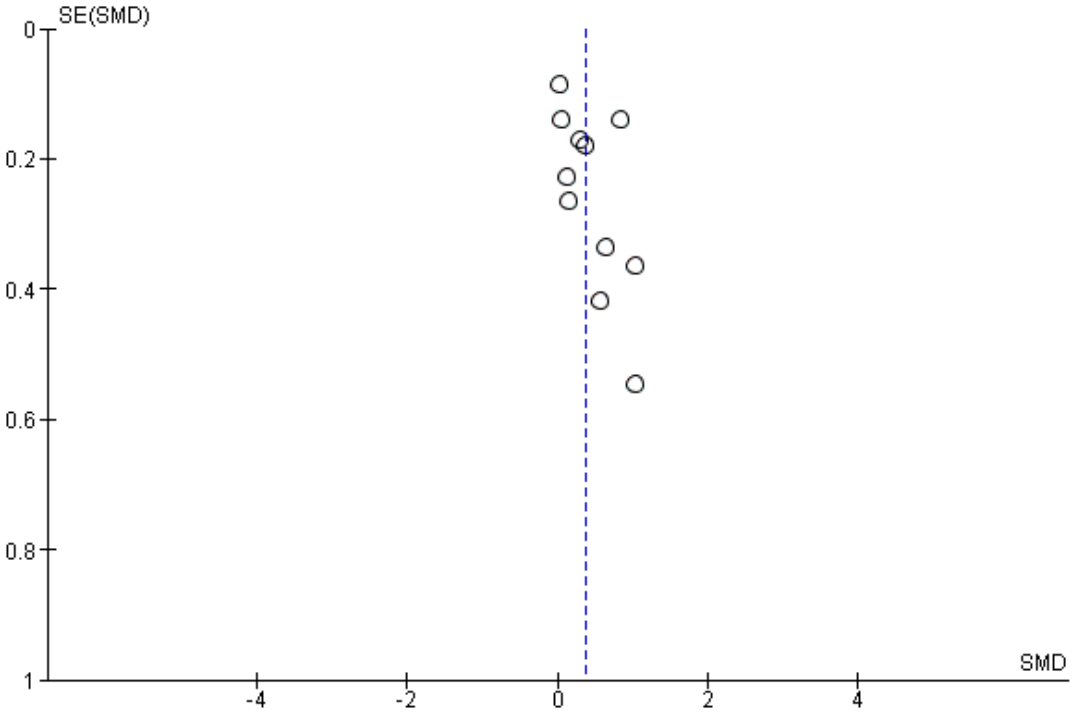


Figure 5. Funnel plot of comparison: 3 Short-term impact (< 12 months) of parent nutrition education intervention versus usual care., outcome: 3.1 Fruit and/or vegetable intake.

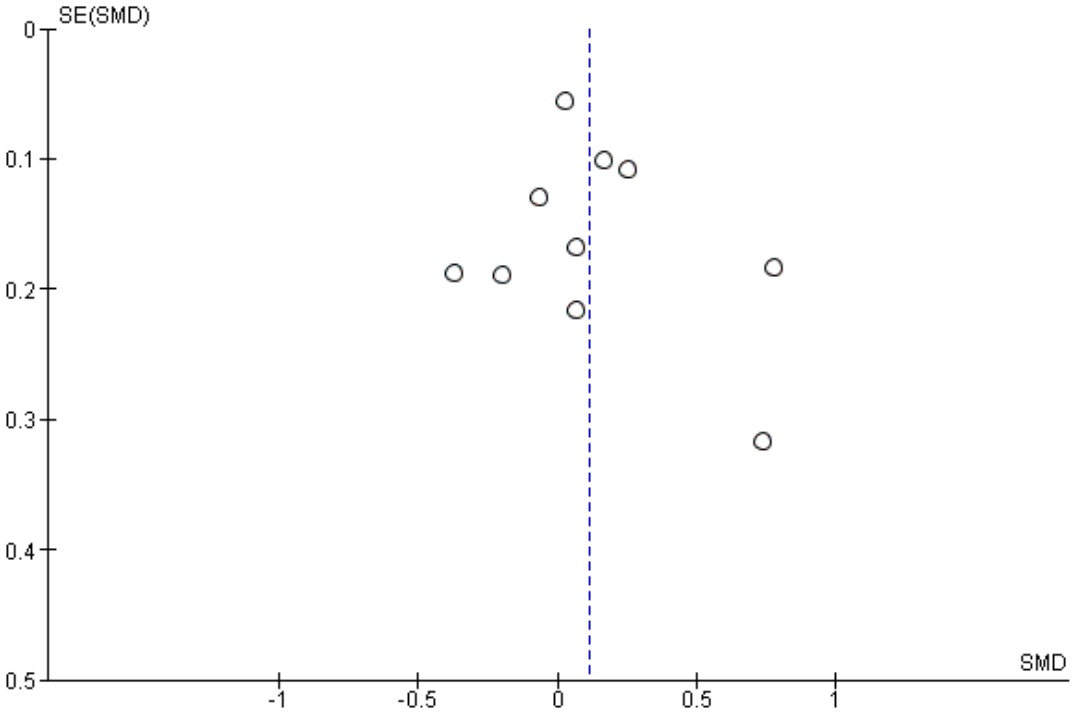
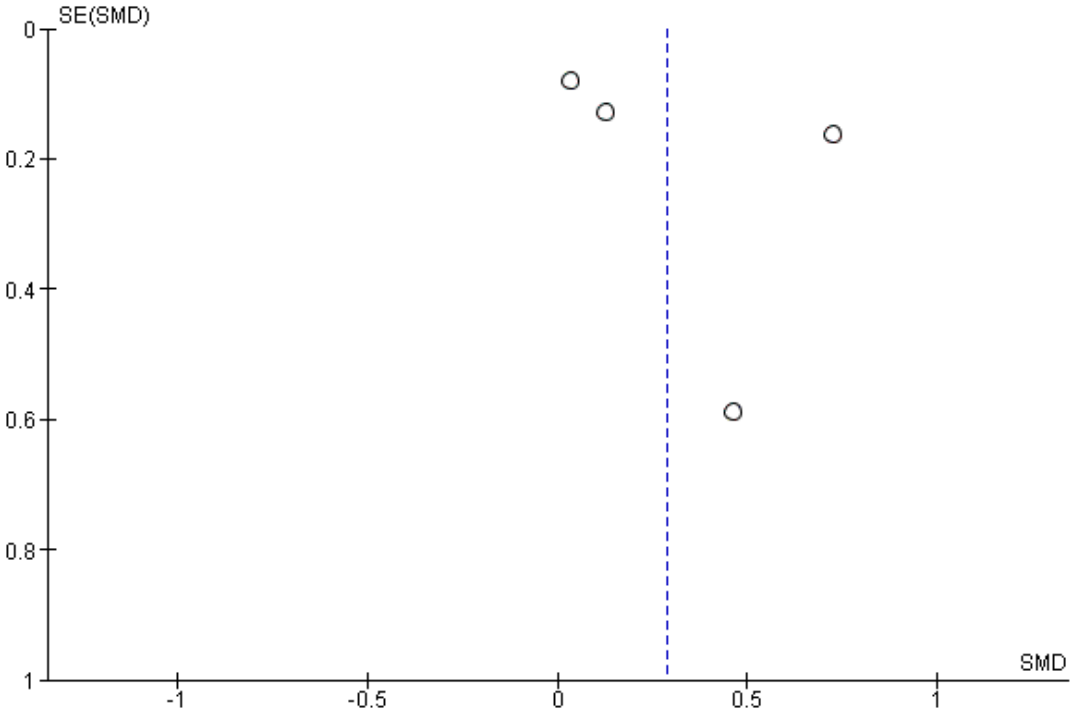


Figure 6. Funnel plot of comparison: 4 Short-term impact (< 12 months) of multicomponent intervention versus usual care, outcome: 4.1 Fruit and/or vegetable intake.



Potential biases in the review process

The review used a comprehensive and rigorous methodology, including a broad search strategy, the screening of trials and extraction of data by two independent review authors, and the appraisal of risks of bias within the included studies. Furthermore, the review did not restrict publications by language. Three aspects of selection bias, however, are worth noting. First, we excluded trials where fruit and vegetable intake was not considered to be a primary trial outcome, to avoid any potential confounding effects of other behavioural interventions (such as physical activity). This restriction may lead to overestimates of intervention effects if in practice they are delivered in the context of other health initiatives. Secondly, the inclusion of trials that did not explicitly state a primary outcome but did assess fruit or vegetable intake in the review may have biased the results. However sensitivity analyses excluding studies that did not state fruit and vegetable intake as a primary outcome suggested this was limited, as results were similar. Thirdly, the review was restricted to RCTs with trials included in the review tending to focus on interventions targeting fruit and vegetable consumption determinants, such as nutrition knowledge and skills, or the food environment of settings. Other trials targeting fruit and vegetable intake that may be less amenable to evaluation using randomised controlled designs, such as those requiring macro-environmental changes, may have been overlooked.

Agreements and disagreements with other studies or reviews

The equivocal findings of the infant-feeding interventions, such as repeated food exposure, are similar in part to previous reviews. An early systematic review of healthy eating interventions for children aged under five years (Tedstone 1998), published by the Health Education Authority, concluded that repeated food exposure is effective in enhancing children's willingness to consume novel foods provided tasting was included as a part of the exposure. Enhanced food acceptance following repeated food exposure has also been reported in other reviews and controlled trials (Contento 1995). As Cooke 2011 points out in the Background review of research for their randomised trial, evidence about the use of rewards to encourage children's consumption of targeted foods appears more equivocal. The positive impact of both social and non-tangible rewards reported in Cooke 2011, were however consistent with previous trials in community settings using tangible non-food rewards and social rewards targeting the fruit or vegetable intake of

school-aged children (Hendy 1999). The large number of trials comparing alternative and heterogenous infant-feeding practice interventions are difficult to interpret, given that they did not include a no-treatment control group, and few reported one intervention to be more effective than another.

The largely null findings of this review for the impact of parent interventions are consistent with those reported in previous reviews of dietary interventions. For example, a comprehensive review of the impact of home-visiting programmes delivered to parents concluded that there was little evidence to recommend such interventions as means of improving children's diet, given the mixed findings of the reviewed studies (Elkan 2000). Among the trials with a positive intervention effect included in the Elkan 2000 review was a pre-post study of an intensive intervention provided to low-income mothers of children aged one to four years (James 1992). In this study, dietician-trained general practitioners and health visitors provided advice and support as part of a primary-care home-visiting intervention lasting up to 20 weeks. Post-intervention improvements in diet were reported, including the consumption of fruits and vegetables. Similarly, a systematic review that examined the effectiveness of parental interventions on the diets of children aged two to five found mixed results for children's diets or feeding practices or both (Peters 2012).

The negative findings for multicomponent interventions are consistent with some previous reviews of interventions. A recent meta-analysis showed no significant differences between multicomponent interventions that promoted fruit and vegetable consumption and control conditions in a primary school setting (Delgado-Noguera 2011). Another systematic review that focused on the fruit and vegetable intake of children aged five to 12 found that school-based interventions had only a minimal effect on vegetable consumption, whereas they found a moderate impact on children's fruit intake (Evans 2012). A recent systematic review that examined interventions aimed at increasing children's (aged two to 12 years) vegetable intake in home and community settings found that only a minority of interventions that targeted children's vegetable intake alone were effective in the short term (Hendrie 2017). In contrast, when vegetable intake was addressed as part of a healthy diet or lifestyle intervention, most interventions showed short-term effectiveness (Hendrie 2017).

In contrast to the findings of this review, a number of other reviews have found multicomponent interventions to be effective. For example, a systematic review of interventions to improve diet, physical activity or to prevent weight gain for children of five years or under, and which included both randomised and non-randomised designs, identified nine studies of interventions implemented in preschool or childcare settings (Hesketh 2010). Three studies included some assessment of dietary outcome. In the first, Head Start preschools were assigned to either a menu intervention to reduce the fat content of meals provided to children in care; the same menu intervention plus nutrition education; or a third usual-care control condition (Williams 2004). Both intervention arms of the trial reduced the fat content of foods served to children compared with the preschools in the control condition. The remaining two trials assessed the impact of a healthy eating and physical activity obesity-prevention programme 'Hip-Hop to Health Jr', implemented in two different populations attending Head Start preschools (Fitzgibbon 2005; Fitzgibbon 2006). In Fitzgibbon 2005, intervention children reported less saturated fat intake at the one-year follow-up, but not total fat or dietary fibre. No improvements in dietary intake were reported in the second trial (Fitzgibbon 2006). Similarly, systematic reviews of school-based fruit and vegetable interventions have frequently concluded that multicomponent initiatives are the most effective in increasing fruit and vegetable consumption in older children, but such effects are only modest and reported to be driven largely by increased fruit intake (Burchett 2003; Ciliska 2000; French 2003; Knai 2006). A systematic review of European school-based interventions also concluded that multicomponent interventions are effective for improving children's fruit and vegetable intakes (Van Cauwenberghe 2010).

AUTHORS' CONCLUSIONS

Implications for practice

We found little evidence of effect for interventions to increase the fruit and vegetable consumption of children aged five years, to provide direction for health policy makers and practitioners. There was no evidence of effect for parent nutrition education or multicomponent interventions when pooled. Very low-quality evidence suggests specific child-feeding interventions (such as repeated exposure and rewards) may be effective, but such findings should be interpreted with caution, given that fewer than half of the identified studies could be pooled in meta-analysis, and that no data were reported for important outcomes such as costs and unintended consequences. Additionally, the effect size for child-feeding interventions was small (equivalent to an increase in vegetable intake of 4.03 grams), which may limit the potential public health benefits of implementing these types of interventions.

Implications for research

Despite the large number of trials, the lack of high-quality research in this area demonstrates the continuing considerable scope for policy makers, researchers and practitioners to develop and evaluate the impact of a variety of initiatives to improve fruit and vegetable intake of children aged five years and under. Behavioural interventions delivered via health professionals, telephone or computer-based programmes, interventions delivered through preschools, play-groups, sports clubs, or co-operatives, and those which address access issues through subsidies or other incentives all have merit, and rigorous evaluation of such interventions for children aged five years and under would contribute

greatly to the available evidence base to inform practice. As the aetiology of child diet is complex, interventions which target multiple determinants across a number of settings may be most likely to be effective.

This review identified a number of opportunities for future or continued intervention research targeting the fruit and vegetable consumption of children aged five years and under, including:

- the exploration and development of intervention strategies that can achieve larger effect sizes;
- the investigation of potential adverse effects of interventions (e.g. increased family grocery costs, or adverse effects on parent self-esteem or sense of competence) as a routine part of intervention trials;
- examination of the cost effectiveness of interventions found to be effective;
- interventions with extended periods of follow-up;
- interventions delivered using electronic modalities such as the web or smart phones;
- interventions implemented across a broader range of settings including health services and sports clubs.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Anzman-Frasca 2012

Methods	**Study design:** Randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children aged 3 to 6 years attending an independent childcare facility in Central Pennsylvania, USA **N (Randomised):** 47 children **Age:** 3 to 6 years (mean = 4.7 years) **% Female:** 51% **SES and ethnicity:** Children: White = 83%, Asian = 10% Parents: "Most parents were well-educated (median education = bachelor's degree) and were currently employed. The majority of parents reported being married (88%), and the majority of the families reported annual combined family incomes greater than $60, 000 (89%)." **Inclusion/exclusion criteria:** No explicit inclusion criteria stated for this trial Exclusion criteria: "Children were excluded if they had intolerance to study foods, a chronic illness affecting food intake, or if they were non-English speaking. Additionally, individuals with extended absences were excluded from the results." **Recruitment:** Not specified **Recruitment rate:** Unknown **Region:** Central Pennsylvania (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** 41 (not specified by group) **Description of intervention:** "All children in each classroom received the same vegetable throughout the study" "children were asked twice weekly over a period of 4 weeks to take of taste of a very small portion (~4 g) of the vegetable in its assigned condition." Repeated exposure: Vegetable intake without dip Flavor-flavor associative conditioning: Vegetable intake with dip. "Dips served in this experiment included two savory dips (ketchup and ranch-flavored) and one sweet-tasting dip (cinnamon sugar)" **Duration:**

	4 weeks **Number of contacts:** 8 exposure sessions (2 exposures/week) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Research staff **Integrity:** No information provided **Date of study:** Unknown **Description of control:** NA
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Consumption of target vegetable (grams). "Children were served a bowl containing 60 g of the vegetable, and children in the AC condition were also served ~60 g of dip in 3. 25 oz soufflé cups, which accompanied the vegetable…. Instructions to children prior to the meal were to eat as much as they wanted, not to share food with others, and to remain in their seats…. When children finished snack, spilled or dropped foods were returned to the correct dish and snack trays were cleared. Vegetables were weighed before serving and were weighed after the intake session was complete, and the difference was recorded as vegetable intake." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 9 weeks **Length of follow-up post-intervention:** 2 weeks **Subgroup analyses:** None **Loss to follow-up:** There was no loss to follow-up **Analysis:** Unknown if sample size calculation was performed.
Notes	Sensitivity analysis - primary outcome: Primary outcome not stated. Child fruit and vegetable intake 2nd listed outcome measure

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

Anzman-Frasca 2012 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants were not blinded and it seems likely that children may have been influenced by those children around them and whether or not other children had a flavoured dip
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Food was weighed and it is unlikely to be influenced by whether the researchers were blinded to condition
Incomplete outcome data (attrition bias) All outcomes	Low risk	There does not appear to be any attrition and therefore low risk of attrition bias
Selective reporting (reporting bias)	Unclear risk	There is no study protocol so it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Barends 2013

Methods	**Study design:** Randomised controlled trial **Funding:** "This project was funded by Wageningen University and Research Centre."
Participants	**Description:** Healthy infants between 4 and 7 months (not being weaned yet) and their parent **N (Randomised):** 101 parent-infant pairs **Age:** Child (mean): Green beans group = 162 days, Artichoke group = 160 days, Apple group = 165 days, Plum group = 162 days Mother (mean): Green beans group = 31 years, Artichoke group = 30 years, Apple group = 31 years, Plum group = 32 years **% Female:** Child: Green beans group = 54%, Artichoke group = 41%, Apple group = 56%, Plum group = 44%

	Parent: 96% **SES and ethnicity:** Parents education: Low = 17%, middle = 32%, high = 50% **Inclusion/exclusion criteria:** Inclusion criteria: "Only healthy Children between 4 and 7 months old, who were not being weaned yet, were included in the study." Exclusion criteria: "Children with known food allergies, swallowing or digestion problems, or other medical problems that could influence the ability to eat, were excluded." **Recruitment:** "The participants were recruited from the area of Wageningen and Almere in the Netherlands where both the research locations were. They were recruited via local newspapers, maternity or children welfare centers, postnatal care groups, and a mailing to subscribers of babyinfo.nl (a Dutch advertisement website that gives a box with free products for subscribers expecting a baby)." **Recruitment rate:** Unknown **Region:** Wageningen and Almere (The Netherlands)
Interventions	**Number of experimental conditions:** 4 **Number of participants (analysed):** Green beans group = 24 Artichoke group = 27 Apple group = 24 Plum group = 24 **Description of intervention:** At the lab (days 1,2,17,18 and 19): "A bowl with two jars of vegetable purée was handed to the mother and the mother fed the infant at their usual rate until the end of the feeding was indicated by the infant (i.e. when it rejected the spoon more than three successive times)." At the home (days 3 - 16): "At the end of the 2nd test-day at the lab, the mothers received the jars of puréed vegetables or fruits for the home exposure period. Each jar was labelled with the date on which it had to be fed to the infant and numbered from 3 to 16 corresponding to the respective days of the intervention period. The feeding was carried out every day at about the same time and in the same way as during days 1 and 2 in the lab." **Duration:** 19 days **Number of contacts:** 9 exposure sessions **Setting:** Lab and home **Modality:** Face-to-face **Interventionist:** Researchers trained parents to offer the target vegetable or fruit puree to their child **Integrity:** No information provided **Date of study:**

	Unknown **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Consumption of target vegetable and fruit purees (grams). At the lab: "The pre- and post-weight of the bowl including the spoon and bib was weighted to measure the actual intake." At the home: "The mother was instructed to empty both jars completely on a plate and to put all what was left over after the feeding, including the vegetable purée that was spilled on the table, floor, bib, child's face, etc., back in the jar and to seal the jar with the lid and put it in the refrigerator…. In order to have a standardized measure of home intake, the jars had been pre-weighted in the lab before the home exposure period, and after they were collected and were post-weighted again in the lab." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 19 days **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 2% (not specified by group) **Analysis:** Unknown if sample size calculation was performed
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	There is no indication whether the mother who fed the child was blind to group allocation. Given the mother fed the child, at high risk of performance bias

Barends 2013 (*Continued*)

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no indication whether the mother who fed the child and weighed the food was blinded to group allocation. Given the food was weighed by the mother the risk of detection bias is unclear
Incomplete outcome data (attrition bias) All outcomes	Low risk	94% retention and therefore risk of attrition bias is low
Selective reporting (reporting bias)	Unclear risk	There is no study protocol, therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Baskale 2011

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "No external or intramural funding was received."
Participants	**Description:** Children 5 years of age in 12 nursery schools connected to the Izmir Provincial Directorate of National Education **N (Randomised):** 6 preschools, 238 children **Age:** Child: 5 years of age Mother (mean): Intervention = 33.4 years, Control = 33.4 years Father (mean): Intervention = 36.9 years, Control = 36.8 years **% Female:** Child: Intervention = 60%, Control = 48% **SES and ethnicity:** Education: Mother: Primary = 9%, Secondary school = 15%, High school = 38%, University = 38% Father: Primary = 10%, Secondary school = 14%, High school = 37%, University = 40% Family SES: Low = 16%, Medium = 73%, Upper = 11% **Inclusion/exclusion criteria:** Not specified **Recruitment:** Not specified **Recruitment rate:** Unknown **Region:** Izmir (Turkey)

Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 141, Control = 97 **Description of intervention:** "The content of the education guided by Piaget's theory included play and visual materials. Thus, healthy food choices were created by means of play/games. Following age-appropriate education carried out using Piaget's theory, improvements are observed in food selection and consumption" **Duration:** Initial intervention = 6 weeks + at 1 year follow-up a 3 week refresher intervention (20 - 30 minutes per session) **Number of contacts:** 9 sessions (1 per week) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** "The researcher (H.B.), who is a nurse educator, was the interventionist for all sessions." **Integrity:** No information provided **Date of study:** February 2007 to June 2008 **Description of control:** "The children in the control group had not received nutrition education but they had received a general program of education (the nutrition education prescribed by the Ministry of National Education preschool). The yearly syllabus of the Ministry includes subjects on nutrition every 2 months. This time frame, however, may be insufficient for nutrition education."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetables assessed using food frequency questionnaire (FFQ) completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Post-test: 4 months (pre-test February 2007 - post-test June 2007) Post-test 2: 16 months (post-test 2 June 2008) **Length of follow-up post-intervention:** Post-test: 2 months Post-test 2: 14 months **Subgroup analyses:** None **Loss to follow-up (at 2 and 14 months)** Intervention: 1%, 52% Control: 9%, 51% **Analysis:**

	Unclear Sample size calculation was performed.
Notes	Sensitivity analysis - primary outcome: Primary outcome not stated, power calculation conducted on knowledge only

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Nutrition knowledge & food frequency (self-reported) There is no blinding to group allocation of participants or personnel described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Nutrition knowledge & food frequency There is no mention that participants were blinded to group allocation and therefore the risk of detection bias is high
Incomplete outcome data (attrition bias) All outcomes	High risk	67/141 (48%) in experimental group and 48/97 (49%) in control group completed post-test 2 and therefore risk of attrition bias is high
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity do not appear to be an issue

Black 2011

Methods	**Study design:** Randomised controlled trial **Funding:** Not reported
Participants	**Description:** Low-income mother/toddler (12 - 30 months) dyads **N (Randomised):** Unknown **Age:** Child: mean = 20 months Mother: mean = 27.4 years **% Female:** Child: 59% **SES and ethnicity:** "67.3% below poverty index, 34% married, 68% black" **Inclusion/exclusion criteria:** Low-income mother (criteria not stated) with toddler 12 - 30 months **Recruitment:** Recruited from WIC (Women, Infants and Children) Clinics **Recruitment rate:** Unknown **Region:** USA
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Preliminary = 151 **Description of intervention:** "Interventions (5 group & 3 individual sessions) used goal setting to promote: 1) parenting practices or 2) maternal diet and physical activity (PA)" **Duration:** Not specified **Number of contacts:** Not specified **Setting:** WIC Clinic **Modality:** Face-to-face **Interventionist:** Unclear **Integrity:** No information provided **Date of study:** Unknown **Description of control:** Placebo group, sessions provided on toddler safety.

Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Change in vegetable and fruit intake (mypyramid equivalent per 1000 kcal) assessed using 24-hour diet recall completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 6 and 12 months **Length of follow-up post-intervention:** Unclear **Subgroup analyses:** None **Loss to follow-up:** Unknown **Analysis:** Unknown if sample size calculation was performed.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	24-hour diet recall There is no blinding to group allocation of participants or personnel described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	24-hour diet recall There is no mention that participants were blinded to group allocation and therefore the risk of detection bias is high
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	There is no information provided about attrition rates at follow-up
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting

Other bias	Unclear risk	There is insufficient information to determine the risk of other bias

Blissett 2016

Methods	**Study design:** Randomised controlled trial **Funding:** "Funded by the Feeding For Life Foundation (grant reference number 11-1170). "
Participants	**Description:** Children aged 2 to 4 years and their principle caregiver (parent) **N (Randomised):** 120 parent-child dyads **Age:** Child (mean): Prompting no modelling = 27 months, Prompting and modelling = 29 months, Modelling 'control' group = 31 months Mothers (mean): Prompting no modelling = 34 years, Prompting and modelling = 26 years, Modelling 'control' group = 35 years **% Female:** Child: 45% Parent: 98% **SES and ethnicity:** Not specified **Inclusion/exclusion criteria:** "Inclusion criteria for children included the absence of known food allergies or disorders affecting eating, current or recent major illness or diagnosed intellectual disabilities." **Recruitment:** "Caregivers and their children were recruited through the Children and Child Laboratory database, which contains information on families in which caregivers have indicated an interest in research participation at the University of Birmingham." **Recruitment rate:** Unknown **Region:** UK
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Prompting no modelling = 35 dyads Prompting and modelling = 37 dyads Modelling 'control' group = 27 dyads **Description of intervention:** Prompting no modelling: "Caregivers were asked to use physical prompts to eat the novel fruit (NF) (including passing the food to the child, moving the food towards the child, holding the NF up to the child's face, encouraging the child to touch the NF)." Prompting and modelling: As well as using physical prompts as in PNM, "The caregivers assigned to this condition were also asked to try the NF themselves." Modelling 'control' group: "Caregivers in this condition were not given any information

	about prompting, but were simply asked to taste the NF themselves." **Duration:** 1 day **Number of contacts:** 1 **Setting:** Lab **Modality:** Face-to-face **Interventionist:** Parents **Integrity:** Prompting no modelling: "Of an original sample of fifty, fifteen were classed as non-compliant: ten caregivers failed to prompt a minimum of three times, and five caregivers were removed from the group because they ate the NF. This left a sample of thirty-five parents who physically prompted but did not model eating the fruit." Prompting and modelling: "Of an original sample of forty-three dyads, six were non-compliant because the parent failed to prompt three times or more, leaving a sample of thirty-seven parents who prompted and modelled eating the fruit." Modelling 'control' group: *"There were twenty-seven dyads in this condition, in which the parent modelled eating of the fruit; all were compliant with this request."* **Date of study:** Unknown **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Consumption of novel fruit (grams): "All meal items were weighed on scientific scales before and after consumption." "Owing to differences in weights of the different NF offered, it was not possible to compare conditions based on simple weight of consumption. Therefore, we calculated consumption of the NF based on the percentage consumed of the whole portion offered. " **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** < 1 day **Length of follow-up post-intervention:** Same day **Subgroup analyses:** None **Loss to follow-up:** Prompting no modelling: 30% Prompting and modelling: 14% Modelling 'control' group: No loss to follow-up **Analysis:** Unknown if sample size calculation was performed

Blissett 2016 (*Continued*)

Notes		

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	The random sequence generation procedure is unclear. The authors indicate that block randomisation was used to allocate to groups in blocks of 10 participants with conditions changing each week, allocated in order of recruitment
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Fruit intake is an objective measure of child's fruit intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Fruit intake All meals were weighed on scientific scales before and after consumption therefore at low risk of detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	Used a per-protocol analysis rather than an intention-to-treat analysis and therefore at high risk of attrition bias
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	There was a significant difference in children's ages and child's age was controlled for in analyses. Therefore the risk of other bias is unclear

Campbell 2013

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "National Health and Medical Research Council Grant No. 425801"

Participants	**Description:** First-time mothers and their infants **N (Randomised):** 62 parent groups, 542 parent-child pairs **Age:** Child (mean): Intervention = 3.9 months, Control = 3.9 months Parent (mean): Intervention = 32.5 years, Control = 32.1 years **% Female:** Intervention = 48%, Control = 47% **SES and ethnicity:** Parent: Education level (Completed university degree or beyond): Intervention = 52%, Control = 57% Born in Australia: Intervention = 78%, Control = 78% **Inclusion/exclusion criteria:** Parent groups: Inclusion criteria: "Parent groups were eligible if ≥8 parents enrolled or ≥6 parents enrolled in areas of low socioeconomic position (SEP) because mothers in areas of low SEP are less likely to attend first-time parent groups." No explicit exclusion criteria stated for this trial Parents: Inclusion criteria: "Parents will be eligible to participate if they are able to freely give informed consent, are first-time parents, members of a participating 'first-time parents group' and are able to communicate in English." Exclusion criteria: "Parents will be excluded from the study if they are unable to give informed consent or are unable to communicate in English. Infants with chronic health problems that are likely to influence height, weight, levels of physical activity or eating habits will be excluded from analyses but will be permitted to participate in the study." **Recruitment:** "A two-stage random sampling process will be used to select first-time parent groups. At the first stage, twelve local government areas within a 60 km radius of the research centre (Deakin University in Burwood, Victoria, Australia) will be randomly selected." "At the second stage, first-time parent groups within selected local government areas will be randomly selected, proportional to the total number of first-time parent groups within each area. The first-time parents group currently underway will then be invited to participate." **Recruitment rate:** Parent: 86% (542/630) **Region:** Melbourne (Australia)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 195, Control = 194 **Description of intervention:** "The dietitian-delivered intervention comprised six 2-hour sessions delivered quarterly during the first-time parents' group regular meeting." The intervention "sought to build knowledge, skills, and social support regarding infant feeding, physical activity, and sedentary behaviors. Messages were anticipatory in nature,

	such that concepts were presented before the associated child developmental phase." "Intervention materials incorporated 6 purpose-designed key messages (for example, "Color Every Meal With Fruit and Veg," "Eat Together, Play Together," "Off and Running") within a purpose-designed DVD and written materials. A newsletter reinforcing key messages was sent to participants between sessions." **Duration:** 15 months **Number of contacts:** 6 sessions at 3-monthly intervals (2 hours per session) **Setting:** Parenting group **Modality:** Multiple (face-to-face, visual and written materials) **Interventionist:** Experienced Dietitian **Integrity:** "Program fidelity was audited via checklists by researchers attending but not delivering the intervention." No further information reported **Date of study:** June 2008 to February 2010 **Description of control:** "Control parents received usual care from their MCH nurse, who may have provided lifestyle advice."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetable (grams) assessed using 3 x 24hr recalls (3 days, including 1 weekend day) conducted by trained nutritionists via telephone interview with parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Intervention cost per family reported that adjusted "for the fact that a trial setting sees an artificially small number of families included relative to the workforce employed" **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 6 (mid-intervention) and 15 months (post-intervention) **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up (Immediately post-intervention):** Intervention = 28% Control = 28% **Analysis:** Adjusted for clustering. Sample size calculation was performed.
Notes	First reported outcome (grams fruit/day) was extracted for inclusion in the meta-analysis. Sample size per group was not reported and instead calculated based on assumption of equal loss to follow-up per group, and reported baseline sample per group and total

	sample for diet outcomes at follow-up Sensitivity analysis - primary outcome: Primary outcome not stated, however power calculation was conducted on fruit or vegetable intake

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomly allocated to condition using a computer-generated random number schedule developed by a statistician with no contact with the centres
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	24-hour dietary recall (parent reported) Parents were not blinded to group allocation and therefore the risk of performance bias is high
Blinding of outcome assessment (detection bias) All outcomes	High risk	24-hour dietary recall (parent reported) Parents were not blinded to group allocation and because this is a self-reported measure the risk of detection bias is high, even though the dietary recalls were administered by telephone by staff blinded to participant's group allocation
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	389/542 (72%) completed the diet outcomes during this long-term assessment. However the number and reasons for dropout is not reported by study group and so cannot establish if reasons for dropouts are similar across groups
Selective reporting (reporting bias)	High risk	There are physical activity outcomes referred to in the protocol that are not reported
Other bias	Low risk	There are no differences in baseline characteristics between trial arms & contamination and other bias unlikely to be an issue

Caton 2013

Methods	**Study design:** Randomised controlled trial **Funding:** "This research has received funding from the European Community's Seventh Framework Programme (FP7/2007-3) under grant agreement no. 245012-HabEat coordinated by Dr Sylvie Issanchou. (INRA, UMR 1324, Centre de Sciences du Gout et de l'Alimentation, F-21000 Dijon France)."
Participants	**Description:** Children aged 6 to 36 months in private daycare nurseries in West and South Yorkshire, UK **N (Randomised):** Unclear "Of the 108 recruited, fourteen children were excluded due to food allergies (n 3) and for being older than 40 months (n 11). Of the ninety-four children, six children refused to take part in the study, fifteen were excluded due to lack of attendance at nursery and one was removed for incomplete exposures. Table 2 provides characteristics of the children who took part in the intervention. Out of the potential sample, seventy-two completed the Study." **Age:** Mean: Repeated exposure = 24 months, Flavour-flavour learning = 23 months, Flavour-nutrient learning = 24 months **% Female:** Repeated exposure = 55%, Flavour-flavour learning = 48%, Flavour-nutrient learning = 68% **SES and ethnicity:** Unclear, "to ensure good representation of ethnic background and SES we selected nurseries in a variety of different locations in West and South Yorkshire, UK" **Inclusion/exclusion criteria:** No explicit inclusion criteria stated for this trial "All children reported to have any food allergies were excluded from taking part in the investigation." **Recruitment:** "In the first instance, nursery managers were given details of the study to check their interest in the study. If the nursery managers expressed an interest, then the participant information sheets and consent forms were distributed to parents." **Recruitment rate:** Unknown **Region:** West and South Yorkshire (UK)
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Repeated exposure = 22 Flavour-flavour learning = 25 Flavour-nutrient learning = 25 **Description of intervention:** "Around 2-4 d after the pre-intervention period, each child was offered one pot (100 g) of artichoke for ten exposures." Repeated exposure: "The RE recipe was a basic vegetable puree." Flavour-flavour learning: "For the FFL puree, the chosen unconditioned stimulus was

	sweetness. The selected sweet ingredient was sucrose." Flavour-nutrient learning: "For the FNL puree, the chosen unconditioned stimulus was a higher energy density. The selected energy-dense ingredient was sunflower oil, because of its relatively neutral taste." **Duration:** 10 days **Number of contacts:** 10 **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Nursery staff **Integrity:** No information provided **Date of study:** Recruitment took place February - May 2011 **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Consumption of novel vegetable (artichoke) (grams) and changes in intake (grams) between a familiar (carrot) and novel vegetable (artichoke) "All pots were weighed before and after to determine intake (g) throughout the experiment. Any spillage on tables and bibs were collected after the session and were added back in to the pots before re-weighing." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Unclear **Length of follow-up post-intervention:** 5 weeks **Subgroup analyses:** None **Loss to follow-up:** Repeated exposure = 27% Flavour-flavour learning = 40% Flavour-nutrient learning = 46% **Analysis:** Unknown if sample size calculation was performed.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Caton 2013 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake (objective) Objective measure of child's vegetable intake and staff were blinded to the target vegetable being offered to the children
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake (objective) Food was weighed to determine intake and staff were blinded to the target vegetable being offered to the children
Incomplete outcome data (attrition bias) All outcomes	High risk	Of the 72 children taking part in the study 45 (63%) completed the follow-up and so the risk of attrition bias is high
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Cooke 2011

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "This research was supported by a grant from the Medical Research Council National Prevention Research Initiative."
Participants	**Description:** 422 children in reception (4 to 5 years) and Year 1 (5 to 6 years) from 16 classes in 8 schools **N (Randomised):** 16 classes, 472 children **% Female:** 47% female **Age:** Reception: 4 to 5 years (N = 216) Year 1: 5 to 6 years (N = 206)

	SES and ethnicity: "To ensure adequate representation of children from families of low socioeconomic status, we selected schools in which the proportions of pupils who were eligible for free school meals, who spoke English as a second language, and who came from minority ethnic backgrounds were above the national average." No individual child data on these variables were reported **Inclusion/exclusion criteria:** Not stated **Recruitment:** Recruited from 16 classes in 8 schools (492 children, 472 consented) **Recruitment rate:** Children: 96% (472/492) Schools: unknown **Region:** United Kingdom
Interventions	**Number of experimental conditions:** 4 **Number of participants (analysed):** Exposure + tangible non-food reward (sticker) = 99 Exposure + social reward (praise) = 106 Exposure alone = 105 Control = 112 **Description of interventions:** "Children in the intervention conditions (ETR, EP, EA)* were seen individually from Day 3 to Day 14 and offered a small piece of their target vegetable." Exposure + tangible non-food reward: "Children in the ETR condition were told that if they tasted the vegetable, they could choose a sticker as a reward." Exposure + social reward: "Children in the EP condition were praised if they tasted the vegetable (e.g. "Brilliant, you're a great taster") Exposure alone: "Children in the EA condition were invited to taste the target vegetable but received minimal social interaction." **Duration:** 3 weeks **Number of contacts:** 12 exposure sessions **Setting:** School **Modality:** Face-to-face, exposure **Interventionist:** Trained researchers **Integrity:** "Children in the three intervention groups agreed to taste their target vegetable in most sessions" Exposure + tangible non-food reward (sticker): *M* = 11.34 sessions, *SD* = 1.45 Exposure + social reward (praise): M = 10.45 sessions, SD = 1.94; Exposure alone: *M* = 9.97 sessions,*SD* = 2.87. "Post hoc analyses showed higher compliance in the ETR condition than in the EP or EA conditions ($p < 0.05$), and compliance in the latter two conditions did not differ."

	Date of study: Unknown **Description of control:** No-treatment control: "Children in the control group did not receive taste exposure to the target vegetable during the intervention period."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Ad libitum consumption of target vegetable (grams). "The child was then invited to eat as much of the vegetable as he or she wanted, with intake (in grams) assessed by weighing the dish before and after consumption using a digital scale" (NB. "Care was taken to ensure that children in the ETR condition understood that the sticker reward was no longer available.") **Length of follow-up from baseline:** Acquisition data: day 15 Maintenance data: 1 month and 3 months later **Subgroup analyses:** None **Loss to follow-up (at 1 month and 3 months follow-up):** Exposure + tangible non-food reward (sticker): 7%, 9% Exposure + social reward (praise): 8%, 5% Exposure alone: 8%, 8% Control: 11%, 6% **Analysis:** Analysis adjusted for clustering "Clustering by school was minimal; therefore, the final analyses adjusted only for clustering by class." Sample size calculation was performed "On the basis of evidence that 10 exposures are needed to alter preferences, we decided to repeat all analyses for a restricted subset of children who tasted their target vegetable on at least 10 days (n=365). Because there were no significant differences between the restricted and the full samples, results are reported for the full sample."
Notes	Sensitivity analysis - primary outcome: Primary outcome not stated, fruit and vegetable intake 2nd listed outcome after liking

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Contact with the author indicated that the study used blocked randomisation performed using an online randomiser programme
Allocation concealment (selection bias)	Unclear risk	Randomisation occurred prior to consent. Head teachers were not aware of group allocation. It is unclear if study personnel knew of allocation

Cooke 2011 (*Continued*)

Blinding of participants and personnel (performance bias) All outcomes	Low risk	Contact with the author indicated that personnel were not blind to group allocations and that there was the potential that participants became aware of group allocation. However, given the objective outcome measure, review authors judged that the outcome would not be influenced by lack of blinding
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Contact with the author indicated that some, but not all of the outcome assessors were blind to group allocation. The outcome measurement (grams of target vegetable consumed, as measured by a digital scale) was objective and unlikely to have been influenced by lack of blinding
Incomplete outcome data (attrition bias) All outcomes	Low risk	Although reasons for missing data were not provided by group, rates of loss to follow-up were low and similar across all experimental arms of the trial at both follow-up points (Exposure+sticker = 6.5%, 8.8%; Exposure+praise = 8.2%, 5.0%; Exposure alone = 8.2%, 8.2%; Control = 10.9%, 5.7%, provided by the author). No reasons were reported for loss to follow-up
Selective reporting (reporting bias)	Unclear risk	Insufficient information to permit judgement Trial was registered, but not prospectively (ISRCTN42922680)
Other bias	Low risk	No further risks of bias identified

Correia 2014

Methods	**Study design:** Randomised controlled trial - cross-over **Funding:** "This project was part of a larger study funded by the Robert Wood Johnson Foundation Healthy Eating Research program."
Participants	**Description:** Preschoolers enrolled in a Child and Adult Care Food Programme-participating childcare centre **N (Randomised):** 57 children **Age:**

	Mean = 4.4 years **% Female:** 35% **SES and ethnicity:** "Among the children's racial and ethnic backgrounds, 41.1% were non-Hispanic black, 37.5% were non-Hispanic white, 14.3% were Hispanic, and 7.1% were Asian. The median total family income was $33,600 (interquartile range, $19,337-$57,000)." **Inclusion/exclusion criteria:** "Preschool children enrolled full time were eligible for participation in the study." No explicit exclusion criteria stated for this trial **Recruitment:** "One large, racially diverse child care center in Connecticut was recruited for participation in the study in 2011." **Recruitment rate:** 79% (57/72) **Region:** Connecticut (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Condition 1: the pairing of a vegetable with a familiar, well-liked food (lunch) = 43 Condition 2: enhancing the visual appeal of a vegetable (snack) = 42 **Description of intervention:** "Classrooms were randomly assigned to first participate in either the intervention or control condition for lunch (condition 1) and snack (condition 2)." "The children participated in the second condition one week after the first condition for each meal." Condition 1: "Steamed broccoli on top of the pizza" Condition 2: "Raw cucumbers arranged as a caterpillar with chive antennae and an olive eye." **Duration:** 2 days (1 day per condition) **Number of contacts:** 2 (1 per condition) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Teachers and researchers **Integrity:** No information provided **Date of study:** 2011 **Description of control:** Condition 1: "Steamed broccoli on the side of the pizza" Condition 2: "Raw cucumbers as semicircular half-slices with chive and an olive on the side."

Outcomes	**Outcome relating to children's fruit and vegetable consumption:** The two primary outcome measures were: 1. Willingness to taste (defined as consumption of 3 grams or more of the test vegetable) and 2. Total consumption of the test vegetable (grams) "Researchers weighed the children's meals in the center's cafeteria in accordance with the CACFP-recommended preschool serving sizes for all meal components before delivering them to the classrooms. After the meal was completed, researchers weighed the plate waste of meal components in the cafeteria. All weights were recorded to the nearest 0.1 g on a digital electronic balance." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** <1 day **Length of follow-up post-intervention:** Same day **Subgroup analyses:** None **Loss to follow-up:** Condition 1 = 25% Condition 2 = 26% **Analysis:** Sample size calculation was performed.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake (objective) Objective measure of child's vegetable intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake (objective) Food was weighed to determine intake, but it is unlikely to be influenced by whether the researchers were blinded to condition

Correia 2014 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	Of the 57 participants 43 (75%) and 42 (74%) were present for both days of lunch and/or snack data collection respectively. Attrition > 20% for short-term assessments
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Cravener 2015

Methods	**Study design:** Randomised controlled trial **Funding:** "College of Health and Human Development (Pennsylvania State University)"
Participants	**Description:** Children aged 3 to 5 years with low vegetable intake **N (Randomised):** 24 children **Age:** Mean: Intervention = 3.8 years, Control = 4.0 years **% Female:** Intervention = 50%, Control = 50% **SES and ethnicity:** "The majority of the participants were white (92%) and 83.3% of mothers and 82.6% of fathers reported graduating from college and/or graduate school." **Inclusion/exclusion criteria:** Inclusion criteria: children aged 3 - 5 years, categorised as "at risk for obesity" based on family history, defined as having at least one parent with a body mass index > 25 and consuming 2 or fewer servings of vegetables per day (according to parent report) Exclusion criteria: pre-existing medical conditions (including relevant food allergies) **Recruitment:** "recruited via flyers posted around the university community and in local newspapers and websites (e.g. Craigslist)." **Recruitment rate:** Unknown **Region:** Pennsylvania (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 12, Control = 12 **Description of intervention:**

	"children in the treatment group (n=12) received vegetables packaged in containers decorated with their four favorite cartoon characters (selected on the first visit) and granola bars in generic packaging. All vegetable packages contained sticker incentives and children could collect stickers on a special game board and trade them for small prizes at the end of the study. This was done to simulate the concept of promotions that often come with packaged foods. Parents were in charge of deciding when children had eaten enough of a vegetable to be awarded the sticker for their game boards." **Duration:** 2 weeks **Number of contacts:** Parents were instructed "to offer children a choice between either a vegetable or granola bar for at least three snacks and/or meals per day." **Setting:** Home + lab **Modality:** Face-to-face **Interventionist:** Parents **Integrity:** "To assess compliance, parents completed daily checklists across the intervention to report when vegetables and granola bars were offered and record what children selected. In addition, parents could also report additional comments on these checklists to report other concerns or deviations. Parents were also responsible for keeping daily food diaries for children (data to be reported elsewhere). These logs were reviewed with parents during weekly home visits to assess progress." **Date of study:** Recruitment August 2012 to June 2013 **Description of control:** "children in the control group (n=12) received weekly supplies of generic-packaged vegetables and granola bars presented as part of a free choice at meals and snacks.."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Children's intake of vegetables (grams), "Intake was measured as the difference between pre- and post-weights of the foods provided." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 4 weeks **Length of follow-up post-intervention:** 1 week **Subgroup analyses:** None **Loss to follow-up:** There was no loss to follow-up **Analysis:** Sample size calculation was performed.

Notes	First reported outcome (broccoli intake grams/day) at the longest follow-up (4-week follow-up) was extracted for inclusion in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable intake is primary outcome

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Randomly assigned to condition using a random-number generator
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Outcome group: All/ Children's vegetable and granola bar intake Families and researchers were not blinded to condition but it is unlikely that this influenced child consumption
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Outcome group: All/ Children's vegetable and granola bar intake Families and researchers were not blinded to condition and it is unclear if this had an impact on the weighing of food. The extent to which parents were compliant with instructions to return all leftovers is unknown
Incomplete outcome data (attrition bias) All outcomes	Low risk	Outcome group: All/ 100% retention rate and so risk of attrition bias is low
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Daniels 2014

Methods	**Study design:** Randomised controlled trial **Funding:** "Research relating to this article was funded 2008-2014 by two consecutive grants from the Australian National Health and Medical Research Council (426704, APP1021065); HJ Heinz (to KM); Meat and Livestock Australia; Department of Health South Australia; Food Standards Australia New Zealand; and Queensland University of Technology."
Participants	**Description:** First-time mothers with healthy term infants **N (Randomised):** 698 mother-infant dyads **Age:** Child (mean): Intervention = 4.3 months, Control = 4.3 months Mother (mean): Intervention = 30.2 years, Control = 29.9 years **% Female:** Child: Intervention = 51%, Control = 50% **SES and ethnicity:** Mother: Education (university degree) = 59% Origin (born in Australia) = 79% SEIFA Index of Relative Advantage and Disadvantage (relative disadvantage $\leq 7^{th}$ decile) = 33% **Inclusion/exclusion criteria:** Inclusion criteria: "Inclusion criteria were ≥18 years of age, infants >35 weeks gestation, and birth weight ≥2500 g, living in the study cities, facility with written and spoken English" Exclusion criteria: "Mother-infant dyads will be excluded if the infant has any diagnosed congenital abnormality or chronic condition likely to influence normal development (including feeding behaviour) or the mother has a documented history of domestic violence or intravenous substance abuse or self-reports eating, psychiatric disorders or mental health problems." **Recruitment:** "A consecutive sample of first-time mothers with healthy term infants was approached at seven maternity hospitals" "Consenting mothers were recontacted for full enrolment when their infant was four (range 2-7) months old." **Recruitment rate:** 16% (698/4376) **Region:** Brisbane and Adelaide (Australia)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 291, Control = 307 **Description of intervention:** "The first intervention module started immediately after baseline (children aged 4-7 months) with the second module commencing 6 months after completion of the first (children aged 13-16 months). Each module comprised six interactive group sessions (10-15 mothers per group, total 40 groups) of 1-1.5 hours duration, co-facilitated by

	a dietitian (n=13) and psychologist (n=13). Developmentally appropriate content addressed: (i) repeated neutral exposure to unfamiliar foods combined with limiting exposure to unhealthy foods to promote healthy food preferences and (ii) responsive feeding that recognizes and responds appropriately to cues of hunger and satiety to promote self-regulation of energy intake to need. A third theme was "feeding is parenting" and positive parenting (encouragement of autonomy, warmth, self-efficacy)." **Duration:** 12 months (12 weeks duration for Modules 1 and 2 respectively, with 6-month gap between Module 1 and 2) **Number of contacts:** 12 group sessions **Setting:** Child health clinics **Modality:** Face-to-face, group sessions **Interventionist:** Co-facilitated by a dietitian and psychologists **Integrity:** No information provided **Date of study:** 2008 to 2011 **Description of control:** "The control group had access to universal community child health services, which, at the mother's initiative, could include child weighing and web- or telephone-based information. An important distinction was that controls did not receive anticipatory guidance but sought advice on a specific problem."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetables, "assessed using a three-pass 24-hour dietary recall conducted via telephone by a dietitian trained" **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 20 months and 4.5 years **Length of follow-up post-intervention:** 6 months and 3.5 years **Subgroup analyses:** None **Loss to follow-up:** Intervention = 26% Control = 19% **Analysis:** Sample size calculation was performed.
Notes	First reported outcome (vegetable intake g/kg body weight) at the longest follow-up < 12 months (6 months after intervention completion) and ≥ 12 months (3.5 years after intervention completion) was extracted for inclusion in meta-analysis

	Sensitivity analysis - primary outcome: Primary outcome not stated, however power calculation was conducted on fruit or vegetable consumption

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomly assigned to condition using permuted-blocks randomisation schedule generated by the Institute's Research Methods Group, which includes this study's statistician, all of whom will otherwise not be involved in data collection or intervention delivery
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Outcome group: All/ Food intake records, food preference, feeding behaviour (self-reported) There is no blinding to group allocation of participants or personnel described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	There is no blinding to group allocation of participants described, and because self-reported measures at high risk of detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	There was 22% attrition at short-term follow-up and dropout was significantly higher in the intervention than the control group
Selective reporting (reporting bias)	Low risk	The measures reported in the protocol paper align with those reported in the outcome papers
Other bias	High risk	There were no differences according to group allocation at baseline. However at high risk of incorrect analysis as the protocol specifies that clustering within assessment clinics will be accounted for but this does not appear to have been done in any of the outcome papers

De Bock 2012

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "This work was supported by a grant from the Baden-Wurttemberg Stiftung." "F.D.B. is supported by the European Social Fund and by the Ministry of Science, Research and the Arts Baden-Wurttemberg."
Participants	**Description:** Children aged 3 to 6 years in 18 preschools from 3 south German regions **N (Randomised):** 18 preschools, 377 children **Age:** Mean = 4.26 years **% Female:** 47% **SES and ethnicity:** Child: 32.4% came from an immigrant background Education levels (mother): Low = 16%, Middle = 56%, High = 21% **Inclusion/exclusion criteria:** "Pre-schools were eligible to participate in the study if they were located in one of three predefined regions and had applied to participate in the nutritional intervention module of a state-sponsored health promotion programme 'Komm mit in das gesunde Boot' ('Come aboard the health boat'), with at least fifteen children participating." "Children between 3 and 6 years of age attending one of the participating pre-schools and participating in the programme were considered eligible for our study." No explicit exclusion criteria stated for this trial **Recruitment:** Preschools: Selected from a group of preschools who had already "applied to participate in the nutritional intervention module of a state-sponsored health promotion programme. " **Recruitment rate:** Preschool: 64% (18/28) Child: 80% (377/473) **Region:** 3 regions in Baden-Württemberg (Germany)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** 202 children (not specified by group) **Description of intervention:** "Intervention activities consisted of familiarizing with different food types and preparation methods as well as cooking and eating meals together in groups of children, teachers and parents. One session additionally focused on healthy drinking behaviours." Of the 15 sessions, five actively involved "parents by targeting them alone (discussions on parents' modelling role and nutritional needs of children) or together with their children. " "Models for healthy eating within the intervention included: (i) use of nutrition experts; (ii) play acting with 'pirate dolls' used as props enjoying fruit and vegetables; (iii) active parental involvement; and (iv) involvement of other pre-school peers. The exposure effect

	was taken into account by repeatedly offering healthy snacks like fruit and vegetables and water to the children every week." **Duration:** 6 months **Number of contacts:** 15 sessions (1/week, 2hr per session) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** "The intervention was delivered by external nutrition experts" "Pre-school group teachers assisted the external nutrition expert during each session to enable them to sustain intervention-related activities after the study end." **Integrity:** "Implementation rate was high with all modules delivered completely (5.0/5); no session was cancelled." "Intervention fidelity was high with the majority of interventions delivered as planned." **Date of study:** 2008 to 2009 **Description of control:** Waiting-list control, "received the same intervention 6 months later than the intervention arm"
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Change in child's consumption of fruits and vegetables (portions/day) assessed using a questionnaire by parent self-report **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 6 and 12 months **Length of follow-up post-intervention:** Immediately and 6 months **Subgroup analyses:** None **Loss to follow-up:** "Of 348 pre-school children, 29.6% completed all three measurements, 51.4% two measurements and 19% one measurement with 58% providing both pre- and post-intervention measurements." Individual loss to follow-up data not reported **Analysis:** Sample size calculation was performed. Analysis was not adjusted for clustering, but justification was provided. "As our data stemmed from natural pre-school-bound clusters of children, we first determined the extent of clustering. Intraclass correlation coefficients (ICC) on the level of pre-schools were 0.016 and 0.014 for the primary outcomes of fruit intake and vegetable intake, respectively. With an average cluster size of 19.5 children per pre-school, the design effect (d = 1 + (average cluster size -1) x ICC) did not exceed 2, allowing us to ignore the issue

	of clustering in our analyses."	
Notes	Sensitivity analysis - primary outcome: Fruit or vegetable intake is primary outcome	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Low risk	Preschool assignment was concealed through the use of sequentially-numbered, sealed envelopes
Blinding of participants and personnel (performance bias) All outcomes	High risk	Outcome group: All/ Fruit & vegetable intake (parent self-reported survey) Due to the nature of the intervention, it was not possible to blind participants or intervention providers and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Fruit & vegetable intake (parent self-reported survey) Parents were not blinded to group allocation and therefore the risk of detection bias is high
Incomplete outcome data (attrition bias) All outcomes	High risk	Of 348 preschool children, 29.6% completed all 3 measurements, 51.4% 2 measurements and 19% 1 measurement, with 58% providing both pre- and post-intervention measurements
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	The design effect did not exceed 2 and so the authors ignored clustering in the analyses. The impact of this on the analyses is unclear

De Coen 2012

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "The study was commissioned, financed and steered by the Ministry of the Flemish Community (Department of Economics, Science and Innovation; Department of Welfare, Public Health and Family)."
Participants	**Description:** Children attending pre-primary and primary schools from 6 communities in Flanders, Belgium **N (Randomised):** 31 schools, 1589 children **Age:** Mean: Intervention = 4.86 years, Control = 5.04 years **% Female:** Intervention = 47%, Control = 55% **SES and ethnicity:** % Of lower SES children: Intervention = 34%, Control = 29% **Inclusion/exclusion criteria:** Not specified **Recruitment:** "All pre-primary and primary schools in the six communities were invited to participate in the study." **Recruitment rate:** Child: 49% (1589/3242) School: 64% (31/49) **Region:** Flanders (Belgium)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 396, Control = 298 **Description of intervention:** "The intervention was based on the 'Nutrition and Physical Activity Health Targets' of the Flemish Community clustered into: (i) increasing daily consumption of water and decreasing soft drinks consumption; (ii) increasing daily milk consumption; (iii) increasing daily consumption of vegetables and fruit; (iv) decreasing daily consumption of sweets and savoury snacks; and (v) increasing daily PA and decreasing screen-time behaviour." **The community** "Each intervention year, information brochures and posters regarding the five topics of the project were distributed through general practitioners, pharmacists, social services and at relevant community events by the regional health boards and the research team." **The schools** "All intervention schools were requested to (i) implement five Healthy Weeks per intervention year (one for each cluster of topics) with a minimum 1 h of classroom time dedicated to the topic together with extracurricular activities (e.g. during the vegetables and fruits week only fruits could be brought to school as a snack; schools organized fruit and vegetable tastings), (ii) evaluate and improve their playground and snack and bev-

	erage policy, and (iii) communicate with the parents on the programme and distribute materials to the parents. The intervention started with a meeting with the teachers during which they received manuals and guidelines and an implementation plan was discussed. " **The parents** "The intervention materials for the parents were newly developed for the project. The parents received a poster visualizing the target messages and containing short tips regarding parenting practices and styles to encourage children to stick to the healthy eating and PA targets. Parents also received five letters, containing detailed information on the intervention topics and a website link with practical information such as tips and recipes. Based on the FFQ in the parental questionnaire, parents received a written, normative individual tailored advice on their child's consumption of water, milk, fruits, vegetables, soft drinks and sweet and savoury snacks, and their PA and screen-time behaviour." **The regional health boards** "They contacted each school at least twice per year assisting them in selecting relevant intervention materials and supervising the implementation progress." **Duration:** "The intervention was implemented over two school years (2008-2009 and 2009-2010) on different levels." **Number of contacts:** Unclear (multi-component) **Setting:** School **Modality:** Multiple (face-to-face, educational materials, resources (posters, brochures), letters) **Interventionist:** Multiple **Integrity:** "Process evaluation data revealed that all schools implemented the requested classroom hour. Regarding the snack and playground policy, it was clear that the requested adjustments asked for more time investment and at the time of observation, most schools did not yet meet up to the standard." **Date of study:** 2008 to 2010 **Description of control:** No information provided
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetables (grams/day) assessed using a validated 24-item semi-quantitative food frequency questionnaire (FFQ) completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 2 years **Length of follow-up post-intervention:** Immediately **Subgroup analyses:**

	None **Loss to follow-up:** Overall = 56% (not specified by group) **Analysis:** Did not adjust for clustering Sample size calculation was performed
Notes	First reported outcome (fruit consumption grams/day) was extracted for inclusion in meta-analysis. The reported estimate did not account for clustering, therefore we used post-intervention data and calculated an effective sample size using ICC of 0.016 to enable inclusion in meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake 2nd listed outcome after BMI

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Outcome group: All/ Fruit and vegetable intake (self-reported) There is no blinding to group allocation of participants described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Fruit and vegetable intake (self-reported) There is no mention that participants were blinded to group allocation and therefore the risk of detection bias is high
Incomplete outcome data (attrition bias) All outcomes	High risk	694/1589 (44%) completed 2-year assessment. Long-term attrition > 30% therefore at high risk of attrition bias
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	High risk	High risk of recruitment bias as communities were randomised and then schools within each community were invited to participate

		Unclear baseline imbalance as communities differed on nutrition and PA policy, raising awareness for these topics and health promotion expertise

De Droog 2014

Methods	**Study design:** Randomised controlled trial (as confirmed by the author) **Funding:** "Grant from The Netherlands Organisation for Scientific Research (NWO)."
Participants	**Description:** Children aged 4 to 6 years from 6 primary schools in both urban and suburban districts in The Netherlands **N (Randomised):** 160 children **Age:** 4 to 6 years (no mean provided) **% Female:** 49% **SES and ethnicity:** No explicit data: "The sample consisted of various socioeconomic and cultural backgrounds." **Inclusion/exclusion criteria:** "Only schools without formal fruit and vegetable programs were selected." **Recruitment:** Not specified **Recruitment rate:** Unknown **Region:** Urban and suburban districts of the Netherlands
Interventions	**Number of experimental conditions:** 5 **Number of participants (analysed):** Interactive + congruent = 26 Interactive + incongruent = 26 Passive + congruent = 26 Passive + incongruent = 26 Baseline group = 56 **Description of intervention:** Children were read a picture book in a quiet room near their class. The picture book story described a main character rescuing his friend. The main character in this story is able to rescue his friend only after eating carrots to make him t and strong Passive vs interactive: In the interactive sessions, the storyteller used a reading manual to ask children questions about the story and its characters before, during, and after the session. In the passive sessions, children were not asked any questions, but encouraged to sit quietly and listen

	Congruent vs incongruent: One book featured a product-congruent character (a rabbit) , and the other featured a product-incongruent character (a turtle) **Duration:** 5 days **Number of contacts:** 5 sessions **Setting:** School **Modality:** Face-to-face **Interventionist:** Female daycare worker **Integrity:** No information provided **Date of study:** October to December 2011 **Description of control:** Baseline 'control' group "not exposed to the book"
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's proportional consumption of vegetables. "Children's proportional product consumption was measured by dividing the number of pieces of each food eaten by the total number of pieces of foods eaten, for example: # carrots eaten / total # foods eaten." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 5 days **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** There was no loss to follow-up **Analysis:** Unknown if sample size calculation was performed
Notes	"Children in the experimental groups were randomly assigned to the four experimental conditions (n = 26 per cell)" whereas the children in the baseline control group were not randomised. Therefore the study was classified as a comparative effectiveness trial and we did not consider the data from the baseline control group

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

De Droog 2014 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake: Objective measure of child's vegetable intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake The experimenter counted the number of pieces of each snack eaten and therefore given it is an objective measure unlikely to be influenced by detection bias
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	There is no information about attrition provided
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

De Wild 2013

Methods	**Study design:** Randomised controlled trial - cross-over **Funding:** "European Community's Seventh Framework Programme (FP7/2007-2013) under the Grant agreement No. 245012-HabEat."
Participants	**Description:** Preschool-aged children recruited from 3 daycare centres in Wageningen, the Netherland **N (Randomised):** 40 children **Age:** 21 to 46 months (mean = 36 months) **% Female:** 50% **SES and ethnicity:** Not specified

	Inclusion/exclusion criteria: Inclusion criteria: "Inclusion into the study required presence of the child at the day care-centre for at least 2 days per week." Exclusion criteria. "Participants were screened for food allergies and health problems (as reported by the parents)" **Recruitment:** "A total of 40 healthy children aged 2-4 years were recruited from 2 day care-centres in Wageningen, The Netherlands. Participation was voluntary and parents and day care-centres were thoroughly informed about the study. Written parental consent was given for the participating children." **Recruitment rate:** Unknown **Region:** Waheningen (The Netherlands)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Spinach high-energy/endive low-energy = 15 Endive high-energy/spinach low-energy = 13 **Description of intervention:** "During the intervention period, half of the participants (n = 20) received vegetable soup flavour A low in energy content (LE) consistently paired with vegetable soup flavour B high in energy content (HE), whereas the other half of the participants received the reverse (i.e. flavour A HE + flavour B LE)." **Duration:** 7 weeks **Number of contacts:** 14 exposures (twice/week) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Daycare leaders **Integrity:** No information provided **Date of study:** Unknown **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Ad libitum consumption of vegetable soup (grams). "Consumption was measured by pre- and post-weighing on a digital scale with a precision of 0.1 g." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:**

	8 weeks and 4 and 8 months **Length of follow-up post-intervention:** 1 week and at 2 and 6 months **Subgroup analyses:** None **Loss to follow-up (at 2 and 6 months):** Overall: 32%, 39% (not specified by group) **Analysis:** Sample size calculation was performed.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake (objective): The children and the daycare leaders were blinded to the treatment, i.e. they were unaware which product was high or low in energy and therefore low risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake (objective): Outcome was pre-post weight of soup bowl assessed by researcher. Researchers were not blinded to group allocation (as they served the soup (2 x green soups varying in energy intake)) and researcher was not present in room during consumption of soup
Incomplete outcome data (attrition bias) All outcomes	High risk	Of 40 eligible children, 12 were excluded from data analysis due to low intake levels during the conditioning period. Of 28 children 17 (61%) completed the 6-month follow-up
Selective reporting (reporting bias)	Low risk	The primary outcomes reported in the paper align with those specified in the trial registration

De Wild 2013 (*Continued*)

Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

De Wild 2015a

Methods	**Study design:** Randomised controlled trial **Funding:** "European Community's Seventh Framework Programme (FP7/2007-2013) under the Grant agreement No. 245012-HabEat."
Participants	**Description:** Preschool-aged children recruited from 3 daycare centres in Wageningen, the Netherland **N (Randomised):** 75 children **Age:** 1.9 - 5.9 years (mean = 3.7 years) **% Female:** 50% **SES and ethnicity:** Not specified **Inclusion/exclusion criteria:** No explicit inclusion/exclusion criteria. "Participants were screened for food allergies and health problems (as reported by the parents)" **Recruitment:** "Parents with children in the targeted age range received an information letter and an invitation to register their child(ren) for participation via the day-cares. Participation was voluntary and parents and day care-centres were thoroughly informed about the study." **Recruitment rate:** Unknown **Region:** Wageningen (The Netherlands)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Choice condition = 34 No-choice condition = 36 **Description of intervention:** "Each child was exposed 12 times to six familiar target vegetables at home during dinner, which is the traditional hot meal including vegetables in The Netherlands….the choice group received two types of vegetables from which to choose, or they could choose to eat both vegetables during the meal." **Duration:** 12 days **Number of contacts:** 12 **Setting:**

	Home **Modality:** Face-to-face **Interventionist:** Parents **Integrity:** No information provided **Date of study:** Unknown **Description of control:** "The no-choice group received only one type of vegetable per dinner session"
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** "The main outcome of the study was the children's intake (in gram) of the vegetables. Vegetable intake was measured by weighing their plates before and after dinner (left overs)." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 12 days **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 6% (not specified by group) **Analysis:** Sample size calculation was performed
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake (objective measure): Children's vegetable intake was measured by weighing their plates before and after dinner (left-overs). There is a low risk of

De Wild 2015a (*Continued*)

		performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake (objective measure): Children's vegetable intake was measured by weighing their plates before and after dinner (left-overs). There is a low risk of detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	70/75 (93%) children completed the study and therefore risk of attrition bias is low
Selective reporting (reporting bias)	Unclear risk	The primary outcomes reported in the paper align with those specified in the trial registration. However in the trial registration the food diary is listed as a secondary outcome but the results are not reported in the outcome paper
Other bias	High risk	Despite random assignment, children in the no-choice group on average liked vegetables better than children in the choice group ($P < 0.01$) and therefore baseline imbalance between groups

De Wild 2015b

Methods	**Study design:** Randomised controlled trial - semi-cross-over **Funding:** "European Community's Seventh Framework Programme (FP7/2007-2013) under the Grant agreement No. 245012-HabEat."
Participants	**Description:** Preschool-aged children recruited from 3 daycare centres in Wageningen, the Netherland **N (Randomised):** 45 children **Age:** 18 - 45 months (mean = 32.6 months) **% Female:** 49% **SES and ethnicity:** Not specified **Inclusion/exclusion criteria:** No explicit inclusion/exclusion criteria. "Participants were screened for food allergies and health problems (as reported by the parents)" **Recruitment:** "recruited from two day-care centres in Wageningen, the Netherlands. Parents signed an informed consent for their child's participation."

	Recruitment rate: Unknown **Region:** Wageningen (The Netherlands)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Parsnip crisps-tomato ketchup/red beet crisps-white sauce = 19 Red beets crisps-tomato ketchup/parsnip crisps-white sauce = 20 **Description of interv0ention:** "Half of the participants received red beet crisps combined with tomato ketchup (TK [C]) consistently paired with parsnip crisps combined with white sauce (WS [UC]). The other half of the participants received the reverse, i.e. red beet crisps + WS(UC) and parsnip crisps + TK(C)." **Duration:** 7 weeks **Number of contacts:** 14 exposures (twice/week) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Daycare leaders **Integrity:** No information provided **Date of study:** Unknown **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Ad libitum consumption of vegetable crisps (grams). "Consumption of crisps and dip sauces were measured by pre- and post-weighing on a digital scale with a precision of 0. 1 g." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Post-test 1: 9 weeks Post-test 2: 4 months (2 months after conditioning) Post-test 3: 8 months (6 months after conditioning) **Length of follow-up post-intervention:** Post-test 1: Immediate Post-test 2: 2 months Post-test 3: 6 months after conditioning **Subgroup analyses:** None

	Loss to follow-up (at 2 and 6 months): Overall: 5%, 33% (not specified by group) **Analysis:** Unknown if sample size calculation was performed.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable crisps intake (objective): The children were not aware that their intake was measured or which condition they participated in and so the risk of performance bias is low
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable crisps intake (objective): The outcome was vegetable chip and dip intake (each assessed separately) by weighing amount before and after consumption. It is not clear who (i.e. researchers or day-care centre staff) weighed the chips & dip, and whether or not they were blinded. Blinding of outcome assessors unlikely to influence outcome
Incomplete outcome data (attrition bias) All outcomes	High risk	Of the 45 children, 6 were excluded because they had no intake at all of the dip sauces. Of the remaining 39 children, 26 (67%) completed the 6-month follow-up. The risk of attrition bias is high
Selective reporting (reporting bias)	Unclear risk	The trial registration reports a secondary outcome that is not reported in the outcome paper
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Duncanson 2013

Methods	**Study design:** Randomised controlled trial **Funding:** "C Collins is supported by a National Health and Medical Research Council Australian Career Development Research Fellowship (#6315005). K Duncanson is supported by a Clinical Education and Training Institute Rural Research Capacity Building Program Grant and New Staff Research Grant (University of Newcastle)."
Participants	**Description:** Parents of children aged 2 to 5 years living in a rural area of New South Wales, Australia **N (Randomised):** 146 parents **Age:** Children (mean): Intervention = 4.0 years, Control = 4.0 years Parents: Younger than 30 years: Intervention = 34%, Control = 17% 30 years or older: Intervention = 66%, Control = 83% **% Female:** Child: Intervention = 47%, Control = 48% Parent: Intervention = 100%, Control = 99% **SES and ethnicity:** Parent education: Secondary = 46%, Tertiary = 55% Aboriginal: Child = 4%, Parent = 2% **Inclusion/exclusion criteria:** Inclusion criteria: "Inclusion criteria were eldest child in family ages 2 to 5 years, without a chronic health condition that affected dietary intake." Exclusion criteria: "A child was excluded if he or she had a chronic disease, such as coeliac disease or a food allergy that has a significant effect on dietary intake. The eldest child within the eligible age range was selected as the study child for consistency and simplicity. " Kids were also excluded if they began primary school **Recruitment:** "parents of young children were recruited from child care facilities in 5 rural, low socioeconomic localities in NSW, Australia." **Recruitment rate:** Parent: 81% (146/180) **Region:** New South Wales (Australia)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 45, Control = 43 **Description of intervention:** "The intervention involved dissemination of the Tummy Rumbles interactive CD (16) and the Raising Children DVD (17) at baseline in September 2009, accompanied by written instructions for optimal use. The only prompt provided to parents to use the resources was a reminder note delivered by post with the 3-month follow-up surveys. To simulate population-level resource dissemination, further prompting of parents was not conducted." "The tummy rumbles interactive nutrition education CD is a self-directed resource for

	childcare staff and parents, Raising children is a guide to parenting from birth to 5" **Duration:** 12 months **Number of contacts:** DVD and CD played at parents' leisure, 1 contact from researchers at 3 months by phone **Setting:** Home **Modality:** DVD/CD **Interventionist:** N/A (provision of DVD) **Integrity:** "Intervention group participants were considered to have adhered to the study protocol if they reported using both Tummy Rumbles and Raising Children for at least 1 hour each during the intervention period." **Date of study:** September 2009 to September 2010 **Description of control:** Wait-list control, " A generic nutrition brochure and the Active Alphabet physical activity resource were distributed to the control group to simulate real-life exposure to control resources and facilitate retention and blinding of the control group. Tummy Rumbles and Raising Children were provided to the control group at trial completion."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetables (servings) assessed using a semi-quantitative food frequency questionnaire (FFQ), the Australian Toddler Eating Survey (ATES) completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 3 and 12 months **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up (at 3 and 12 months):** Intervention = 17%, 40% Control = 24%, 39% **Analysis:** Sample size calculation was performed.
Notes	First reported outcome (serves fruit/day) at 3-month follow-up was for inclusion in the short-term meta-analysis and 12 month follow-up for the ≥ 12 months meta-analysis. Additional data were provided by the author to allow pooling in meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, power calculation

	conducted fruit or vegetable intake	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	The random sequence was created by computer-generated random numbers
Allocation concealment (selection bias)	Low risk	Allocation was concealed given that sequentially-numbered unopened returned baseline survey envelopes were matched with computer-generated random numbers
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants were blinded to group allocation throughout the trial
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Participants were blinded to group allocation throughout the trial. The protocol indicates that assessors of the main outcome measures were blinded to participant group allocation
Incomplete outcome data (attrition bias) All outcomes	High risk	Short-term attrition was 21% and long-term attrition was 40%. No imputation of missing data was carried out
Selective reporting (reporting bias)	Low risk	The primary outcomes published in the protocol align with the results reported in the outcomes paper
Other bias	High risk	There were no differences at baseline in parent and child characteristics except for % of parents older than 30 years. There is no mention that this was adjusted for in the analysis

Fildes 2014

Methods	**Study design:** Randomised controlled trial **Funding:** "The recruitment of the Gemini cohort was funded by a grant from Cancer Research UK (no. C1418/A7974), and the design and production of the packs used in this study was funded by Weight Concern (registered charity no. 1059686)."
Participants	**Description:** Families with 3- to 4-year-old children from a larger cohort study (the Gemini study) **N (Randomised):** 1006 families **Age:** Child (mean): Intervention = 3.9 years, Control = 3.8 years Parent (mean): Intervention = 38.0 years, Control = 37.3 years **% Female:** Child: Intervention = 49%, Control = 50% Parent: not specified **SES and ethnicity:** Maternal education (below university level): intervention 49%, control = 49% **Inclusion/exclusion criteria:** Not specified **Recruitment:** "Participants were families with 3- to 4-year-old children from the Gemini study, a cohort of 2,402 families with twins born during 2007 in England and Wales. Currently active families (n=2,321) were sent information about a study to test a method of increasing children's acceptance of vegetables" **Recruitment rate:** Families: 43% (1006/2321) **Region:** England and Wales
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 98, Control = 123 **Description of intervention:** "The intervention pack contained an exposure instruction leaflet, progress charts, and stickers. The exposure instructions asked parents to offer the child a single very small piece of their target vegetable every day for 14 days, allowing the child to choose a sticker as a reward if they tried it. They were asked to do this separately with each child and outside mealtimes." **Duration:** 14 days **Number of contacts:** 14 **Setting:** Home **Modality:** Face-to-face **Interventionist:**

	Parents **Integrity:** "Among the 175 returned (89%), the mean number of exposure sessions was 13.8 (range= 11 to 14), and children tasted their target vegetables a mean of 12.4 times (range=0 to 14). Children complied with the intervention by trying their target vegetable on an average of 90% (range 0% to 100%) of the exposure days during the experiment phase. " **Date of study:** Unknown **Description of control:** Received no intervention, "Control families were sent the intervention materials on completion of the study."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's intake of the target vegetable (number of pieces). Parents "recorded the number of pieces (including half-pieces) of vegetable the child ate; this comprised the intake measure." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 14 days **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Intervention = 68% Control = 68% **Analysis:** Unknown if sample size calculation was performed
Notes	Mean and SEM were estimated from a study figure using an online resource (Plot Digitizer: plotdigitizer.sourceforge.net) for intervention and control groups at the end of the experimental phase (T3) Sensitivity analysis - primary outcome: Fruit or vegetable intake is listed as primary outcome

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is un-

Fildes 2014 (*Continued*)

		clear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Vegetable intake: There is no mention that the parents were blinded and they were cutting and offering the pieces to the child and this could have influenced performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Vegetable intake: There is no mention that the parents were blinded and they were cutting and offering the pieces to the child and so at high risk of detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	472 (47%) out of the 1006 randomised returned the outcome data sheets and therefore high risk of attrition bias
Selective reporting (reporting bias)	Unclear risk	There are secondary outcomes reported in the trial registration that are not presented in the outcomes paper
Other bias	High risk	Children in the intervention group had significantly lower intake and liking than the control group at baseline (i.e. baseline imbalances)

Fildes 2015

Methods	**Study design:** Randomised controlled trial **Funding:** "This research is supported by European Community's Seventh Framework Programme (FP7/2007-2013) under the grant agreement no. 245012-HabEat. The purees offered to participants in this study and the artichoke and peach purees used as a test food were donated by Danone Nutricia Research."
Participants	**Description:** Mothers and their 4- to 6-month-old infants in the UK, Greece and Portugal **N (Randomised):** 146 parent-infant dyads **Age:** Infant (mean): Intervention = 39.0 weeks, Control = 38.9 weeks Mother (mean, at child's birth): Intervention = 33.0 years, Control = 32.7 years **% Female:** Infant: 52% **SES and ethnicity:** Education (below university) = 27%

	Inclusion/exclusion criteria: "Mothers were eligible to participate if they were over 18 years old at recruitment, they were sufficiently proficient in each country's respective native language to understand the study materials and their infant was born after 37 weeks' gestation, without diagnosed feeding problems." **Recruitment:** "Women in the final trimester of their pregnancy and mothers of infants aged less than 6 months were recruited from antenatal clinics (n 327), primary care, paediatricians and hospitals in London (UK), Athens (Greece) and Porto (Portugal) to a larger study exploring children's fruit and vegetable acceptance during weaning." **Recruitment rate:** Mothers: 45% (146/327) **Region:** London (UK), Athens (Greece) and Porto (Portugal)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 71, Control = 68 **Description of intervention:** "In the intervention group, a researcher or health professional explained to the participant: (1) the importance of introducing vegetables early in the weaning process, (2) the beneficial effects of offering different single vegetables each day, (3) the techniques of exposure feeding, (4) interpreting infants' facial reactions to food and (5) the need for persistence when an infant initially rejects a food "five vegetables were selected as the first foods to be introduced. They were asked to offer the five vegetables in a sequence over 15 d as follows: A,B,C,D,E, A,B,C,D,E, A,B,C,D, E and to record progress on a chart provided. For a further 5 d, participants were told to continue to offer vegetables, but in addition, to start to introduce additional age-appropriate foods." **Duration:** 20 days (15 days exposure, 5 days veg plus other foods) **Number of contacts:** 20 (15 veg feeding exposures, 5 veg plus other food exposures) **Setting:** Home or health facility **Modality:** Face-to-face + leaflet **Interventionist:** Parent **Integrity:** "Completed intervention charts were returned by 86% of intervention families (UK; 100 % (28/28), Greece; 100 % (16/16), Portugal; 63% (17/27)). Completed charts revealed that over the 15-d intervention period, parents recorded their infants consuming vegetables on 89% (mean 13·3 (SD 3·0)) of the fifteen possible eating occasions." **Date of study:** February 2011 and July 2012 **Description of control:** Received no intervention, 'usual care'

Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Infant consumption of fruits and vegetables (serves/day). "Mothers reported separately on the frequency of fruit and vegetable servings they had consumed in the past week and the data were recoded to provide an estimation of the total number each of fruit and vegetable portions consumed daily." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 1 month **Length of follow-up post-intervention:** 2 weeks **Subgroup analyses:** None **Loss to follow-up:** Intervention = 5% Control = 4% **Analysis:** Sample size calculation was performed.
Notes	First reported outcome (vegetable intake) was extracted for inclusion in meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, fruit and vegetable intake 1st listed outcome

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomised to experimental group using a block randomisation matrix created by an independent statistician
Allocation concealment (selection bias)	Unclear risk	Allocation was revealed to the researcher, but unclear how or when
Blinding of participants and personnel (performance bias) All outcomes	High risk	Infant's consumption of novel vegetable: Mothers offered and fed the vegetable to infants. Given the nature of the intervention, parents in the intervention arm were not blinded and therefore this could have influenced performance
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Infant's consumption of novel vegetable: The outcome was weighed, but it is not clear who weighed the food (mother who fed the child, or researcher who observed the mother feeding the child). The researcher who was present during outcome

Fildes 2015 (*Continued*)

		assessment was the same researcher who delivered the intervention to the mother. The impact on detection bias is unclear
Incomplete outcome data (attrition bias) All outcomes	Low risk	139/146 (95%) completed the follow-up and therefore low risk of attrition bias
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Fisher 2012

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "This work was funded by an investigator-initiated grant to J.O.F. from the Clorox Company, which owns the Hidden Valley, The Original Ranch brand of dressing used in this research. The authors attest to having full scholarly authority over this work and responsibility for the research design and methods, the integrity of the data, the analyses, and the interpretation of the findings."
Participants	**Description:** Preschool-aged children in Head Start classrooms and their parent **N (Randomised):** 155 parent-child dyads **Age:** Child: 3 to 5 years (mean = 4 years) Parent: not specified **% Female:** Child: 48% Parent: not specified **SES and ethnicity:** "predominately Hispanic (88%) children" "Of participating parents, close to a majority (n=89) reported being married and slightly greater than one-third (n=51) reported schooling beyond high school." **Inclusion/exclusion criteria:** No explicit inclusion criteria stated for this trial Exclusion criteria: "Exclusion criteria included severe food allergies and/or other medical conditions (e.g., diabetes) that might influence the ability to participate in an ad libitum snack and absences at 75% or more of the vegetable exposure trials." **Recruitment:** "To achieve a target sample size of 37 children per experimental dip condition, eight preschool classrooms within three Head Start Centers were approached to participate.

Fisher 2012 (*Continued*)

	Parents of 166 children were sent letters to request written consent for their own and their child's participation in the study." **Recruitment rate:** Parent-child dyads = 93% (155/166) **Region:** Houston, TX (USA)
Interventions	**Number of experimental conditions:** 4 **Number of participants (analysed):** Plain = 39, Regular = 39, Light = 36, Sauce = 38 142 parents (not specified by group) **Description of intervention:** "At each trial, raw broccoli was presented with 2% milk (8 oz [246 g]) to children in the condition to which they were assigned. Children were instructed to eat as much or as little as desired." Plain: "broccoli was served without dressing." Regular: "broccoli was served with 2.5 oz of a regular ranch-flavored salad dressing." Light: "broccoli was served with 2.5 oz of a reduced-energy/fat ranch-flavored salad dressing." Sauce: "2.5 oz of the regular dressing was mixed together with broccoli as a sauce" **Duration:** 7 weeks **Number of contacts:** "Thirteen exposure trials (twice per week) took place in children's classrooms across a 7-week period." **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Trained research staff **Integrity:** No information provided **Date of study:** 2008 **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of target vegetables (broccoli) (grams) with/without dressing/sauce. "Weights of broccoli, milk, and the salad dressing (except in the plain condition) were recorded to the nearest 0.1 g once a stable reading was indicated using a calibrated, research grade digital electronic balance before and following the snacks. In the sauce condition, broccoli and the dressing intakes were estimated from the amount of the mixture consumed based on the proportionate contributions of each to the total pre-weight." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:**

	Not reported **Length of follow-up from baseline:** 7 weeks **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 2% (not specified by group) **Analysis:** Adjusted for clustering Sample size calculation was performed
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	(Authors describe as a quasi-experimental design although appear to have randomised classrooms) Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	(Authors describe as a quasi-experimental design although appear to have randomised classrooms) There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake (objective): Objective measure of child's vegetable intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake (objective): Objective measure of child's vegetable intake and whether those who weighed the food were blinded is unlikely to have an impact on detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	152/155 (98%) completed the study and therefore risk of attrition bias is low
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome re-

Fisher 2012 (*Continued*)

		porting
Other bias	Unclear risk	There is insufficient information about baseline imbalances and whether clustering was adjusted for in the analyses

Haire-Joshu 2008

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "Funding for this work was provided by National Cancer Institute (R01 CA68398)."
Participants	**Description:** Parents and their children participating in the 'Parents as Teachers' (PAT) programme sites in rural Missouri (USA) **N (Randomised):** 16 PAT sites, 1658 families **Age:** Children: 1 to 3 y: intervention = 67%, control = 61% 4 to 6 y: intervention = 33%, control = 40% Parents: < 25 y: intervention = 28%, control = 21% 25 to 29 y: intervention = 35%, control = 33% 30 to 34 y: intervention = 21%, control = 24% 35+ y: intervention = 17%, control = 23% **% Female:** Children: intervention = 47%, control = 49% Parents: intervention = 99%, control = 98% **SES and ethnicity:** Parent - Not high school graduate: intervention = 16%, control = 11% Parent - College graduate: intervention = 20%, control = 25% Household income: < USD 20K: intervention = 30%, control = 25% USD 20K to 35K: intervention = 30%, control = 25% USD 35K to 50K: intervention = 13%, control = 18% USD 50+K: intervention = 28%, control = 32% Ethnicity - White: intervention = 86%, control = 80% **Inclusion/exclusion criteria:** Not specified **Recruitment:** "16 PAT programs from rural, southeast Missouri were recruited into the study. Within these sites 2012 families enrolled were assessed for eligibility and willingness to participate by parent educators." PAT is a "parenting and child development program with over 3000 sites across all 50 states and 8 US territories." PAT provides free services on "an annual basis to parents at the time of pregnancy until the youngest child is 3 years of age. However, PAT extends services until the youngest child is 5 years of age in the case of

	underserved families, defined as single or minority parent homes, those living in poverty or low parent education. In addition, underserved families may receive additional home visits as a means of ensuring complete delivery of the curriculum." **Recruitment rate:** Families: 79% families PAT sites: unknown **Region:** Rural southeast Missouri (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 605, Control = 701 **Description of intervention:** Intervention families received the standard PAT program plus the 'Hi 5 for Kids' (H5-KIDS) protocol. "H5-KIDS was comprised of three components: a tailored newsletter, a series of home visits, and materials for the parent and child, including storybooks." **Computer-tailored nutrition newsletter** "To develop the tailored newsletter, parents were rst formally enrolled in H5-KIDS and completed a pretest interview. Relevant data was then imported into an in-house computer-based tailoring program. Scores were calculated based on FV knowledge and intake, frequency of parental modeling, style of parenting (coercive or non-coercive), and quality of the home food environment (FV availability). Each newsletter began with a bulleted tailored statement that included the self reported servings of FVs the parent and the child consumed per day. Additional parent data (e.g. FV knowledge, parental role modeling, non-coercive parenting skills, FV availability) were each uniquely used to individualize messages and describe the themes of each of the four storybook sets the family would receive at their home visits. For example, if participant data indicated a parent did not eat FV in front of their child very often (< 7/week), the tailored messages would emphasize the importance of modeling FV intake in front of the child as a means of improving consumption, and provide relevant examples of how this could be accomplished. The parent was then referred to H5-KIDS storybooks that provided examples of modeling for the child. In contrast, parents who scored appropriately in each individual area received messages of praise encouraging them to continue their behaviors. Newsletters were mailed to the parent's home at the beginning of the program." **Home visits** "Parent educators delivered four H5-KIDS home visits, each of which addressed the core program areas (knowledge, parental modeling of FV intake, non-coercive feeding practices, FV availability). Parent educators then reinforced the core content in subsequent visits. Consistent with the philosophy of the PAT program, each visit provided examples of parent-child activities designed around healthy nutrition, that the parent could use to promote the child's language and cognitive ability, and ne and gross motor skill development (e.g. having the child learn the names and colors of various FV; child assists with selecting a variety of FV for breakfast). As part of each visit, parents also received materials and informational handouts with suggestions for improving feeding practices and the food environment in the home. Consistent with the standard PAT program, each home visit was designed to allow for 60 min of contact." **Sing-a-long storybooks with audio cassette** "At each home visit children received a H5-KIDS sing-a-long storybook with audio cassette tape and a coloring book. Each storybook reinforced one of the core areas of the

	H5-KIDS program through the use of child friendly characters and appealing storylines presented through songs." **Duration:** 60 minutes per home visit **Number of contacts:** 4 H5-KIDS home visits plus 5 standard PAT home visits **Setting:** Home **Modality:** Face-to-face via home visits **Interventionist:** Parent educators who received 4 hours of training on nutrition content and overview of materials **Integrity:** "The H5-KIDS program was delivered in its entirety to 78% of intervention families." **Date of study:** 2001 to 2006 **Description of control:** "Parent educators deliver a standardized curriculum via at least five home visits, on-site group activities and newsletters." ("PAT ... empowers parents ... by encouraging positive parent-child communication and increasing parents' knowledge of ways to stimulate children's social and physical development.")
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's daily servings of fruits and of vegetables assessed using the Saint Louis University for Kids Food Frequency Questionnaire (SLU4Kids FFQ) administered by parent telephone survey **Length of follow-up from baseline:** Average time to follow-up was 7 months (range 6 to 11 months) **Subgroup analyses:** Normal weight vs overweight children **Loss to follow-up:** Intervention: 15% (+ 5% missing or inconsistent data) Control: 17% (+ 5% missing or inconsistent data) **Analysis:** Analysis was not adjusted, but justification was provided. "There was minimal impact of grouping by site on the principle measures of impact in this study (ICC child fruit and vegetable servings = 0.00095 and ICC parent fruit and vegetable servings = 0.01). Therefore, the analyses did not adjust for group." Sample size calculation was performed.
Notes	The proportion of normal weight vs overweight children not reported, making it difficult to interpret the subgroup analysis. First reported outcome (fruit intake) was extracted for inclusion in meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake only reported outcome
Risk of bias	

Haire-Joshu 2008 (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"A computer generated number table was used for random assignment to intervention or control."
Allocation concealment (selection bias)	High risk	"Families enrolled in PAT were assessed for eligibility and willingness to participate by parent educators." Contact with the author indicated that parent educators were aware of site allocation when they were enrolling participants to the trial
Blinding of participants and personnel (performance bias) All outcomes	High risk	Study personnel were aware of allocation - "Sites were not blind to assignment." Contact with the author indicated that parent participants completed a consent form which described the activities of their experimental condition, and were therefore unlikely to be blind to allocation. Given the trial outcomes were based on parental report, the review authors judged there was potential for performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Contact with the author indicated that outcome assessors were blind to group allocation
Incomplete outcome data (attrition bias) All outcomes	Low risk	Rates of loss to follow-up (intervention = 15%, control = 17%) and missing/ inconsistent data (intervention = 5%, control = 5%) were similar across groups. No information was provided about reasons for loss to follow-up
Selective reporting (reporting bias)	Unclear risk	A subgroup analysis was conducted based on child's weight status (normal vs overweight). "A final limitation of the study is the limited power to definitely assess the impact of the intervention of children within weight status subgroups." It is unclear whether the subgroup analysis was pre-specified
Other bias	Low risk	Rationale provided for not adjusting analysis for clustering. "There was minimal impact of grouping by site on the principle measures of impact in this study (ICC child fruit and vegetable servings = 0.00095 and

		ICC parent fruit and vegetable servings = 0.01). Therefore, the analyses did not adjust for group." No further risks of bias identified.

Harnack 2012

Methods	**Study design:** Randomised controlled trial - cross-over **Funding:** "Funded by a grant from the Robert Wood Johnson Foundation Healthy Eating Research program."
Participants	**Description:** Preschool-aged children attending a Head Start centre in Minneapolis, Minnesota, USA **N (Randomised):** 57 children **Age:** 2 to 3 years = 51% 4 to 5 years = 49% **% Female:** Not specified **SES and ethnicity:** Child: Non-Hispanic African-American = 76%, Hispanic or Latina/Latino = 6%, Multiracial = 13%, American Indian = 4%, Non-Hispanic White = 2% Parent education: Less than high school = 9%, High school graduate = 42%, Some college = 49% **Inclusion/exclusion criteria:** Not specified **Recruitment:** "Children in three preschool classrooms were recruited. A consent form and letter explaining the study was sent to parents." **Recruitment rate:** 98% (57/58) **Region:** Minneapolis, Minnesota (USA)
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Overall = 53 **Description of intervention:** Fruit and vegetable first: "During the fruit and vegetable first experimental weeks all fruits and non-starchy vegetables on the lunch menu were served traditional family style five minutes in advance of other menu items. Children were allowed to begin eating the fruit and vegetable items served first, with the remaining menu items (e.g. milk, entrée, side dishes) placed on the tables for traditional family style meal service five minutes following distribution of the first course. All other usual meal service practices remained the same during the fruit and vegetable first experimental condition." Provider portioned: "During the provider portioned experimental condition, a plate was

	prepared for each child that contained a specific quantity of each menu item." **Duration:** "Each condition was implemented for two one-week periods over the six week period, for a total of two weeks per condition" **Number of contacts:** Unclear, each day of the 6-week period (dependent on how many days children attend) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Classroom teachers **Integrity:** No information provided **Date of study:** Unknown **Description of control:** Usual 'control' meal service: " "During each day of the control weeks, the usual traditional family style meal service approach to serving lunch meals at the center was followed. During usual lunch meals at the center children are seated around tables, and each food item on the menu is passed around the table from child to child in serving bowls for self-service."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetable serves (1 cup equivalents) Study staff trained and certified in conducting lunch observations recorded food intake on a meal observation form. "The lunch observation data were entered into Nutrition Data System for Research (NDSR), a dietary analysis software program." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 6 weeks **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 7% **Analysis:** Unknown if sample size calculation was performed
Notes	Sensitivity analysis - primary outcome: Primary outcome not stated, fruit and vegetable intake is the only outcome

Risk of bias

Bias	Authors' judgement	Support for judgement

Harnack 2012 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Intake: There is no mention if children were blinded and so it is unclear how this may impact children's vegetable intake
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Intake: Observers made visual estimations of food amounts to determine the amount taken but it is unclear if observers were blinded to condition. Food amounts may not be accurately estimated by observers
Incomplete outcome data (attrition bias) All outcomes	Low risk	3/57 (93%) completed the study and therefore the risk of attrition bias is low
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Hausner 2012

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under the Grant Agreement No. FP7-245012-HabEat."
Participants	**Description:** Children aged 2 to 3 years from 5 nurseries in the Copenhagen area and suburbs **N (Randomised):** 104 children ("from 5 nurseries, involving 17 groups") **Age:** Mean: Mere exposure group = 27.8 months, Flavour-flavour learning group = 27.5 months, Flavour-nutrient learning group = 30.8 months **% Female:**

	Mere exposure group = 63%, Flavour-flavour learning group = 42%, Flavour-nutrient learning group = 54% **SES and ethnicity:** Not specified **Inclusion/exclusion criteria:** Not specified **Recruitment:** "Children aged 2-3 years were recruited for the experiment from five nurseries, involving 17 groups, in the Copenhagen area and suburbs." **Recruitment rate:** Unknown **Region:** Denmark
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Mere exposure group = 20 Flavour-flavour learning group = 30 Flavour-nutrient learning group = 21 **Description of intervention:** Mere exposure group, exposed to unmodified artichoke puree 10 times Flavour-flavour learning group, exposed to a sweetened artichoke puree 10 times Flavour-nutrient learning group, exposed 10 times to an energy dense artichoke puree with added fat **Duration:** 4 weeks **Number of contacts:** 10 exposures **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Nursery staff **Integrity:** No information provided **Date of study:** Unknown **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of unmodified artichoke puree (grams). "Testing took part in group rooms. The children were seated at tables where they would normally eat their lunch to mimic the natural eating environment. The purées were served in preweighted plastic cups at room temperature. The standard serving size was 100 g for artichoke and 130 g carrot. Intake was measured individually and recorded for all sessions with a precision of 1 g." **Outcome relating to absolute costs/costs-effectiveness of interventions:** Not reported

	Outcome relating to reported adverse events: Not reported **Length of follow-up from baseline:** 5 and 8 months **Length of follow-up post-intervention:** 3 and 6 months **Subgroup analyses:** None **Loss to follow-up (at 3 and 6 months):** Mere exposure group = 9%, 38% Flavour-flavour learning group = 21%, 9% Flavour-nutrient learning group = 23%, 46% **Analysis:** Adjusted for clustering (ANOVA proc mixed models). Unknown if sample size calculation was performed.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake: Objective measure of child's vegetable intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake: Intake was weighed and therefore it is unlikely that this would be influenced by detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	Of 104 children, 71 (68%) completed the 6-month follow-up and therefore at high risk of attrition bias
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting

Other bias	Unclear risk	The groups differed in age, but age was included as a covariate to correct for the possible influence on intake. Therefore the risk of other bias is unclear

Hetherington 2015

Methods	**Study design:** Randomised controlled trial **Funding:** "Funding received through the EC Seventh Framework Programme (FP7/2007-2013) under the IAPP 230637 "VIVA: V is for Vegetable - Applying Learning theory to increase liking and intake of vegetables"
Participants	**Description:** Mothers with infants under 12 weeks old **N (Randomised):** 40 mother-infant dyads (20 intervention, 20 control) **Age:** Infant (mean): Intervention = 4.78 months, Control = 4.88 months Mother (mean): Intervention = 33.7 years, Control = 30.9 years **% Female:** Infant: 57% **SES and ethnicity:** Not specified **Inclusion/exclusion criteria:** Not specified **Recruitment:** "Mothers were recruited from the local community using widespread advertising within mother and baby groups and a recruitment agency." **Recruitment rate:** 83% (40/48) **Region:** UK
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 17, Control = 18 **Description of intervention:** "IG infants received 12 daily exposures to vegetable puree added to milk (days 1-12), then 12 x 2 daily exposures to vegetable puree added to baby rice at home (days 13-24). Then both groups received 11 daily exposures to vegetable puree (days 25-35). They were each given a pack containing a 35 day diary and all of the equipment and foodstuffs they would need to complete the study. They were informed that breast or formula feeding should continue as normal." **Duration:** 24 days **Number of contacts:**

	24 exposures (daily) **Setting:** Home + lab **Modality:** Face-to-face **Interventionist:** Parents **Integrity:** "Another possible limitation of the study was that most of the intervention was conducted at home. It is then difficult to ensure that instructions were strictly followed." **Date of study:** Recruitment took place between September 2011 and May 2012. **Description of control:** "Plain milk and cereal were given to the control group (days 1-24)"
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Consumption of vegetables (grams) measured by "a small set of portable digital pocket scales (MYCO MZ-100, Dalman) to weigh accurately intakes (i.e. by weighing bottles or bowls before and after each feed) of all feeds consumed across the day." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 35 days, 6 months and 18 months **Length of follow-up post-intervention:** Immediate **Subgroup analyses:** None **Loss to follow-up (immediate, 6 months, 18 months):** Intervention = 15%, 25%, 45% Control = 10%, 20%, 15% **Analysis:** Unknown if sample size calculation was performed.
Notes	First reported outcome (vegetable intake grams during laboratory session) at immediate follow-up was extracted for inclusion in meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, fruit and vegetable intake 1st listed outcome in abstract

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Mothers were randomised to either the intervention (n = 20) or control group (n = 20) after they had consented to the study and before they had completed any questionnaires."

		No information provided about the randomisation procedure
Allocation concealment (selection bias)	Unclear risk	No information provided about allocation concealment
Blinding of participants and personnel (performance bias) All outcomes	High risk	The participants were aware of whether or not they were adding vegetable puree to milk and rice cereal No blinding, and the outcome is likely to be influenced by lack of blinding
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Food intake was weighed which would be low risk. However, "the researcher and mother made a joint decision on when 3 refusals were reached". This may have impacted on outcome assessment
Incomplete outcome data (attrition bias) All outcomes	Low risk	"Forty parents provided informed consent for their infants to take part in the study; however, complete data were collected on 36 mother-infant dyads." For outcome of vegetable intake grams during laboratory session 17 mothers in the intervention group and 18 mothers in the control group provided data "At 6 months follow-up, 15 mothers in the IG completed the two feeding sessions, while 16 mothers completed them in the CG (86% return rate)."
Selective reporting (reporting bias)	Unclear risk	No protocol listing prespecified outcomes
Other bias	Unclear risk	Recruitment bias may be an issue due to the method used. Baseline table showed that groups appeared similar, so there does not appear to be a high risk of bias. However there is not enough info to determine the level of risk "Mothers were recruited from the local community using widespread advertising within mother and baby groups and a recruitment agency between September 2011 and May 2012." "In total, the research team made contact with 48 mothers and from this initial contact 40 mothers were screened and accepted into the study."

Keller 2012

Methods	**Study design:** Randomised controlled trial **Funding:** "Funding for this study came from NIH grant K01DK068008 and a St. Luke's Roosevelt Hospital Pilot Award. Additional support came from the Obesity Research Center Grant"
Participants	**Description:** Healthy children aged 4 to 5 years from diverse ethnic backgrounds **N (Randomised):** 19 children **Age:** 4 to 5 years **% Female:** Not specified **SES and ethnicity:** "from diverse ethnic backgrounds." **Inclusion/exclusion criteria:** "All the children were "at risk for obesity," based on having at least one parent with a BMI≥25 kg/m2, and they had to consume fewer than two servings of F&V per day, based on parental report during a screening phone call." **Recruitment:** Not specified **Recruitment rate:** Unknown **Region:** Pennsylvania (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 7, Control = 9 **Description of intervention:** "Families in both groups attended weekly, small-group sessions with the researchers where baseline measures were taken and family-based nutrition education was delivered." Children in the intervention group were "given F&V in containers decorated with their favorite cartoon characters. In addition, a sticker was included inside each decorated container to simulate the practice of premiums used by the food industry; children were allowed to collect these stickers on a game board to cash in for a prize the following week. " ***Duration:*** 7 weeks **Number of contacts:** Weekly group sessions and offered F&V containers 3 times a day **Setting:** Home + Lab **Modality:** Face-to-face **Interventionist:** Parents and researchers **Integrity:**

	No information provided **Date of study:** Unknown **Description of control:** "Children who were in the control group received F&V in plain plastic containers throughout the study"
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetables (grams, servings per day). F&V containers were stored by parents throughout the study period and taken back to the lab to be weighed **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 7 weeks **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 16% (not specified by group) **Analysis:** Unknown if sample size calculations performed.
Notes	First reported outcome (grams vegetables/week) was extracted for inclusion in the meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake only outcome reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	There is not enough information to determine the sequence generation
Allocation concealment (selection bias)	Unclear risk	There is not enough information to determine allocation concealment
Blinding of participants and personnel (performance bias) All outcomes	Low risk	The outcome is objective consumption of fruit & vege which is unlikely to be influenced by lack of participant & personnel blinding
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Objective assessment (weight) of fruit and vegetable consumption therefore low risk

Keller 2012 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	16/19 (84%) children completed the 7-week study, however 3 children were excluded from the analysis. Intention-to-treat analysis was not used, therefore high risk of bias
Selective reporting (reporting bias)	Unclear risk	There is not enough information to determine if there is any reporting bias
Other bias	Unclear risk	There is baseline imbalance between the study groups. Children in the intervention group consumed more servings of fruit & veg at baseline. Not clear of the impact this may have had on the results

Martinez-Andrade 2014

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children aged 2 to 5 years at 4 primary care clinics and their parent **N (Randomised):** 4 primary care clinics, 306 children **Age:** Child (mean): Intervention = 40.1 months, Control = 41.1 months Parent (mean): Intervention = 29.3 years, Control = 29.5 years **% Female:** Child: 47% Parent: not specified **SES and ethnicity:** Education: no schooling = 0.3%, Primary school = 8.9%, Junior high = 33.7%, High school = 39.3%, Professional school - 12.5%, Postgraduate = 1.7% **Inclusion/exclusion criteria:** Inclusion criteria: "Participants comprised children aged 2 - <5 years of age whose BMI (calculated as weight in kilograms divided by height in meters squared) was above the median for age and sex (BMI z-score 0 - 3); who attended one of the participating IMSS clinics during the recruitment period for pediatric care, vaccination, or accompanying a family member; and whose parent or caregiver gave written consent to participate." Exclusion criteria: "Families were excluded if they planned to move residences or change primary care clinics during the study period; the child had motor limitations (e.g., physical disability or delay); or required a special diet by medical indication." **Recruitment:** "The project manager approached the directors of the 6 primary care clinics in Mexico City with the greatest proportion of preschoolers (approximately 5% children <5 years) to request their support for the project."

	Recruitment rate: Primary care clinic = 67% (4/6) Child = 10% (306/3095) (using number of participants approached as denominator) **Region:** Mexico City
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 168, control = 138 **Description of intervention:** Intervention participants received a 6-week curriculum focused on obesity awareness and prevention. 5 aspects dealt with throughout the 6 sessions: 1) Dietary culture, risk-benefit practices; 2) The process of feeding acquisition/preparation/service/eating behaviours; 3) Physical activity habits; 4) Importance of weighing/measuring oneself and its meaning; 5) feedback and evaluations **Duration:** 6 weeks **Number of contacts:** 6 sessions (2 hrs a session) **Setting:** Primary care clinics **Modality:** Face-to-face, group sessions **Interventionist:** Nutritionist, nurse and health educator **Integrity:** Delivery of intervention: "To ensure fidelity, a small group of study staff (nutritionist, nurse and health educator) administered all intervention sessions and completed all screening, baseline and follow-up assessments. No quantitative measure of delivery of intervention components" Attendance: "Only 52% (88 of the 168 who agreed to participate) attended ≥ 1 educational session (405 sessions attended in total). The total number of expected attendances at educational sessions was 1008 (168 participants attending 6 sessions each). Thus, compliance in the intervention group was 40% (405/1008) of total expected attendances. However, of the 88 receiving any intervention content, 67% (59/88) attended 5-6 of the intended 6 workshops" **Date of study:** March 2012 to April 2013 **Description of control:** Usual-care control - received no intervention
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetables (servings per week), "staff assisted parents in completing a child Food Frequency Questionnaire (FFQ) adapted from the FFQ used to assess dietary intake among 1-4 year old children in the 2006 Mexican National Nutrition Survey." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:**

	Not reported **Length of follow-up from baseline:** 3 and 6 months **Length of follow-up post-intervention:** 1½ and 4½ months **Subgroup analyses:** None **Loss to follow-up (at 1 ½ and 4 ½ months):** Intervention = 41%, 35% Control = 26%, 26% **Analysis:** Adjusted for clustering Unknown if sample size calculation was performed
Notes	First reported outcome (fruit servings/week) at the longest follow-up < 12 months (3 months after intervention completion - as 6-months follow-up did not report retention values by group) was extracted for inclusion in meta-analysis The reported estimate which adjusted for clustering assessed change from baseline, we therefore used post-intervention data and calculated an effective sample size using ICC of 0.016 to enable inclusion in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable intake listed as primary outcome

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A computer-generated randomisation list designed by a statistician with no connection to the intervention was used for random allocation to experimental group
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Child dietary intake (parent-reported): "Only after informed consent did participants learn of their treatment assignment" There is no blinding to group allocation of participants at follow-up described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Child dietary intake (parent reported): "Only after informed consent did participants learn of their treatment assignment" There is no blinding to group allocation of participants at follow-up described and because self-reported measures were used this is likely to influence detection bias

Martinez-Andrade 2014 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	"Non-participation was greater in the intervention (75 (45%) of 168 participants) than in the usual care (42 (30%) of 138 participants) arm (Figure 1)." Attrition rate was high with >35% of families not completing follow-up at 3 months. Multiple imputations were performed to address missing data however non-participation was greater in the intervention than in the usual care condition
Selective reporting (reporting bias)	Low risk	The primary outcomes reported in the paper align with those specified in the trial registration
Other bias	Unclear risk	There were baseline imbalances between the groups, but results were adjusted Unclear risk of recruitment bias as individuals were recruited to the trial after clusters have been randomised

Menella 2008

Methods	**Study design:** Randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children aged 4 to 9 months and their mother **N (Randomised):** 88 parent-children dyads **Age:** Child (mean): Study 1 fruits = 6.7 months, Study 2 vegetables = 6.3 months Mother (mean): Study 1 fruits = 29 years, Study 2 vegetables = 28 years **% Female:** Child: Study 1 fruits = 49%, Study 2 vegetables = 43% Parent: 100% **SES and ethnicity:** Parent: "Their ethnic background was 55.4% (N =41) Black; 29.7% (N =22) White; 2.7% (N =2) Hispanic and 12.2% (N =9) Other/Mixed Ethnicity." SES not specified **Inclusion/exclusion criteria:** "To qualify the Children had to have at least two weeks of experience eating cereal or fruit from a spoon and little experience with the target fruits and vegetables." **Recruitment:** "Seventy-four mothers whose Children were between the ages of 4 and 9 months were recruited from advertisements in local newspapers and from Women, Children and

	Children Programs in Philadelphia, PA." **Recruitment rate:** Not specified **Region:** Philadelphia (USA)
Interventions	**Number of experimental conditions:** 5 **Number of participants (analysed):** Study 1: fruits Pear group = 20 dyads, between-meal (BM) group = 19 dyads Study 2: vegetables Green bean group = 11 dyads, between-meal (BM) group = 12 dyads, between-meal and within-meal (BM-WM) group = 12 dyads **Description of intervention:** Study 1: fruits "During the home exposure period, one group fed only pears at the target meal (Pear Group, N=20) whereas the other group fed a fruit which was different than the one experienced during the previous 2 days (Between-Meal (BM) Fruit Variety Group, N= 19)." Study 2: vegetables "The three groups differed in the type, amount and variety of foods that infants were fed during the target meal during the 8-day home exposure period. The infants in the Green Bean Group (N=11) were fed only the target vegetable, green beans, whereas those in the Between-Meal variety group (BM Vegetable Variety Group, N=12) and the Between-Meal and Within-Meal Variety Group (BM-WM Vegetable Variety Group, N=12) were fed a variety of vegetables. The BM Variety Group was fed only one vegetable each day and green and orange vegetables were alternated daily, whereas the BM-WM Variety Group was fed two vegetables each day (one green, one orange). In the latter group, the pair of vegetables varied from day-to-day but one of the pair was experienced the prior day." **Duration:** 8 days **Number of contacts:** 8 exposures **Setting:** Home **Modality:** Face-to-face **Interventionist:** Mothers **Integrity:** "All of the mothers complied with these instructions." **Date of study:** Unknown **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetable purees (grams). Mother resealed jars and returned them after the exposure period to be weighed

	Outcome relating to absolute costs/cost effectiveness of interventions: Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 12 days (4 days of test food(s)) **Length of follow-up post-intervention:** 2 days **Subgroup analyses:** None **Loss to follow-up:** Condition 1: fruits Overall = 15% (no specified by group) Condition 2: vegetables Overall = 17% (no specified by group) **Analysis:** Unknown if sample size calculation was performed.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Fruit & vegetable intake: The mother fed the child and there is no mention of blinding, therefore at unclear risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The mother fed the child and there is no mention of blinding. However, this is an objective measure of intake, and therefore low risk of detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	Mother-infant pairs were excluded from the study because they did not comply with experimental procedures or ate less than 5 grams on the testing days. An intention-to-treat approach was not adopted and therefore at high risk of attrition bias

Menella 2008 (*Continued*)

Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	High risk	The groups differed significantly in the fruit study (Study 1) in terms of approachability and there is no mention that this difference was adjusted for in the analysis

Namenek Brouwer 2013

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children and centre directors from 4 licensed childcare centres in North Carolina **N (Randomised):** 4 childcare centres **Age:** < 3 years = 27% 3 to 5 years = 73% **% Female:** Child: not specified Directors: 100% **SES and ethnicity:** "All centers had at least some subsidized children enrolled." Directors: "75% were African American, and 50% had a college degree." **Inclusion/exclusion criteria:** "To participate in the study, centers had to provide all foods and beverages to children in care (i.e., parents could not send food from home), not have an open case of abuse or neglect with the state licensing agency, and have at least three children between the ages of three and five years in care on a regular basis." **Recruitment:** "We mailed a letter of invitation to every licensed center (n = 6) in the city limits of a small community near our research offices. The letter was followed by a telephone call from the study team. We enrolled the first four centers that agreed to participate. Center directors provided written informed consent to participate in the study; parents were provided a fact sheet describing the study and were asked to contact the project director if they did not want their children observed during the dietary assessment." **Recruitment rate:** 100% of centres; recruitment rate for children not reported **Region:** Central North Carolina (USA)

Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** 4 childcare centres, "An average of 19.0 (7.9) children were enrolled per center" **Description of intervention:** "The Watch Me Grow program is a garden-based intervention aimed to increase the number of vegetables and fruits provided to and consumed by children in child care. The intervention took place in spring 2011. The program includes a "crop-a-month" structured curriculum for child-care providers, consultation by a gardener, and technical assistance from a health educator. Over the course of the four-month-long intervention, providers and children in the intervention centers grew (1) lettuce, (2) strawberries, (3) spinach, and (4) broccoli. We designed the garden to yield one crop per month, and provided classrooms in the intervention centers with corresponding curriculum materials highlighting the target fruit or vegetable of the month." **Duration:** 4 months **Number of contacts:** Health educators (technical assistance): monthly Visits from study gardener: at least monthly Centre staff provided curriculum activities: 1 activity per week **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Health educator/Gardener provided intervention to childcare centres Centre Staff provided curriculum/activities to children **Integrity:** No information provided **Date of study:** 2011 **Description of control:** Received no intervention
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetables (mean servings, consumed by 3 children in each centre). Registered dietitians observed all meals and snacks over 2 full days and recorded all foods consumed for each of the 3 target children **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** ~ 5 months **Length of follow-up post-intervention:** 1 month **Subgroup analyses:** None **Loss to follow-up:** N/A: "the same three children may not have been observed pre- to post-intervention."

	Analysis: Did not adjust for clustering Unknown if sample size calculation was performed
Notes	First reported outcome (daily vegetable servings consumed) was extracted for inclusion in meta-analysis No adjustment was made for clustering; we therefore used post-intervention data and calculated an effective sample size using ICC of 0.014 to enable inclusion in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable intake is primary outcome as in trial registry

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"either the intervention or control condition on a 1:1 ratio, using the Research Randomizer (www.randomizer.org/form.htm)" The research randomiser was used to generate the random sequence
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Dietary observation: A trained registered dietitian blinded to treatment group conducted the dietary assessments
Blinding of outcome assessment (detection bias) All outcomes	High risk	Dietary observation: The outcome is observation of foods served and consumed at mealtimes at the childcare centre undertaken by blinded dietitians. However, there is no blinding of childcare centre staff, cooks, children etc., because they were provided with a garden at their centre, curriculum materials and lessons, and staff met with research team about the garden and how to incorporate it into all aspects of the centre
Incomplete outcome data (attrition bias) All outcomes	Low risk	Randomly selected a classroom and then 3 children within classroom at centres to observe pre- and post-intervention; it did not need to be the same 3 children observed pre- and post-intervention

Namenek Brouwer 2013 (*Continued*)

Selective reporting (reporting bias)	Low risk	The primary outcomes reported in the paper align with those specified in the trial registration
Other bias	Unclear risk	"Due to sample size limitations, we did not conduct formal statistical analysis beyond comparing crude differences in mean servings of vegetables and fruits." Insufficient information was reported to determine whether childcare centres were similar at baseline or or recruitment bias. No statistical method to account for clustering, but we calculated an effective sample size prior to inclusion in meta-analysis to account for this

Natale 2014a

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "This research was funded by the Miami-Dade County Children's Trust (grant number 764-287)."
Participants	**Description:** Children aged 2 to 5 years enrolled in 8 subsidised childcare centres in Miami-Dade County, Florida **N (Randomised):** 8 childcare centres, 307 children **Age:** "the average age for boys was 3.82 years, the average age for girls was 3.91 years" **% Female:** Intervention = 49%, Control = 48% **SES and ethnicity:** "Thirty-six percent identified their child as black, 34% identified their child as white, 18% chose other, and 14% were unknown. The ethnicity of the sample mirrors that of Miami-Dade County, with 32% of the parents identifying their child as Hispanic/other, 25% as Hispanic/Cuban, 22% as African American, and 2% as Caucasian. Thirty-five percent of the sample were primarily Spanish speaking and completed the measures in Spanish, and 65% of the sample were primarily English speaking and completed the measures in English" **Inclusion/exclusion criteria:** "Center study inclusion criteria consisted of (a) serve >30 children, (b) serve low-income children, and (c) ethnic makeup had to be reflective of the county as a whole (minority majority). Low income was determined based on whether or not the child received subsidized child care." No inclusion/exclusion criteria specified for children. **Recruitment:**

	"All participants were recruited at the child care center. Parents were approached during drop-off or pickup times. Consent forms were attached to the interview packets, and parent data were collected during the initial visit." **Recruitment rate:** 98% **Region:** Miami-Dade County, Florida (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 238, Control = 69 **Description of intervention:** **Teacher curriculum:** Modeled after a modified version of Hip-Hop to Health Jr., included implementation of lessons and a low-fat, high fibre diet that included more fruits and vegetables with an emphasis on cultural barriers **Parent curriculum**: Modeled after a modified version of the Eating Right Is Basic and Hip-Hop to Health Jr., included a monthly educational dinner (run by dietitians) in which nutrition and physical activity were discussed, monthly newsletters, and at-home activities, also information on how to introduce new foods and how to encourage eating more fruits and vegetables. Parents were encouraged to reduce TV viewing, increase physical activity, and model healthy eating behaviours for their child at home **Centre-based modifications:** These included: the development of policies to increase physical activity and healthy eating; modifying menus to make them compliant with the policies and also to ensure that the U.S. Department of Agriculture (USDA) nutritional requirements were met; agreeing on a drink policy that included providing water as the primary beverage, not allowing juice or sweetened beverages more than one time per week; changing from whole milk to 1% milk; having a snack policy which consisted of substituting healthy snacks, such as fresh fruit and/or vegetables, for cookies and other high-lipid snacks; having a physical activity policy to increase physical activity to more than one hour per day and to decrease TV viewing to less than 60 minutes two times a week **Duration:** 6 months **Number of contacts:** Unclear, multiple contacts **Setting:** Preschool, home **Modality:** Multiple (face-to-face, newsletters) **Interventionist:** Teachers, Parents and Registered Dieticians **Integrity:** No information provided **Date of study:** Unknown **Description of control:** "The Attention control group centers received a visit from an injury prevention education mobile. The mobile provided parents and teachers with hands-on safety education and

	information, as part of an ongoing injury prevention program at the University of Miami. "
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetables assessed using a 16-item food frequency questionnaire (FFQ) completed by parents and teachers **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 3, 6 and 12 months **Length of follow-up post-intervention:** Immediately and 6 months **Subgroup analyses:** None **Loss to follow-up (Immediately post-intervention and 12 months):** Overall = 25%, 42% **Analysis:** Unclear if adjusted for clustering Unknown if sample size calculation performed
Notes	Sensitivity analysis - primary outcome: Primary outcome not stated, BMI 1st listed outcome

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Food intake: There is no blinding to group allocation of participants or personnel described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Food intake (parent and teacher reported): There is no blinding to group allocation of participants or personnel described and this is likely to influence detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	Of the 318 child-parent dyads at baseline, there were 185 (58%) at the 1-year follow-

		up
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	Some evidence of baseline imbalance (e.g. ethnicity) Unclear recruitment bias Unclear whether potential clustering within childcare centres accounted for

Nicklas 2017

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "This study was sponsored by the National Institutes of Health (NIH)/National Institute of Child Health and Human Development through grant number R21-HD073608. Partial support was received from the USDA Agriculture Research Service through specific cooperative agreement 58-6250-0-008."
Participants	**Description:** Preschool-aged children who were predominantly low-income African-American and Hispanics **N (Randomised):** 6 Head Start centres, 253 children **Age:** Mean: Intervention = 4.47 years, Control = 4.38 years **% Female:** Intervention = 49%, Control = 52% **SES and ethnicity:** Hispanics: Intervention = 46%, Control = 54% African-American: Intervention = 59%, Control = 41% **Inclusion/exclusion criteria:** Not specified **Recruitment:** "Recruitment strategies included flyers that were sent to the home with the children, presentations at parent meetings, face-to-face recruitment during child drop-off and pickup at Head Start, and active involvement of the Head Start manager and staff in the recruitment process" **Recruitment rate:** Children: 65% (253/391) **Region:** Houston, TX (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 128, Control = 125

	Description of intervention: The intervention included 4 DVDs (videos) theatre-based puppet shows that aimed at persuading children to increase vegetable consumption through encouragement, rationale/reason, reinforcement, and role modeling that were delivered over 4 consecutive weeks at preschools. Additionally, "each intervention child took home a bag including the DVD video for that week, a pamphlet, main ingredients to prepare a simple vegetable snack, crayons, and a disposable camera (if parents did not have a smart phone) to use as instructed in the booklets." The intervention was "based on the theoretical framework "transportation into a narrative world", three professionally developed characters, unique storylines and an engaging, repetitious song were incorporated in four 20-min videotaped puppet shows." **Duration:** 4 weeks **Number of contacts:** 6 contacts per week **Setting:** Preschool, home **Modality:** Multiple (face-to-face, visual/audio - DVD) **Interventionist:** Teachers and parents **Integrity:** No information provided **Date of study:** Unknown **Description of control:** "During the 4-week intervention period the control group did not receive any alternate intervention."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of vegetables assessed using digital photography and plate weight before and after consumption (grams) **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 4 weeks + 2 days **Length of follow-up post-intervention:** 2 days **Subgroup analyses:** None **Loss to follow-up:** No loss to follow-up **Analysis:** Adjusted for clustering. Unknown if sample size calculation performed.

Notes	Reported estimates accounted for clustering, but confidence intervals or other measures of variance were not available. We therefore estimated means and SDs by groups at follow-up from a study figure using an online resource (Plot Digitizer: plotdigitizer.sourceforge.net) and calculated an effective sample size using ICC of 0.014 to enable inclusion in meta-analysis Sensitivity analysis - primary outcome: Primary outcome was vegetable consumption

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	The random sequence generation was not described
Allocation concealment (selection bias)	Unclear risk	No information about allocation concealment is provided and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Participants and teachers in intervention preschools were not blinded to the intervention, as children viewed a DVD, and teachers were asked to identify the vegetable components served in the lunch. It is unclear whether this resulted in performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Children's vegetable intake was assessed using the digital photography method and plates were weighed and therefore unlikely to be influenced by detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	253 children were enrolled and all of them completed the follow-up assessment, so risk of attrition bias is low
Selective reporting (reporting bias)	Low risk	The primary outcomes reported in the paper align with those specified in the trial registration
Other bias	Unclear risk	There is potential recruitment bias, as it is not clear when or how clusters were randomised, and whether recruitment occurred before or after

O'Connell 2012

Methods	**Study design:** Cluster-randomised controlled trial - cross over **Funding:** "Financial support was provided by the Rudd Foundation."
Participants	**Description:** Children aged 3 to 6 years attending 2 private preschools in a small north-eastern city **N (Randomised):** 2 preschools (number of children not specified, 96 children recruited) **Age:** "Age ranged from 3 to 6 years old, but most (85%) children were 4 or 5 years old." **% Female:** 44% **SES and ethnicity:** "These preschools primarily serve highly educated households; nearly all (93%) of the children had at least one parent with a bachelor's degree and 75% had at least one parent with a graduate or professional degree." "Race/ethnicity was white (69%), Asian (8%), African American (5%), Hispanic (6%), and other (12%)." **Inclusion/exclusion criteria:** Not specified **Recruitment:** Not specified **Recruitment rate:** Unknown **Region:** New Haven (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 43, control = 53 **Description of intervention:** "During the intervention, the children at Preschool A were served one of the new vegetables every day for 30 days in a 3-day cycle (e.g., Monday, cauliflower; Tuesday, snow peas; Wednesday, green pepper) until they had received each vegetable a total of 10 times." **Duration:** 6 weeks **Number of contacts:** 30 (1 per day for 30 days) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Teachers **Integrity:** No information provided **Date of study:** 2007

	Description of control: Control/delayed intervention (Preschool B). " "Preschool B continued routine practices during the first 6 weeks of the study, and then switched conditions with Preschool A for the second 6 weeks"
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of new vegetables (grams). "Researchers picked up the bags of vegetables later from the schools, weighed them, and calculated intake to the nearest gram." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 12 weeks **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** No loss to follow-up **Analysis:** Adjusted for clustering (multilevel modelling) Sample size calculations performed
Notes	Post-intervention data were extracted following the first phase of the trial (Time 2) prior to cross-over. As an estimate was not reported for the Time 2 follow-up that adjusted for clustering, we used post-intervention data and calculated an effective sample size using ICC of 0.014 to enable inclusion in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable only outcome reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable consumption: Objective measure of child's vegetable intake and unlikely to be influenced by performance bias

Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable consumption: Objective measure of child's vegetable intake and unlikely to influence detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	There is no reported attrition. Data from 96 children were analysed
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	High risk	Baseline imbalances were reported. There were differences in vegetable consumption at baseline

Remington 2012

Methods	**Study design:** Randomised controlled trial **Funding:** "Supported by Medical Research Council/National Preventive Research Initiative grant G0701864"
Participants	**Description:** Children aged 3 to 4 years attending nursery school and their primary caregiver **N (Randomised):** 173 parent-child dyads **Age:** Child (mean): tangible reward = 3.96 years, social reward = 3.99 years, control = 3.90 years Primary caregiver (mean): tangible reward = 37.44 years, social reward = 37.35 years, control = 37.52 years **% Female:** Child: tangible reward = 48%, social reward = 54%, control = 55% Primary caregiver (mother): tangible reward = 85%, social reward = 88%, control = 77% **SES and ethnicity:** Primary caregiver: Ethnicity: White = 66%, Black = 2.9%, South Asian = 6% Education level: Nongraduate = 24%, Degree level of higher = 62% **Inclusion/exclusion criteria:** Not specified **Recruitment:** **"**Children aged 3-4 years and their primary caregivers were recruited through nursery schools in North London, United Kingdom.**"** **"**Recruitment was done in 3 waves in 2010. At each wave, teachers distributed consent forms and information letters about the "Tiny Tastes" study, and families were asked to return their contact details in a prepaid envelope if they were interested in taking part.

	Potential participants were then contacted by telephone." **Recruitment rate:** Parent-child dyads: 82% (173/212) **Region:** North London (UK)
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Taste exposure + tangible reward = 47 Taste exposure + social reward = 46 No treatment control = 47 **Description of intervention:** Taste exposure + tangible reward: "The parents were asked to offer their child a small piece (~2.5g) of their target vegetable every day for 12 weekdays and to tell them that they could choose a sticker if they tried it. No tastings were done over the weekends." Taste exposure + social reward: "Parents were asked to offer the vegetable as described above and to praise their child with phrases such as "brilliant, you're a great vegetable taster" if they tasted it. The parents were to emphasize that the praise was being given for tasting the vegetable" **Duration:** 3 weeks **Number of contacts:** 12 taste exposures **Setting:** Home **Modality:** Face-to-face **Interventionist:** Primary caregiver **Integrity:** "The parents were also given a diary to record whether each day's trial was performed, whether the child tried the vegetable, and whether the reward was given; space was allowed for comment." "No differences in the number of days that the child was offered or tried the target vegetable were found between the intervention groups" **Date of study:** 2010 **Description of control:** "Families assigned to the control group did not perform any daily tastings and were given no instructions or materials for the intervention period, but were told that they would be taught a special technique to help their child to eat more vegetables after the last visit. "
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of target vegetable (grams). "Intake (in g) was recorded by weighing the bowl containing pieces of the target vegetable before and after consumption with a digital scale (Mettler Toledo)." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:**

	Not reported **Length of follow-up from baseline:** 3 weeks, ~ 2 months and ~ 4 months **Length of follow-up post-intervention:** Immediately and at 1 and 3 months **Subgroup analyses:** None **Loss to follow-up (Immediately post-intervention, and at 1 and 3 months):** Taste exposure + tangible reward = 0%, 0%, 3% Taste exposure + social reward = 0%, 3%, 2% No treatment control = 0%, 5%, 2% **Analysis:** Sample size calculations performed.
Notes	Data from the longest follow-up < 12 months (3 month follow-up) were extracted for inclusion in meta-analysis. Estimates were reported comparing the tangible reward and control conditions, but not social reward condition. We estimated mean and SEM from a study figure using an online resource (Plot Digitizer: plotdigitizer.sourceforge.net) for all 3 groups. The tangible reward and social reward conditions were combined into a single intervention group for inclusion in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable intake is primary outcome as per trial registry

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Consumption of target vegetable: There is insufficient information to determine the likelihood of performance bias
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Consumption of target vegetable: There is insufficient information to determine the likelihood of detection bias
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	The proportion that completed the follow-up assessments is not reported and therefore the risk of attrition bias is unclear
Selective reporting (reporting bias)	Unclear risk	The primary outcomes reported align with those specified in the trial registration.

		However the secondary outcomes specified on trial registry do not appear to be reported in the abstract
Other bias	Unclear risk	There is insufficient information to determine the risk of other bias

Remy 2013

Methods	**Study design:** Randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children aged 4 to 8 months old and their parent **N (Randomised):** 100 parent-child dyads **Age:** Mean: Repeated exposure = 6.3 months, Flavour-flavour learning = 6.6 months, Flavour-nutrient learning = 6.2 months Parent: not specified **% Female:** Child: Repeated exposure = 47%, Flavour-flavour learning = 35%, Flavour-nutrient learning = 38% Parent: mostly mothers (exact % not reported) **SES and ethnicity:** Not specified **Inclusion/exclusion criteria:** "The criteria for children inclusion were as follows: age between 4 and 8 mo, introduction of complementary foods was started at >2 wk and <2 mo before the start of the study, no health problems or food allergies at the beginning of the study, and gestational age ≥36 wk." **Recruitment:** "Parents in the Dijon area of France were recruited using leaflets or posters distributed in health professionals consulting rooms, pharmacies, and day-care centers." **Recruitment rate:** Parent-child dyads = 81% (100/123) **Region:** Dijon (France)
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Repeated exposure = 32 Flavour-flavour learning = 30 Flavour-nutrient learning = 30 **Description of intervention:** "During the exposure period, infants were exposed 10 times to a basic (RE group), a sweet (FFL group), or an energy-dense (FNL group) artichoke puree according to their

	group." **Duration:** Approx. 41 days **Number of contacts:** 2 - 3 times per week **Setting:** Home **Modality:** Face-to-face **Interventionist:** Parents **Integrity:** "parents were given precise instructions, and data collected in the notebook revealed that they complied with the instructions." **Date of study:** October 2010 and May 2011 **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of varied artichoke purees (grams). "To measure intake, parents were asked to weigh each jar before and after consumption, using a digital kitchen scale (61 g, Soehnle) that we provided them with, and to record the weight in a notebook. After each observation, parents were required to reseal the jar(s) of food, freeze them, and bring the used jars back to the laboratory to check compliance with the study procedure and data accuracy." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Unclear **Length of follow-up post-intervention:** 2 weeks, 3 months and 6 months **Subgroup analyses:** None **Loss to follow-up (at 2 weeks, 3 and 6 months):** Overall = 5%, 7%, 8% **Analysis:** Sample size calculations performed.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation pro-

Remy 2013 (*Continued*)

		cedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake: The interventions are all artichoke puree with different nutrient content. Parents would be unable to determine study group from feeding the child, and therefore this would be unlikely to influence the outcome
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake: This is objective assessment. Parents would be unable to determine study group from feeding the child, and therefore this would be unlikely to influence the outcome
Incomplete outcome data (attrition bias) All outcomes	High risk	5 families dropped out during the exposure period and were excluded. An intention-to-treat approach was not used and therefore at high risk of attrition bias
Selective reporting (reporting bias)	Low risk	The outcomes reported in the paper align with those specified in the trial registration
Other bias	Unclear risk	The groups differed significantly in relation to weaning, but this was adjusted for in analyses. Therefore the risk of other bias is unclear

Roe 2013

Methods	**Study design:** Cluster-randomised controlled trial - cross-over **Funding:** "Supported by NIH grant R01 DK082580"
Participants	**Description:** Children 3 to 5 years attending the Bennett Family Center on campus at The Pennsylvania State University **Age:** Mean: 4.4 years **% Female:** 52% **SES and ethnicity:** "The children were racially diverse: 56% were white, 29% Asian, 11% black or African American, and 4% Pacific Islander."

	Inclusion/exclusion criteria: No explicit inclusion criteria stated for this trial Exclusion criteria: "Children who were allergic to any of the foods to be served at the snack were not included in the study." **Recruitment:** "Participants in the study were recruited by distributing letters to parents of children in 4 classrooms of the childcare facility that included children aged 3-5 y; these classrooms had a total of ~75 children present at snack time." **Recruitment rate:** Unknown **Region:** Pennsylvania (USA)
Interventions	**Number of experimental conditions:** 8 **Number of participants (analysed):** Overall = 61 **Description of intervention:** Variety type serve: 1 x occasion: a variety of all 3 vegetables offered (cucumber, sweet pepper, tomato) 1 x occasion: a variety of all 3 fruits offered (apple, peach, pineapple) Single-type serve: 3 x occasions: a single type of vegetable offered (cucumber, sweet pepper, tomato) 3 x occasions: a single type of fruit offered (apple, peach, pineapple) **Duration:** 4 weeks **Number of contacts:** 8 **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Childcare helper **Integrity:** No information provided **Date of study:** February to April 2011 **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetables (number of pieces). "The number of pieces of vegetables or fruit selected by each child in the study was recorded independently by 2 observers seated near each table." "After the meal, the number of uneaten pieces on each child's plate was recorded as well as any dropped pieces. All uneaten food and beverage items were weighed after the meal with digital scales (models PR5001 and XS4001S; Mettler-Toledo Inc)." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported

	Outcome relating to reported adverse events: Not reported **Length of follow-up from baseline:** Unclear **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** No loss to follow-up **Analysis:** Unclear if adjusted for clustering Unclear if sample size calculations performed
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random sequence created using a computerised random-number generator
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable and fruit intake Child's vegetable and fruit intake unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Vegetable and fruit intake: 2 observers independently recorded the number of pieces of vegetables or fruit selected by each child. However it is unclear whether these observers were blinded to condition and whether this influenced detection bias. This was observation of the number of pieces of fruit or vege selected and eaten by each child, and weight of any uneaten pieces of fruit /veg on the plate at end of meal. It was assessed by 2 independent observers, but it is not clear if they were blinded or not. Childcare staff sat at table with children and passed around fruit & vege bowls but were unaware of the study hypotheses

Roe 2013 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Low risk	54 (89%) of the 61 children completed the liking ratings and therefore the risk of attrition bias is low
Selective reporting (reporting bias)	Low risk	The primary outcomes reported in the paper align with those specified in the trial registration
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Roset-Salla 2016

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "This work was supported by a grant for investigation in nursing from Collegi Oficial d' Infermeria de Barcelona, 2009 (grant number PR-5001/09); Primer Premio Nacional de Investigación en Enfermería, 2009, from Hospital Universitario Marqués de Valdecilla; and a grant for investigation in nursing from Acadèmia de Ciències Mèdiques de Catalunya i Balears, filial Maresme, 2010. The funders had no role in the design, analysis or writing of this article."
Participants	**Description:** Children aged 1 to 2 years attending 12 daycare centres and their parent **N (Randomised):** 12 day-care centres, 206 children, 195 parents **Age:** Child (mean): Intervention = 1.3 years, Control = 1.4 years Parent (mean): Intervention = 35 years, Control = 35 years **% Female:** Child: Intervention = 37%, Control = 49% Parent: Intervention = 93%, Control = 85% **SES and ethnicity:** Educational level: Primary = 10%, Secondary = 35%, University = 55% **Inclusion/exclusion criteria:** No explicit inclusion criteria stated for this trial Exclusion criteria: "Children still exclusively breast-feeding at the time of the study, children whose parents were not responsible for their alimentation, children with special diets due to chronic diseases (such as coeliac disease, food intolerances or allergies, inflammatory bowel disease), parents with language difficulties, parents unable to attend the educational workshops and those who did not sign the informed consent." **Recruitment:** "At the beginning of the school term, all parents of the children attending the participating day-care centres were invited to informative meetings regarding the study with the use of pamphlets and posters." **Recruitment rate:**

	Child: 35% (206/581) **Region:** The city of Mataró (north of Barcelona), Spain
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Child: Intervention = 75, Control = 67 Parent: Intervention = 74, Control 72 **Description of intervention:** "All parents from the day-care centres in the intervention group (IG) were invited to attend four educational workshops on alimentation at the beginning of the study and one reminder at 4 months. A model of participatory-active education was used, in order to achieve practical skills in addition to nutritional knowledge. Cognitive (teaching how to improve diet), emotional (addressing beliefs and attitudes of the participants through discussion and analysis techniques) and skill areas (developing dietary skills) were included. The aim was to incorporate new and better dietary knowledge and to change the habits of the participants." **Duration:** 6 months (workshops in October - November and a reminder in March) **Number of contacts:** 5 workshops **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Nurses trained in nutrition **Integrity:** No information provided **Date of study:** October 2010 to May 2011 **Description of control:** "The parents included in the control group (CG) did not receive any education related to nutrition. In order to avoid drop outs, the participants of the CG were invited to a workshop on a subject not related to the study or nutritional education (manipulation and conservation."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruits and vegetables (servings per day) assessed using a 78-item food frequency questionnaire (FFQ) completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 8 months **Length of follow-up post-intervention:** 2 months **Subgroup analyses:**

	None **Loss to follow-up:** Child: Intervention = 32%, Control = 35% Parent: Intervention = 9%, Control = 8% **Analysis:** Did not adjust for clustering. Unknown if sample size calculation performed.
Notes	First reported outcome (changes in vegetable and garden produce servings per day) was extracted for inclusion in the meta-analysis. To enable inclusion in meta-analysis, we calculated post-intervention means by group by summing baseline and change from baseline means, assuming baseline SDs for post-intervention SDs, and we calculated an effective sample size using ICC of 0.014 to account for clustering Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake 2nd listed outcome after adherence to Mediterranean diet

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Dietary intake (self-reported): There is no blinding to group allocation of participants and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Dietary intake (self-reported): There is no blinding to group allocation of participants and because this is a self-reported measure this is likely to introduce detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	"Of the parents randomized to the IG only sixty-seven (65 %) attended three or more workshops, with the remaining parents considered drop outs. The reasons for not attending the workshops were mainly difficulties in family timetables and illness of the children". 35% of the intervention group did not attend the minimum of 3 workshops and

Roset-Salla 2016 (*Continued*)

		were considered dropouts. Therefore analysis was not undertaken according to intention-to-treat principles and risk of attrition bias is high
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	There were baseline imbalances for certain characteristics between the conditions (e.g. servings of legumes), although adjusted for in the analysis and so the impact of this is unclear Analysis did not accounted for effect of clustering, but we calculated an effective sample size prior to pooling in meta-analysis to account for this

Savage 2012

Methods	**Study design:** Randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children aged 3 to 5 years attending full-day childcare at the Child Development Laboratory located at The Pennsylvania State University **N (Randomised):** 21 children **Age:** Mean = 4.3 years **% Female:** 59% **SES and ethnicity:** "most of the families (60%) reported combined family incomes of US>$50,000." **Inclusion/exclusion criteria:** "Exclusion criteria were the presence of food intolerance to study foods, chronic illness affecting food intake, consuming <22 g of the entree (<10% of the 220-g entree portion) , dislike of the main entree, uncooperative behavior during lunch, non-English speaking, or extended absences." **Recruitment:** Not specified **Recruitment rate:** Unknown **Region:** Pennsylvania (USA)

Interventions	**Number of experimental conditions:** 6 **Number of participants (analysed):** Overall = 17 (not specified by group) **Description of intervention:** "Children were served a series of 6 lunches in a random order, once per week, which varied only in entrée portion size (entree portion size order: 100, 160, 220, 280, 320, and 400 g). Children were served lunch on the same day of the week at their regularly scheduled time in an eating laboratory dining room facility near their classroom." "The menu at all lunches included the portion-manipulated macaroni and cheese entree and fixed portions of 2% milk and other foods served with the entree (eg, green beans with butter, whole-wheat roll, and unsweetened applesauce)." **Duration:** 6 days **Number of contacts:** 6 (1 lunch per day) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Research staff **Integrity:** No information provided **Date of study:** 2007 **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetable for different entree portion sizes (grams). "Food and milk weights were recorded before and after consumption to the nearest 0.1 g by using digital scales (Mettler-Toledo PR5001 and Mettler-Toledo XS4001S; Mettler-Toledo Inc). The amount of each food item consumed (g) was determined by subtracting postmeal weights from premeal weights." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 6 days **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 19% (not specified by group) **Analysis:** Unknown if sample size calculations performed.

Savage 2012 (*Continued*)

Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Food and milk intake: Objective measure of child's food intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Food and milk intake (weighed before and after consumption): Objective measure of child's food intake because food was weighed before and after consumption. Low risk of detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	There is no reported attrition. Data are reported for all of the 17 children who met predetermined inclusion criteria
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Skouteris 2015

Methods	**Study design:** Randomised controlled trial **Funding:** "Australian Research Council Linkage Grant (ARC LP100100049)"
Participants	**Description:** Children aged 20 to 42 months and their parent **N (Randomised):** 201 parent-child dyads

	Age: Child (mean): Intervention = 2.7 years, Control = 2.8 years Parent (mean): Intervention = 35 years, Control = 35 years **% Female:** Child: Intervention = 49%, Control = 37% Parent: not specified **SES and ethnicity:** Parent highest level of education (Bachelor degree or higher): Intervention = 57%, Control = 60% Annual family income (AUD): AUD < 450,000: Intervention = 14%, Control = 21% AUD 45,001 - 85,000: Intervention = 41%, Control = 33% AUD 85,001 - 125,000: Intervention = 27%, Control = 27% AUD > 125,000: Intervention = 17%, Control = 19% Location of parents' birth: Australia or New Zealand: Intervention = 77%, Control = 74% Europe: Intervention = 3%, Control = 4% Asia: Intervention = 11%, Control = 9% **Inclusion/exclusion criteria:** Inclusion criteria: "Families were eligible if their child was aged 20-42 months at baseline (waitlist children would still be ≤4 years when receiving the programme), and if parents were aged ≥ 18 years and could read and write English (with the assistance of an interpreter if required). There were no other qualifying or exclusion criteria." **Recruitment:** "We sourced participants through community events, local newspaper and magazine advertisements, flyers distributed through kindergartens/pre-schools/childcares, maternal and child health centres, and medical centres." **Recruitment rate:** Parent-child dyads = 97% (201/207) **Region:** Victoria (Australia)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Time 2: Intervention = 80, Control = 72 Time 3: Intervention = 74, Control = 69 Time 4: Intervention = 73, Control = 63 **Description of intervention:** MEND (Mind, Exercise, Nutrition…Do it! 2 - 4 intervention: "Each session included three sections: (i) 30 min of guided active play; (ii) 15 min of healthy snack time based on an evidence-based, exposure technique to promote acceptance of fruit and vegetables and (iii) 45 min of supervised creative play activities for the children while parents attended an interactive education and skill development session. Guided active play involved games played with children and parents together that could be easily replicated at home. Healthy snack time centred on a role model (puppet called 'Max Moon') who encouraged children to sniff, touch, lick and taste fresh fruit and vegetables. Parents received weekly handouts." **Duration:** 10 weeks

	Number of contacts: 10 (1 per week, 90 minutes a session) **Setting:** Community health centres **Modality:** Face-to-face **Interventionist:** Trained program leader **Integrity:** "Programme leaders were monitored regularly to ensure their practice was in accordance with guidelines." **Date of study:** May 2010 and December 2012 **Description of control:** Wait-list control: "The WLC group did not receive any intervention, but were offered the programme at study completion."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetables (usual servings) assessed by the Eating and Physical Activity Questionnaire completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Post-intervention: 10 weeks Time 2: ~ 8 - 9 months Time 3: ~ 15 months **Length of follow-up post-intervention:** Immediately Time 2: 6 months Time 3: 12 months **Subgroup analyses:** None **Loss to follow-up (Immediately post-intervention and at 6 and 12 months):** Intervention = 12%, 4%, 4% Control = 5%, 6%, 6% **Analysis:** Sample size calculations performed
Notes	First reported outcome (usual servings a day of vegetables) at the longest follow-up < 12 months (6 months) and ≥ 12 months (12 months) was extracted for inclusion in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable intake listed as primary outcome in trial registry
Risk of bias	

Skouteris 2015 (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"conducted by a researcher not involved in data management using a randomized treatment allocation schedule produced by computer algorithm." The random sequence was produced by computer algorithm
Allocation concealment (selection bias)	Unclear risk	Although the authors indicate that participants were informed of group allocation by opaque envelopes, there is no indication if these envelopes were sealed and sequentially numbered
Blinding of participants and personnel (performance bias) All outcomes	High risk	Dietary intake (includes fruit and vegetables): There is no blinding to group allocation of participants described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Dietary intake (includes fruit and vegetables) (self-report): There is no blinding to group allocation of participants described and because of the self-report measure this is likely to influence detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition rate was < 20% at follow-up T4 and missing values of baseline measurements were imputed using mean imputation
Selective reporting (reporting bias)	Unclear risk	"Outcomes not addressed here will be presented in future papers." Insufficient evidence to determine, as it appears that future papers with additional outcomes are planned
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Spill 2010

Methods	**Study design:** Cluster-randomised controlled trial - cross-over **Funding:** "Supported by the National Institute of Diabetes and Digestive and Kidney Diseases (R01 DK082580) and the Robert Wood Johnson Foundation"
Participants	**Description:** Children aged 3 to 6 years enrolled in daycare at the Bennett Family Center on campus at The Pennsylvania State University **N (Randomised):** 5 classrooms, 51 children **Age:** Mean = 4.4 years **% Female:** 57% **SES and ethnicity:** "Of the 51 children in the study, 46 parents provided demographic information for their children. Of these 46 children, 28 (61%) were white, 14 (30%) were Asian, 3 (7%) were black or African American, and 1 (2%) was American Indian or Alaska Native. Parents of the children had above-average educational levels and household incomes; 90% of mothers and 85% of fathers had a college degree, and 79% of households had an annual income >$50,000." **Inclusion/exclusion criteria:** No explicit criteria stated for this trial **Recruitment:** "Recruitment began in April 2008 by distributing letters to parents who had children aged 3-6 years enrolled in daycare at the Bennett Family Center at the University Park campus of The Pennsylvania State University." **Recruitment rate:** Unknown **Region:** Pennsylvania (USA)
Interventions	**Number of experimental conditions:** 4 **Number of participants (analysed):** Overall = 51 **Description of intervention:** One day a week for 4 weeks, children were provided with a first course and main course at lunch. Across the weeks the portion size of raw carrots and dip served as the first course of lunch was varied (30 g, 60 g, or 90 g) and during 1 week no first course was provided. Cooked broccoli was served as the vegetable with the main lunch course **Duration:** 4 weeks **Number of contacts:** 4 (1 day a week) **Setting:** Preschool **Modality:** Face-to-face

	Interventionist Preschool teacher **Integrity:** No information reported **Date of study:** Recruitment began in April 2008 **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of vegetables for different first course portion sizes (grams). "Uneaten items were removed, and weights were recorded to the nearest 0.1 g with digital scales. Consumption of the foods and milk was determined by subtracting postmeal weights from premeal weights." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Unclear **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** There was no loss to follow-up **Analysis:** Unclear if adjusted for clustering Sample size calculations performed.
Notes	Sensitivity analysis - primary outcome: Vegetable intake listed as primary outcome in trial registry

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Children were enrolled from 5 classrooms; the order of the experimental conditions across study weeks was assigned to classrooms by using a Latin square design." There is no description of how or who generated the latin square design (e.g. whether it was a computer-generated random sequence or not)
Allocation concealment (selection bias)	Unclear risk	It is not clear who undertook randomisation of classrooms

Spill 2010 (*Continued*)

Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	"Incidents of food and drink spillage were recorded by researchers. Teachers were instructed to redirect conversations pertaining to food to nonfood-related topics to minimize the influence on lunch intake." Children were not blinded and it seems unlikely that this would influence their intake. Staff present during the meal and staff who served the food to children were not blinded and it seems unlikely this would influence child intake
Blinding of outcome assessment (detection bias) All outcomes	High risk	"Uneaten items were removed, and weights were recorded to the nearest 0.1 g with digital scales". "Incidents of food and drink spillage were recorded by researchers." Appears that researchers who weighed the food were the same researchers who recorded incidents of food and drink spillage. Researchers were not blinded and this may have had an impact on how the outcome was recorded in different classrooms
Incomplete outcome data (attrition bias) All outcomes	Low risk	"A total of 51 children were enrolled, and all of them completed the study" There were no children who dropped out over the study
Selective reporting (reporting bias)	Unclear risk	There is no study protocol and unable to determine if all prespecified outcomes have been reported as described
Other bias	Low risk	There are no other sources of potential bias

Spill 2011a

Methods	**Study design:** Randomised controlled trial - cross-over **Funding:** Not reported
Participants	**Description:** Children aged 3 to 6 years attending 2 daycare centres at the University Park campus of The Pennsylvania State University **N (Randomised):** 49 children **Age:**

	Mean = 4.7 years **% Female:** 54% **SES and ethnicity:** "Of the 39 children, 28 children (72%) were white, 9 children (23%) were Asian, and 2 children (5%) were black or African American. Parents of the children had above average education levels and household incomes; ~90% of mothers and 80% of fathers had a college degree, and 76% of households had an annual income >$50,000." **Inclusion/exclusion criteria:** No explicit inclusion criteria stated for this trial Exclusion criteria: "Children with an allergy to the foods being served were not eligible to participate in the study." **Recruitment:** "Recruitment began by distributing letters to parents with children aged 3-6 years who were enrolled in daycare at the Bennett Family Center or the Child Development Laboratory at the University Park campus of The Pennsylvania State University." **Recruitment rate:** Unknown **Region:** Pennsylvania (USA)
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Overall = 39 **Description of intervention:** "The 3 experimental entrees were manipulated by adding pureed vegetables to a standard recipe (100% energy dense (ED) condition) to reduce the ED by either 15% (85% ED condition) or 25% (75% ED condition). Manipulated entrees were zucchini bread at breakfast, pasta with tomato-based sauce at lunch, and chicken noodle casserole at dinner and evening snack." In addition unmanipulated side dishes and snacks were served, including fruit, vegetables, milk and cheese and crackers **Duration:** 3 weeks **Number of contacts:** 3 (1 day a week) **Setting:** Preschool **Modality:** Face-to-face **Interventionist** Unclear **Integrity:** No information reported **Date of study:** January and May 2010 **Description of control:** N/A

Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of vegetable for difference energy density entrees (grams). "Food and beverage weights were recorded to the nearest 0.1 g with digital scales (PR5001 and XS4001S; Mettler-Toledo Inc). The consumption of foods and beverages was determined by subtracting postmeal weights from premeal weights." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Effect of intervention on amount of meal consumed **Length of follow-up from baseline:** Unclear **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 18% **Analysis:** Sample size calculations performed.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	The random sequence was generated with computer software
Allocation concealment (selection bias)	Unclear risk	"Random orders were generated with computer software and assigned to a list of participant identification numbers" The random sequence was assigned to a list of participant identification number, but it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake: Objective measure of child's vegetable intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake: Objective measure of child's vegetable intake and unlikely to be influenced by detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	49 children were enrolled, but 9 were excluded because they had difficulty following the protocol. Given an intention-to-

		treat approach to analysis was not used, the risk of attrition bias is high
Selective reporting (reporting bias)	Low risk	The primary outcomes reported in the paper align with those specified in the trial registration
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Spill 2011b

Methods	**Study design:** Cluster-randomised controlled trial - cross-over **Funding:** Not reported
Participants	**Description:** Children aged 3 to 5 years attending 2 daycare centres at the University Park campus of The Pennsylvania State University **N (Randomised):** 5 classrooms, 73 children **Age:** Range 3.3 to 5.7 years (mean = 4.7 years) **% Female:** 57% **SES and ethnicity:** "Parents of the children had above average education levels and household incomes; approximately 95% of mothers and 88% of fathers had a college degree and 70% of households had an annual income above $50,000." "Parents provided demographic information for 66 of the 72 children; of these, 42 (67%) were white, 17 (27%) were Asian, and 4 (6%) were black or African American" **Inclusion/exclusion criteria:** Not specified **Recruitment:** "Recruitment began by distributing letters to parents who had children within the age range of three to six years enrolled in two daycare centers on the University Park campus of The Pennsylvania State University." **Recruitment rate:** Unknown **Region:** Pennsylvania (USA)
Interventions	**Number of experimental conditions:** 4 **Number of participants (analysed):** Overall = 72 **Description of intervention:**

	"On one day a week for four weeks, children in a daycare setting were provided with breakfast, lunch, and afternoon snack. Across the weeks, the portion size of soup (tomato soup) served in the first course of lunch was varied (150, 225, or 300 g) and during one week no first course was provided. The foods and beverages served in the main course of lunch, as well as the foods and beverages served at breakfast and snack, were not varied in portion size." **Duration:** 4 weeks **Number of contacts:** 4 (1 day per week) **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Teachers **Integrity:** No information provided. **Date of study:** Unknown **Description of control:** N/A
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of vegetable (grams): tomato consumed from soup + broccoli from main course, Broccoli only, Afternoon snack, Total (soup, broccoli and afternoon snack) . Portion sizes of foods were provided and researchers recorded the amount consumed **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Unclear **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** Overall = 1% **Analysis:** Unclear if adjusted for clustering Sample size calculations performed.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Spill 2011b (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Vegetable intake: Objective measure of child's vegetable intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Vegetable intake: Researchers recorded the number of pieces of each food item taken by the child and it is unlikely that this would be influenced by detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	72 out of 73 children were included in the vegetable intake analysis and therefore the risk of attrition bias is low
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue

Staiano 2016

Methods	**Study design:** Randomised controlled trial **Funding:** "AES is supported, in part, by the 1 U54 GM104940 grant from the National Institute of General Medical Sciences of the National Institutes of Health, which funds the Louisiana Clinical and Translational Science Center (July, 2015 to June, 2017)."
Participants	**Description:** Children aged 3 to 5 years attending at 2 full-day preschools **N (Randomised):** 42 children **Age:** Mean: Food modelling DVD = 4.5 years, Non-food DVD = 4.1 years, No DVD (Control) = 4.3 years **% Female:**

	50% **SES and ethnicity:** Child: White = 74%, African American = 5%, Asian = 10%, Hispanic = 10% **Inclusion/exclusion criteria:** Not specified **Recruitment:** Not specified **Recruitment rate:** 39% (42/108) **Region:** LA (USA)
Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** Food modelling DVD = 14 Non-food DVD = 14 No DVD (Control) = 14 **Description of intervention:** Food modelling group = Copy-Kids Eat Fruits and Vegetables DVD Non-food DVD group = Copy-Kids Brush Teeth. Day 1: "Depending on the condition, on day 1 the child viewed 1 of 2 video clips or sat quietly for 7.5 minutes. Two plates of snacks (the modelled vegetable and a comparison food) were placed in front of the participant in a standardized format (green bell peppers on the right and dry cereal on the left) on separate, identical white Styrofoam plates. Children were instructed to eat as much or as little as they wished during this time. The video segments were played concurrently during the food presentation" Day 2 and 7: "food items were presented for 7.5 minutes without the concurrent video presentation" **Duration:** 1 week ± 2 days **Number of contacts:** 3 **Setting:** Preschool **Modality:** Visual/audio - DVD **Interventionist:** Unclear **Integrity:** No information provided **Date of study:** Unknown **Description of control:** No DVD Control: food items were presented the same way as in the intervention but no DVD was played on any of the 3 exposure days
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of vegetable (grams). "Study staff weighed 0.5 cups of the modeled vegetable (ie, approximately 80 g of raw, sliced green bell pepper) and 0.5 cups of

	the comparison food (ie, approximately 16 g of Multi Grain Cheerios; General Mills, Minneapolis, MN) using a transportable scale before and after snack presentation on days 1, 2, and 7." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 1 week ± 2 days **Length of follow-up post-intervention:** Immediately **Subgroup analyses:** None **Loss to follow-up:** There was no loss to follow-up **Analysis:** Unknown if sample size calculations performed.
Notes	Outcome data from the longest follow-up < 12 months (day 7). We estimated the mean and SEM from a study figure using an online resource (Plot Digitizer: plotdigitizer.sourceforge.net) for all 3 groups. We combined the control DVD and control conditions into a single control group for inclusion in meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake 1st listed outcome in abstract

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"used block randomization to distribute age and sex evenly across conditions using a randomization schedule generated with SAS programming" The random sequence was generated using statistical software, SAS
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Vegetable intake (weighed): Objective measure of child's vegetable intake and unlikely to be influenced by performance bias Parent reported fruit and vegetable consumption: There is no blinding to group allocation of participants or personnel described and this is likely to influence performance.

Staiano 2016 (*Continued*)

		However, it does appear that parents were blinded to the food provided to their children. "Researchers did not inform parents regarding which foods were presented to the children."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Vegetable intake (weighed): Objective measure of child's vegetable intake and unlikely to be influenced by detection bias Parent reported fruit and vegetable consumption: There is no blinding to group allocation of participants or personnel described and these are self-reported measures. However, "Researchers did not inform parents regarding which foods were presented to the children."
Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants randomised completed the study. Therefore low risk of attrition bias
Selective reporting (reporting bias)	Low risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	The authors state that limitations included potential for within-school contamination across conditions. No other evidence presented about this potential bias

Tabak 2012

Methods	**Study design:** Randomised controlled trial **Funding:** "Funding for this research was provided by an unrestricted grant from "Get Kids in Action," a partnership between the Gatorade Corporation and the University of North Carolina."
Participants	**Description:** Children aged 2 to 5 years and their parent **N (Randomised):** 50 parent-child dyads **Age:** Child (mean): Intervention = 3.9 years, Control = 3.3 years Parent (mean): Intervention = 36.6 years, Control = 36.2 years **% Female:** Child: Intervention = 59%, Control = 67%

	Parent: Intervention = 86%, Control 90% **SES and ethnicity:** Parent (non-white): Intervention = 18%, Control = 10% Income (USD): < 50,000: Intervention = 18%, Control = 81% ≥ 50,000: Intervention = 77%, Control = 19% Education: College or less: Intervention = 36%, Control = 43% **Inclusion/exclusion criteria:** At least 1 child 2 - 5 years old, "Additional eligibility criteria included having lived in their current residence and planning to stay in that residence for at least 6 months. If the family had more than 1 eligible child, the eldest was selected as the reference child" **Recruitment:** "A convenience sample of 50 parent-child dyads, with at least 1 child 2-5 years old, was recruited through child care centers, listservs, and community postings. Interested parents responded to recruitment materials and were screened by phone." **Recruitment rate:** Unknown **Region:** USA
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 22, control = 21 **Description of intervention:** "addressed vegetable and food issues based on the baseline surveys, and the dietitian helped parents select 1 primary target area for improvement during the intervention from 4 possible options (vegetable availability; picky eating; modeling; family meals). These areas were selected based on Social Cognitive Theory, which posits that there is reciprocal interaction between an individual and his/her environment. This theory also highlights the importance of self-efficacy, which was thus a target of the intervention as well." **Duration:** 4 months **Number of contacts:** 6 (2 phone calls, 4 newsletters) **Setting:** Home **Modality:** Multiple (telephone, newsletters) **Interventionist:** A registered dietitian **Integrity:** No information provided **Date of study:** April and December 2009 **Description of control:** "Control group families received 4 non-health/nutrition related children's books, 1 per month."

Tabak 2012 (*Continued*)

Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of vegetables (servings per day) assessed using a Block Kids food frequency questionnaire (FFQ) completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 5 months **Length of follow-up post-intervention:** Immediate **Subgroup analyses:** None **Loss to follow-up:** Intervention = 12% Control = 16% **Analysis:** Unknown if sample size calculations performed
Notes	To enable inclusion in meta-analysis, we calculated post-intervention means by group by summing baseline and change from baseline means, and assumed baseline SDs for post-intervention SDs Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake 2nd listed outcome after height and weight

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Child vegetable intake (parent reported): There is no blinding to group allocation of participants or personnel described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Child vegetable intake (parent reported): There is no blinding to group allocation of participants or personnel described and because this is a parent-reported measure at high risk of detection bias

Tabak 2012 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Low risk	43 (86%) of the 50 parent-child dyads recruited completed the study. Therefore at low risk of attrition bias
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	Participants differed on child age by condition. However although this was adjusted for in the analysis the impact of this imbalance is unclear

Verbestel 2014

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "The work was supported by the Ministry of the Flemish Community (Department of Economics, Science and Innovation; Department of Welfare, Public Health and Family) ."
Participants	**Description:** Children aged 9 to 24 months enrolled at daycare centres in 6 different communities in Flanders (Belgium) **N (Randomised):** 70 day care centres, 203 children **Age:** Mean: Intervention = 15.8 months, Control = 14.9 months **% Female:** Intervention = 47%, Control = 44% **SES and ethnicity:** Low SES: Intervention = 13%, Control = 24% **Inclusion/exclusion criteria:** No explicit inclusion criteria stated for this trial Children were excluded if they were not present in daycare on the measurement day for objective height and weight at baseline (i.e. not fulfilling the minimum criteria to be included in the study) **Recruitment:** "Within each day-care centre, parents of all children aged 9-24 months were invited to enrol their child in the study." **Recruitment rate:** 50% (203/404) **Region:** Flanders (Belgium)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):**

	Intervention = 100, control = 56 **Description of intervention:** "The intervention aimed at increasing daily consumption of water (instead of soft drinks) , milk, fruit and vegetables, increasing daily physical activity and decreasing daily consumption of sweets and savoury snacks and daily screen-time behaviour." "programme that consisted of two components: (i) guidelines and tips presented on a poster and (ii) a tailored feedback form for parents about their children's activity- and dietary related behaviours." **Duration:** 12 months **Number of contacts:** Unclear **Setting:** Preschool **Modality:** Face-to-face **Interventionist:** Researchers **Integrity:** No information provided **Date of study:** 2008 to 2009 **Description of control:** No information provided
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetables assessed using a 24-item semi-quantitative food frequency questionnaire (FFQ) completed by parents **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 12 months **Length of follow-up post-intervention:** Immediate **Subgroup analyses:** None **Loss to follow-up:** Intervention = 21% Control = 14% **Analysis:** Did not adjust for clustering Unknown if sample size calculations performed
Notes	First reported outcome (grams fruit/day) was extracted for inclusion in the meta-analysis. The reported estimate that adjusted for clustering did not report 95% CI or SEM. Therefore we used final values and caluculated an effective sample size using ICC of 0. 016 to enable inclusion in meta-analysis

	Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake 2nd listed outcome after BMI

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Fruit and vegetable intake (parent reported): Parents were not blinded to group allocation and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Fruit and vegetable intake (parent reported): Parents were not blinded to group allocation and this is likely to influence performance
Incomplete outcome data (attrition bias) All outcomes	High risk	FT: Of 203 children, 156 (77%) were re-examined 12 months later at follow-up (this is the first follow-up post-intervention). If we define this as short-term follow-up, this is high risk of bias as > 20% dropout
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	High risk	Baseline imbalance: Baseline differences were observed between the control and intervention groups in sociodemographic characteristics and body composition. However although this was adjusted for in the analysis the impact of this imbalance is unclear "The analyses were adjusted for SES, age of the child and BMI Z-score at baseline to control for the observed baseline imbalance in these variables between intervention and control groups."

		Recruitment bias: Appears that parents and childcare centres were recruited after communities had been matched and randomised - high risk Incorrect analyses: Linear mixed models adjusted for clustering within daycare centres, but standard errors were not reported. Reported mean (SD) by group at follow-up and calculation of effective sample sizes prior to inclusion in meta-analyses accounted for this, therefore low risk

Vereecken 2009

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "The development of the intervention was funded by the PWO(Project-related Scientific Research)-funding of University College Arteveldehogeschool. Funds for the evaluation were provided by the Provincial Government East-Flanders."
Participants	**Description:** Children attending 16 preschools in East Flanders (Belgium) **N (Randomised)** 16 preschools, 1432 preschoolers **Age: (DOB)** < 2002: intervention = 41%, control = 51% 2002: intervention = 28%, control = 24% 2003: intervention = 31%, control = 26% **% Female:** Intervention = 53%, control = 44% **SES and ethnicity:** Predominantly low parental education Low education (mother): intervention = 49%, control = 49% Low education (father): intervention = 60%, control = 57% Ethnicity: No information provided **Inclusion/exclusion criteria:** Not specified **Recruitment:** Schools were approached by mail for consent. All parents of preschoolers attending the consenting schools were asked to fill in a food frequency questionnaire **Recruitment rate:** Parents: 54% Schools: 10% (40 out of 403 schools consented, although only 8 were selected in the end) **Region:** East Flanders (Belgium)

Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 308, Control = 168 **Description of intervention:** 8 preschools received a multi-component intervention to assist schools to implement a healthy school food policy. "The main objectives were to increase the consumption of fruit, vegetables and water and to decrease the consumption of sugared milk drinks and fruit juice." The main strategies to influence the child and the different environmental factors included: "Child: Guided and self-guided activities based on experiential education (e.g. tasting) and developmental education (e.g. explanation of concepts of food triangle); Role model, feed back and reinforcement by teachers; Educational role-model story and characters; Availability of healthy foods; Availability of cooking equipment. Parents: Newsletters; Suggestions for the back and forth diary; Work sheets and creations by children; Parent evenings and other school activities with parents Teacher: Training sessions; Manual including didactic and policy aspects; Digital learning environment; Newsletters; Group discussions with teachers; Examples of good practices School environment: Newsletters; Training sessions for principals and cafeteria staff; Help on demand via e-mail; Examples of good practices; Policy aspects in the teachers' manual; Feedback to schools." **Duration:** 6 months **Number of contacts:** Unclear (multicomponent) **Setting:** Preschool **Modality:** Multiple (staff training, experiential education, newsletters, email support, resources) **Interventionist:** Not specified **Integrity:** No information provided **Date of study:** Sept 2006 - April 2007 **Description of control:** 8 preschools received the control: no information provided
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Daily consumption of fresh fruit and vegetables (grams) as reported by parents in a written food frequency questionnaire **Length of follow-up from baseline:** 6 months (March/April 2007) **Subgroup analyses:** None **Loss to follow-up** Intervention: 47% Control: 45% **Analysis:**

	Contact with the author indicated that the analysis was adjusted for clustering by school Unknown if sample size calculation was performed
Notes	Trial results are reported as change from baseline in mean daily consumption of fruit and vegetables and post-intervention values. No standard deviations were reported for post-intervention data to enable inclusion in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable intake is primary outcome

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Contact with the author indicated that a computerised random-number generator was used
Allocation concealment (selection bias)	Unclear risk	Contact with the author indicated that schools did not know their allocation prior to consenting to the study. It is unclear if study personnel responsible for recruitment were aware of group allocation
Blinding of participants and personnel (performance bias) All outcomes	High risk	Contact with the author indicated that parents and school staff were not blind to group allocation and that parents could have attended information sessions organised by the researchers, or observed posters, newsletters or intervention materials in intervention schools. Given that the relevant trial outcomes were based on parental reports, the review authors judged that there was a risk of bias
Blinding of outcome assessment (detection bias) All outcomes	High risk	Contact with the author indicated that parents and school staff were not blind to group allocation and that parents could have attended information sessions organised by the researchers, or observed posters newsletters or intervention materials in intervention schools. Given that the relevant trial outcomes were based on parental reports, the review authors judged that there was a risk of bias. (NB. There were no independent outcome assessors in this trial; the parents completed and returned a food frequency questionnaire about their child's food intake)

Vereecken 2009 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Although similar across groups (intervention = 47%, control = 45%), rates of loss to follow-up were high. Contact with the author indicated that no information was collected on reasons for loss to follow-up
Selective reporting (reporting bias)	Unclear risk	Insufficient information to permit judgement
Other bias	Low risk	Contact with the author indicated that analysis was adjusted for clustering No further risk of bias identified

Wardle 2003a

Methods	**Study design:** Randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children aged 2 to 6 years and their principal caregiver (parent) who were recruited from a larger study **N (Randomised):** 156 children **Age:** Child: 34 to 82 months (mean = 53 months) Parent: mean = 36 years **% female:** Children (by group): Exposure = 34%, Nutrition Information = 58%, Control = 51% Parent (overall): 95% **SES and ethnicity:** "68% of parents had left full-time education at the age of 21 or over" and "the majority of parents held further education qualifications." Ethnicity = 74% white **Inclusion/exclusion criteria:** No explicit inclusion/exclusion criteria stated for this trial, or for the trial from which participants were recruited. 13 children (1 girl, 12 boys) were excluded when they did not comply with the experimental procedures during the pre-experimental taste test **Recruitment:** Participants were recruited from a larger study on the predictors of children's fruit and vegetable intake and expressed an interest in participating in further research to modify their children's acceptance of vegetables **Recruitment rate:** Parents: 28% **Region:** United Kingdom

Interventions	**Number of experimental conditions:** 3 **Number of participants (analysed):** **i) Restricted to at least 10 out of 14 exposures:** Exposure = 34, Nutrition Information = 48, Control = 44 **ii) All available data:** Exposure = 48, Nutrition Information = 48, Control = 44 **Description of intervention:** Exposure: Taste exposure intervention carried out in the home where parents were asked to offer their child a taste of a target vegetable daily for 14 consecutive days. Parents were given suggestions to encourage the child to taste the vegetable. Parents were given a vegetable diary to record their experiences, and children could record their liking for the vegetable after each session using 'face' stickers Nutrition Information: Parents were informed about the '5 a day' recommendations and given a leaflet with advice and suggestions for increasing children's fruit and vegetable consumption **Duration:** 14 days **Number of contacts:** 14 (daily for 14 consecutive days) **Setting:** The home **Modality:** Face-to-face, exposure **Interventionist:** Researchers trained parents to offer the target vegetable to their child **Integrity:** 14 participants in the exposure group failed to complete a minimum of 10 out of 14 tasting sessions - 4 children completed 9 sessions, 2 completed 8 sessions, 2 completed 7 sessions, 1 completed 6 sessions, 4 completed 5 or less sessions **Date of study:** Not provided **Description of control:** "No treatment" control - parents received no further intervention
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Ad libitum consumption of target vegetable (grams) assessed by weighing the amount of the vegetable on the plate before and after consumption using a professional digital scale (Tanita Corporation, Japan) **Length of follow-up from baseline:** Approximately 2 weeks **Subgroup analyses:** Restricted sample to only those in the taste exposure group who received 10 or more exposures. This restricted the Exposure group from 48 to 34 children **Loss to follow-up:** 2% (140 provided follow-up data of 143 who were eligible and provided data at baseline) Exposure: 4% (children withdrawn from their study by their parents following collection of baseline data) Nutrition Information: 0%

	Control: 2% (children withdrawn from their study by their parents following collection of baseline data) **Analysis:** Adjustment for clustering not applicable Unknown if sample size calculation was performed
Notes	"Two sets of analyses were carried out: (a) on a restricted sample which excluded those in the Exposure group who completed less than 10 tasting sessions (n=126) and (b) on the whole sample (n=140). Results below refer to the reduced sample size ... results for the whole sample are only included where they differed from these." Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake 3rd listed outcome after rated and ranked liking

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Participants were randomly assigned to one of three experimental treatment groups". No further information provided regarding sequence generation
Allocation concealment (selection bias)	Low risk	Contact with the author indicated that allocation was concealed in an opaque envelope opened at participant's homes after baseline data collection
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Contact with the author indicated that personnel delivering the intervention were not blind to group allocation and that parents may not have been blind to group allocation. However, given the objective assessment of outcome (electronic scales), the review authors judged that the study outcome was unlikely to be affected by lack of blinding
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Contact with the author indicated that the outcome assessors were not blind to group allocation. Given the objective measure of outcome (electronic scales), assessment is unlikely to have been influenced by lack of blinding
Incomplete outcome data (attrition bias) All outcomes	Low risk	Rates of loss to follow-up were similar and low across the exposure (4%), nutrition information (0%) and the control conditions (2%). Reasons for loss to follow-up were provided and were similar

Selective reporting (reporting bias)	Unclear risk	Insufficient information to permit judgement
Other bias	Low risk	No further risk of bias identified

Watt 2009

Methods	**Study design:** Randomised controlled trial **Funding:** "This work was commissioned by the Food Standards Agency in 2009 and supported by the Department of Health (UK) from 2010."
Participants	**Description:** New mothers attending baby clinics in disadvantaged London neighbourhoods **N (Randomised):** 312 mothers **Age:** Children: mean = 10 weeks Parents: mean = 30 years **% Female:** Children = not stated Parents = 100% **SES and ethnicity:** 28% lone parents 57% living in social housing 33% receiving income support/job seeker's allowance Ethnicity: 50% from an ethnic minority **Inclusion/exclusion criteria:** Inclusion criteria: "Women from Registrar General occupational classes II-V (non-professional); babies born >/= 37 weeks; babies' birth weight above 2500g; singletons; women able to understand written and spoken English; and resident in the study area." Exclusion criteria: "Women aged under 17 years; infants were diagnosed with a serious medical condition or were on special diets; infants aged over 12 weeks; women or their partners were from social class I (professional). Originally their intention was to restrict the sample to first-time mothers over the initial 12 week recruitment period. The inclusion criteria was therefore changed to include all new-mothers." **Recruitment:** "Women were recruited from December 2002 to February 2004 at baby clinics located in the more disadvantaged neighbourhoods across Camden and Islington where Surestart (a national social welfare initiative targeting families with young children) programmes existed. A standardised technique was used to approach new mothers attending the baby clinics. An overview of the study was given and randomisation explained. If the women were interested, a short screening questionnaire was then used to assess their eligibility." **Recruitment rate:** Mothers: 82% **Region:** London, UK

Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 124, Control = 115 **(12 months)** Intervention = 108, Control = 104 **(18 months)** **Description of intervention:** A monthly home visiting programme (from 3 to 12 months) delivered by trained local mothers, providing practical support on infant-feeding practices **Duration:** 9 months (duration of each visit = 60 min) **Number of contacts:** Monthly from 3 to 12 months (maximum = 10 contacts) **Setting:** The home **Modality:** Face-to-face, via home-visiting **Interventionist:** Trained local volunteers "A group of local mothers were recruited and trained to provide the support in a 12-session programme delivered over a 4-week period." **Integrity:** "On average each woman in the intervention group received five volunteer home visits (range 1-10). A small number of women were also contacted by telephone when home visits were not possible." **Date of study:** Recruited from Dec 2002 to Feb 2004 **Description of control:** Usual care. "Women in the control group only received standard professional support from health visitors and GPs."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Children's intake of vitamin C from fruit Secondary outcome: Proportion of children who consumed specific fruits and vegetables more than once a week **Length of follow-up from baseline:** 9 months and 15 months (when children aged 12 months and 18 months, respectively) **Subgroup analyses:** None **Loss to follow-up: (at 9 and 15 months)** Intervention: 27%, 34% Control: 20%, 30% **Analysis:** Adjustment for clustering not applicable Sample size calculation was performed
Notes	Vitamin C (mg) from fruit at the longest follow-up < 12 months (9 months - children aged 12 months) and ≥ 12 months (15 months - children aged 18 months old) was extracted for inclusion in meta-analysis Sensitivity analysis - primary outcome: Vitamin C intake from fruit listed as primary outcome

Watt 2009 (*Continued*)

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"A random allocation schedule was prepared in advance using random digit computer tables."
Allocation concealment (selection bias)	Low risk	"Those responsible for recruiting ... were all masked to group assignment."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Contact with the author indicated that parent participants and intervention personnel were not blind to group allocation. Given that the trial outcome was based on parental reports of children's fruit intake, the review authors judged that there was a risk of performance bias in this study
Blinding of outcome assessment (detection bias) All outcomes	Low risk	"Those responsible for ... assessing outcomes were all masked to group assignment."
Incomplete outcome data (attrition bias) All outcomes	High risk	Rates of loss to follow-up were similar across intervention (27%, 34%) and control (20%, 30%) groups at both time points and were moderate. There were no substantial differences in the reasons for loss to follow-up
Selective reporting (reporting bias)	Low risk	All primary or secondary outcomes of interest were reported according to the information provided in the trial register (ISRCTN 55500035)
Other bias	Low risk	Small deviation in protocol: The original sample was restricted to first-time mothers but after 12 weeks of the 14-month recruit this was broadened to all new mothers No further risks of bias identified

Williams 2014

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "This research was supported by US Department of Agriculture's (USDA) Food and Nutrition Service (FNS)."
Participants	**Description:** Children attending childcare centres participating in the Child and Adult Care Food Program and their parent **N (Randomised):** 24 childcare centres, 1143 parent-child dyads **Age:** Child: mean = 4.4 years Parent: "Overall, 67% of respondents were between the ages of 18 and 34" **% Female:** Child = 48% Parent: not specified **SES and ethnicity:** Parent: "40% were Hispanic or Latino; 24% were white, non-Hispanic; 27% were black, non-Hispanic; and 9% were another race or more than one race" **Inclusion/exclusion criteria:** Not specified **Recruitment:** "The study sampled child-care centers participating in the Child and Adult Care Food Program in New York" "Approximately 5 to 6 weeks before the start of the intervention in spring 2010, teachers sent children home with a study invitation and the baseline survey. Parents who agreed to participate in the study were asked to return a contact information card and the completed questionnaire in a separate envelope to preserve confidentiality." **Recruitment rate:** Parent: 75% (1143/1518) **Region:** New York (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 440, control = 462 **Description of intervention:** Eat Well Play Hard in Child Care Settings program "is a Supplemental Nutrition Assistance Program (SNAP) Education program that allows states to receive funding for nutrition education to improve the likelihood that SNAP participants will make healthy food choices." "The program includes multilevel messaging targeted to preschool children, their parents, and the childcare center staff who shape the policies and practices in their child-care environment." "Some of the most frequently taught modules used for this intervention included trying new foods (Food Mood); eating a variety of vegetables (Vary Your Veggies); eating a variety of fruits (Flavorful Fruit); incorporating more healthy dairy products into the diet (Dairylicious); eating healthier snacks (Smart Snacking); and engaging in physical activity (Fitness Is Fun)."

	Duration: 6 - 10 weeks **Number of contacts:** 6 classes for children and parents separately (30-60 minutes per session) 2 classes for center's staff "Finally, the RDN works with each center director to identify areas of policy improvement that can enhance nutrition at the center and teaches at least two classes to the center's staff to help them integrate the program's messages into their classroom activities" **Setting:** Preschool **Modality:** Multiple (face-to-face, printed materials/resources) **Interventionist:** Registered dietitian nutritionist **Integrity:** No information provided **Date of study:** March and June 2010 **Description of control:** Wait-list control: "control centers received the intervention after the evaluation was completed, but within the same calendar year."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetables (cups per day) by parent self-report via mail or telephone survey using modified questions from the University of California Cooperative Extension Food and Behaviour Checklist **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** Unclear, ~ 7 to 10 weeks **Length of follow-up post-intervention:** 1 week **Subgroup analyses:** None **Loss to follow-up:** Intervention = 20% Control = 22% **Analysis:** Adjusted for clustering Sample size calculations performed
Notes	First reported outcome (cups of vegetables child consumed at home a day) was extracted for inclusion in the meta-analysis. We selected post-intervention values over change from baseline estimates, and calculated effective sample size at follow-up using an ICC of 0.014 to enable inclusion in meta-analysis Sensitivity analysis - primary outcome: Primary outcome not stated, power calculation

	conducted on fruit or vegetable intake

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Child's fruit and vegetable intake (parent survey): There is no blinding to group allocation of participants or personnel described and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Child's fruit and vegetable intake (parent survey): There is no blinding to group allocation of participants or personnel described and because this is a parent-reported survey this is likely to influence detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	902 (79%) out of 1143 parents completed the follow-up. Given this was a short-term follow-up, the risk of attrition bias is high
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	At baseline, children in the intervention group were statistically significantly older than children in the control group, but unclear what impact this may have had "At baseline, children in the intervention group were statistically significantly older than children in the control group (difference=0.2 years; 95% CI 0.1 to 0.3). Otherwise, there were no statistically significant differences in the characteristics of respondents and their households or in outcome measures between the intervention and control groups at baseline" Analyses accounted for clustering

Witt 2012

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** Not reported
Participants	**Description:** Children aged 4 or 5 years at 17 childcare centres **N (Randomised):** 17 childcare centres, 263 children **Age:** "The researchers were not permitted to obtain specific ages of each child but were informed by the centers' directors that the majority of the children were 4 or 5 years old. " **% Female:** 47% **SES and ethnicity:** Not specified **Inclusion/exclusion criteria:** Not specified **Recruitment:** Not specified **Recruitment rate:** Unknown **Region:** Boise Idaho (USA)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention: fruit = 83, vegetable = 70 Control: fruit = 70, vegetable = 52 **Description of intervention:** "Color Me Healthy comes in a "toolkit" that includes a teacher's guide, 4 sets of picture cards, classroom posters, a music CD that contains 7 original songs, a hand stamp, and reproducible parent newsletters. Color Me Healthy is composed of 12 circle-time lessons and 6 imaginary trips. The majority of the CMH circle-time lessons focus on fruits and vegetables of different colors. Several of the lessons provide opportunities for children to try fruits and vegetables. The 6 imaginary trips included in CMH encourage children to use their imagination to explore places, be physically active, and eat fruits and vegetables. Six interactive take home activities were developed for the current evaluation. These interactive activities coincided with the circle-time lessons." **Duration:** 6 weeks **Number of contacts:** 24 (preschool = 2 circle-time + 1 imaginary trip per week, each 15 - 30 minutes, home = 6 interactive take home activities) **Setting:** Preschool + home **Modality:**

	Face-to-face **Interventionist:** Lead teachers **Integrity:** No information provided **Date of study:** Unknown **Description of control:** No treatment control: "During the study, comparison classrooms did not incorporate nutrition curriculum into their lesson plans."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetable snacks (grams). "To determine the amount of fruit and vegetable snack consumed, the fruit and vegetable snacks were weighed (in grams) before they were served to children and then weighed again after children had had an opportunity to consume the snack. Percentage of fruit and vegetable snack consumed was calculated for each child." **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Not reported **Length of follow-up from baseline:** 7 weeks (1 week post-intervention) and ~ 5 months (3 months post-intervention) **Length of follow-up post-intervention:** 1 week and 3 months **Subgroup analyses:** None **Loss to follow-up (at 3 months):** Intervention: fruit = 50%, vegetable = 58% Control: fruit = 29%, vegetable = 47% **Analysis:** Adjusted for clustering Unknown sample size calculations performed
Notes	First reported outcome (mean number of pineapple snacks remaining) at the longest follow-up (3 month follow-up) was extracted for inclusion in meta-analysis. Insufficient data available to enable inclusion in meta-analysis (standard deviation not reported, nor available from authors) Sensitivity analysis - primary outcome: Primary outcome not stated, fruit or vegetable intake is only reported outcome

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomly allocated to experimental group but the random sequence generation procedure is not described

Witt 2012 (*Continued*)

Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Fruit and vegetable snacks (weighed): Objective measure of child's fruit and vegetable intake and unlikely to be influenced by performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Fruit and vegetable snacks (weighed): Objective measure of child's fruit and vegetable intake and unlikely to be influenced by detection bias
Incomplete outcome data (attrition bias) All outcomes	High risk	Attrition rate > 20% for short-term follow-up. Only 58% of consenting children received fruit snacks at all 3 time points
Selective reporting (reporting bias)	Unclear risk	There is no study protocol therefore it is unclear if there was selective outcome reporting
Other bias	Unclear risk	Recruitment bias: it appears that parents were invited to participate after centres had been randomised, so unclear risk of bias Baseline imbalance: there are no baseline data comparing study groups, so we cannot tell if groups were balanced at baseline, so unclear risk of bias Incorrect analysis: "The current evaluation was a nested design; children were nested within classrooms. The classrooms were the units of assignment, but the outcome data were collected among the children." HLM modelling accounted for clustering, therefore low risk of bias

Wyse 2012

Methods	**Study design:** Cluster-randomised controlled trial **Funding:** "The trial is funded by the Cancer Institute New South Wales (Ref no. 08/ECF/1-18)."
Participants	**Description:** Children aged 3 to 5 years attending selected preschools, and their parent **N (Randomised):** 30 preschools, 394 parent-child dyads

	Age: Child (mean): Intervention = 4.3 years, Control = 4.3 years Parent (mean): Intervention = 35.7 years, Control = 35.7 years **% Female:** Child: Intervention = 51%, Control = 46% Parent: Intervention = 95%, Control = 97% **SES and ethnicity:** Household income AUD ≥ 100K: Intervention = 42%, Control = 40% University education: Intervention = 45%, Control = 50% Aboriginal and/or Torres Strait Islander: Child: Intervention = 1%, Control = 5% Parent: Intervention = 1%, Control = 3% **Inclusion/exclusion criteria:** **Preschool:** Inclusion criteria: licensed in NSW Exclusion criteria: "Preschools will be excluded from the trial if they provide meals to children in their care (as this limits parents' capacity to influence the foods their children consume), cater exclusively for children with special needs (given the specialist care required for such children), are Government preschools (as conduct of the research has not been approved by the New South Wales Government Department of Education and Training) or have participated child healthy eating research projects within six months of the commencement of recruitment." **Parent:** Inclusion criteria: "participant must be a parent of a child aged 3 to 5 years attending a participating preschool, must reside with that child for at least four days a week (in order for the child to be sufficiently exposed to the intervention strategies that the parent may implement), must have some responsibility for providing meals and snacks to that child, and must be able to understand spoken and written English." Exclusion criteria: "Parents will be excluded from the trial if their children have special dietary requirements or allergies that would necessitate specialised tailoring of the intervention or that may be adversely affected by the intervention. Such exclusions will be determined by an Accredited Practising Dietitian who is independent of the research team." **Recruitment:** Preschools randomly selected "The supervisors of the selected preschools will be sent letters and consent forms informing them of the study and requesting permission to recruit parents through their services." Recruitment packs will be delivered to each participating preschool Distribution of these packs to parents will occur *via* methods considered by the preschool supervisor to be most effective and appropriate in engaging parents Where possible, research staff will attend the preschool, hand out recruitment packs to parents and be available to answer parent questions **Recruitment rate:** Preschool = 51% (30/59) **Region:** New South Wales (Australia)
Interventions	**Number of experimental conditions:** 2 **Number of participants (analysed):** Intervention = 174, Control = 169

	Description of intervention: The intervention group will receive a resource kit and weekly scripted telephone contacts "The kit comprises a participant workbook containing information and activities, a pad of meal planners, and a cookbook including recipes high in fruit and vegetables." "Each telephone contact aims to provide parents with appropriate knowledge and skills to modify three key domains within the home food environment: availability and accessibility of fruit and vegetables; supportive family eating routines, and parental role-modelling." **Duration:** 4 weeks **Number of contacts:** 4 (one a week) **Setting:** Home **Modality:** Telephone and mailed resources **Interventionist:** Trained telephone interviewers **Integrity:** "During each four-week batch of telephone calls, members of the research team will monitor at least two completed calls made by each interviewer to assess adherence with the intervention protocol." "In total, 44 intervention calls were monitored, representing 6% of all completed calls and an average of 9 calls per interventionist. Across all monitored calls, interventionists covered 97% of key content areas, and in .80% of calls they "rarely" deviated from the script. In instances in which calls deviated from the script, interventionists were provided with feedback immediately after the call, and the issue was raised during biweekly supervision." **Date of study:** April to December 2010 **Description of control:** "Parents allocated to the control group were mailed the Australian Guide to Healthy Eating-a 22-page booklet outlining the dietary guidelines and ways to meet them."
Outcomes	**Outcome relating to children's fruit and vegetable consumption:** Child's consumption of fruit and vegetables assessed by parent self-report by telephone survey using items from the Children's Dietary Questionnaire **Outcome relating to absolute costs/cost effectiveness of interventions:** Not reported **Outcome relating to reported adverse events:** Effect of intervention on family food expenditure **Length of follow-up from baseline:** 2 and 6 months **Length of follow-up post-intervention:** 1 and 5 months **Subgroup analyses:** None **Loss to follow-up (at 1 and 5 months):** Intervention = 14%, 16%

	Control = 4%, 9% **Analysis:** Adjusted for clustering Sample size calculations performed
Notes	The fruit and vegetable score outcome at the longest follow-up < 12 months (6 months) was extracted for inclusion in meta-analysis. The reported estimate and 95% CI which adjusted for baseline and clustering were included in meta-analysis Sensitivity analysis - primary outcome: Fruit or vegetable intake listed as primary outcome

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	The random sequence was generated using a random-number function in Microsoft Excel
Allocation concealment (selection bias)	Unclear risk	There is no information provided about allocation concealment and therefore it is unclear if allocation was concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Fruit and vegetable intake (self-reported): Participants were unblinded and this is likely to influence performance
Blinding of outcome assessment (detection bias) All outcomes	High risk	Fruit and vegetable intake (self-reported): Participants were unblinded and because self-reported measure this is likely to influence detection bias
Incomplete outcome data (attrition bias) All outcomes	Low risk	Of 394 parents, 343 (87%) completed the 6-month follow-up. Sensitivity analyses were also conducted where missing follow-up data were imputed by using baseline observation carried forward
Selective reporting (reporting bias)	Low risk	The primary outcomes reported in the outcomes paper align with those specified in the protocol. The 12- and 18-month fruit and vegetable outcomes are reported in Wolfenden 2014
Other bias	Low risk	Contamination, baseline imbalance, & other bias that could threaten the internal validity are unlikely to be an issue. Analyses adjusted for clustering

BMI: body mass index

EA: exposure alone
EP: exposure plus praise
ETR: exposure plus tangible non-food reward
DOB: date of birth
FV: fruit and vegetables
ICC: intra-class correlation
N/A: not applicable
SEM: standard error of the mean

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Aboud 2008	This responsive feeding trial was ineligible as its primary outcome was not to increase fruit and vegetable consumption and the study only assessed children's fruit and vegetable consumption post-hoc in order to describe the mechanism behind a change in weight status among participants in the sample
Adams 2009	Primary outcome was not fruit or vegetable intake; primary outcome was BMI and waist circumference
Adams 2011a	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Adams 2011b	No fruit or vegetable intake outcome
Adams 2012	Primary outcome is BMI as reported in related study (Adams 2011a)
Adams 2015	Not RCT: Editorial
Agrawal 2012	No fruit or vegetable intake outcome
Ahern 2014	Not randomised controlled trial
Al Bashabsheh 2016	No fruit or vegetable intake outcome
Alford 1971	Children aged 6 to 17 years
Amin 2016	Participants were Grade 3-5 children
Anderson 2014	Mean age of children 5.3 years
Ang 2016	Participants were 2nd and 3rd grade children
Anliker 1993	Children aged 14 to 17 years
Anonymous 2001	Not RCT: Editorial
Anonymous 2002	Not RCT: Editorial

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Anonymous 2009	Not RCT: Editorial
Anonymous 2011a	Not RCT: Editorial
Anonymous 2011b	Children aged 5 to 9 years
Anonymous 2012	Participants were 4th grade children
Apatu 2016	Participants were adult, no participants aged 0 - 5 years
Arrow 2013	Primary outcome was not fruit or vegetable intake; primary outcome was dental caries incidence and prevalence of obesity
Au 2015a	No fruit or vegetable intake outcome, only assessed intake of fruit juice
Au 2015b	Participants were 4th and 5th grade children
Au 2016	No fruit or vegetable intake outcome
Bai 2012	Participants were elementary school children
Bammann 2006	No comparison group
Bannon 2006	Outcome is food choice (apple or crackers)
Baranowski 2002	Children aged 9 to 18 years
Barkin 2012	Primary outcome was not fruit or vegetable intake; primary outcome was weight and BMI
Baur 2012	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Baxter 1998	Not RCT: Editorial
Bayer 2009	Child mean age 6 years
Beasley 2012	Children aged 8 to 12 years
Beets 2016	Participants were aged 6 - 12 years
Bellows 2013	Intervention was not designed to increase fruit and/or vegetable consumption, intervention aimed to explore individual, family and environmental factors and their relationship to child weight status
Bellows 2014	Intervention was not designed to increase fruit and/or vegetable consumption, intervention aimed to explore individual, family and environmental factors and their relationship to child weight status
Benjamin 2008	Outcome is quality of meals

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Benjamin Neelon 2016	No fruit or vegetable intake outcome, only amount served
Bensley 2011	Quasi-experiemental design
Bere 2015	Participants were 6th and 7th grade children
Berg 2016	Not RCT: Book review
Bergman 2016	Participants were 3rd, 4th and 5th grade children
Berhe 1997	No comparison group
Berry 2013	No fruit or vegetable intake outcome
Bessems 2012	Children aged 12 to 14 years
Best 2016	Children aged 7 to 12 years
Black 2013	Child mean age of subgroups ranged from 5.8 to 11 years.
Blissett 2012	No comparison group
Blom-Hoffman 2008	Child mean age 6.2 years
Boaz 1998	Children aged 7 to 9 years
Bollella 1999	Outcome is vitamins and minerals, not fruit and vegetable consumption
Bonvecchio-Arenas 2010	Participants were primary school children
Bouhlal 2014	Allocation of groups to condition was not randomised
Bradley 2014	No fruit or vegetable intake outcome, outcome is preference
Brambilla 2010	No F&V consumption outcome
Branscum 2012	Children aged 8 to 11 years
Branscum 2013	Children aged 8 to 11 years
Briefel 2006	No comparison group
Briefel 2009	Children aged 6 to 18 years
Briefel 2010	No comparison group

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Briley 1999	No comparison group
Briley 2011	Not RCT: Editorial
Briley 2012	Primary outcome was not fruit or vegetable intake; primary outcome was observed servings in packed lunch
Briley 2016	Primary outcome was not fruit or vegetable intake; primary outcome was observed servings in packed lunch
Brotman 2012	No F&V consumption outcome
Bruening 1999	Non-equivalent control group design
Brunt 2012	Participants were 4th grade school children
Burrows 2008	Child mean age 8 years
Burrows 2011	Child mean age 8 years
Buttriss 2004	Not RCT: Descriptive review
Byrd-Bredbenner 2012	Primary outcome was not fruit or vegetable intake; primary outcome was BMI and audits of home environment characteristics/lifestyle practice
Byrd-Bredbenner 2014	Primary outcome was not fruit or vegetable intake; primary outcome was BMI and audits of home environment characteristics/lifestyle practice
Byrne 2002	Outcome is willingness to taste kohlrabi
Camelo 2016	Participants were children aged 6 - 13 years
Campbell 2016a	Primary outcome was not fruit or vegetable intake; primary outcome was body weight and waist circumference
Campbell 2016b	Primary outcomes were length for age score and rates of stunting
Candido 2013	No fruit or vegetable intake outcome
Capaldi-Phillips 2014	Allocation of groups to condition was not randomised
Carter 2005	Children aged 9 to 12 years
Cason 2001	No comparison group
Castro 2013	Child mean age 6 years

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Cates 2014	Not RCT: Descriptive review
Caton 2014	Study design: results are not reported by study group. Additionally the paper reports data from 3 other included studies: Caton 2013; Hausner 2012; Remy 2013
Chatham 2016	Participants mean age 6.15 years
Ciampolini 1991	No comparison group
Clason 2016	No fruit or vegetable intake outcome, only number of days per week child consumes
Coelho 2012	Children aged 8 to 12 years
Cohen 2014	Child mean age 8.6 years
Coleman 2005	No fruit and vegetable outcomes
Collins 2011	Children aged 5.5 to 9.9 years
Condrasky 2006	Quasi-experimental: intervention sample randomly selected from 1 church. Control randomly selected from a separate church
Cooper 2011	Children aged 5 to 11 years
Cooperberg 2014	No fruit or vegetable intake outcome
Copeland 2010	Child mean age 9 years
Coppinger 2016	Children aged 5 to 11 years
Corsini 2013	Participants were children with mean age 5.16 years
Court 1977	No participants, these are guidelines, not research trial
Crespo 2012	Child mean age 5.9 years
Croker 2012	Child mean age 8.3 years
Cullen 2013	Participants were kindergarten to grade 5 and grade 6 to 8 children
Cullen 2015	Participants were kindergarten to grade 5
Curtis 2012	No child fruit or vegetable intake outcome
Céspedes 2012	Primary outcome was not fruit or vegetable intake; primary outcome was knowledge, attitudes and physical activity habits

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Céspedes 2013a	Primary outcome was not fruit or vegetable intake; primary outcome was knowledge, attitudes and physical activity habits
Céspedes 2013b	Primary outcome was not fruit or vegetable intake; primary outcome was knowledge, attitudes and physical activity habits
Dai 2015	Child mean age 6 years
Dalton 2011	No child fruit or vegetable intake outcome
Davis 2013	Primary outcome was not fruit or vegetable intake as per trial registry
Davoli 2013	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Day 2008	Child mean age 9 - 10 years
Dazeley 2015	No fruit or vegetable intake outcome, only assessed foods touched and tasted
De Bourdeaudhuij 2015	Child mean age in intervention group 6.05 year and in control group 5.98 years
De Droog 2011	No fruit or vegetable intake outcome, only assessed liking and prchase request intent
De Pee 1998	No comparison group
De Silva-Sanigorski 2010	Quasi-experimental, repeat cross-sectional design
Delgado 2014	Intervention was not designed to increase fruit and/or vegetable consumption
Dick 2016	Not RCT: Editorial
Dixon 1997	Child mean age 6 years
Dixon 2000	Children aged 6.3 to 6.8 years
Dollahite 2014	No child fruit or vegetable intake outcome
Dorado 2015	Children aged 9 to 10 years
Draper 2010	Participants were 4, 5 and 6 grade children
Duke 2011	Not RCT: Descriptive review
Dunn 2004	No participants aged 5 years or younger
Dunn 2006	No F&V consumption outcome
Dwyer 2010	No comparison group - cross-sectional survey

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Eicholzer-Helbling 1986	Outcome no consumption measure
Elder 2014	Child mean age 6.6 years
Elizondo-Montemayor 2014	Children aged 6 to 12 years
Epstein 2001	Children aged 6 to 11 years
Esfarjani 2013	Children aged 7 years
Esquivel 2016	Not randomised controlled trial
Estabrooks 2009	Children aged 8 to 12 years
Evans 2006	Children in 4th, 5th grade school
Evans 2011	No child fruit or vegetable intake outcome
Evans 2015	No child fruit or vegetable intake outcome
Evenson 2016	No fruit and vegetable consumption outcome
Faber 2002	Cross-sectional survey
Faith 2006	The intervention programme was not specifically designed to increase consumption of fruit and vegetables; instead primary aim is to illustrate a methodological concept. "This methodological note illustrates the use of co-twin design for testing substitution, phenomenon, a prominent behavioural economics concept. We test whether fruits and vegetables can substitute for high-fat snack foods in young children in a single meal laboratory setting."
Fangupo 2015	Primary outcome as reported in trial registry was not fruit or vegetable intake
Fernandes 2011	Not RCT: Measurement tool
Fernández-Alvira 2013	Child mean age 11 years
Fialkowski 2013	No child fruit or vegetable intake outcome
Fisher 2014	No child fruit or vegetable intake outcome
Fishman 2016	Not RCT: Editorial
Fitzgibbon 2002	Outcome is weight change
Fitzpatrick 1997	Not randomised controlled trial
Fletcher 2009	Children aged 13 to 19 years

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Foerster 1998	Children in 4th, 5th grade school
Folta 2006	Children in kindergarten to grade 8 school
Fournet 2014	Children aged 6 to 13 years
Freedman 2010	Outcome is child feeding attitudes and practices
French 2012	Intervention was not designed to increase fruit and/or vegetable consumption
Friedl 2014	Not RCT: Taskforce report
Friend 2015	Participants were parents of 8 - 12 year-old children
Gaglianone 2006	Participants were 1st and 2nd grade children
Gallotta 2016	Children aged 8 to 11 years
Gardner 2014	Primary outcome was not fruit or vegetable intake; primary outcome was parental habit strength
Gaughan 2016	No comparison group
Gelli 2016	Child mean age 7.5 years
Gentile 2009	Children in 3rd, 4th, 5th grade school
Gittelsohn 2010	Children aged 8 to 12 years
Glanz 2012	No child fruit or vegetable intake outcome
Glasper 2011	Not RCT: Editorial
Glasson 2012	Participants were parents of primary school-aged children
Goldberg 2009	Children in grades 1 to 3 school
Golley 2012	Child mean age 8.3 years
Gorham 2015	No comparison group
Gosliner 2010	Quasi-experimental: childcare centres in existing study matched to other childcare centres, then randomised
Goto 2012	No child fruit or vegetable intake outcome
Gottesman 2003	No participants, not research trial

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Gottesman 2007	No participants, not research trial
Graham 2008	Outcome not fruit and vegetable consumption
Gratton 2007	Children aged 11 to 16 years
Gregori 2014	No comparison group
Gripshover 2013	Intervention was not designed to increase fruit and/or vegetable consumption
Groner 2009	Intervention was not designed to increase fruit and/or vegetable consumption
Gross 2012	Primary outcome was not fruit or vegetable intake; primary outcome was obesity
Guenther 2014	No participants aged 0 - 5 years
Haines 2016	No child fruit or vegetable intake outcome
Hambleton 2004	Children aged 9 to 10 years
Hammons 2013	Children aged 5 to 13 years
Hancocks 2011	Not RCT: Editorial
Hanks 2016	No fruit and vegetable consumption outcome
Hansen 2016	Participants were children aged 6 - 14 years
Hardy 2010a	No fruit or vegetable intake outcome, only assessed lunchbox contents
Hardy 2010b	No child fruit or vegetable intake outcome
Hare 2012	Child mean age 6.3 years
Haroun 2011	Participants were primary school children - aged 4 to 12 years old
Harris 2011	Children aged 5 to 12 years
Hart 2016	No child fruit or vegetable intake outcome
Harvey-Berino 2003	No F&V consumption outcome
Havas 1997	No assessments of children included in study
Heath 2010	No F&V consumption outcome

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Heim 2009	Children in 4th and 6th grade school
Helland 2013	Primary outcome was not fruit or vegetable intake; primary outcome was food neophobia and staff feeding practices
Helland 2016	Primary outcome was not fruit or vegetable intake; primary outcome was food neophobia and staff feeding practices
Hendy 2002	No comparison group
Hendy 2007	Participants were 1st, 2nd and 4th grade children
Hendy 2011	No child fruit or vegetable intake outcome
Herbold 2001	Participants were 1st and 6th grade children
Herring 2016	Not RCT: Editorial
Hildebrand 2010	No comparison group
Hoffman 2011	Child mean age 6.2 years
Hoffman 2015	Participants were 6th to 12th grade children
Hohman 2016	No fruit or vegetable intake outcome, only assessed patterns of dietary exposure
Hollar 2012	No child fruit or vegetable intake outcome
Hollar 2013	Participants were Kindergarten to 5th Grade children
Hooft 2013	No child fruit or vegetable intake outcome
Horne 2009	Child mean age 7 years
Horodynski 2004	Non-equivalent control group study design
Horodynski 2005	Outcome is feeding behaviours
Hotz 2012a	Intervention was not designed to increase fruit and/or vegetable consumption, intervention aimed to increase the consumption of organe sweet potato over consumption of white and yellow sweet potato
Hotz 2012b	Intervention was not designed to increase fruit and/or vegetable consumption, intervention aimed to increase the consumption of organe sweet potato over consumption of white and yellow sweet potato
Howarth 2011	No comparison group

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Hu 2010	Outcome is eating behaviours and weight, not fruit and vegetables
Hughes 2007	Outcome is feeding styles and behaviour
Hughes 2016	No fruit and vegetable consumption outcome
IFIC 2002	Children aged 9 to 12 years
Izumi 2013	No child fruit or vegetable intake outcome
James 1992	No comparison group
Jancey 2014	No child fruit or vegetable intake outcome
Janicke 2013	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Jansen 2010	Participants were children with mean age 5.8 years
Jayne 2009	Outcome is food choice
Johnson 1993	This study was excluded as fruit and vegetable consumption was measured in terms of dietitian-classified 'appropriate' versus 'inappropriate' consumption levels, and as such, it failed to meet the inclusion criteria relating to the primary outcome
Johnson 2007	Outcome is food preference and ranking
Jones 2016	Participants were 1st to 5th grade children
Jordan 2010	No child fruit or vegetable intake outcome
Joseph 2015a	No child fruit or vegetable intake outcome
Joseph 2015b	No comparison group
Just 2013	Participants were elementary school children
Kabahenda 2011	No child fruit or vegetable intake outcome
Kain 2012	Participants aged 6-12 years
Kalb 2005	No participants, not research trial
Kannan 2016	Not randomised controlled trial
Karanja 2012	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Kashani 1991	Child mean age 10 years

(*Continued*)

Kaufman-Shriqui 2016	Participants mean age 5.28 years
Kelder 1995	Children in 6th grade school
Keller 2014	Not RCT: Editorial
Kessler 2016	Not RCT: Review
Khoshnevisan 2004	Dietary outcomes are not reported for the control group and no comparison is made between between experimental conditions
Kidala 2000	Quasi-experimental: 2 areas, 1 intervention, 1 control, not randomly selected
Kilaru 2005	Outcome is proportion being fed bananas
Kilicarslan 2010	Child mean age 9.3 years
Kipping 2014	Participants aged 8-9 years
Kipping 2016	Primary outcome was not fruit or vegetable intake
Knoblock-Hahn 2016	No fruit and vegetable consumption outcome
Knowlden 2012	Child mean age 5.18 years
Knowlden 2014	Child mean age 5.18 years
Knowlden 2015	Child mean age 5.18 years
Knowlden 2016	Child mean age 5.18 years
Koehler 2007	No F&V consumption outcome
Koff 2011	No comparison group
Korwanich 2008	Quasi-experimental: 8 intervention schools; 8 matched control schools
Kotler 2012	No fruit or vegetable intake outcome, only number of pieces of food consumed
Kotz 2010	Not RCT: Editorial
Kral 2010	Participants were children with mean age 5.9 years
Lanigan 2010	Not RCT: Review
LaRowe 2010	No comparison group

(*Continued*)

Larson 2011	No child fruit or vegetable intake outcome
Laureati 2014	Child mean age 7.9 years
Leahy 2008	No fruit and vegetable outcome
Ling 2016	No child fruit or vegetable intake outcome
Lioret 2015	Not RCT
Llargues 2011	Child mean age 6 years
Llargues 2012	Child mean age 6 years
Lloyd 2011	Participants were fathers of children aged 5 to 12 years
Locard 1987	No comparison group
Longacre 2015	No child fruit or vegetable intake outcome
Longley 2013	Not RCT: Editorial
Low 2007	Quasi-experimental, 2 intervention areas, and 1 control area selected, in prospective longitudinal study
Luepker 1996	Child mean age 8.8 years
Lumeng 2012	Intervention was not designed to increase fruit and/or vegetable consumption, intervention aimed to improve children's emotional and behavioural self regulation on preventing obesity
Lumeng 2013	Intervention was not designed to increase fruit and/or vegetable consumption, intervention aimed to improve children's emotional and behavioural self regulation on preventing obesity
Lumeng 2014	Intervention was not designed to increase fruit and/or vegetable consumption, intervention aimed to improve children's emotional and behavioural self regulation on preventing obesity
Maier 2007	Not RCT - treatment group not randomised
Maier 2008	Not RCT
Maier-Noth 2016	Not RCT
Malekafzali 2000	No fruit and vegetable consumption data
Manger 2012	Child mean age 5.7 years
Manios 2009	No comparison group

(*Continued*)

Markert 2014	Child mean age 9 years
Marquard 2011	No child fruit or vegetable intake outcome
Martens 2008	Children aged 12 to 14 years
Mathias 2009	Participants were children with mean age 5.4 years - as per Mathias 2012
Mathias 2012	Participants were children with mean age 5.4 years
May 2010	No comparison group - cross-sectional survey
Mbogori 2016	No comparison group
McAuley 2009	Child mean age 7.7 years
McAuley 2010	Child mean age 7.7 years
McGowan 2013	Primary outcome was not fruit or vegetable intake; primary outcome was parent habit strength
McKenzie 1996	Child mean age 6.3 to 6.8 years
Mehta 2014	No comparison group
Meinen 2012	Child mean age 9.9 years
Messito 2013a	No child fruit or vegetable intake outcome
Messito 2013b	No child fruit or vegetable intake outcome
Messito 2014	No child fruit or vegetable intake outcome
Metcalfe 2016	Participants were children aged 8 - 13 years
Monterrosa 2013	Not randomised controlled trial - quasi-experimental
Morgan 2016	Not RCT
Morrill 2016	Participants were Grade 1-5 students
Nabors 2015	Participants mean age 6.12 years
NAPNAP 2006	Guidelines not trial, so no participants
Natale 2012	Primary outcome was not fruit or vegetable intake as per trial registry

(*Continued*)

Natale 2013a	Primary outcome was not fruit or vegetable intake as per trial registry
Natale 2013b	Primary outcome was not fruit or vegetable intake as per trial registry
Natale 2014	Primary outcome was not fruit or vegetable intake as per trial registry
Nemet 2007	Child mean age 5.5 years
Nemet 2008	Children aged 8 to 11 years
Niederer 2009	Child mean age 5.1 years
Niederer 2011	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Noller 2006	Outcome is public health impact, not fruit and vegetable consumption
Novotny 2014	Intervention was not designed to increase fruit and/or vegetable consumption
O'Connor 2010	No comparison group
Olvera 2010	Children aged 7 to 13 years
Onnerfält 2012	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Panunzio 2007	Children in 4th grade school
Parcel 1989	Children in 3rd, 4th grade school
Passehl 2004	Outcome is process evaluation
Peracchio 2016	No fruit and vegetable consumption outcome
Perry 1985	Children in 3rd, 4th grade school
Perry 1998	Child mean age 8.8 years
Peters 2012a	No child fruit or vegetable intake outcome
Prelip 2011	Participants were 3rd to 5th grade children
Presti 2015	Participants aged 5-11 years
Prosper 2009	Child mean age 11.7 years
Puder 2011	Child mean age 5.2 years

(*Continued*)

Quandt 2013	No child fruit or vegetable intake outcome
Quizan-Plata 2012	Participants were primary school children
Quizan-Plata 2014	Participants mean age 6.9 years in intervention and 7.2 years in control group
Rahman 1994	Outcome asks if vegetables eaten today (Yes/No). No amount provided
Ransley 2007	Non-randomised controlled trial. 1 intervention sample and 1 matched control sample
Rauber 2014	Primary outcome, as per trial registry, was not fruit or vegetable intake
Raynor 2012	Child mean age 6.7 years
Reicks 2012	Children aged 9 to 12 years
Reifsnider 2012	No child fruit or vegetable intake outcome
Reinaerts 2007	Quasi-experimental: consenting schools paired then randomised to 1 of 2 interventions. Control schools in different area identified and then matched
Reinaerts 2008	Child mean age 8 years
Reinbott 2016	Primary aim (as per trial registry) is mean height for age z-scores
Reinehr 2011	Primary outcome was not fruit or vegetable intake, primary outcome was weight
Reverdy 2008	Children aged 8 to 10 years
Reynolds 1998	Participants were 4th grade children
Reznar 2013	No fruit or vegetable intake outcome, only assessed diet quality
Ribeiro 2014	Children aged 6 to 11 years
Ritchie 2010	Children aged 9 to 10 years
Rito 2013	Child mean age 8.6 years
Roberts-Gray 2016	No child fruit or vegetable intake outcome
Robertson 2013	Primary outcome was not fruit or vegetable intake; primary outcome was waist circumference and self-esteem
Rogers 2013	Child mean age 11 years
Rohlfs 2013	Not RCT

(*Continued*)

Rubenstein 2010	No fruit or vegetable intake outcome, only assessed child-feeding practices
Ruottinen 2008	The intervention programme was not specifically designed to increase consumption of fruit and vegetables The aim of intervention, as reported in a separate paper (Lapinleimu 1995) is "to investigate the effects of an individually supervised, eucaloric, diet with low content of fat, saturated fat and cholesterol in healthy children"
Salminen 2005	Children aged 6 to 17 years
Sanders 2014	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Sanigorski 2008	Child mean age 8 years
Sanna 2011	Intervention was not designed to increase fruit and/or vegetable consumption, intervention focused on dietary fat quality
Savage 2010	Comparison between treatment groups not reported for fruit and vegetable consumption
Schmied 2015	Participants were parents of children with mean age of 10 years
Schwartz 2007a	Study design uses convenience sample
Schwartz 2007b	Quasi-experimental - 2 elementary schools randomly allocated to 1 intervention and 1 control
Sharafi 2016	Intervention did not aim to increase consumption of fruit or vegetables
Sharma 2016	Participants were 1st grade children
Sharps 2016	Participants were children aged 6 - 11 years
Sherwood 2013	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Shilts 2014	Not randomised controlled trial as confirmed by author
Shim 2011	No child fruit or vegetable intake outcome
Shin 2014	Participants were 4th to 6th grade children
Siega-Riz 2004	No comparison group
Simons-Morton 1988	Children in 3rd, 4th grade school
Skouteris 2014	No child fruit or vegetable intake outcome
Slusser 2012	Primary outcome was not fruit or vegetable intake; primary outcome was BMI

(*Continued*)

Smith 2015	No comparison group
Sobko 2011	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Sojkowski 2012	No comparison group
Solomons 1999	Review, not trial, no participants
Sotos-Prieto 2013	Primary outcome was not fruit or vegetable intake; primary outcome was change in overall knowledge, attitudes and habits
Speirs 2013	Participants were parents of elementary school children
Stark 1986	No F&V consumption outcome
Stark 2011	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Story 2012	Participants mean age 5.84 years
Strauss 2011	As per related paper Bayer 2009: Child mean age 6 years
Suarez-Balcazar 2014	Participants were Kindergarten and 1st grade children
Sweitzer 2010	Outcome is servings packed in lunchbox, not consumed
Sweitzer 2011	No fruit or vegetable intake outcome, only assessed observed food pack in lunch bag
Talvia 2006	The intervention programme was not specifically designed to increase consumption of fruit and vegetables The aim of intervention, as reported in a separate paper (Lapinleimu 1995) is "to investigate the effects of an individually supervised, eucaloric, diet with low content of fat, saturated fat and cholesterol in healthy children"
Tande 2013	No comparison group
Taylor 2007	Child mean age 7.7 years
Taylor 2008	Participants were children with mean age 7.5 years
Taylor 2010	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Taylor 2013a	Participants were primary school-aged children 4 to 11 years old
Taylor 2013b	No child fruit or vegetable intake outcome
Taylor 2013c	Primary outcome, as per trial registry, was not fruit or vegetable intake

(*Continued*)

Taylor 2015a	Not RCT: Review
Taylor 2015b	Participants mean age 6.5 years
Te Velde 2008a	Children aged 10 to 13 years
Te Velde 2008b	Children aged 11 years
Timms 2011	Not RCT: Editorial
Trees 2012	No comparison group - cross-sectional survey
Uicab-Pool 2009	Outcome is eating habits
Upton 2013	Participants were primary school children aged 4 to 11 years
Upton 2014	Not randomised controlled trial
Upton 2015	Participants were primary school children aged 4 to 11 years
Uys 2016	Particiants were Grade 4 students
Valmorbida 2014	No comparison group
Van Horn 2005	Children aged 8 to 10 years
Van Horn 2011	Not RCT: Editorial
Van Nassau 2015	Not RCT: Commentary
Vecchiarelli 2005	Children school-aged
Veldhuis 2009	Outcome is weight, not fruit and vegetable consumption
Verbestel 2011	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Viggiano 2012	Children aged 9 to 19 years
Vio 2014	Not randomised controlled trial
Vitolo 2010	Primary outcome was not fruit or vegetable intake; primary outcome was Healthy Eating Index
Walton 2015	Primary outcome, as per trial registry, was not fruit or vegetable intake; primary outcome was BMI
Wansink 2013	Participants were middle school children
Wansink 2014	Participants were middle school children

(*Continued*)

Ward 2011	Primary outcome was not fruit or vegetable intake; primary outcome was percent body fat
Wardle 2003b	Child mean age 6 years
Wells 2005	Not randomised controlled trial - cross-sectional
Wen 2007	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Wen 2012	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Wen 2013a	Primary outcome was not fruit or vegetable intake; primary outcome was good eating behaviour
Wen 2013b	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Wengreen 2013	Participants were elementary school children
Whaley 2010	Study design in intervention and matched control site
Wijesinha-Bettoni 2013	Children aged 6 to 12 years
Williams 2015	Not randomised controlled trial
Williamson 2013	Participants were primary school children
Wilson 2016	No fruit and vegetable consumption outcome
Winkler 2005	Outcome is education programme evaluation
Wyatt 2013	Children aged 9 to 10 years
Wyse 2014	No child fruit or vegetable intake outcome
Yin 2012	Intervention was not designed to increase fruit and/or vegetable consumption
Zask 2012	Primary outcome was not fruit or vegetable intake; primary outcome was BMI
Zeinstra 2010	Participants were children with mean age 5.1 to 5.2 years
Zota 2016	Child mean age as reported by author 8.6 years
Zotor 2008	Children aged 11 to 15 years.
Østbye 2012	Primary outcome was not fruit or vegetable intake; primary outcome as per trial registry was BMI

Characteristics of studies awaiting assessment *[ordered by study ID]*

Hull 2014

Methods	
Participants	
Interventions	
Outcomes	
Notes	No full text available to determine eligibility. Contact with author reported chapter describing study currently underway

Characteristics of ongoing studies *[ordered by study ID]*

Belanger 2016

Trial name or title	Healthy Start-Départ Santé
Methods	Cluster-randomised controlled trial
Participants	Approximately 735 children aged 3 - 5 years from 62 Early Childcare Centres
Interventions	Intervention: "The intervention is composed of six interlinked components which are presented in more detail in Fig. 1. These components include: 1) intersectoral partnerships conducive to participatory action that leads to promoting healthy weights in communities and ECC; 2) the Healthy Start-Départ Santé implementation manual for educators on how to integrate healthy eating and physical activity in their centre; 3) customized training, role modelling and monitoring of Healthy Start-Départ Santé in ECC; 4) the evidence-based resource, LEAP-GRANDIR [16], which contains material for both families and educators; 5) supplementary resources from governmental partners; and 6) a knowledge development and exchange (KDE), and communication strategy involving social media and web-resources to raise awareness and mobilize grassroots organizations and communities Healthy Start-Départ Santé is delivered over 6-8 months and includes a partnership agreement, an initial training session which orients ECC staff to the concepts, the implementation manual and the use of resources, on-going support and monitoring over time, one tailored booster session, and a family day to celebrate the ECC' success at the end of the intervention." Control: "Usual practice controls" "Control sites are given the option of receiving the intervention once their participation in the evaluation has been completed"
Outcomes	Usual intake of fruits and vegetables assessed via parent-reported semi-quantitative food frequency questionnaire
Starting date	Participant recruitment began in Autumn 2013
Contact information	Anne Leis: Anne.Leis@usask.ca
Notes	

Horodynski 2011

Trial name or title	The Healthy Toddlers Trial
Methods	Randomised controlled trial
Participants	Approximately 600 children aged 12 to 26 months recruited from community programmes, immunisation clinics and food pantries
Interventions	Intervention: "HT addresses core nutrition concepts but moves well beyond basic nutrition to address maternal self-efficacy during feeding, appropriate feeding styles, and practices, including skill development to increase success in making these behavioural changes." "The HT intervention consists of eight in-home visits by a specially trained paraprofessional instructor plus four weekly telephone follow-up reinforcement contacts. Particularly for high-risk families with young children, providing services within the context of the family's home environment appears to be a useful and effective strategy to provide parents with information, emotional support, access to other services and direct education [19]. The home-visitation model also engages families who lack transportation or child care, a challenge frequently reported by families with low incomes. Paraprofessional instructors are peer educators who can relate to the target audience. Research shows that people learn best from their peers (people like themselves). Eight home visit sessions have been found to produce behavioral change [20]. At each visit, the paraprofessional spends approximately 1 hour with the mother and toddler dyad. The HT lessons use a variety of techniques and materials to enhance each mother's learning experience and help reinforce knowledge. Each lesson includes opportunities for discussion, hands-on activities, and an opportunity for mothers to practice skills covered in the lesson. The eight lessons include a lesson plan, handouts, and recipes. Mothers receive a notebook binder at the beginning of Lesson 1." Control: "The control group families receive the usual services provided by Building strong families (BSF) or Expanded Food and Nutrition Education Program (EFNEP) in respective states. These families are newly enrolled into BSF or EFNEP as part of the HT study and have not received home visitation previously. The control lessons are similarly delivered as the HT lessons, such that, a paraprofessional instructor provides eight lessons during an in-home visit, which last approximately 60 minutes. However, the control lessons focus on parenting (BSF) or nutrition (EFNEP) and do not include extensive content on feeding toddlers. Paraprofessionals who provide the lessons for the control group families are different to prevent cross contamination between the two groups."
Outcomes	Child fruit and vegetable intake will be assessed via 3-day dietary record of child's intake
Starting date	Unknown
Contact information	Mildred Horodynski: millie@msu.edu
Notes	

Sobko 2016

Trial name or title	Play and Grow
Methods	Randomised controlled trial
Participants	Approximately 240 families aged 2 - 4 years

Sobko 2016 (*Continued*)

Interventions	Intervention: "Play & Grow is a 10-week family-based, multi-component healthy lifestyle programme" "The Play & Grow will have educational strategies including instructions, parental peer support and group discussions, and homework tasks, in accordance with the elements developed in our Play & Grow pilot study. Each session will comprise: (i) 15 min of guided active play involving both children and parents; (ii) 15 min of interactive education and skill development for parents; simultaneous supervised active play with foods for children, to promote acceptance of vegetables, and (iii) 15 min of guided active nature games outdoors, involving both children and parents. The sessions will incorporate a lifestyle component, for example: eating, active play and connectedness to nature). These will target the parents' knowledge and skills on how to introduce and maintain their child's correct lifestyle routines. A group leader and co-leader with healthcare backgrounds (and trained by the PI during the Play & Grow pilot study) will facilitate the sessions involving 4 to 5 parent-child dyads. The proposed intervention, we will employ environmental education and nature-related activities to help participating families develop skills conducive to improving playtime and eating habits in children." Control: "The (waiting list or control group) WLCG children will be offered the Play & Grow programme at study completion"
Outcomes	Child fruit and vegetable intake will be assessed using the Eating and Physical Activity Questionnaire (EPAQ) and The Children's Eating Behaviour Questionnaire (CEBQ)
Starting date	Unknown
Contact information	Tanja Sobko: tsobko@hku.hk
Notes	

Watt 2014

Trial name or title	Choosing Healthy Eating when Really Young (CHERRY)
Methods	Randomised controlled trial
Participants	Approximately 288 parents of children aged 18 months to 5 years from children's centres
Interventions	Intervention: "The intervention group participants attended four sessions (one each week) over 4 weeks. Each session lasted 2 h. The first hour of each session involved parents discussing and learning about a variety of aspects of healthy eating while the children attended a free crèche in the adjacent room (the crèche activities were not considered part of CHERRY and were not monitored). The second hour involved parents. and children together for a more practical, 'hands on' cook and eat session involving basic food preparation and tasting. Each session began with a recap from the previous week and finished with parents being given a 'CHERRY at home' activity to complete before the following week's session; these were both designed to consolidate parents' learning The intervention group also received SMS reminders via mobile phones between sessions; SMSs included the main messages of the CHERRY programme, as well as reminders to attend each session. The intervention comprised not only individually focused nutrition support, but also encompassed activities directed at developing the capacity of the children's centre to promote and maintain healthy nutritional practices In the intervention centres, a staff training session was offered to all staff working in the centres. The training session covered various aspects of healthy eating and nutrition for early years and included an introduction and overview of the CHERRY programme. Each training session was tailored to the needs of the staff, as

Watt 2014 (*Continued*)

	identified by heads of each intervention centre. Intervention centres were also given support and advice to revise and develop their centre's food policies in order to support healthy eating practices and procedures." Control: "The children's centres randomised to the control group did not receive any of the components of the CHERRY programme. During the study period, the control centres agreed not to implement any new nutritional interventions but continued with existing support. On final completion of the study, the CHERRY resources were disseminated to control centres and other early years settings interested in nutrition. "
Outcomes	"Child's fruit and vegetable consumption at home (portions per day). This was defined as the total weight (grams) of fruit and vegetables consumed the number of different types of fruit and vegetables consumed, and the actual types of fruit and vegetables consumed. The child's diet was assessed using the **multiple-pass 24-h recall method**. As the children concerned were under 5 years of age, the parents completed the interviews on their behalf."
Starting date	Parents were recruited into the study over 5 recruitment waves between September 2010 and November 2011
Contact information	Richard Geddie Watt: r.watt@ucl.ac.uk
Notes	

Østbye 2015

Trial name or title	Keys to Healthy Family Child Care Homes (KEYS)
Methods	Cluster-randomised controlled trial
Participants	Approximately 450 children aged 18 months to 4 years from 150 Family Child Care Homes
Interventions	Intervention: "The Keys intervention is delivered over nine months, spending approximately three months on each of three modules. These modules are designed to help providers (1). Modify their own weight-related behaviors so that they can become role models for children (Module 1: Healthy You), (2) create environments that encourage and support children's physical activity and healthy eating habits (Module 2: Healthy Home), and (3) adopt sound business practices that will help them sustain the changes introduced (Module 3: Healthy Business) "The intervention is delivered through workshops, home visits, tailored coaching calls, and educational toolkits." Control: "Participants in the **control arm** receive the Healthy Business" only
Outcomes	Child intake collected using direct observation at the Family Child Care Homes
Starting date	Unknown
Contact information	Courtney Mann: courtney.mann@dm.duke.edu
Notes	

LGA: Local Government Area

DATA AND ANALYSES

Comparison 1. Short-term impact (< 12 months) of child feeding intervention versus no intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Vegetable intake	11	1509	Std. Mean Difference (Random, 95% CI)	0.38 [0.15, 0.61]
2 Vegetable intake - sensitivity analysis - risk of bias	11	1509	Std. Mean Difference (Random, 95% CI)	0.38 [0.15, 0.61]
2.1 Low/unclear risk of bias	5	487	Std. Mean Difference (Random, 95% CI)	0.23 [0.03, 0.44]
2.2 High risk of bias	6	1022	Std. Mean Difference (Random, 95% CI)	0.48 [0.08, 0.87]
3 Vegetable intake - sensitivity analysis - primary outcome	11	1509	Std. Mean Difference (Random, 95% CI)	0.38 [0.15, 0.61]
3.1 Primary outcome of child fruit or vegetable intake	9	1228	Std. Mean Difference (Random, 95% CI)	0.47 [0.19, 0.76]
3.2 Primary outcome unclear	2	281	Std. Mean Difference (Random, 95% CI)	0.07 [-0.17, 0.30]
4 Vegetable intake - sensitivity analysis - missing data	11	1509	Std. Mean Difference (Random, 95% CI)	0.38 [0.15, 0.61]
4.1 Low attrition or high attrition with ITT analysis	8	757	Std. Mean Difference (Random, 95% CI)	0.29 [0.10, 0.48]
4.2 High attrition and no ITT analysis	3	752	Std. Mean Difference (Random, 95% CI)	0.55 [-0.16, 1.27]
5 Vegetable intake - subgroup analysis - modality	11	1509	Std. Mean Difference (Random, 95% CI)	0.38 [0.15, 0.61]
5.1 Face-to-face	9	1328	Std. Mean Difference (Random, 95% CI)	0.38 [0.10, 0.65]
5.2 Other modality	2	181	Std. Mean Difference (Random, 95% CI)	0.36 [0.06, 0.66]
6 Vegetable intake - subgroup analysis - setting	11	1509	Std. Mean Difference (Random, 95% CI)	0.38 [0.15, 0.61]
6.1 School or preschool	3	341	Std. Mean Difference (Random, 95% CI)	0.18 [-0.12, 0.47]
6.2 Home	4	474	Std. Mean Difference (Random, 95% CI)	0.56 [0.18, 0.95]
6.3 Home + Lab	2	40	Std. Mean Difference (Random, 95% CI)	0.74 [0.09, 1.39]
6.4 Other settings	2	654	Std. Mean Difference (Random, 95% CI)	0.11 [-0.14, 0.36]

Comparison 2. Short-term impact (< 12 months) of parent nutrition education intervention versus no intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Fruit and vegetable intake	10	3023	Std. Mean Difference (Random, 95% CI)	0.11 [-0.05, 0.28]
2 Fruit and vegetable intake - sensitivity analysis - primary outcome	10	3023	Std. Mean Difference (Random, 95% CI)	0.11 [-0.05, 0.28]
2.1 Primary outcome of child fruit or vegetable intake	7	2737	Std. Mean Difference (Random, 95% CI)	0.03 [-0.10, 0.15]

2.2 Primary outcome unclear	3	286	Std. Mean Difference (Random, 95% CI)	0.52 [0.03, 1.00]
3 Fruit and vegetable intake - sensitivity analysis - missing data	10	3023	Std. Mean Difference (Random, 95% CI)	0.11 [-0.05, 0.28]
3.1 Low attrition or high attrition with ITT analysis	6	2463	Std. Mean Difference (Random, 95% CI)	0.11 [-0.02, 0.24]
3.2 High attrition and no ITT analysis	4	560	Std. Mean Difference (Random, 95% CI)	0.07 [-0.45, 0.59]
4 Fruit and vegetable intake - subgroup analysis - modality	10	3023	Std. Mean Difference (Random, 95% CI)	0.11 [-0.05, 0.28]
4.1 Face-to-face only	5	826	Std. Mean Difference (Random, 95% CI)	0.12 [-0.20, 0.45]
4.2 Audio visual only	2	386	Std. Mean Difference (Random, 95% CI)	0.40 [-0.04, 0.85]
4.3 Other modality	3	1811	Std. Mean Difference (Random, 95% CI)	-0.00 [-0.22, 0.21]
5 Fruit and vegetable intake - subgroup analysis - setting	10	3023	Std. Mean Difference (Random, 95% CI)	0.11 [-0.05, 0.28]
5.1 Home	5	2047	Std. Mean Difference (Random, 95% CI)	0.06 [-0.16, 0.27]
5.2 Preschool	2	243	Std. Mean Difference (Random, 95% CI)	0.43 [-0.27, 1.13]
5.3 Other settings	3	733	Std. Mean Difference (Random, 95% CI)	0.06 [-0.14, 0.26]

Comparison 3. Short-term impact (< 12 months) of multicomponent intervention versus no intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Fruit and vegetable intake	4	1861	Std. Mean Difference (Random, 95% CI)	0.28 [-0.06, 0.63]
2 Fruit and vegetable intake - sensitivity analysis - primary outcome	4	1861	Std. Mean Difference (Random, 95% CI)	0.28 [-0.06, 0.63]
2.1 Primary outcome of child fruit or vegetable intake	3	1167	Std. Mean Difference (Random, 95% CI)	0.38 [-0.20, 0.95]
2.2 Primary outcome unclear	1	694	Std. Mean Difference (Random, 95% CI)	0.12 [-0.13, 0.38]
3 Fruit and vegetable intake - sensitivity analysis - missing data	4	1861	Std. Mean Difference (Random, 95% CI)	0.28 [-0.06, 0.63]
3.1 Low attrition or high attrition with ITT analysis	2	265	Std. Mean Difference (Random, 95% CI)	0.70 [0.39, 1.01]
3.2 High attrition and no ITT analysis	2	1596	Std. Mean Difference (Random, 95% CI)	0.06 [-0.08, 0.20]
4 Fruit and vegetable intake - subgroup analysis - setting	4	1861	Std. Mean Difference (Random, 95% CI)	0.28 [-0.06, 0.63]
4.1 School or preschool	3	1608	Std. Mean Difference (Random, 95% CI)	0.07 [-0.07, 0.20]
4.2 Other settings	1	253	Std. Mean Difference (Random, 95% CI)	0.72 [0.40, 1.04]

WHAT'S NEW

Last assessed as up-to-date: 30 September 2016.

Date	Event	Description
30 October 2017	Amended	This is a Living Systematic Review. Searches are run and screened monthly. Last search date was 25 September 2017. In this search, 3 new studies and 3 new ongoing studies were found. These are currently being included in the review. The team is aiming to publish the next update in January 2018

HISTORY

Protocol first published: Issue 6, 2010

Review first published: Issue 11, 2012

Date	Event	Description
30 September 2016	New search has been performed	We conducted an update of the review which identified 45 new trials eligible for inclusion
30 September 2016	New citation required and conclusions have changed	There is very low-quality evidence that specific child-feeding practice interventions increase the consumption of vegetables amongst children aged five years and under. There is very low-quality evidence that parent nutrition education interventions and multicomponent interventions respectively may not be effective in increasing fruit and vegetable consumption of children aged five and under

CONTRIBUTIONS OF AUTHORS

All authors contributed to the conception of the research and were involved in the preparation of the review including providing critical comment on drafts.

RH led the review update and manuscript drafting.

RH and FS conducted searches of other sources.

RH, FS, RW, KO, NN, SY, EJ and KB screened titles and abstracts.

RH, FS, NN, RS, KO, RW, SY and LW screened full texts to determine study eligibility.

EJ, TCM, RW, KB, KO, ER, RH and RS extracted data from eligible trials.

FS, FT and TCM assessed risk of bias.

RH, NN and LW assessed quality of studies (GRADE).

DECLARATIONS OF INTEREST

Rebecca K Hodder: none known.

Fiona G Stacey: none known.

Kate M O'Brien: none known.

Tara Clinton-McHarg: none known.

Flora Tzelepis: none known.

Nicole K Nathan: none known.

Erica L James: none known.

Kate M Bartlem: none known.

Rachel Sutherland: none known.

Emma Robson: none known.

Sze Lin Yoong: none known.

Rebecca J Wyse and Luke Wolfenden: are authors on an included randomised trial of an intervention to increase fruit and vegetable consumption (Wyse 2014); neither were involved in the determination of study eligibility, data extraction or risk of bias assessment for this study. The authors have not received any benefit, in cash or kind, any hospitality, or any subsidy derived from the food industry or any other source perceived to have an interest in the outcome of the review.

SOURCES OF SUPPORT

Internal sources

- Hunter Medical Research Institute, Australia.

Infrastructure support

- The University of Newcastle, Australia.

Salary Support

- Deakin University, Australia.

Salary Support

- Hunter New England Area Health Service, Australia.

Salary Support

- Cancer Council NSW, Australia.

Salary Support

- Cancer Institute NSW, Australia.

Salary support

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

- Consistent with the original review (Wolfenden 2012), we excluded trials if fruit or vegetable intake was not the primary trial outcome, to avoid potential confounding effects of other interventions and reduce the risk of publication bias and selective outcome reporting which is more predominate among secondary trial outcomes (or outcomes that were not otherwise stated). This included trials where fruit and vegetable outcomes were assessed within broader targeted interventions. The protocol stated that trials listing fruit and vegetable intake as a secondary trial outcome would also be included. We included trials that did not state a primary outcome, but did report intake of fruit or vegetables or both. We conducted sensitivity analyses to explore the impact on the overall assessment of treatment effects, excluding studies that did not state a primary outcome of children's fruit and vegetable consumption.

- Consistent with the original review (Wolfenden 2012), we amended classification of intervention effects as 'short-term' from 'three to less than 12 months' in the protocol to less than 12 months in the review.

- Consistent with the original review (Wolfenden 2012), we did not contact professional associations as part of the review search strategy, nor did we search the National Institute of Health Randomized Trial Records Database.

- Consistent with the original review (Wolfenden 2012), we amended the title and text throughout the review to ensure consistent terminology for the description of age. Specifically, we replaced the age description of children as 'preschool' with a more precise description of 'children aged five years and under', to more accurately reflect the scope of the review. We refer only to preschools when discussing the findings of trials conducted in that setting.

- Consistent with the original review (Wolfenden 2012), as some trials included children across a range of ages, we included any trial where the mean age of the sample at baseline was five years or under.

- For the review update, while two independent reviewers extracted data from each study, the extraction was undertaken by pairs of reviewers.

- For the review update, risk of bias was assessed on published study information and authors of included studies were not contacted to clarify any aspects.

- For the review update, we did not conduct planned subgroup analyses by interventions of varying intensities, due to insufficient information being reported across the included studies about the number and duration of intervention contacts or components.

- For the review update, while articles were screened independently against all pre-specified eligibility criteria by two reviewers, this was not conducted in a sequential manner (that is by order: participants, outcome, comparator, intervention, study type) as adopted in the original review.

- Whilst not explicitly excluded from the original review, for the review update we specifically considered cross-over trials to be an eligible study design. This was due to the many trials that adopt this design to investigate the effectiveness of interventions to increase the fruit and vegetable consumption of children aged five years and under, and the review authors deeming the study design to be appropriate in this context.

- This update includes some new methods relevant for living systematic reviews, which are included in the Methods and also described in Appendix 3

INDEX TERMS

Medical Subject Headings (MeSH)

*Eating; *Feeding Behavior; *Fruit; *Vegetables; Conditioning (Psychology); House Calls; Randomized Controlled Trials as Topic; Reward

MeSH check words

Child, Preschool; Humans; Infant