



**Table 4-E.2. Studies Examining the Effects of Multi- vs. Single-component Nutrition Education Interventions**

\*Description of Intervention, Comparison and/or Control

Author, Year	Single-component Interventions*	Multi-component Intervention*	Control*	Study Population	Description of Outcomes	Limitations
Debar, 2006 Positive Quality Randomized Controlled Trial	Individual counseling visits	<ul style="list-style-type: none"> <li>Individual counseling visits</li> <li>Telephone calls</li> <li>Group meetings</li> <li>Diet self-monitoring</li> <li>Use of a study website</li> <li>Youth/parent newsletters</li> <li>Fitness center membership</li> </ul>	Not applicable	<p>N = 209</p> <p>Age: 15 years</p> <p>Location: United States</p> <p>Gender: 100% female</p> <p>Race: 81% White</p> <p>SES: Majority middle- to upper-middle income</p>	<p>The multi-component group compared to the single-component group reported greater intake of:</p> <ul style="list-style-type: none"> <li>Calcium in both study years (adjusted mean difference [AMD]), 216.6mg and 241.3mg, respectively; P&lt;0.001)</li> <li>Vitamin D in the first year (AMD, 34.3 IU; P&lt;0.02)</li> <li>Fruits and vegetables in both years (AMD, 0.74 and 0.79 servings, respectively; P&lt;0.001).</li> </ul> <p>No effects on soda consumption were found.</p>	<p>Limited generalizability (population was largely white, middle-income to upper-middle-income females, with relatively high calcium intake at baseline).</p> <p>Some intervention elements may not be easily replicated in all medical settings.</p> <p>Health plans might have less participant contact than schools do.</p>
He et al, 2009 Neutral Quality Randomized Controlled Trial	Free fruit or vegetable snack	<ul style="list-style-type: none"> <li>Free fruit or vegetable snack</li> <li>Classroom nutrition education</li> </ul>	No intervention control	<p>N = 1,277</p> <p>Age: 12 years</p> <p>Location: Canada</p> <p>Gender: 55% female</p> <p>Race: Not applicable</p> <p>SES: Not applicable</p>	<p>The multi-component group consumed more fruits and vegetables at school compared to control (0.49 serving per day; P&lt; 0.05).</p> <p>There were NS differences in school fruit and vegetable consumption between the single-component group and control.</p> <p>There were NS differences between any of the groups in fruit and vegetable intake at home.</p>	<p>The 24-hour recall used has been validated, but was not pre-tested in this study population. The 24-hour recall was complicated, which may have resulted in a substantial number of missing values.</p> <p>Due to missing values, sample size decreased, and the study may not have been adequately powered.</p>



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Hopper, 2005 Positive Quality Randomized Controlled Trial	Usual school nutrition education curriculum	<ul style="list-style-type: none"> <li>Classroom nutrition education</li> <li>Physical education</li> <li>Parental involvement</li> </ul>	Not applicable	<p>N=238</p> <p>Age: Nine years</p> <p>Location: United States</p> <p>Gender: 49% female</p> <p>Race: 83% White, 5% Native American, 5% Asian, 5% Hispanic, 2% African American</p> <p>SES: Not applicable</p>	<p>The multi-component group had significantly lower total fat intake (64.68±0.87 vs. 57.05±4.21; P&lt;0.05) compared to the single-component group.</p> <p>There were no differences between the groups in other dietary intake variables measured.</p>	<p>Research is needed to determine how to deliver the intervention with increased parent participation, and less time and resource burden for teachers.</p> <p>Parent participation rates were low.</p>
Hopper et al, 1996 Neutral Quality Randomized Controlled Trial	Classroom nutrition education	<ul style="list-style-type: none"> <li>Classroom nutrition education</li> <li>Parental involvement</li> </ul>	Usual school nutrition education curriculum	<p>N=132</p> <p>Age: 12 years</p> <p>Location: United States</p> <p>Gender: Not applicable</p> <p>Race: Not applicable</p> <p>SES: Not applicable</p>	<p>There were NS differences in fat intake between the multi-component and single component intervention groups, though both groups decreased fat intake compared to control (P&lt;0.05).</p>	<p>The intervention was delivered at the classroom level, making it difficult to control variations in delivery between classrooms.</p> <p>There were low parental participation rates.</p>
Kitzman-Ulrich et al, 2009 Neutral Quality Randomized Controlled Trial	Family-based psycho-education	<ul style="list-style-type: none"> <li>Family-based psycho-education</li> <li>Multi-family group therapy</li> </ul>	No intervention control	<p>N = 42</p> <p>Age: 13 years</p> <p>Location: United States</p> <p>Gender: 100% female</p> <p>Race: 55% White</p> <p>SES: Not applicable</p>	<p>Energy intake decreased in the single-component group (-365kcal per day) compared to the multi-component (+61kcal per day) and control (+327kcal per day) groups (P&lt;0.01).</p>	<p>Modest attendance rates (below 50%) may have reduced the impact of the intervention or results in selection bias.</p> <p>Long-term research is needed to determine effects on weight and BMI.</p> <p>The 24-hour dietary recall may not be accurate.</p> <p>The study had a small sample size.</p>



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Long, 2004 Neutral Quality Non-Randomized Controlled Trial	Usual school nutrition education curriculum	<ul style="list-style-type: none"> <li>Classroom nutrition education</li> <li>Web-based nutrition education</li> </ul>	Not applicable	N=121 Age: 13 years Location: United States Gender: 52% female Race: 47% White, 40% to 43% Hispanic, 10% to 13% Black SES: Not applicable	There were no differences between the intervention groups in consumption of fruit, vegetables or fat.	As students were drawn from two volunteer schools, results may not be generalizable to other student populations.  The study was limited to education of individual adolescents, and changes to the home and school environment were not included; future research should include all strategies in order to determine the effects of education combined with supportive environmental changes.  Children in the single-component intervention received a much lower dose (zero hours to three hours) compared to those in the multi-component intervention (~15 hours).
McAleese & Rankin, 2007 Neutral Quality Non-Randomized Controlled Trial	Classroom nutrition education	<ul style="list-style-type: none"> <li>Classroom nutrition education</li> <li>School gardening</li> </ul>	No intervention control	N=99 Age: 11 years Location: United States Gender: 56% female Race: Not applicable SES: Not applicable	The multi-component group increased fruit (1.3 servings; P<0.001), vegetable (1.44 servings; P<0.001), vitamin A (P=0.004); vitamin C (P=0.016), and fiber (P=0.001) intake compared to students in the single-component or control groups.	Non-randomized design limits generalizability to this specific study population.



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McKenzie et al, 1996 Positive Quality Randomized Controlled Trial	Home nutrition education (parent-child auto-tutorial)	<ul style="list-style-type: none"> <li>Individual counseling sessions (child and parent)</li> <li>Take-home nutrition education materials</li> <li>Telephone access to an RD</li> </ul>	No intervention control	<p>N=303</p> <p><b>Age:</b> Four years to 10 years</p> <p><b>Location:</b> United States</p> <p><b>Gender:</b> Males and females</p> <p><b>Race:</b> Not applicable</p> <p><b>SES:</b> Not applicable</p>	<p>The single-component group significantly decreased fruit intake (3.2 to 2.4 servings per day of fruit and fruit juice combined; P&lt;0.006).</p> <p>There were no changes in any of the measured dietary-intake related outcomes following the intervention for either the multi-component or control groups, and there were NS differences between groups.</p>	<p>Study population was mostly upper-class white children from highly educated two parent homes, which limits generalizability of the study.</p> <p>Report changes in fruit intake, but do not distinguish between whole fruit, fruit juice and 100% fruit juice.</p>
Neumark-Sztainer, 2003 Neutral Quality Randomized Controlled Trial	Distribution of educational materials on healthy eating and physical education	<ul style="list-style-type: none"> <li>Nutrition education sessions</li> <li>Physical activity sessions</li> <li>Social support sessions</li> <li>Lunch meetings with healthy food</li> <li>Parental involvement</li> </ul>	Not applicable	<p>N=190</p> <p><b>Age:</b> 15 years</p> <p><b>Location:</b> United States</p> <p><b>Gender:</b> 100% female</p> <p><b>Race:</b> 42% White, 29% African American, 21% Asian, 4% Hispanic, 1% Native American, 3% Other</p> <p><b>SES:</b> Not applicable</p>	There were NS differences between the multi-component and single-component groups for any of the dietary intake-related outcomes measured.	<p>Study includes a subgroup from the larger school population and may not be representative.</p> <p>Small sample size limits statistical power.</p> <p>Short study length; more long-term studies are needed.</p>



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Olvera, 2010 Neutral Quality Non-Randomized Controlled Trial	Individual counseling sessions	<ul style="list-style-type: none"> <li>• Nutrition education sessions</li> <li>• Physical activity sessions</li> <li>• Behavioral counseling sessions</li> </ul>	Not applicable	N=35 Age: 10 years Location: United States Gender: 100% females Race: 100% Latino SES: Not applicable	There were NS changes in any of the measured dietary intake-related outcomes in either study group.	Small sample size, high dropout rate (76% completed the study), and exclusive analysis of Latina females limits study generalizability. Short study duration; longer-term studies are needed.
Parmer, 2009 Neutral Quality Non-Randomized Controlled Trial	Classroom nutrition education	<ul style="list-style-type: none"> <li>• Classroom nutrition education</li> <li>• School gardening</li> </ul>	No intervention control	N=115 Age: Seven years Location: United States Gender: 30% female Race: Not applicable SES: Not applicable	The multi-component group ate significantly more vegetables (T=3.04, P<0.01), the single-component group had NS change in consumption and the control group ate significantly fewer vegetables (T= -2.64, P<0.001) at post-test compared the pre-test.	Relatively small sample size and short study length. Non-randomized design limits the scope of inference to this specific study population Study population may not be representative, limiting generalizability.
Prell et al, 2005 Neutral Quality Randomized Controlled Trial	Modification of school meals	<ul style="list-style-type: none"> <li>• Modification of school meals</li> <li>• Home economics education</li> </ul>	No intervention control	N=228 Age: 14 years Location: Sweden Gender: 47% female Race: Not applicable SES: Not applicable	The multi-component group significantly increased fish consumption following the intervention, and this increase differed significantly from the control group (P<0.01). The single-component group had NS change in fish consumption, and did not differ from control. The single-component and multi-component groups did not differ.	Baseline differences in fish consumption between groups may have influenced results. Did not include a comparison group that received the home economics education alone to determine the impact of this component alone on fish consumption.



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Reinaerts, 2008 Neutral Quality Randomized Controlled Trial	Free fruit or vegetable snack	<ul style="list-style-type: none"> <li>Classroom nutrition education</li> <li>Parental involvement</li> </ul>	No intervention control	N=436 <b>Age:</b> Eight years <b>Location:</b> The Netherlands <b>Gender:</b> 53% female <b>Race:</b> Not applicable <b>SES:</b> Not applicable	Both intervention groups increased fruit and total fruit, juice and vegetable intake compared to control (P<0.05).  The single-component group also increased their vegetable snack intake (P<0.05) and vegetable intake during dinner (P<0.01), as compared to the multi-component and control groups.	Schools were assigned randomly to interventions, but control schools were matched to intervention schools based on size and ethnicity, which resulted in significant baseline differences between groups.  High attrition rates (46% at year one, 75% at year two) due to missing questionnaires.  Few schools were willing to participate due to limited time.  The study relied heavily on parental reports for intake of their children, which might threaten validity.
Sahota et al, 2001 Positive Quality Randomized Controlled Trial	Usual school nutrition education curriculum	<ul style="list-style-type: none"> <li>Teacher training</li> <li>Modification of school meals, foods sold in school</li> <li>Action plans for nutrition and physical education curriculum</li> </ul>	Not applicable	N=593 <b>Age:</b> Eight years <b>Location:</b> United Kingdom <b>Gender:</b> 45% female <b>Race:</b> Not applicable <b>SES:</b> Not applicable	Results from the 24-hour recalls showed that the multi-component group had higher vegetable consumption compared to the single-component group (+0.3 portions per day, 95% CI: 0.2, 0.4).  Fruit consumption was lower in obese children in the multi-component group (-1.0 portions per day, 95% CI: -1.8, -0.2) than those in the single-component group.  Results from the three-day food records showed that overweight children in the multi-component consumed more high-sugar foods (+0.8 portions per day, 95% CI: 0.1, 1.6) than the single-component group.	Inadequate sample size for group randomization (five schools).  Dietary intake-related outcomes were self-reported.