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Consuming sufficient amounts of fruit and vegetables (F&V) may contribute to prevention of several chronic diseases. Nevertheless, most children in Western countries, including the Netherlands, do not comply with recommendations for F&V intake. Therefore, several F&V promoting interventions have been implemented. One of these interventions is the large-scale Dutch Schoolgruiten Project. ‘Schoolgruiten’ is a Dutch acronym for ‘school fruit and vegetables’. The Schoolgruiten Project is planned to grow into a nationwide campaign for primary schoolchildren, but it started with a pilot phase in which the intervention was tested in a controlled design. This pilot phase is described in the present thesis.

The first part of this thesis (chapters two and three) describes two studies on potential determinants of F&V intake. The second part (chapter four) is chapter on methodological issues. It describes the questionnaire used to assess F&V intake among children and tests the agreement between parent and child reports of the children’s F&V intake levels. The last part of the thesis (chapters five to eight) describes the impact evaluation and economic evaluation of the Schoolgruiten intervention. The thesis concludes with a summary and an integration of the main findings in chapter nine, as well as a discussion of the methodological issues and implications for future research and practice.

The main strategy of the Schoolgruiten intervention was to improve accessibility of F&V at school, which is one of the main determinants of F&V intake among children. The children of the intervention group received a free serving of fruit or ready-to-eat vegetables twice a week at school. Additionally, a school curriculum aiming at increasing knowledge and skills related to F&V consumption was offered to the schools.

To evaluate the effect of the Schoolgruiten intervention, a pre-test and two post-test measurements were conducted. Both schoolchildren (aged 9 years old at baseline) and their parents filled in questionnaires about the child’s intake and determinants of intake, which gave us the opportunity to perform all analyses on both parent and child reported data.

Chapter two gives an overview of the presumed most important determinants of F&V intake among schoolchildren, with a specific emphasis on taste and taste preferences, based on reviews of the literature and results from two specific studies. Results from the two studies revealed that taste preferences and liking of F&V, a positive attitude
for F&V, knowledge of recommended daily intakes of F&V, positive self-efficacy for F&V, positive role modelling for F&V, family rules for eating F&V, parental facilitation of F&V, and availability at home of vegetables were important potential determinants of intake. These factors seemed to be of greater importance for fruit intake than for vegetable intake.

In chapter three we investigated whether changes in F&V intake frequency and changes in potential determinants measured at three different time points were associated. For this study, we additionally used data of the Dutch part of the European Pro Children Study, an intervention study among primary schoolchildren to promote F&V intakes. Both longitudinal and cross-sectional analyses showed that positive changes in important determinants (taste preferences, self-efficacy, family rules and availability at home) were associated with positive changes in F&V intakes. Changes in F&V intake were also associated with changes in taste preferences and knowledge of recommendations later in time. These findings support theories proposing direct and indirect reciprocal associations between determinants and behaviour.

Because it was not clear from the literature whether child or parent reports of the child’s intake are the most valid regarding intake levels, a study (described in chapter four) investigated the level of agreement between child and parent reports of the child’s F&V intake and their determinants. Weighed Cohen’s kappa were moderate and limits of agreement were wide, indicating moderate agreement between child and parent reports on child’s F&V intake. Moreover, agreement was worse among boys and among non-Western immigrant children. The weak to moderate agreement was dependent on the age of the child, since disagreement was stronger for fourth graders than fifth graders. Fourth graders tend to overestimate their own intake of F&V. Differences in agreement seemed further to be dependent on level of consumption and ethnicity, at least for the younger children.

In chapters five and six, we investigated the short- and long-term effects of this intervention on F&V intake and their determinants. Short-term effect evaluation showed positive mixed results, namely a significant higher vegetable intake for children of non-Western ethnicity than their peers from the control schools. The Dutch children from the intervention schools reported significantly higher fruit intake than the Dutch children from the control schools. No significant effects in intake were observed based on parent-reports. Significant positive intervention effects were also found for perceived accessibility among children of non-Western ethnicity, and for parent-reported taste
preference of their child among children of non-Western ethnicity and among boys of Dutch ethnicity.

Chapter six describes the long-term effects. Both children and parent reports indicated that the intervention group had a significantly higher fruit intake at second follow-up. Significant positive intervention effects were also found for knowledge of fruit recommendations among boys. Further, we explored whether children's appreciation of the project could explain these intervention effects. After different analyses, we concluded that appreciation of the project partially mediated this effect. This suggests that children should be consulted in the development of school-based interventions so that interventions are developed that are appreciated by the children.

In chapter seven, we investigated if the Schoolgruiten intervention could contribute to increasing F&V intake, and/or to replace unhealthy snacks by a piece fruit or vegetable in the mid-morning break at school. Results indicated that children in the intervention group brought F&V snacks more often and unhealthy snacks less often from home to school to consume in the morning break at school. We found this result in both the child data and in the parent data.

In chapter eight, an economic evaluation of the Schoolgruiten and the Pro Children Study is described. A comparison was made between these two Dutch interventions and ‘no intervention or doing nothing’. First, future health effects induced by an increased F&V intake were estimated by means of epidemiological modelling. Future intervention effects of the Pro Children intervention as modelled by the multi-state life table were estimated at a gain of 326 DALYs/100,000 children (DALY = Disability-Adjusted Life-Years). The future intervention effects for the Schoolgruiten intervention were estimated to be a bit less: 196 DALYs/100,000 children. Economic evaluations including extensive sensitivity analyses estimated that both the Schoolgruiten and the Pro Children interventions were cost-effective.

The final chapter (chapter 9) describes and discusses the main findings of the eight chapters of this thesis. Furthermore, some methodological issues of all seven studies are addressed, and implications for future research and practice are discussed.

One of the overall conclusions of the Schoolgruiten project is that this intervention is effective in increasing children’s fruit intake. Although effect sizes were small, a scheme that improves availability of F&V in school appears to be an effective way to increase
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intake levels of fruit. Environmental factors such as availability and accessibility of F&V are important determinants of F&V intake among primary schoolchildren and should be targeted in interventions.