

School based Fruit and Vegetable Provision Programs

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What is already known on this topic

Priority of the problem: Only 40% of European 7–9-year-olds¹ and 11–13–15-year-olds eat fruit daily.² The proportion of children who consume Fruit and Vegetables (FV) has remained unchanged for 20 years.³ To reverse this, better understanding of implementation and long-term impact of School-based FV Provision Programs (SFPPs) is needed.

Benefits and harms: A higher FV consumption is associated with lower risk of all-cause mortality and evidence supports the recommendations of 400 gram or five portions of FV per day.

Cost-effectiveness: The benefits of implementing these programs outweigh the costs of not doing so assuming that 30% of the effect will be maintained over time.^{4,5}



Source: colourbox.com

What our studies add

Table 1. Consolidated Framework for Implementation Research (CFIR) determinants pertaining to the SFPPs

Scheme characteristics	Outer setting	Inner setting	Characteristics of individuals	Process
Scheme source - both barrier, facilitator	School needs and resources - both barrier, facilitator	Structural characteristics - both barrier, facilitator	Knowledge and beliefs about the intervention – both barrier and facilitator	Planning - no content classified
Evidence strength and quality - present factor, unclear influence		Cosmopolitanism - barrier	Networks and communications – both barrier, facilitator	
Relative advantage - facilitator	Peer pressure - facilitator		Culture - no content classified	Individual stage of change- no content classified
Adaptability – both barrier, facilitator		External policy and incentives - both barrier, facilitator	Implementation climate - both barrier, facilitator and with unclear influence	Individual identification with organization - no content classified
Trialability - facilitator	Readiness for implementation - both barrier, facilitator		Other personal attributes - no content classified	
Complexity – no content classified				Reflecting and evaluating - both barrier, facilitator
Design quality and packaging - both barrier, facilitator and with unclear influence				
Cost - both barrier, facilitator				

Acceptability of SFPPs: Our study indicated parents are both important for implementation and a secondary target group of these programs, thus their awareness and support is crucial. Positive child perceptions of the SFPPs and perceived behaviour change are considered as important facilitators of implementation.⁶ Teachers and government employees would continue to implement the SFPPs as long as financial resources are available.

Feasibility of SFPPs: Table 1 depicts the identified determinants from the Consolidated Framework for Implementation Research (CFIR) pertaining to the European school FV program. Many of the determinants could be both barriers or facilitators depending on the situation.

Resource use of SFPPs: Lack of time, adequate human resources, and tools like teaching materials or websites linked to the interventions, were among important barriers to the implementation of SFPPs. Sustained financial resources that ensures frequent and free FV provision that reaches to as many children as possible can enhance the impact of the SFPPs.

Policy recommendations

1. Time and effort should be invested in establishing and cultivating the relationships between suppliers of FV and kindergartens/schools before and during the implementation.
2. Teachers, children, and those involved in distributing the FV should be consulted on appropriate design, packaging, as well as frequency of delivery and overall duration of the SFPPs throughout the school year.
3. Nutrition-related policies in Europe/nationally should make use of the relationships between ministries of agricultural, health, and education established by the European School FV Scheme.
4. SFPPs activities should align the actors and their objectives across settings to address children's motivation and capabilities combined with sustained opportunities to eat FV.



Source: colourbox.com

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Summary

Problem context

A higher fruit and vegetables consumption is associated with lower risk of all-cause mortality. Nonetheless, only 40% of European 7–9-year-olds¹ and 11–13–15-year-olds² eat fruit daily. Comparing these data to a survey from 2000³, showed the proportion of children who consume FV has remained unchanged for 20 years. To reverse this trend, it is required to revisit School-based FV Provision Programs (SFPPs) and evaluate their long term impact as well as their implementation. Research to date has shown that the degree to which an intervention is implemented has a direct effect on the intervention's intended outcomes.^{4,5}

The research on the impact of SFPPs has been pervasive; a systematic review and meta-analysis found that interventions in the school setting which directly provide fruit and vegetables to children, increase fruit intake by 0.27 servings and vegetables intake by 0.04 servings per day.⁶ However, research on the implementation of SFPPs using an implementation science-based framework, investigation of the long-term impact on children's FV consumption (over 18 months), has been limited. On the long-term impact of the SFPPs, evidence from a Norwegian FV programme that offered free FV for an entire school year indicated that the program had an effect after three⁷ and seven years⁸, but not after fourteen⁹ years. School-based FV programmes involve a variety of people, institutions, sectors, and variables that interact and influence the long-term impact on children's FV consumption. The complex nature of this interrelated stakeholders and factors that shape the impact of these interventions calls for utilizing methods such as systems approach that can explain and capture these complexities.

We used implementation science and systems thinking methods to look at implementation and map mechanisms of change in SFPPs.

Summary of study 1

In this study,¹⁰ we conducted a systematic qualitative review of 14 studies reporting on the determinants (barriers and facilitators) to implementation of interventions that entail the action of direct provision of fruit and vegetables in kindergarten and school settings. This review highlights the importance of the following Consolidated Framework for Implementation Research (CFIR) constructs as determinants in the implementation of fruit and vegetables interventions in schools: 1) intervention characteristics domain: 'design quality and packaging', 'adaptability' and 'cost'; 2) outer setting: 'cosmopolitanism', external policy and incentives' and 'patients' needs and resources'; 3) inner setting: 'implementation climate', 'readiness for implementation' and 'structural characteristics'; 4) characteristics of individuals: 'individual stage of change', 'knowledge and beliefs about the intervention' and finally of 5) process: 'engaging', 'executing' and 'reflecting and evaluating'. The review stresses the dual role of parents as both supporting the implementation and targets of the intervention. Positive child perceptions of the value of the intervention and perceived behaviour change due to the intervention were reported as relevant facilitators to implementation across several studies. We concluded that CFIR provides a systematic approach for identifying and organising the implementation determinants of nutrition interventions in kindergartens and schools. Revisions are encouraged to provide adequate space for the perceptions of various implementation actors and the target group.

Summary of study 2

In this study,¹¹ we aimed to understand barriers and facilitators to implementation of the European School Fruit and Vegetable Scheme (EU-Scheme) based on perceptions from those responsible at government level and consider the applicability of the CFIR for this purpose. Twenty-three semi-structured interviews (n=29) were conducted with persons from ministries of agriculture, health, and education, across 10 EU member states and with a representative from the EU level. Qualitative data was initially coded inductively, and subsequently inductive codes were mapped to the domains/constructs/sub-constructs of the CFIR. The country level was considered the inner setting of the CFIR. Barriers and facilitators were subsequently identified within each construct/subcontract. We found relevant content in regard to most of the constructs of CFIR. We focus on the barriers and facilitators to implementation linked to a few exemplary constructs: adaptability (Scheme characteristics domain), external policy and incentives (outer setting), networks and communications (inner setting), knowledge and beliefs about the intervention (characteristics of individuals) and executing (process). Flexibility in how the EU-Scheme is

designed and implemented enables country level implementation, and newly established cooperation between implementing ministries is a potential facilitator. However, timing of the top-down budget allocation is a barrier and taking EU funding for granted is a potential disincentive to improvement although the funding facilitates sustainability. Despite agreement on what the overall goals of the EU-Scheme are, there is some ambiguity as to what the primary goal is, which may influence design as well as implementation at country and school level. Some ambiguity may be useful at the supranational policy level enabling politically acceptable framing and continuation of the financing of the EU-Scheme, but this seems to translate into a potential barrier to design and implementation at country and school level. CFIR is appropriate for use at country level, and for identifying barriers and facilitators to policy implementation.

Summary of study 3

This study¹² aimed to apply a systems approach to provide an integrated perspective of the mechanisms of the EU-Scheme to understand better how to increase its long-term impact on children's fruit and vegetables consumption. We developed a causal loop diagram using conceptualisation steps from the system dynamics approach to synthesise peer-reviewed articles and documents of national governments related to the EU-Scheme. Three one-hour online meetings were held with ten experts in school-based fruit and vegetable programmes, children's fruit and vegetable consumption, and the EU-Scheme to validate and improve the initial causal loop diagrams. The findings suggest that a central self-reinforcing mechanism through which children socialise during fruit and vegetables consumption is critical in the habituation process. Additionally, the initial increase in children's fruit and vegetables consumption following the EU-Scheme implementation is due to growth in three self-reinforcing loops related to motivation and capability mechanisms; however, this trend gradually slows and stops due to four balancing feedback loops with alternative goals related to opportunity mechanisms that reach their limits. We concluded that children's fruit and vegetables consumption can be maintained over time when their motivation and capabilities are combined with sustained opportunities. Because multiple actors and settings influence children's motivation, capability, and opportunity, activities that can align them and their objectives should be included in the EU-Scheme.

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