

Briefing: Rapid review of evidence base for effectiveness of school-centred food literacy programmes in improving child health and education outcomes

1. Introduction

The school environment is a critical setting for health interventions. Programmes run in educational settings offer the policy benefits of engaging broad, heterogeneous student cohorts, facilitating the rollout of inclusive and equitable-access health policies. As a result, a diverse range of dietary strategies have been deployed in schools across the western world over recent decades. The case for concentrating preventative health resources among the primary school-age population is well-established and summarized with regard to diet under (2) below. In sections (3) the international evidence base for the effectiveness of school-centred food literacy programmes is presented and discussed, followed by discussion of case studies in (4). In (5) we summarize policy implications and in (6) draw out the key conclusions of the evidence base collated in this paper; that success depends on ambitious implementation of a multi-pronged approach.

2. Evidence framework for school-centred dietary interventions

The framework of evidence for concentrating population-level dietary interventions on children's diets is well established and is summarized below:

2.1 Impacts of childhood diet

- Child nutrition can have lifelong impacts and contribute to the development of chronic diseases in adulthood (Alves et al. 2024)
- Higher consumption of UPFs in childhood is associated with more rapid progression of BMI, FMI, weight, and waist circumference into adolescence and early adulthood (as shown through Avon study (Chang et al. 2021)
- Higher UPF intake has been linked to adverse behavioral and emotional symptoms by age 5 years. Reducing UPF resulted in less adverse behaviour and emotional symptoms (Kavanagh et al. 2026)
- Diet and nutrition affects gut health and brain development/functioning, influencing mental health and behaviour. This is particularly important in childhood development (Jiang et al. 2025)

2.2. Children's diets and school food

- Children consume roughly one third of their calorific intake at school (Crossley et al. 2020)
- 64% of calories in current school meals come from UPFs (Parnham et al. 2022)

- Over 1 in 5 children in Wales report that they couldn't always have fruit or vegetables as part of their school meal provision (Children's Commissioner for Wales, 2026)
- British children consume 65% of their daily calorie intake as ultra-processed foods (UPF), the highest level in Europe (Monteiro et al. 2018)

2. 3 Dietary behaviour change in childhood

- Food preferences start in early childhood. Supportive, positive environments favour new foods being tried, and stressful or forcing environments hinder this. There is a predisposition to learn from early experiences through associated learning and repeated exposure (Ventura et al. 2013)
- The literature suggests that what infants are willing to consume depends on their ability to recognize items on their plate as familiar exemplars of that food type (Paroche et al. 2017)
- Reviews find evidence that child-feeding practice interventions have a positive effect on child vegetable consumption. (Hodder et al. 2024). There remains substantial variation in behaviour change techniques applied in childhood obesity prevention interventions (Chakraborty et al. 2022).
- Systematic reviews evaluating dietary interventions among young people demonstrate that specific techniques—particularly habit formation, environmental restructuring, and consequence salience—consistently yield the highest effectiveness ratios for modifying dietary patterns and food choices (Ashton et al., 2019).
- A 10-year longitudinal study observed that those with higher cooking skills in emerging adulthood prepared meals with vegetables more frequently and consumed fast food less often as adults (Utter et al., 2018)

3. International evidence base

The international evidence base demonstrates that holistic food literacy programmes - encompassing hands-on cooking classes, garden-based learning, nutrition education, and food system awareness-yield positive, measurable impacts on child health and educational outcomes (Ares et al., 2023; Dudley et al., 2015). Effectiveness varies depending on program duration, experiential components, and integration with broader school food environments (Carroll et al., 2021). Across the eight systematic, scoping, and synthesis reviews specifically covering child nutrition interventions in the school setting, included in the reference list below, the literature draws on a combined total of 232 studies.

3.1 Literature Review findings

A number of literature reviews have been carried out over the past decade specifically evaluating school-based interventions that improve the eating habits of primary school children. These studies

have differing but overlapping design parameters and approaches, but typically they draw on papers published from the 1980s onwards, excluding those with inadequate design and controlling for bias.

Taking their findings together, it is clear that well-designed, multicomponent and consistent interventions are strongly associated with effective outcomes. For instance, a recent review of the effectiveness of school-based nutrition education programs on fruit and vegetable consumption among primary school aged children internationally found that:

“effective outcomes always included experiential environmental sustainability components, such as gardening, tastings of F&Vs, and more often included food preparation/cooking activities. The latter appeared more commonly among studies reporting significant outcomes than noneffective studies in this review. In addition, the combination of these 3 experiential activities was more likely to be present in effective than in noneffective studies” (Karpouzis et al. 2025)

The review finds that inclusion of these three elements in interventions (cooking, tasting and school gardening) were more consistently more likely “to improve children's vegetable consumption than those that do not contain experiential learning” in line with other studies and reviews. In non-effective interventions, the role of teachers as the primary delivery mechanism for food literacy within an overcrowded curriculum was identified as a likely factor. In line with this the findings of other reviews, such as “Factors that contribute to effective nutrition education interventions in children” (2018), emphasize the importance of assuring the quality of interventions for efficacy:

“Successful interventions targeting school children engaged parents by means of face-to-face sessions, identified specific behaviors to be modified, and assured fidelity by training teachers or recruiting trained experts to deliver the intervention. In addition, they allowed adequate dosage, with an intervention duration of at least 6 months, and used age-appropriate activities” (Murimi et al. 2018)

Process evaluation, where carried out in the studies analysed by Karpouzis et al., found that in noneffective interventions programmes were not implemented as intended, with experiential components omitted and programmes cut short. The authors conclude that student outcomes were clearly “affected by the fidelity of program implementation” (Karpouzis et al. 2025). Conversely, process evaluations of effective interventions found:

“in one study, 100% of the program was delivered, reaching 96% of students, resulting in significantly increased vegetable intakes; and in another study, more teacher training was undertaken, and more lesson plans were implemented in the intervention schools compared with the comparator schools, producing significant increases in the number of F&Vs children brought to school each month” (Karpouzis et al. 2025)

The same review also found that school food and local government policies were effective supporting strategies to support increases in F&V consumption among children. A further review of the characteristics of successful primary school-based experiential nutrition programmes underlined the importance of a holistic approach, supported by an enabling policy environment, was crucial to ensuring success in dietary change among children:

“Key characteristics of successful interventions were identified as parental involvement and take-home activities, sessions taught by external experts, as well as incorporation of food service providers to increase exposure, availability and accessibility of healthy foods within the school environment.” (Charlton et al. 2021)

Although the detail of the component characteristics summarized here by Charlton et al (2021) differ from those identified by Karpouzis et al. and Murimi et al., they support the overall finding that high-quality, multicomponent interventions are necessary for success.

3.2 Impact of interventions: health, behaviour and educational outcomes

Successful interventions have impacts across multiple domains, even when diet and health outcomes are typically targeted. These include wider health outcomes e.g. in cognition and mental health, behavioural outcomes including reduced neophobia and classroom conduct, and educational outcomes including increased attainment. These outcomes are summarized below:

Health

- **Knowledge acquisition:** Systematic reviews indicate that primary and secondary school interventions consistently increase nutrition knowledge, food safety awareness, and culinary self-efficacy (Carroll et al., 2021; Cotton et al., 2020).
- **Synergistic multi-component effects:** When food literacy is embedded into broader frameworks (e.g. "Health-Promoting Schools") — combining education with free or subsidized nutritious school meals — studies show positive associations with healthier weight trajectories and reduced cardiometabolic risk factors (Ares et al., 2023).
- **Modest direct impact:** Standalone food literacy classes rarely show direct, significant reductions in Body Mass Index (BMI) or childhood obesity rates in isolation (Dudley et al., 2015).
- **Nutritional adequacy & cognition:** Deficiencies in key micronutrients (e.g., iron, zinc, B vitamins) impair memory and processing speed. Interventions that improve overall diet quality correlate directly with improved working memory, concentration, and spatial cognition (McGrattan et al., 2018; Follong et al., 2021).

Behaviour

- **Neophobia reduction:** Hands-on experiential learning (e.g., growing or preparing food)

consistently reduces food neophobia (fear of new foods) and increases willingness to try unfamiliar fruits and vegetables (Varman et al., 2021).

- **Fruit and vegetable consumption:** Multi-component interventions centered on cooking yield statistically significant short-term increases in daily fruit and vegetable intake (averaging an increase of 0.2 to 0.5 servings per day) (Cotton et al., 2020; Muzaffar et al., 2023).
- **Processed food reduction:** Increased food literacy may correlate with reduced intake of energy-dense, nutrient-poor foods, ultra-processed snacks, and sugar-sweetened beverages (Silva et al., 2023; Ares et al., 2023).
- **Classroom conduct:** Regular access to balanced meals via improved diet reduces hyperactive behavior, aggression, and classroom disruptions, fostering enhanced student engagement (Naveed et al., 2020; Lange et al., 2023; Tammam et al., 2015)

Education

- **Standardized testing:** Empirical evaluations demonstrate that students participating in school garden and cooking initiatives achieve higher academic achievement scores in core subjects, particularly science, mathematics, and literacy, compared to non-participating control groups (Berezowitz et al., 2015; Holloway et al., 2023).
- **Multiple pathways:** Food literacy impacts educational attainment through direct cognitive mechanisms (proper nutrition fueling brain development) and indirect behavioral pathways (increased engagement and attendance) (Berezowitz et al., 2015; Follong et al., 2021).
- **Reduced absenteeism:** Improved nutrition reduces susceptibility to routine childhood illnesses, leading to fewer sick days and improved attendance in the short-term (Ye et al., 2023) and significant long-term health and economic benefits (Lundborg et al., 2022)

Beyond these outcomes, a wider set of outcomes within the home environment and the wider food system (including rural employment and farm sector resilience) could be achieved by regional or national level school food literacy programmes, but these are outside the scope of this rapid review. Recent studies have also emphasised the absence of pleasure in both intervention and study design in this domain, and highlighted its potential importance in achieving positive outcomes in dietary change (Bedard et al., 2020). In particular, pleasure-oriented messages have been reported recently to be effective at triggering changes in food choices, particularly among people with lower diet quality (Trudel-Guy et al., 2019). Despite the salience of eating pleasure in common-sense approaches to dietary shift, its absence in study design until recently demonstrates that further potentially effective approaches to interventions may also remain underappreciated within the academic literature.

3.3 Summary of evidence across key outcome dimensions

Outcome Dimension	Evidence Strength	Primary Academic Findings	Key Representative References
Nutritional knowledge	Very High	Significant increases in diet, food safety, and culinary skills knowledge.	Muzaffar et al. (2023); Cotton et al. (2020)
Dietary intake (F&V)	High	Increases of 0.2 to 0.9 daily servings of fruits and vegetables.	Jones et al. (2012); Muzaffar et al. (2023)
Obesity / BMI	Moderate / Mixed	Limited standalone impact; significant when combined with school meal policy.	Dudley et al. (2015); Vidal et al. (2026)
Academic performance	High	Measurable gains in science and math scores through experiential learning; and long-term impact	Berezowitz et al. (2015); Holloway et al. (2023); Lundborg et al. (2022)
Behaviour and mental health	Moderate	Reduced hyperactive behavior and classroom disruption	Lange et al., (2023); Tammam et al., (2015)

4. Case Studies

The following models, from varied but comparable Western contexts, illustrate the impact of differing multi-pronged holistic models on child food literacy and health outcomes:

Food for Life Partnership (United Kingdom)

- **Model:** A whole-school framework combining, at Gold Award level, classroom nutrition, cooking, school gardens, farm visits, and procurement reform (Jones et al., 2012).
- **Health Impact:** Evaluation across English primary schools showed that children in active Food for Life schools were twice as likely to consume 5 portions of fruits and vegetables daily compared to control schools, achieving an average increase of +0.7 portions per child per day (Jones et al., 2012). This finding was supported by a follow-up survey of pupils in participating schools in 2017,

showing an increase of +0.5 portions per child per day in schools continuing to run the programme themselves. (Jones et al., 2017)

- **Educational Impact:** Free school meal uptake increased by 21%, expanding nutritional access for socioeconomically disadvantaged pupils and improving afternoon concentration (Jones et al., 2012).

Stephanie Alexander Kitchen Garden Program (Australia)

- **Model:** Integrates 45–60 minutes of weekly garden-based learning and 90 minutes of kitchen laboratory classes directly into primary school curricula (Morgan et al., 2010).
- **Health & Behavior:** Evaluated by Deakin University and the University of Melbourne, the initiative demonstrated significant reductions in food neophobia and higher culinary self-efficacy among pupils (Gibbs et al., 2013; Block et al., 2009).
- **Educational Impact:** Provided effective alternative learning modalities for non-traditional classroom learners, improving social-emotional cohesion and peer collaboration (Block et al., 2009).

National *Shokuiku* Framework (Japan)

- **Model:** Established under the 2005 *Basic Act on Shokuiku*, mandating holistic dietary education, agricultural visits, and daily communal school lunch (*Kyoshoku*) (Kuwahara & Eum, 2022; Kibayashi et al. 2024).
- **Health & Habit Impact:** Not extensively evaluated, but associated with Japan maintaining the lowest childhood obesity rates among OECD nations (<5%). Longitudinal studies suggest that children exposed to *Shokuiku* maintain balanced dietary patterns, lower rates of breakfast skipping, and reduced lifestyle disease risks in adulthood (Kuwahara & Eum, 2022; Kibayashi et al. 2024).

School Food 4 Change (EU)

- **Model:** Four year EU funded project aiming to create a framework for a 'Whole School Food Approach' (WSFA), in conjunction with changing school menus in order to establish a sustainable food culture in and around schools across European contexts.
- **Impact:** 549 schools across 18 EU countries implementing WSFA as of late 2025, with clear sense of policy alignment and direction perceived as most valuable outcomes to date within the context of an ambitious and multi-pronged programme.

5. Implications for Policy

Charlton et al (2020) provide a detailed list of policy recommendations based on their systematic review of successful primary school-based experiential nutrition programmes:

- Use behavioural change theory to guide interventions, as these are most impactful in terms of creating changes in both the environment and children's behaviours;
- Link experiential learning opportunities to specific curriculum topics and integrate with classroom-based learning, rather than being provided in isolation;
- Include a focus on influencing the home and community food environment as well as providing exposure to experiential learning opportunities during school hours;
- Incorporate family involvement and take-home activities to encourage healthy eating at home and provide role modelling of good nutrition practices;
- Involve food service providers at schools to increase exposure, availability and accessibility of healthy food options;
- When developing a school garden programme, ensure long-term commitment of at least 3 years, to allow sufficient time to impart skills, mentor across multiple growing seasons and to adequately integrate the garden into the culture of the school;
- Ensure adequate resources are available for maintenance of food gardens, including weeding, watering and harvesting, particularly during school holidays;
- Provide repeated opportunities to taste foods to encourage acceptability by children, especially for vegetables;
- Where possible, include cooking-based activities as these are the most effective interventions that impact student self-efficacy, as well as improve their food knowledge and preferences;
- Engage specialist staff, trained in horticulture and cooking to deliver interventions rather than expect classroom teachers to add gardening or food preparation to their skillset.

This comprehensive list either incorporates or complements most recommendations from other similar review studies (Karpouzis et al, 2025; Vargas et al, 2025; Vidal et al, 2026 (2)), and corresponds to the findings of Vidal et al (2026) when evaluating the implementation of the whole-school approach to food across multiple European countries, that the success of such a multifaceted approach depends on a phased approach, with due consideration given to preliminary steps – such as forming a working group, conducting a school food review, and determining school needs and priorities.

Further, Ares et al (2023) emphasize the need in public policy to adopt a comprehensive view of food literacy that captures the 3 types of competencies: relational, functional, and critical. In practice, this relates both to the design of food literacy interventions and to the need to account for a child's different food environments in policy design, integrating home, preschool, school and external environments, thus also complementing the findings of the aforementioned reviews.

It is clear that significant outcomes across multiple policy areas can thus be achieved through holistic school-centred food literacy programmes, but those outcomes depend on the ambitious implementation of a multi-component approach. A child's food environment includes the entirety of their school setting and extends further into the home and other external environments.

Mazzucato et al (2025) provide a case for the wider policy benefits of investments in this area, concluding that "school meal procurement can be designed to create market demand for food that is healthy, sustainable, tasty and accessible, instead of only seeking the lowest-cost options."

6. Conclusion

In summary, across the literature, intervention efficacy depends on at least the following three key design parameters:

1. **Hands-on experiential learning:** Programmes combining cooking, tasting and gardening are significantly more effective at altering food preferences than classroom-only teaching (Dudley et al., 2015; Varman et al., 2021).
2. **Programme duration:** Intensive interventions extending multiple weeks or longer yield sustained behavioral outcomes compared to short-term workshops (Cotton et al., 2020; Muzaffar et al., 2023).
3. **Whole-school alignment:** Integrating curriculum, canteen offerings, and outreach to the family environment ensures positive impacts across both health and educational outcomes (Ares et al., 2023; Vidal et al., 2026 (2)).

As discussed above, different studies and interventions have prioritized varied intervention components, but all are in agreement that dietary shift among pre-teens requires a sustained and multi-pronged approach.

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