

# IMPACT AND EFFECTIVENESS

## TABLE 36

### **Provision of Fruits and Vegetables**

Effectiveness Tables

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# EFFECTIVENESS TABLES

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<b>United States</b>				
<p><b>Author</b> Williamson, Copeland (2007)</p> <p>No location specified</p> <p><b>Design</b> Intervention Evaluation</p> <p>Randomized trial</p> <p><b>Duration</b> High</p> <p>2 academic years</p>	<p><b>Measures</b> <i>Access to a healthy school environment</i> (physical activity during class time/recess)</p> <p><b>Outcome(s) Affected</b> Overweight/obesity (height and weight [body mass index], body fat composition), physical activity (SAPAC and the Godin-Shephard Leisure Time Questionnaire), nutrition (digital photography of food)</p>	<p><b>Neutral for Overweight/obesity for Children in the Study Population (School Physical Activity and Environment Policies)</b></p> <p><b>Net Positive for Nutrition in the Study Population (School Physical Activity and Environment Policies)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><b>OVERWEIGHT/OBESITY:</b></p> <ol style="list-style-type: none"> <li>1. Analysis of change in body mass index (BMI) z scores from baseline as a function of treatment arm (intervention or control) indicated no significant effects related to treatment arm, (p=0.5458).</li> <li>2. There was a negative correlation (r= -0.18) between baseline BMI z scores and changes in BMI z scores at 18 months for intervention and control, indicating that at risk for overweight and overweight children tended to either lose weight, relative to changes in height and age, or gain modest amounts of weight.</li> <li>3. The success rates for weight gain prevention at month 18 for the intervention group were 51% and 54.7% for control. There was a positive correlation (r= 0.17) between baseline BMI z-scores and success of weight gain prevention for intervention and control, indicating that children with higher BMI z scores at baseline were more likely to decrease or maintain their BMI z score in comparison with children with lower baseline BMI z scores.</li> <li>4. Baseline % body fat (BF) was significantly associated with changes in % BF at 18 months, with lower levels of %BF at baseline being associated with greater increases in %BF during intervention period (r= -0.09, p&lt;0.02). This indicates that fatter children (in both groups) at baseline tended to lose fat during the intervention at rates that were lower than those for children who were lean at baseline (r= -0.12, p &lt;0.05 for control, r= -0.07, p&gt;0.05 for intervention).</li> </ol> <p><b>NUTRITION:</b></p> <ol style="list-style-type: none"> <li>5. After 18 months, the intervention group was consuming fewer total calories (-59 ± 13.3, d=0.55) and lower percentages of calories from total dietary fat (-41 ± 3.4, d=0.61), saturated fat (-17 ± 1.2, d=0.49) and protein (-11 ± 4.0, d=0.60). The dietary changes were determined primarily by changes in food selections.</li> </ol>	<p><b>Not Effective for Overweight/obesity in the Study Population</b></p> <p><b>Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = High</p> <p>Effect size = Neutral for overweight/obesity in children with higher baseline BMI and net positive for nutrition for the study population</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>
<p><b>Author</b> Jamelske, Bica (2008)</p> <p>Wisconsin</p> <p><b>Design</b> Intervention Evaluation</p> <p>Non-randomized trial</p> <p><b>Duration</b> High</p> <p>March 2006 through the 2007 school year</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of low/no cost fruits and vegetables in schools and nutrition education)</p> <p><b>Outcome(s) Affected</b> Fruit and vegetable consumption (dietary recall)</p>	<p><b>Net Positive for Nutrition in the Study Population (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><b>NUTRITION:</b></p> <ol style="list-style-type: none"> <li>1. 62.8% of intervention students with low initial consumption (&lt;1 F&amp;V per day) reported increased fruit and vegetable intake compared to 47.1% of control students (p=0.13).</li> <li>2. Difference in reported fruit and vegetable consumption was 19.5% between intervention and control schools (p=0.07) after controlling for demographic and physical activity behaviors</li> <li>3. Low consuming 4th grade students in the intervention schools (n=40) were 29.7% more likely than control students (n=17) to have increased their average daily fruit and vegetable intake (p=0.05).</li> </ol>	<p><b>Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = High</p> <p>Effect size = Net positive for nutrition in the study population</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Schneider, May (2006) Mississippi</p> <p><b>Design</b> Intervention Evaluation Before and after study</p> <p><b>Duration</b> Medium 1 school year (2004-2005)</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of low/no cost fruits and vegetables in schools and nutrition education)</p> <p><b>Outcome(s) Affected</b> Fruit and vegetable consumption (24 hour recall)</p>	<p><b>Net Positive for Nutrition in the Study Population (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><b>NUTRITION:</b></p> <ol style="list-style-type: none"> <li>1. Student consumption of fruit in school and overall increased significantly by 0.34 and 0.61 servings per day, respectively (p&lt;0.01 for both) among the 8th and 10th grade students who participated in the dietary recall interviews.</li> <li>2. Student consumption of vegetables in school decreased significantly (0.38 servings per day; p=0.05) but consumption of vegetables overall did not change among 8th and 10th grade students.</li> <li>3. Intake of vitamin C increased overall, and intake of dietary fiber increased in school among 8th and 10th grade students (not significant).</li> </ol>	<p><b>Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Medium</p> <p>Effect size = Net positive for nutrition in the study population</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>
<b>International</b>				
<p><b>Author</b> Wind, Bjelland (2008); Klepp, Perez-Rodrigo (2005); Te Velde, Brug (2008); Perez-Rodrigo, Wind (2005) Norway, Spain, The Netherlands</p> <p><b>Design</b> Intervention Evaluation Group randomized trial</p> <p><b>Duration</b> High 2 years</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of low/no cost fruits and vegetables in schools and nutrition education)</p> <p><b>Outcome(s) Affected</b> Fruit and vegetable intake (24-H recall questionnaire, food frequency questionnaire)</p>	<p><b>Net Positive for Nutrition in the Study Population (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><b>NUTRITION:</b></p> <p><i>Year one follow-up:</i></p> <ol style="list-style-type: none"> <li>1. The intervention group reported a 56.9 g/day higher intake of fruits and vegetables (F&amp;V) than the control group (95% CI: 28.0-85.9). These increases were not due to higher intakes during school hours (except for Dutch schools).</li> <li>2. Children with the highest appreciation of the intervention had higher increases in F&amp;V intake (+0.28 portions fruit, +0.37 portions vegetable) compared with children who had medium (no change in portions fruit, -0.02 portions vegetable) and low (-0.13 portions fruit, -0.09 portions vegetable, p&lt;0.01) scores.</li> <li>3. Children who completed &gt;10 lessons had higher increases in F&amp;V intake (+0.18 portions fruit, +0.21 portions vegetable) compared to those who completed 7 to 10 lessons (no change in portions fruit, +0.12 portions vegetable), or less than 7 lessons (-0.02 portions fruit, -0.05 portions vegetable, p&lt;0.05).</li> <li>4. Adjustments for family educational level attenuated the intervention effect at first follow-up, but differences between the intervention and control group were still significant (p&lt;0.01 for total fruit and vegetable intake and fruit intake, and p&lt;0.05 for vegetable intake, data not shown)</li> </ol> <p><i>Year two follow-up:</i></p> <ol style="list-style-type: none"> <li>5. Multilevel modeling indicated the intervention effect was higher than at 1st follow up for total F&amp;V intake and fruit intake alone in Norway (from 56.9 g/day to 91.5g/day, p=0.044; and from 34.1 g/day to 87.8g/ day, p&lt;0.002; respectively). In Spain and the Netherlands, the intervention effect for total F&amp;V intake decreased.</li> <li>6. At second follow-up the intervention effect for Norway became even stronger after adjustment for family educational level (regression coefficient= 95.2, 95% CI: 52.3-138.0 g/d for total fruit and vegetable intake).</li> </ol>	<p><b>Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = High</p> <p>Effect size = Net positive for nutrition in the study population</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Reinaerts, de Nooijer, Candel (2007); Reinaerts, Crutzen (2008); Reinarts, de Nooijer, de Vriesr (2007) The Netherlands</p> <p><b>Design</b> Intervention Evaluation Group randomized trial</p> <p><b>Duration</b> Medium October 2004 – June 2005</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of free fruits and vegetables in schools and nutrition education)</p> <p><b>Outcome(s) Affected</b> Fruit and vegetable consumption (parent completed 24 hour recall and food frequency questionnaire)</p>	<p><b>Net Positive for Nutrition in the Study Population (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><b>NUTRITION:</b></p> <ol style="list-style-type: none"> <li>Both interventions were effective in increasing fruit intake with an increase of 0.2 portions (+15%, net increase in consumption compared with baseline intake of the intervention group, <math>p &lt; 0.001</math>) per day, including weekends.</li> <li>The F&amp;V distribution intervention was effective in increasing vegetable intake at dinner for 4-6th graders (+22%, <math>p &lt; 0.01</math>) and for non-native children (+32%, <math>p &lt; 0.01</math>).</li> <li>Regarding vegetable snack intake from baseline to follow-up, the distribution intervention was effective for 4-6th graders (+33%, <math>p &lt; 0.01</math>), and the curriculum intervention for 1st – 3rd graders (+50%, <math>p &lt; 0.05</math>) and for girls (+50%, <math>p &lt; 0.01</math>).</li> <li>Native children in the curriculum intervention increased their consumption of fruits, juices and vegetables by 0.2 times per day (+8%, <math>p &lt; 0.05</math>) and non-native children by 1.6 times per day (+60%, <math>p &lt; 0.01</math>). Fruit, juice and vegetable consumption also increased in the distribution intervention group for 4-5 year olds by 0.1 times per day (+4%, <math>p &lt; 0.05</math>) and for 4-6th graders by 0.5 times per day (+15%, <math>p &lt; 0.01</math>).</li> <li>The distribution intervention was more effective than the curriculum intervention in increasing vegetable intake at dinner for 4-6th graders (<math>\beta = -1.34</math>, <math>p &lt; 0.001</math>) and for non-native children (<math>\beta = -1.41</math>, <math>p &lt; 0.01</math>), and in increasing vegetable snack intake for 4-6th graders (<math>\beta = -0.08</math>, <math>p &lt; 0.05</math>) and boys (<math>\beta = -0.06</math>, <math>p &lt; 0.05</math>).</li> </ol>	<p><b>Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Medium</p> <p>Effect size= Net positive for nutrition in the study population</p>	<p><b>Maintenance</b></p> <ol style="list-style-type: none"> <li>The F&amp;V distribution intervention group increased F&amp;V intake 1 year after the intervention with a net effect of 0.13 times /day fruit, juice and vegetable consumption [24hr recall] (<math>d = 0.09</math>), 0.09 more portions fruit/day (<math>d = 0.15</math>), and 0.07 more vegetable snacks/day (<math>d = 0.29</math>), compared to controls (<math>p &lt; 0.05</math> for all).</li> <li>The uncorrected data showed that children from the distribution group consumed 3.25 g more vegetables during dinner (<math>d = 0.14</math>).</li> <li>The curriculum group increased F&amp;V intake 1 year after the intervention with a net effect of 0.32 times/day fruit, juice and vegetable consumption [24hr recall] (<math>d = .22</math>) and 0.19 portions fruit/day (<math>d = 0.29</math>) compared to controls (<math>p &lt; 0.05</math> for both).</li> <li>Both interventions showed similar effects in increasing 24 hour fruit, juice and vegetable consumption and fruit consumption, but the distribution intervention had significantly higher intakes of vegetable snacks (0.40 vs. 0.26 times per day, <math>p &lt; 0.05</math>) and vegetables at dinner (49.6 vs. 48.4 g/day, <math>p &lt; 0.01</math>) compared to the curriculum intervention.</li> </ol> <p><b>Sampling / Representativeness</b> Not Reported</p>

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Ashfield-Watt, Stewart (2008) New Zealand</p> <p><b>Design</b> Intervention Evaluation Group randomized trial</p> <p><b>Duration</b> Low 10 weeks</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (free fresh fruit provided in schools)</p> <p><b>Outcome(s) Affected</b> Fruit consumption (24 hour recall)</p>	<p><b>Net Positive for Nutrition in Lower-Income Children (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><b>NUTRITION:</b> <i>End of the intervention (A2)</i></p> <ol style="list-style-type: none"> <li>At Assessment 2 (A2), the intervention group increased their fruit intake at school by 0.39 pieces/school day and were significantly greater than the control group's intake which remained unchanged from baseline (<math>p &lt; 0.001</math>).</li> <li>68% of the control group who had eaten no fruit at baseline continued to eat no fruit at the end of the intervention (A2), compared with only 36% in the intervention group (<math>p &lt; 0.001</math>).</li> <li>Of the remaining 64% of intervention group subjects who had eaten no fruit at baseline, approx. two-thirds increased school fruit intake to 1 piece/school day and a third had increased to <math>\geq 2</math> pieces/school day at end of intervention (<math>p &lt; 0.001</math>).</li> <li>Intervention children who had eaten fruit at school at baseline (1 or <math>\geq 2</math> pieces/school day) were also more likely to continue eating or increase school fruit intake than control children at the end of the intervention (<math>p &lt; 0.001</math>). The probability of intervention students who consumed 1 piece of fruit/school day at baseline continued to consume 1 piece or increased to <math>\geq 2</math> pieces was 0.43 and 0.38, respectively; compared to 0.36 and 0.22 for controls. The probability of intervention students who consumed <math>\geq 2</math> pieces of fruit/school day at baseline to continue consuming <math>\geq 2</math> pieces was 0.45 compared to 0.31 for controls.</li> </ol>	<p><b>Somewhat Effective for Nutrition in Lower-Income Children</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Low</p> <p>Effect size = Net positive for nutrition in lower-income children</p>	<p><b>Maintenance</b> <i>6 weeks post-intervention (A3)</i></p> <ol style="list-style-type: none"> <li>Mean total fruit and fruit at school intakes at A3 in the intervention group fell compared with A2 (from 1.22 pieces/school day to 0.61 pieces/school day total and from 0.93 pieces/school day to 0.37 pieces/school day at school) and were lower than intakes in the control group at A3, <math>p \leq 0.01</math>.</li> <li>Intervention children who had consumed 1 or <math>\geq 2</math> pieces of fruit/school day at A2 were more likely to be eating no fruit at A3 than control group students (event probability for consuming 0 pieces at A3 among those consuming 1 piece at A2 = 0.62 vs 0.45, <math>p = 0.001</math> and event probability for consuming 0 pieces at A3 for those consuming <math>\geq 2</math> pieces at A2 = 0.56 vs 0.31, <math>p &lt; 0.001</math>, respectively).</li> <li>9% of the intervention group had increased fruit intake at school from A1 to A2 and maintained their A2 intakes through to A3. 32% of the intervention group had increased fruit intake at school during the intervention but reduced their intakes by A3. 5% of the intervention group children maintained their fruit intake at school at all 3 assessments. 13% of intervention group children ate no fruit at any time point.</li> </ol> <p><b>Sampling / Representativeness</b> Not Reported</p>

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Moore, Tapper (2008); Moe, Roberts (2001) United Kingdom</p> <p><b>Design</b> Intervention Evaluation Group randomized trial</p> <p><b>Duration</b> Medium 9 months</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of affordable fruits and vegetables in schools and removal of unhealthy choices such as sweets and crisps)</p> <p><b>Outcome(s) Affected</b> Fruit and snack consumption (computerized 24-hr recall questionnaire)</p>	<p><b>Net Positive for Nutrition in Lower-Income Children (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><u>NUTRITION:</u></p> <ol style="list-style-type: none"> <li>1. School level regression models found that there were no significant differences in children's intake of fruit or other snacks.</li> <li>2. There was a significant interaction with school food policy only for fruit consumed at school (<math>F[2, 32]= 4.55, p&lt;0.02</math>) for the intervention group. Where students were only allowed to bring fruit to school, fruit intake was 0.37 portions per day (95% CI: 0.11, 0.64), compared to 0.14 portions per day (95% CI: -0.30, 0.58) where no food was allowed and -0.13 portions (95% CI: -0.33, 0.07) where there were no restrictions.</li> <li>3. Children in intervention schools were more likely than control schools to report eating fruit as a snack at school "often" (OR=1.49, 95% CI: 1.15, 1.95, <math>p&lt;0.005</math>).</li> </ol> <p><u>POLICY CHANGE:</u></p> <ol style="list-style-type: none"> <li>4. Several schools changed their policy so that children could only eat healthy snacks post intervention.</li> </ol>	<p><b>Effective for Nutrition in Lower-Income Children</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Medium</p> <p>Effect size = Net positive for nutrition in lower-income children</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Bere, Veierod (2005); Bere, Veierod (2006); Bere, Veierod (2006); Bere, Veierod (2007)</p> <p>Norway</p> <p><b>Design</b> Intervention Evaluation</p> <p>Non-randomized trial</p> <p><b>Duration</b> Medium</p> <p>October 2001 - June 2002</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of affordable fruits and vegetables at school and nutrition education curriculum)</p> <p><b>Outcome(s) Affected</b> Fruit, vegetable and snack consumption (24 hour recall, food frequency questionnaire)</p>	<p><b>Net Positive for Nutrition in the Study Population (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><b>NUTRITION:</b></p> <ol style="list-style-type: none"> <li>1. The free fruit group (mean 1.1 portions/day) had higher intake of F&amp;V at school than paid (mean 0.4 portions/day) or no fruit groups (mean 0.2 portions/day) at follow-up, p&lt;0.001.</li> <li>2. The paid fruit group (mean 0.4 portions/day) had higher intake of F&amp;V at school than the no fruit group (mean 0.2 portions/day) at follow-up, p=0.003.</li> <li>3. The free fruit group (mean 2.4 portions/day) had higher intake of F&amp;V all day than the paid (mean 1.8 portions/day) or no fruit groups (mean 1.8 portions/day) at follow-up, p=0.009.</li> <li>4. The free fruit group (mean 7.0 portions/day) had lower intake of soda/candy/chips than no fruit group (mean 8.4 portions/day) at follow-up, p=0.01</li> <li>5. Classroom curriculum component had no effect on F&amp;V intake.</li> <li>6. Students in the paid fruit group who purchased fruit and had low baseline habitual fruit and vegetable intake had higher fruit intake at school (0.8 vs. 0.1 portions/day, p&lt;0.001), all day (2.2 vs. 1.5 portions/day, p&lt;0.03) and lower intake of soda/candy/chips (5.9 vs. 8.9 times/week, p&lt;0.007) at follow-up compared to those with low baseline habitual fruit and vegetable consumption who did not purchase fruit.</li> </ol>	<p><b>Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Medium</p> <p>Effect size = Net positive for nutrition in the study population</p>	<p><b>Maintenance</b></p> <p><i>One year follow-up (n=517 Sixth graders):</i></p> <ol style="list-style-type: none"> <li>1. After one year, significant differences between free fruit and paid/no fruit groups were sustained for all day F&amp;V intake (effect size= 0.5 portions, p=0.03). Intervention students also still ate more F&amp;V at school than control students (effect size =0.2 portions, p=0.07).</li> <li>2. Paid fruit group ate 0.4 more portions of F&amp;V at school than no fruit group, p=0.04.</li> </ol> <p><i>3-year follow-up (n=1602 Sixth and Seventh graders):</i></p> <ol style="list-style-type: none"> <li>3. Sustained significant effects on F&amp;V intake three years after the end of the intervention were observed. The estimated change in F&amp;V intake from baseline to May 2005, compared to the control group, were 0.13 portions for boys and 0.15 portions for girls for F&amp;V at school, 0.38 portions for boys and 0.44 portions for girls for F&amp;V all day and 1.6 times/week for boys and girls for usual F&amp;V intake, p&lt;0.001 for all.</li> <li>4. There was no significant intervention effect for consumption of soda/candy/chips.</li> </ol> <p><b>Sampling / Representativeness</b> Not Reported</p>



Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Day, Strange (2008) British Columbia</p> <p><b>Design</b> Intervention Evaluation Group randomized trial</p> <p><b>Duration</b> Low 12 weeks</p>	<p><b>Measures</b> <i>Access to a healthy school environment</i> (goals for school environment, physical education, classroom action, family and community, extra-curricular and school spirit)</p> <p><b>Outcome(s) Affected</b> Nutrition (24 hour recall, food frequency questionnaire)</p>	<p><b>Net Positive for Nutrition in the Study Population (School Physical Activity and Environment Policies)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><u>NUTRITION:</u></p> <ol style="list-style-type: none"> <li>From baseline to follow-up there was an increase of 0.24 serving of fruit for the intervention group while the usual practice schools decreased their fruit intake by -0.68 serving (<math>p \leq 0.05</math>).</li> <li>There was a significant increase from baseline to follow-up in the variety of fruits and vegetables consumed in the intervention group (+0.47), while there was a decrease in the variety of fruits and vegetables consumed in the usual practice schools (-0.10; <math>p \leq 0.05</math>).</li> <li>Servings of fruits and vegetables decreased from baseline to follow-up in the usual practice schools (-0.79 serving), while there was a small increase (+0.18 serving) in intervention schools (<math>p \leq 0.05</math>).</li> <li>The percentage of fruits and vegetables tried increased from 78% to 83% in intervention schools, while there was little change in usual practice schools (<math>p \leq 0.05</math>).</li> <li>No effect was found for servings of vegetables.</li> <li>No effects were found for typical daily frequency of fruit and vegetable consumption.</li> </ol>	<p><b>Somewhat Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Low</p> <p>Effect size = Net positive for nutrition for study population</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>
<p><b>Author</b> Angelopoulos, Millionis (2009) Greece</p> <p><b>Design</b> Intervention Evaluation Group randomized trial</p> <p><b>Duration</b> Medium 12 months</p>	<p><b>Measures</b> <i>Access to a healthy school environment</i> (time spent in physical education classes, dietary consumption)</p> <p><b>Outcome(s) Affected</b> Moderate to vigorous physical activity (time spent in moderate-to-vigorous physical activity), overweight/obesity (height and weight [body mass index]), and nutrition (24 hour recall, questionnaire)</p>	<p><b>Net Positive for Overweight/obesity in Lower-income Children (School Physical Activity Policies)</b></p> <p><b>Net Positive for Nutrition in Lower-income Children (School Physical Activity Policies)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><u>OVERWEIGHT/OBESITY:</u></p> <ol style="list-style-type: none"> <li>The mean BMI increase observed in the control children (+0.1, 95% CI -0.03 to 0.2) was significantly different compared to the decrease observed in intervention children (-1.1, 95% CI -1.2 to -0.9; <math>p = 0.047</math>).</li> </ol> <p><u>NUTRITION:</u></p> <ol style="list-style-type: none"> <li>Mean daily consumption of fruits increased in the intervention group (0.4, 95% CI 0.1 to 0.7) but decreased in the control group (-0.2, 95% CI -0.4 to 0.1; <math>p &lt; 0.05</math>).</li> <li>Intervention children decreased mean consumption of total fat/oils and sweets/beverages (fats and oils -1.6, 95% CI -2.4 to 0.9; sweets and beverages -0.8, 95% CI -1.3 to -1.4), while increases were found for control children (fats and oils +0.7, 95% CI 0.05 to 1.4; sweets and beverages +0.2, 95% CI -0.2 to 0.6; <math>p &lt; 0.05</math> for all).</li> <li>Intervention children decreased mean consumption of dairy products (-0.2, 95% CI -1.4 to 0.1), while increased consumption was found for control children (0.2, 95% CI 0.02 to 0.5; <math>p = 0.008</math>).</li> </ol>	<p><b>Effective for Overweight/obesity in Lower-income Children (Study Population)</b></p> <p><b>Effective for Nutrition in Lower-income Children (Study Population)</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Medium</p> <p>Effect size = Net positive for overweight/obesity and nutrition in lower-income children (study population)</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Ransley, Greenwood (2007) England</p> <p><b>Design</b> Intervention Evaluation Non-randomized trial</p> <p><b>Duration</b> High 3 years (evaluation data only for the first 7 months)</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of affordable fruits and vegetables at school and nutrition education curriculum)</p> <p><b>Outcome(s) Affected</b> Fruit, vegetable, sugar and nutrient consumption (Child and Diet Evaluation Tool [CADET])</p>	<p><b>Net Positive for Nutrition in the Study Population (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b> <u>NUTRITION:</u></p> <ol style="list-style-type: none"> <li>The intervention was associated with an increased fruit and vegetable intake across reception and year 1 students of 0.5 portions (95% CI: 0.3-0.7) and 0.7 portions (95% CI: 0.3-1.0) at 3 months, which fell to 0.2 (95% CI: 0-0.4) at 7 months in reception and to 0.2 (95% CI: -0.2-0.6) in year 1.</li> <li>The impact of the intervention on year 2 students was associated with an increased fruit and vegetable intake of 0.5 portions (95% CI: 0.2-0.9) 3 months after the introduction of the intervention. This fell to -0.2 (95% CI: -0.5-0.2) at 7 months. By this time, year 2 students were no longer eligible to receive free fruit and vegetables.</li> <li>There were no associations between the intervention and change in energy, fat, or salt intake across the year groups.</li> <li>Carotene intake at 7 months increased in reception and year 1 by 14% (95% CI: 5%-24%) and 21% (95% CI: 5%-40%), respectively, but declined in year 2 by 14% (95% CI: -1%-26%).</li> <li>Vitamin C intake at 7 months increased in reception and year 1 by 8 mg (95% CI: 3-30 mg) and 9 mg (95% CI: 3-16 mg), and decreased in year 2 by 23 mg (95% CI: 15-32 mg).</li> <li>There was a non-significant increase in sugar intake in reception and year 1.</li> <li>Year 2 had a decrease in sugar intake associated with the intervention, by 38.2 grams (95% CI: 46.0-30.5 g) at 7 months.</li> <li>At 7 months, there was no long-term impact on vegetable intake in any of the groups.</li> </ol>	<p><b>Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = High</p> <p>Effect size = Net positive for nutrition in the study population</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>
<p><b>Author</b> Eriksen, Haraldsdottir (2003) Denmark</p> <p><b>Design</b> Intervention Evaluation Non-randomized trial</p> <p><b>Duration</b> Low 5 weeks</p>	<p><b>Measures</b> <i>Access to Healthy Food Options</i> (provision of fresh fruits and vegetables at recess)</p> <p><b>Outcome(s) Affected</b> Fruit and vegetable intake (24-H recall questionnaire, food frequency questionnaire)</p>	<p><b>Net Positive for Nutrition in the Study Population (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b> <u>NUTRITION:</u></p> <ol style="list-style-type: none"> <li>According to the 24-hour recall form, students in the intervention group increased their intake of fruit by 0.4 pieces/school day (p=0.019) on days they received fruit as part of the subscription.</li> <li>Children who did not participate in the intervention at the intervention schools also increased their fruit intake (0.3 pieces/school day, p=0.008)</li> <li>No change for students in the intervention group for intake of vegetables on days they received vegetables, or in total intake when "fruit and vegetable" days were combined.</li> <li>Changes in intake occurred at the different meals during the day. Intervention group increased their fruit intake by 0.5 pieces/school day during the morning snack on fruit days (p&lt;0.001) and increased their vegetable intake by 0.4 pieces/school day during the morning snack on vegetable days (p&lt;0.001). Students, however tended to eat slightly less fruit and fewer vegetables during the rest of the day.</li> <li>Children who did not participate in the intervention at the intervention schools also increased their intake of fruit in the morning by 0.2 pieces/school day (p=0.015) but no change was observed later in the day for fruit intake and no change in intake of vegetables during the school day was observed.</li> <li>The food frequency questionnaire showed no difference in intake for children who subscribed to the fruit and vegetable program between baseline and 5 weeks, whereas there was a significant increase in intake observed for children who did not subscribe (0.1 pieces/school day, p=0.046).</li> <li>There was no difference in fruit and vegetable intake from baseline to follow up in control schools.</li> </ol>	<p><b>Somewhat Effective for Nutrition in the Study Population</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = Low</p> <p>Effect size = Net positive for nutrition in the study population</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>
<p><b>Author</b> Laurence, Peterken (2007) Melbourne, Australia</p> <p><b>Design</b> Intervention Evaluation Time series study</p> <p><b>Duration</b> High 2 years</p>	<p><b>Measures</b> <i>Access to Healthy Food and Beverage Options</i> (class-time fruit snack breaks and provision of bottled water to students)</p> <p><b>Outcome(s) Affected</b> Nutrition and bringing fresh fruit to school (lunchbox audits)</p>	<p><b>Not reported (for desired health outcomes) (Provision of Fruits and Vegetables)</b></p> <p><b>Net Positive for Nutrition in Lower-Income Children (Provision of Fruits and Vegetables)</b></p> <p><b>Provision of Fruits and Vegetables</b> <u>NUTRITION:</u></p> <ol style="list-style-type: none"> <li>41% mean increase (increases between 25-50%) in proportion of children bringing fresh fruit for up to 2 years after initial implementation of Fresh Kids program (p&lt;0.001), across all schools observed.</li> </ol>	<p><b>More Evidence Needed</b></p> <p>Study design = Intervention evaluation</p> <p>Intervention duration = High</p> <p>Effect size = Not reported</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Reported</p>

Study Description	Measures & Outcomes	Effect Size or % Change	Effectiveness	Maintenance & Representativeness
<p><b>Author</b> Wells, Nelson (2005) London, England</p> <p><b>Design</b> Association Cross-sectional study</p> <p><b>Duration</b> Not applicable</p>	<p><b>Measures</b> <i>Access to Healthy Food</i> (Provision of one piece of fresh fruit to each student every day)</p> <p><b>Outcome(s) Affected</b> Fruit consumption (questionnaire completed by parent)</p>	<p><b>Positive Association for Nutrition in Infant School Lower-Income Students (4-6 year olds) (Provision of Fruits and Vegetables)</b></p> <p><b>No Association for Nutrition in Junior School Lower-Income Students (7-8 year olds)(Provision of Fruits and Vegetables)</b></p> <p><b>(Assumption: Provision of free fruit leads to greater access to healthy food which leads to increased consumption of healthy food resulting in lower body mass index and overweight/obesity.)</b></p> <p><b>Provision of Fruits and Vegetables</b></p> <p><u>NUTRITION:</u></p> <ol style="list-style-type: none"> <li>1. Median total fruit consumption (excluding fruit juice) in infant school students receiving free fruit was 117 grams per day compared with 67 grams per day in infant school students not receiving free fruit (<math>p &lt; 0.001</math>).</li> <li>2. Median consumption in junior students who had received free fruit at school as infant students did not differ from those who had not (83 grams per day vs. 86 grams per day), but junior students had significantly higher levels of consumption than did infant students in schools not in the scheme.</li> <li>3. Among the infant students eligible to receive free school fruit, only 12% reported not having consumed fruit on the day of the survey, compared with 22% in the group not receiving free fruit (<math>p = 0.02</math>).</li> <li>4. If fruit juice was excluded, 17% of infants in schools in the National School Fruit Scheme reported not having any fruit on the day of the survey, compared with 27% of infants in control schools (<math>\chi^2 = 12.04</math>, <math>p = 0.001</math>), and the differences between the distributions of the number of portions were significant (Kolmogorov-Smirnov two-sample test, <math>p = 0.019</math>).</li> <li>5. Among the junior students, a higher percentage who had received fruit as infants reported consuming no fruit (32%) compared with students in the control schools (26%), but the differences were not significant.</li> </ol>	<p><b>Positive Association for Nutrition in Infant School Lower-Income Students</b></p> <p><b>No Association for Nutrition Junior School Lower-Income Students</b></p> <p>Study design = Association</p> <p>Effect size = Positive association for nutrition in infant school lower-income students and no association for nutrition in junior school lower-income students</p>	<p><b>Maintenance</b> Not Reported</p> <p><b>Sampling / Representativeness</b> Not Applicable</p>

# IMPACT TABLES

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<b>United States</b>						
<p><b>Author</b> Williamson, Copeland (2007)</p> <p>No location specified</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High</p> <p>All children at the 2 intervention schools were exposed to the school lunch changes and physical activity intervention.</p> <p><b>High-Risk Population</b> Not Reported (for intervention population)</p> <p>6-11 year olds</p> <p>94.9% White, 2.4% African American, 2.7% other racial groups (evaluation sample)</p>	<p><b>Representative High</b> All children in the intervention schools were exposed.</p> <p><b>Potential Population Reach</b> High Exposure = High Representativeness = High</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Not reported Representativeness = High</p>	<p><b>Intervention Components</b> Multi-component</p> <p>Wise Mind Study - Physical activity component: Teacher supplies (bean bags, balls) to promote play during class time/ recess, lesson plans for academic games involving the equipment</p> <p><b>MULTI-COMPONENT:</b> School policies to modify school menus to include: 1. Five fruit and vegetable servings per day 2. &lt;30% of dietary energy from total fat 3. &lt;10% of dietary energy from saturated fat 4. 20 to 30 g fiber per day</p> <p><b>COMPLEX:</b> 1. Family component: Newsletters, weight gain prevention website, school assemblies for families promoting healthy eating, increased PA/decreased sedentary behavior. 2. Posters promoting physical activity centers</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Feasibility = High</p> <p>Intervention activities: School menu modifications, increased physical activity opportunities for students, family newsletters, website, school assemblies</p> <p>Specialized expertise: Trainers to conduct training for cafeteria staff in meal preparation (frequency and duration not reported) and training for teachers in healthy eating and exercise (6 sessions)</p> <p>Resources needed: Personnel (trainers, school staff), posters, handouts, menu boards, parent newsletter, physical activity equipment, resources for events, incentives, funds/ personnel to create/maintain internet program</p> <p>Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components = Multi-component Feasibility = High</p>	<p><b>Population Impact</b> High Impact for Overweight/obesity in the Study Population High Impact for Nutrition in Study Population</p> <p>Effectiveness = Effective for overweight/obesity in study population, not effective for physical activity in the study population</p> <p>Potential population reach = High Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness for high-risk populations = Not reported Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Not Reported</p>	<p><b>School Physical Activity and Environment Policies</b> <u>PHYSICAL ACTIVITY:</u> 1. Marginally significant effects of the intervention were observed for the physical activity checklist measure of physical activity. The intervention group was associated with increased minutes of physical activity (22 ± 4.8), while control group had a non-significant decrease in physical activity. The effect size for this difference was 0.23, (p=0.06).</p>	<p>1. Improvement in measures of depression, self-esteem and eating disorder symptoms were observed in both intervention and control groups (p&lt;0.05).</p>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Jamelske, Bica (2008) Wisconsin</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High 13,500 students from 25 public schools received the intervention.</p> <p><b>High-Risk Population</b> Not Reported 9-15 year olds Lower income &gt;70% White (evaluation sample)</p>	<p><b>Representative</b> Not Reported</p> <p><b>Potential Population Reach</b> More Evidence Needed Participation = Not reported Exposure = High Representativeness = Not reported</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Not reported Representativeness = Not reported</p>	<p><b>Intervention Components</b> Complex United States Department of Agriculture (USDA) Fresh Fruit and Vegetable Program (FFVP) - Fresh fruits and vegetables provided at no cost to students in schools</p> <p><b>COMPLEX:</b> 1. Nutrition education included in classroom curriculum to promote fruit and vegetable consumption.</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High</p> <p>Intervention activities: Provision of free fruits and vegetables at school, nutrition education incorporated into classroom curriculum</p> <p>Specialized expertise: Not reported</p> <p>Resources needed: Free fruit and vegetables from the USDA, materials for nutrition education sessions, places and equipment to store fruits and vegetables</p> <p>Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components = Complex Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Effective for nutrition in the study population Potential population reach = More evidence needed Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Not reported for high-risk populations Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Not Reported</p>	Not Reported	<ol style="list-style-type: none"> <li>1. Intervention students were more willing to try a new fruit and vegetable at school than control students (24.8% vs. 12.8%, <math>p &lt; 0.01</math> for fruits, 25.1% vs. 18.4%, <math>p = 0.01</math> for vegetables).</li> <li>2. The multivariate probit regression model predicted that intervention students were 12.1% more likely to have experienced an increase in willingness to try a new fruit at school relative to control students (<math>p &lt; 0.01</math>), while the difference for a new vegetable was 6.7% (<math>p = 0.02</math>).</li> <li>3. When restricted to 4th grade students only (because these programs have the greatest potential to influence the behavior of younger children) there was greater willingness to try new fruits and vegetables compared to control (25.1% vs. 11.1%, <math>p &lt; 0.01</math> for fruits; 26.7% vs. 12.2%, <math>p &lt; 0.01</math> for vegetables).</li> <li>4. Among 4th grade students, there was a significant difference in increased willingness to choose a vegetable as a snack instead of chips/candy for intervention students (24.3%) versus control students (14.8%), <math>p = 0.02</math>.</li> <li>5. When restricted to only those students most in need (with <math>&lt; 1</math> F&amp;V initial consumption) there was greater willingness to try new fruits and vegetables in intervention students compared to control (32% vs. 15% for fruits and vegetables, <math>p = 0.03</math> and <math>0.04</math>, respectively).</li> </ol>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Schneider, May (2006) Mississippi</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All children in the intervention schools received the intervention.</p> <p><b>High-Risk Population</b> Not Reported 10-16 year olds Grade 5: 53% Black, 35.1% White, 11.9% other Grade 8: 76.5% Black, 18.4% White, 5.1% other Grade 10: 71.2% Black, 27.4% White, 1.4% other (evaluation sample)</p>	<p><b>Representative</b> Not Reported</p> <p><b>Potential Population Reach</b> More Evidence Needed Participation = Not reported Exposure = High Representativeness = Not reported</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Not reported Representativeness = Not reported</p>	<p><b>Intervention Components</b> Complex Mississippi Fresh Fruit and Vegetable Pilot Program- Provision of free fruits and vegetables at school</p> <p><u>COMPLEX:</u> 1. Nutrition education activities to promote and support consumption of fruits and vegetables</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High Intervention activities: Provision of free fruits and vegetables at schools, nutrition education Specialized expertise: Not reported Resources needed: Fresh fruits and vegetables, materials for educational program, places and equipment to store fruits and vegetables Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components = Complex Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Effective for nutrition in the study population Potential population reach = More evidence needed Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Not reported for high-risk populations Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Not Applicable Pilot study</p>	<p>Not Reported</p>	<ol style="list-style-type: none"> <li>8th grade students had significant increases in positive attitudes toward eating fruits and vegetables (+0.11, p&lt;0.01), in their beliefs that they could eat more fruit (+0.20, p&lt;0.01), and in their willingness to try new fruit (+0.17, p&lt;0.01).</li> <li>The willingness of 5th grade students to try new fruit and vegetables declined significantly (-0.17, p=0.01 and -0.20, p=0.03, respectively), as did their belief that they could eat more vegetables (-0.20, p=0.04).</li> <li>Degree of preference for fruit increased significantly among 8th and 10th grade students (+0.03, p=0.01 and +0.05, p&lt;0.01, respectively) but decreased significantly among 5th grade students (-0.05, p=0.03).</li> <li>Degree of preference for vegetables decreased significantly among 5th and 8th grade students (-0.17, p&lt;0.01 and -0.05, p=0.01, respectively) but remained unchanged among 10th grade students.</li> <li>Intention to eat fruit increased among 10th grade students (+0.12, p=0.01) but not among 5th and 8th grade students.</li> </ol>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<b>International</b>						
<p><b>Author</b> Wind, Bjelland (2008); Klepp, Perez-Rodrigo (2005); Te Velde, Brug (2008); Perez-Rodrigo, Wind (2005)</p> <p>Norway, Spain, The Netherlands</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All students in the intervention schools were exposed to the intervention.</p> <p><b>High-Risk Population</b> Not Reported 10-13 year olds 28% children from Norway, 36.8% from Spain, 35.2% from the Netherlands</p>	<p><b>Representative</b> Not Reported</p> <p><b>Potential Population Reach</b> More Evidence Needed Participation = Not reported Exposure = High Representativeness = Not reported</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Not reported Representativeness = Not reported</p>	<p><b>Intervention Components</b> Complex Pro Children Study- Provision of fruits and vegetables (F&amp;V) for free or paid subscription to students at school in Norway, the Netherlands and Spain</p> <p><b>COMPLEX:</b></p> <ol style="list-style-type: none"> <li>Classroom component: 16 activities and web-based computer program to increase knowledge, preference for F&amp;V and skills to ask for and prep F&amp;V</li> <li>Family component: Parent homework, newsletters and web-based computer program</li> <li>Optional component: Community participation in Pro Children study encouraged through local media (Norway &amp; Netherlands), schools (Spain) and grocery stores (Norway)</li> </ol> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High Intervention activities: Provision of fruits and vegetables at school, classroom activities, web-based computer program (students and parents), parent homework, parent newsletter, community participation activities Specialized expertise: One-day training for teachers Resources needed: Nutrition curriculum, funds for fruits and vegetables, newsletters, computers for web-based tool, places and equipment to store fruits and vegetables Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components - Complex Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Effective for nutrition in the study population Potential population reach = More evidence needed Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Not reported for high-risk populations Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Not Reported</p>	<p>Not Reported</p>	<p>1. Children who completed &gt;10 lessons had higher increases in F&amp;V intake (+0.18 portions fruit, +0.21 portions vegetable) compared to those who completed 7 to 10 lessons (no change in portions fruit, +0.12 portions vegetable), or less than 7 lessons (-0.02 portions fruit, -0.05 portions vegetable), p&lt;0.05.</p>



Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Reinaerts, de Nooijer, Candel (2007); Reinaerts, Crutzen (2008); Reinarts, de Nooijer, de Vriesr (2007) The Netherlands</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All students in the intervention schools were exposed to the intervention.</p> <p><b>High-Risk Population</b> Not Reported 4-12 year olds</p>	<p><b>Representative</b> Not Reported</p> <p><b>Potential Population Reach</b> More Evidence Needed</p> <p>Participation/potential exposure = High</p> <p>Representativeness = Not reported</p> <p><b>Potential High Risk Popluation Reach</b> More Evidence Needed</p> <p>High-risk population = Not reported</p> <p>Representativeness = Not reported</p>	<p><b>Intervention Components</b> Complex</p> <p>Provision of free fruits, vegetables and fruit juice at school – students received one serving of fruit twice a week, fruit juice once a week and raw vegetable twice a week (Group 1)</p> <p><b>COMPLEX:</b></p> <ol style="list-style-type: none"> <li>Children provided lunchbox to bring fruits and vegetables (F&amp;V) from home (Group 2)</li> <li>Classroom curriculum tailored to different age groups (pre-school, 1st -3rd grade, 4th – 6th grade) promoted F&amp;V intake (Group 2)</li> <li>Homework activities and newsletters for parents (Group 2)</li> <li>Posters displayed at local supermarkets to remind parents to buy F&amp;V (Group 2)</li> </ol> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High</p> <p>Intervention activities: Provision of fruits and vegetables at school, lunch boxes for children, classroom curriculum, homework activities, parent newsletter, posters displayed at local supermarkets</p> <p>Specialized expertise: Training for teachers on the new classroom curriculum activities (1 meeting at the beginning of each school period)</p> <p>Resources needed: Funds for fruits and vegetables, lunchboxes, classroom activities, newsletters, homework activities, supermarket posters, places and equipment to store fruits and vegetables</p> <p>Costs: Not reported</p> <p><b>Implementation Complexity</b> High</p> <p>Intervention components - Complex Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed</p> <p>Effectiveness = Effective for nutrition in the study population</p> <p>Potential population reach = More evidence needed</p> <p>Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed</p> <p>Effectiveness = Not reported for high-risk populations</p> <p>Potential high-risk population reach = More evidence needed</p> <p>Implementation complexity = High</p> <p><b>Sustainability</b> Not Reported</p>	<p>Not Reported</p>	<p>1. The curriculum group increased F&amp;V intake 1 year after the intervention with a net effect of 0.32 times/day fruit, juice and vegetable consumption [24hr recall] (d=.22) and 0.19 portions fruit/day (d=0.29) compared to controls (p&lt;0.05 for both).</p>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Ashfield-Watt, Stewart (2008) New Zealand</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All children attending each intervention school received free fruit.</p> <p><b>High-Risk Population</b> High Pacific Islander, New Zealand Maori, Lower-income 5-13 year olds 45% of children living in the school district were classified as the most deprived in the country</p> <p>Intervention – 57.8% Pacific people, 23.3% New Zealand Maori, 11.3% mixed/other, 5.5% European and 2.1% Asian. Control – 57.3% Pacific people, 22.8% New Zealand Maori, 15.1% mixed/other, 3.5% European and 1.2% Asian (evaluation sample)</p>	<p><b>Representative</b> Not Reported</p> <p><b>Potential Population Reach</b> More Evidence Needed Participation/potential exposure = High Representativeness = Not reported</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = High Representativeness = Not reported</p>	<p><b>Intervention Components</b> Simple Provision of a variety of free export-quality, seasonal fruits at school (apples, pears, nashi pears, oranges, plums, and bananas)</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High Intervention activities: Provision of free fruit at school Specialized expertise: Not reported Resources needed: Funds to purchase fruits, teachers and students to distribute fruits, places and equipment to store fruits Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components - Simple Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Not reported Potential population reach = More evidence needed Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Somewhat effective for nutrition in lower-income children Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Not Reported</p>	<p>Not Reported</p>	<p>Not Reported</p>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Moore, Tapper (2008); Moe, Roberts (2001) United Kingdom</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All children in the intervention schools had access to the tuck shops.</p> <p><b>High-Risk Population</b> High (Note: The exact % of students with free school meal entitlement was not reported, but the authors stated they were focusing on a lower-income population.) 5-13 year olds, Lower-income 5,600 students enrolled in the intervention schools at the time of the study; schools identified as having a free school meal entitlement higher than the national average (17%) were invited to participate</p>	<p><b>Representative</b> Not Reported</p> <p><b>Potential Population Reach</b> More Evidence Needed Participation = Not reported Exposure = High Representativeness = Not reported</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = High Representativeness = Not reported</p>	<p><b>Intervention Components</b> Complex Established fruit tuck shops and offered at least one choice of fruit per day at 15 pence per item.</p> <p><b>COMPLEX:</b> 1. Schools refrained from stocking sweets, crisps, and other unhealthy items in the tuck shops 2. Letters sent to parents explaining the tuck shops and prices</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High Intervention activities: Establishment of a tuck shop, policy to restrict availability of unhealthy items in the tuck shop, letters to parents Specialized expertise: Not reported Resources needed: Funds to purchase fruits, resources for setting up tuck shops, 50 pound donation for schools, adult from community to run tuck shop, letters to parents, promotional materials, places and equipment to store fruits Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components = Complex Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Not reported Potential population reach = More evidence needed Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Effective for nutrition in lower-income children Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Yes Over 80% of schools sustained tuck shops without researchers' help or funding.</p>	<p>Not Reported</p>	<p>1. Children in intervention schools were more likely than children in control schools to state that they would use a tuck shop (OR=2.00, 95% CI: 1.28, 3.12; p&lt;0.002).</p>

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<p><b>Author</b> Bere, Veierod (2005); Bere, Veierod (2006); Bere, Veierod (2006); Bere, Veierod (2007) Norway</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = Low All students in the free F&amp;V group received F&amp;V; only those students in the paid group who were able to subscribe to the F&amp;V program received F&amp;V</p> <p><b>High-Risk Population</b> Not Reported 11-13 year olds</p>	<p><b>Representative Reach</b> Not Reported More Evidence Needed Participation = Not reported Exposure = Low Representativeness = Not reported</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Not reported Representativeness = Not reported</p>	<p><b>Intervention Components</b> Complex Provision of fruits and vegetables for free or paid subscription to students at school</p> <p><b>COMPLEX:</b> 1. Classroom curriculum component 2. Parental involvement (newsletters, parent meeting)</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High</p> <p>Intervention activities: Provision of fruits and vegetables at school, classroom curriculum, parent newsletters, parent meetings</p> <p>Specialized expertise: Not reported</p> <p>Resources needed: Funding for free F&amp;V, teachers to provide the classroom curriculum, materials to support the curriculum, partnerships with local F&amp;V distributors and farmers, places and equipment to store fruits and vegetables</p> <p>Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components = Complex Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Effective for nutrition in the study population Potential population reach = More evidence needed Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Not reported for high-risk populations Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Not Reported</p>	<p>Not Reported</p>	<p>Not Reported</p>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Day, Strange (2008) British Columbia</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All students at the schools were exposed to the Action Zone changes and All 4th and 5th grade students at the intervention schools were exposed to the classroom fruit and vegetable component. <b>High-Risk Population</b> Not Reported 9-11 year olds (target population)</p>	<p><b>Representative</b> High All students were exposed. <b>Potential Population Reach</b> High Exposure = High Representativeness = High <b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Not reported Representativeness = High</p>	<p><b>Intervention Components</b> Multi-component Action Schools! British Columbia-Healthy Eating – Schools set goals across six Action Zones: school environment, physical education, classroom action, family and community, extra-curricular and school spirit <b>MULTI-COMPONENT:</b> 1. School policy to increase the availability of fruits and vegetables in class through two weekly classroom activities and a once a month fruit and vegetable taste testing <b>COMPLEX:</b> 1. Monthly newsletters and voluntary take-home activities 2. Presentations (for parents and advisory committees) 3. Menu of classroom activities and materials for implementation provided to the teachers <b>Feasibility</b> Intervention Feasibility = Low Policy Feasibility = High Intervention activities: Two weekly classroom activities, monthly fruit and vegetable taste testing, schoolwide policy changes, monthly newsletter, take home activities, materials to assist teachers in implementing the classroom activities Specialized expertise: 1.5 hour teacher training Resources needed: \$12.50 given to teachers for purchase of fruits and vegetables, menu of classroom activities and implementation materials, training resources, monthly newsletter, take-home activity resources, school committees to set goals, teachers to carry out the classroom activities Costs: Not reported <b>Implementation Complexity</b> High Intervention components = Multi-component Feasibility = High</p>	<p><b>Population Impact</b> Low Impact for Nutrition in the Study Population Effectiveness = Somewhat effective for nutrition in the study population Potential population reach = High Implementation complexity = High <b>High-risk Population Impact</b> More Evidence Needed Effectiveness for high-risk populations = Not reported Potential high-risk population reach = More evidence needed Implementation complexity = High <b>Sustainability</b> Not Reported</p>	<p>Not Reported</p>	<p>1. No effects were found for willingness to try new fruits and vegetables.</p>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Angelopoulos, Milionis (2009) Greece</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All 5th graders at the 13 intervention schools were exposed to the intervention.</p> <p><b>High-Risk Population</b> High Loannina (site of the intervention) is one of the poorest prefectures in Greece with some of the highest obesity rates. Lower income, 10-11 year olds (target population) Intervention schools: 90.3% Greek, 9.7% immigrant Control schools: 88% Greek, 12% immigrant 75% Urban population, 25% rural population (evaluation sample)</p>	<p><b>Representative</b> High All 5th graders were exposed.</p> <p><b>Potential Population Reach</b> High Exposure = High Representativeness = High</p> <p><b>Potential High Risk Population Reach</b> High High-risk population = High Representativeness = High</p>	<p><b>Intervention Components</b> Multi-component Two 45 minute physical education sessions per week; playgrounds and school yards at intervention schools accessible after the end of the curricular program.</p> <p><b>MULTI-COMPONENT:</b> 1. Daily provision of fresh fruits and juices in school cafeterias</p> <p><b>COMPLEX:</b> 1. Nutrition component: Parents were encouraged to have more fruits and vegetables at home. 2. Class curriculum component: 1-2 hours/week was integrated into existing school curriculum including self-esteem, body image, nutrition, physical activity, fitness and environmental issues. 3. Parental component: Fruit and vegetable bazaars were held where parents were given results of children's medical and nutritional assessment.</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Feasibility = High Intervention activities: Addition of fresh fruits and juices to school lunches, physical education sessions, opening of school yards after the curriculum program, classroom curriculum (health education), parent education/promotion, fruit and vegetable bazaars Specialized expertise: Not reported Resources needed: Classroom curriculum, funds to organize fruit and vegetable bazaars, funds to provide fresh fruit and fruit juices in the intervention schools, staff to supervise school yards after the curriculum program, materials for physical education sessions Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components = Multi-component Feasibility = High</p>	<p><b>Population Impact</b> High Impact for Overweight/obesity in the Study Population High Impact for Nutrition in the Study Population Effectiveness = Effective for overweight/obesity and nutrition in the study population Potential population reach = High Implementation complexity = High</p> <p><b>High-risk Population Impact</b> High Impact for Overweight/obesity in Lower-income Children High Impact for Nutrition in Lower-income Children Effectiveness for high-risk populations = Effective for overweight/obesity and nutrition in lower-income children Potential high-risk population reach = High Implementation complexity = High</p> <p><b>Sustainability</b> Not Reported</p>	<p><b>School Physical Activity and Environment Policies</b> <b>PHYSICAL ACTIVITY:</b> 1. There was an increase in the intervention group for mean time spent in moderate to vigorous physical activity [MVPA] (+2.2, 95% CI -2.6 to 7.1) compared to decreases in MVPA in the control group (-16.4, 95% CI -21.1 to -11.7; p=0.041).</p>	<p><b>PHYSIOLOGICAL RESPONSE:</b> 1. Systolic blood pressure (SBP) and diastolic blood pressure (DSP) levels increased in the control children (systolic +1.9, 95% CI 1.0 to 2.9); diastolic +2.3, 95% CI 1.6 to 3.1) and decreased in the intervention children (systolic -1.6, 95% CI -2.7 to -0.6; diastolic -0.5, 95% CI -1.3 to 0.3), p=0.016 and p=0.005, respectively. 2. The significant associations between the change observed in BMI and the changes in SBP and DBP indicate that the effect of the implemented intervention on SBP and DBP was mediated by the change induced in BMI.</p> <p><b>OTHER:</b> 1. Mediating variable analysis revealed that the effect of the intervention on BMI, systolic blood pressure and diastolic blood pressure was no longer significant (<math>\beta=-0.08</math>, p=0.123; <math>\beta=-0.11</math>, p=0.065; <math>\beta=-0.13</math>, p=0.053, respectively) after controlling for possible mediators, such as the changes observed in MVPA, food intake and BMI. 2. The significant associations between the change observed in BMI and the changes observed in fruit intake and fats and oils intake indicate that the effect of the intervention on BMI mediated via the changes in fruits, fats and oils intakes.</p>

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<p><b>Author</b> Ransley, Greenwood (2007) England</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All children in reception, year 1 and year 2 classes were exposed to the intervention. <b>High-Risk Population</b> Low 4-6 year olds Intervention schools: 18% of children with free school meals eligibility Control schools: 20% of children with free school meals eligibility</p>	<p><b>Representative Reach</b> Not Reported <b>Potential Population Reach</b> More Evidence Needed Participation = Not reported Exposure = High Representativeness = Not reported <b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Low Representativeness = Not reported</p>	<p><b>Intervention Components</b> Complex School policy offering a daily piece of fruit or vegetable to students in reception (4 year olds), year 1 (5 year olds) and year 2 (6 year olds) classes <b>COMPLEX:</b> 1. Educational materials and activities relating to the benefits of eating fruit and vegetables (training video for teachers, wall charts, cooking activities and games for children) 2. Information related to the benefits of eating fruit and vegetables made available to parents <b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High Intervention activities: Provision of daily fruits and vegetables, educational materials and activities to teachers, informational material for parents Specialized expertise: Not reported Resources needed: Fruits and vegetables, educational materials (training video, wall charts, cooking activities, games), informational materials for parents, places and equipment to store fruits and vegetables Costs: Not reported <b>Implementation Complexity</b> High Intervention components = Complex Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Effective for nutrition in the study population Potential population reach = More evidence needed Implementation complexity = High <b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Not reported for high-risk populations Potential high-risk population reach = More evidence needed Implementation complexity = High <b>Sustainability</b> Not Reported</p>	<p>Not Reported</p>	<p>Not Reported</p>

Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Eriksen, Haraldsdottir (2003) Denmark</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All children at the intervention schools were offered the fruit and vegetable subscription. <b>High-Risk Population</b> Not Reported 6-10 year olds</p>	<p><b>Representative Reach</b> Not Reported <b>Potential Population Reach</b> More Evidence Needed Participation = Not reported Exposure = High Representativeness = Not reported <b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = Not reported Representativeness = Not reported</p>	<p><b>Intervention Components</b> Simple Provision of fruits and vegetables for paid subscription to students during 10 o'clock recess at school <b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High Intervention activities: Provision of fruits and vegetables for paid subscription during 10 o'clock recess at school Specialized expertise: Not reported Resources needed: Fruit and vegetables, subscription subsidy (3.00 DKK per school day), places and equipment to store fruits and vegetables Costs: Not reported <b>Implementation Complexity</b> High Intervention components = Simple Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Somewhat effective for nutrition in the study population Potential population reach = More evidence needed Implementation complexity = High <b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Not reported for high-risk populations Potential high-risk population reach = More evidence needed Implementation complexity = High <b>Sustainability</b> Not Reported</p>	<p>Not Reported</p>	<p>Not Reported</p>



Study Description	Population	Reach	Intervention	Impact & Sustainability	Other Results	Related Benefits & Consequences
<p><b>Author</b> Laurence, Peterken (2007) Melbourne, Australia</p>	<p><b>Participation/Potential Exposure</b> Participation = Not Reported Exposure = High All children in the 4 primary schools were exposed to the intervention.</p> <p><b>High-Risk Population</b> High 5-10 year olds, Urban, Lower-income Schools A,B &amp; D were 60-90% culturally/linguistically diverse (mainly Vietnamese)</p>	<p><b>Representative</b> Not Reported</p> <p><b>Potential Population Reach</b> More Evidence Needed Participation = Not Reported Exposure = High Representativeness = Not reported</p> <p><b>Potential High Risk Population Reach</b> More Evidence Needed High-risk population = High Representativeness = Not reported</p>	<p><b>Intervention Components</b> Multi-Component Fresh Kids Program –School policy providing scheduled class-time fruit breaks</p> <p><b>MULTI-COMPONENT:</b> 1. Encouragement to drink water during class (and prohibition of sweet drinks), students were provided water bottles</p> <p><b>COMPLEX:</b> 1. Nutrition education in association with seasonal “Fresh Fruit Weeks” 2. Monthly nutrition newsletter distributed to parents</p> <p><b>Feasibility</b> Intervention Feasibility = Low Policy Component Feasibility = High</p> <p>Intervention activities: Scheduled class-time fruit breaks, encouragement to drink water along with prohibition of sweet drinks at school, provided students with water bottles, nutrition education, monthly parent newsletter</p> <p>Specialized expertise: Community dietician to coordinate the program planning, implementation and evaluation</p> <p>Resources needed: Dietician to coordinate the program, teachers to implement the class breaks and deliver the curriculum, nutrition education materials, newsletters, water bottles</p> <p>Costs: Not reported</p> <p><b>Implementation Complexity</b> High Intervention components = Multi-component Feasibility = High</p>	<p><b>Population Impact</b> More Evidence Needed Effectiveness = Not reported Potential population reach = More evidence needed Implementation complexity = High</p> <p><b>High-risk Population Impact</b> More Evidence Needed Effectiveness = Effective for nutrition in lower-income children Potential high-risk population reach = More evidence needed Implementation complexity = High</p> <p><b>Sustainability</b> Yes Fresh Kids continues to be supported by the Telstra Foundation. Fresh Kids program has been expanded to over 35 primary schools across Melbourne’s west suburbs.</p>	<p><b>Provision of Drinking Water in School</b> <b>NUTRITION:</b> 1. All schools recorded increases between 15% and 60% in the proportion of children bringing filled water bottles to school for up to 2 years (p&lt;0.001). 2. The increases in the proportion of children drinking water were inversely related to the reductions observed in the proportion of children with sweetened drinks, including cordials, soft drinks, and fruit juices. Reductions between 8% and 38% were observed among all schools in proportion of children bringing sweet drinks or ordering them through canteen lunch (School A and D: p&lt;0.001; School C: p&lt;0.01; School B: not significant).</p>	<p>Not Reported</p>

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<p><b>Author</b> Wells, Nelson (2005) London, England</p>	<p><b>Participation/Potential Exposure</b> Not Applicable</p> <p><b>High-Risk Population</b> Not Applicable</p> <p>Only cross-sectional data provided.</p> <p>Lower-income, 4-6 year olds, 7-8 year olds</p> <p>Schools examined were selected from areas where the electoral wards were in the bottom 20% of the distribution of IMD2000 (Index of Multiple deprivation; Department of Transport, 2000).</p>	<p><b>Representative</b> Not Applicable</p> <p><b>Potential Population Reach</b> Not Applicable</p> <p><b>Potential High Risk Population Reach</b> Not Applicable</p>	<p><b>Intervention Components</b> Not Applicable</p> <p>Only cross-sectional data provided.</p> <p>National School Fruit Scheme (NSFS) that provides one free piece of fruit to students each school day</p> <p><b>Feasibility</b> Not Applicable</p> <p><b>Implementation Complexity</b> Not Applicable</p>	<p><b>Population Impact</b> Not Applicable</p> <p><b>High-risk Population Impact</b> Not Applicable</p> <p><b>Sustainability</b> Not Applicable</p>	<p>Not Reported</p>	<p>Not Reported</p>