Obesity Prevention and Control: Interventions to Support Healthier Foods and Beverages in Schools

Task Force Finding and Rationale Statement
Ratified December 2016

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Context
Healthy eating during childhood is important for optimal growth, helps prevent high cholesterol and high blood pressure, and helps reduce one’s risk for developing osteoporosis, iron deficiency, dental caries, and obesity (Centers for Disease Control and Prevention, 1998; Dietary Guidelines Advisory Committee, 2010). With an estimated one in three school-aged children and adolescents being overweight or obese (Ogden et al., 2014), promoting healthier dietary habits during childhood is critical. Schools can play an important role in preventing obesity because most U.S. children attend school six hours a day and consume as much as half of their daily calories at school (Centers for Disease Control and Prevention, 2016a). Schools can provide nutritious and appealing foods and beverages in all venues accessible to students, including cafeterias, vending machines, school stores, and concession stands (CDC, 2011).

Interventions Definition
These interventions aim to provide healthier foods and beverages that are appealing to students, limit access to less healthy foods and beverages, or both. Healthier foods and beverages include fruits, vegetables, whole grains, low-fat or fat-free dairy, lean meats, beans, eggs, nuts, and items that are low in saturated fats, salt, and added sugars, and have no trans fats. Less-healthy foods and beverages include those with more added sugars, fats, and sodium.

Approaches to support healthier foods and beverages in schools must include one of the following:

1. **Meal interventions and fruit and vegetable snack interventions to increase the availability of healthier foods and beverages provided by schools.** These interventions must include one of the following components:
   - School meal policies that ensure school breakfasts or lunches meet specific nutrition requirements (e.g., School Breakfast Program, National School Lunch Program)
   - Fresh fruit and vegetable programs that provide fresh fruits and vegetables to students during lunch or snack.

2. **Interventions supporting healthier snack foods and beverages sold or offered as a reward in schools** must include one of the following components:
   - Food and beverage policies that require foods and beverages sold during the school day, outside of school meal programs, meet established nutritional standards or guidelines. These foods and beverages are often referred to as “competitive foods and beverages” as they are sold in competition with school meal programs, and include in-school fundraisers, a la carte foods, vending machines, school stores, and snack bars.
   - Celebration and reward rules or policies that encourage healthy foods and beverages be served during classroom celebrations, parties, and special events or encourage rewards of nonfood items for academic achievement.

3. **Multicomponent interventions to increase availability of healthier foods and beverages in schools** must include one component from each of the interventions described above (1. meal and fruit and vegetable snack interventions in combination with 2. healthier snack foods and beverages).

4. **Interventions to increase water access in schools** ensure students have access to safe, free drinking water during the school day. Interventions may include one or more of the following components aimed at increasing students’ water intake:
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- Procedures to ensure water fountains are clean and maintained
- Availability of water fountains and hydration stations throughout the school
- Policies allowing students to have water bottles in class

Each intervention may also include one or more of the following:

- Healthy food and beverage marketing strategies:
  - Placing healthier foods and beverages where they are easy for students to select
  - Pricing healthier foods and beverages at a lower cost
  - Setting up attractive displays of fruits and vegetables
  - Offering taste tests of new menu items
  - Posting signs or verbal prompts to promote healthier foods and beverages and new menu items
- Healthy eating learning opportunities such as nutrition education and other strategies that give children knowledge and skills to help choose and consume healthier foods and beverages.

**Task Force Findings (December 2016)**

The Community Preventive Services Task Force issued separate findings for four types of interventions to increase the availability of healthier meals, snacks, and beverages in schools.

- The Community Preventive Services Task Force recommends **meal interventions and fruit and vegetable snack interventions to increase the availability of healthier foods and beverages provided by schools** based on sufficient evidence of effectiveness for increasing fruit and vegetable consumption and reducing or not changing the prevalence of obesity or overweight. Evidence was favorable for fruit and vegetable consumption primarily due to fruit and vegetable programs.

- The Community Preventive Services Task Force finds insufficient evidence to determine the effectiveness of **interventions supporting healthier snack foods and beverages sold or offered as a reward in schools**. Evidence is considered insufficient because too few studies evaluated comparable dietary and weight outcomes.

- The Community Preventive Services Task Force recommends **multicomponent interventions to increase availability of healthier foods and beverages in schools (i.e., meal and fruit and vegetable snack interventions in combination with healthier snack foods and beverages)** on the basis of sufficient evidence of effectiveness for reducing or not changing the prevalence of obesity or overweight.

- The Community Preventive Services Task Force finds insufficient evidence to determine the effectiveness of **interventions to increase water access in schools**. Evidence is considered insufficient because there were too few studies.

**Rationale**

**Basis of Finding**

In 2013, the Agency for Healthcare Research and Quality (AHRQ) conducted a meta-analysis on the effectiveness of childhood obesity prevention programs implemented in six intervention settings and reported moderate evidence of effectiveness in school settings (Wang et al., 2013). The Task Force findings are based on a subset of studies from the AHRQ review that focused on dietary-only approaches in schools (Wang et al., 2013; 15 studies, search period through August 2012) combined with more recent evidence (20 additional studies, search period August 2012 through March 8,
The 4 intervention approaches in this review align with the Center for Disease Control and Prevention’s Comprehensive Framework for Addressing the School Nutrition Environment and Services (CDC, 2016b): meal interventions and fruit and vegetable snack interventions to increase the availability of healthier foods and beverages provided by schools (16 studies); interventions supporting healthier snack foods and beverages sold or offered as a reward in schools (7 studies); multicomponent interventions to increase availability of healthier foods and beverages in schools (i.e., meal and fruit and vegetable snack interventions in combination with healthier snack foods and beverages; 9 studies); and interventions to increase water access in schools (2 studies).

Dietary outcomes included intake of energy, sugar-sweetened beverages (SSB), low nutrient foods, fruits and vegetables, milk and alternatives to dairy products, water, or 100% fruit juice, and overall diet quality indices.

For energy intake, a favorable direction is dependent on age, length of follow-up, and baseline obesity prevalence. Decreases in SSB and low nutrient food intake were considered favorable. Increases in fruit and vegetable, milk or dairy alternatives, water, and 100% fruit juice intake were considered favorable. Diet quality indices are composite measures of diet quality that include aspects of diet adequacy, variety, balance, and moderation. For the indices reported in this review, a higher score indicates better diet quality.

Weight outcomes were assessed by overweight/obesity prevalence and BMI z-score. When studies did not have control groups, then no changes or minimal decreases in weight outcomes were considered favorable as this demonstrated potential for a decreased rate of change in obesity prevalence.

Results of the intervention effect on weight-related and diet-related outcomes are shown in Table 1. It was not possible to calculate summary effect estimates due to the variability of outcome measures. However, an overall direction for each outcome is provided. Study design is provided for weight-related outcomes in order to show whether a control group was used and whether no change was favorable.
Table 1. Intervention Effect on Weight-related and Diet-related Outcomes

<table>
<thead>
<tr>
<th>Overweight/Obesity Prevalence</th>
<th>Meal and Fruit and Vegetable Snack Interventions to Increase Healthier Foods and Beverages Provided by Schools</th>
<th>Interventions Supporting Healthier Snack Foods and Beverages Sold or Rewarded in Schools</th>
<th>Multicomponent Interventions to Increase Availability of Healthier Foods and Beverages in Schools</th>
<th>Interventions to Increase Water Access in Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity Prevalence: Decrease of 1 percentage point, NS (1 study; post only with comparison)</td>
<td>Obesity Prevalence: Weak Law Arm: decrease of 0.8, NS&lt;br&gt;Strong Law Arm: 0, NS (1 study, 2 arms; before after with comparison)</td>
<td>Obesity/Overweight Prevalence: Decrease of 0.2%, NS (1 study; group RCT)</td>
<td>Obesity Prevalence: Girls: decrease of 0.2 percentage points, NS&lt;br&gt;Boys: decrease of 0.5 percentage points, p=0.08 (1 study; repeat cross-sectional with comparison)</td>
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</tr>
<tr>
<td>Overweight/Obesity Prevalence: Median decrease of 6.33, range -10.9 to 1.17 (4 studies; 3 before after, 1 post only with comparison)</td>
<td>Overweight Prevalence: Weak Law Arm: decrease of 4.5, p&lt;0.01&lt;br&gt;Strong Law Arm: decrease of 2.8, p&lt;0.05 (1 study, 2 arms; before after with comparison)</td>
<td>Overweight/Obesity Prevalence: Increase of 0.6 percentage points (significance not reported)*&lt;br&gt;(1 study; repeat cross-sectional)&lt;br&gt;Significantly slower rate of increase in overweight/obese children (2 studies; repeat cross-sectional)</td>
<td>Overweight/Obesity Prevalence: Girls: decrease of 0.6 percentage points, p=0.07&lt;br&gt;Boys: decrease of 1.2 percentage points, p&lt;0.01 (1 study; repeat cross-sectional with comparison)</td>
<td></td>
</tr>
<tr>
<td>Summary: Favorable Effect</td>
<td>Summary: Too few studies; included studies favorable</td>
<td>Summary: Favorable Effect</td>
<td>Summary: Too few studies; included studies favorable</td>
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* Odds Ratio: 0.69, 95% CI: 0.48, 0.98 (1 study; group RCT)
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<table>
<thead>
<tr>
<th>Meal and Fruit and Vegetable Snack Interventions to Increase Healthier Foods and Beverages Provided by Schools</th>
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<tbody>
<tr>
<td><strong>BMI z-score</strong></td>
<td>Median: 0.01; range -0.14 to 0.03 (3 studies; 1 RCT, 1 post only with comparison, 1 time series)</td>
<td>Weak Law Arm: decrease of 0.39, p&lt;0.01&lt;br&gt;Strong Law Arm: decrease of 0.10, NS (1 study, 2 arms; before after with comparison)</td>
<td>Decrease of 0.01&lt;br&gt;(1 study; group RCT)&lt;br&gt;Increase in both groups in BMIz, p&lt;.001 (1 study; group RCT)</td>
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<tr>
<td><strong>Summary:</strong> Too few studies; included studies mixed</td>
<td>Summary: Too few studies; included study favorable</td>
<td>Summary: Too few studies; included studies mixed</td>
<td><strong>Summary:</strong> Too few studies; included studies no effect</td>
</tr>
<tr>
<td><strong>Energy Intake</strong></td>
<td>161.9 kilocalories/day median decrease (range -452.2 to 4.5 kilocalories/day) (3 studies)</td>
<td>Mean energy intake (kcal) per day:&lt;br&gt;Increase of 85 kilocalories/day, NS (1 study)&lt;br&gt;Decrease of 248 kilocalories/day, p&lt;0.001 (1 study)</td>
<td><strong>Mean energy intake at lunch</strong>&lt;br&gt;Increase of 44 kcal at lunch (95% CI: 26.6, 62.0) (1 study)</td>
</tr>
<tr>
<td><strong>Summary:</strong> Too few studies; included studies mixed</td>
<td>Summary: No Studies</td>
<td>Summary: Too few studies; included studies mixed</td>
<td><strong>Summary:</strong> No Studies</td>
</tr>
<tr>
<td>Sugar Sweetened Beverage (SSB) Intake</td>
<td>Meal and Fruit and Vegetable Snack Interventions to Increase Healthier Foods and Beverages Provided by Schools</td>
<td>Interventions Supporting Healthier Snack Foods and Beverages Sold or Rewarded in Schools</td>
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<tr>
<td><strong>Range:</strong> -0.33 to 0.08 servings/day (2 studies; both studies reduced availability of SSB in schools)</td>
<td><strong>Sweet drinks at school:</strong> Decrease of 0.25, NS (1 to 4 scale) (1 study)</td>
<td><strong>Decrease of 0.3 servings/day, p&lt;0.05</strong></td>
<td><strong>No intervention effect</strong> 1 study</td>
</tr>
<tr>
<td><strong>Ban soda:</strong> Prevalence difference 2.3, NS <strong>Ban SSB:</strong> Prevalence difference 5.5 (0.6, 11.1) (1 study, 2 arms; reduced availability of soda or SSB in schools)</td>
<td><strong>Decrease of 0.2 servings/day, 95% CI: −0.27, −0.12</strong> (1 study)</td>
<td><strong>Decrease of 0.20 servings/day (95% CI: −0.27, −0.12)</strong></td>
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<tr>
<td><strong>Summary: No Studies</strong></td>
<td><strong>Summary: Too few studies; included studies mixed</strong></td>
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# Task Force Finding and Rationale Statement

## Meal and Fruit and Vegetable Snack Interventions to Increase Healthier Foods and Beverages Provided by Schools

- **Sweets**: Decrease of 0.14 portions/day (95% CI: -0.53, 0.26 portions/day)
- **Crisps**: Decrease of 0.04 portions/day (95% CI: -0.25, 0.18 portions/day)
- **Soda/Candy/Chips**: Decreases of 0.40 and 0.58 times/week (1 study, 2 arms)

**Intake of energy-dense, micronutrient-poor food or drink**: -10.6%, NS (1 study)

**Summary**: Too few studies; included studies favorable

## Interventions Supporting Healthier Snack Foods and Beverages Sold or Rewarded in Schools

- **Sweet snacks**: decrease of 0.10, NS
- **Salty snacks**: decrease of 0.20, NS
  (1 to 4 scale)
  1 study

- **Candy**:
  - In school: Odds Ratio 0.97, NS
  - Out of school: Odds Ratio 0.99, NS

- **Pastries**:
  - In school: Odds Ratio 0.44, p= 0.00
  - Out of School: Odds Ratio 1.4, p=0.06

- **Chips**:
  - In school: Odds Ratio 0.87, NS
  - Out of school: Odds Ratio 1.17, NS
  (1 study)

**Summary**: Too few studies; included studies favorable

## Multicomponent Interventions to Increase Availability of Healthier Foods and Beverages in Schools

**Summary**: Too few studies; included study favorable

## Interventions to Increase Water Access in Schools

**Decrease of 0.18 low-nutrient density food servings/day,(95% CI: -0.23, -0.14)** (1 study)

**Summary**: No Studies
| Fruit and Vegetable Intake | Fruit and Vegetable:  
Median increase of 25.7%; IQI: 0.25% to 55.2% (5 studies, 6 arms)  
Increased vegetable intake 8.2 grams/day, NS  
Increased fruit intake by 0.18 pieces/day, NS (1 study)  
Mediterranean Diet Quality Index (KIDMED); range -4 to 11  
Increase of 1.88, p<0.001 (1 study)  
Increase of 0.09 servings/lunch, NS (fruit intake increased 0.17, p<0.05 and vegetable intake decreased 0.06, NS) (1 study)  
Increase in home consumption for 10 of 17 vegetables and fruit; NS (1 study)  
**Fruit:**  
In school: increase of 0.06 servings/day, NS  
Whole day: increase of 0.09 servings/day, NS (1 study)  
Decrease of 0.41% of students reporting fruit intake at breakfast, NS (1 study)  
**Summary:** Favorable Effect | Fruit:  
In school:  
- Odds Ratio 1.01, NS  
Out of school:  
- Odds Ratio 1.21, p=0.09  
**Vegetable:**  
In school:  
- Odds Ratio 1.08, NS  
Out of school:  
- Odds Ratio 0.94, NS (1 study)  
**Fruit intake:** increase of 0.17 cups/day, NS  
**Vegetable:** decrease of 0.03 cups/day, NS (1 study) | Increase of 40 grams per day* (1 study)  
Increase of 0.10 servings per day, NS (1 study)  
Decrease of 0.08 servings per day, NS (1 study)  
Increase of 5.2% in lunchtime energy from fruit and vegetables, NS (1 study) | Summary: Too few studies; included studies no effect | Summary: Too few studies; included studies no effect | Summary: No Studies |
<table>
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<tr>
<th>Intake of Milk and Alternatives to Dairy Products</th>
<th>Meal and Fruit and Vegetable Snack Interventions to Increase Healthier Foods and Beverages Provided by Schools</th>
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<tbody>
<tr>
<td>Decrease of 0.05 servings per day, p=0.07 (1 study)</td>
<td>Milk: In school: Odds Ratio 0.97, NS Out of school: Odds Ratio 1.24, p&lt;0.05 (1 study)</td>
<td>Increase of 4.1 ounces of milk at lunch, p&lt;0.05 (1 study)</td>
<td>Increase of 1.1 glasses/day; p&lt;0.001 (1 study)</td>
<td>Increase of 0.24 servings of milk/dairy products per day (95% CI: 0.18, 0.31) (1 study)</td>
</tr>
<tr>
<td>Decrease of 1.44 servings per week, p&lt;0.001 (1 study)</td>
<td>Increase of 0.18 servings of milk and alternatives to dairy per day (95% CI: 0.80, 0.28) (1 study)</td>
<td>Increase of 4.1 ounces of milk at lunch, p&lt;0.05 (1 study)</td>
<td>Increase of 0.24 servings of milk/dairy products per day (95% CI: 0.18, 0.31) (1 study)</td>
<td>Summary: No studies</td>
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<tr>
<td>Increase of 8.7% in percentage of students reporting any milk intake, NS (1 study)</td>
<td>Increase of 0.24 servings of milk/dairy products per day (95% CI: 0.18, 0.31) (1 study)</td>
<td>Increase of 0.18 servings of milk and alternatives to dairy per day (95% CI: 0.80, 0.28) (1 study)</td>
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**Summary:** Too few studies; included studies mixed

**Water Intake**

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<tbody>
<tr>
<td>See next row: one study combined water and fruit juice.</td>
<td>Increase of 0.18 servings of milk and alternatives to dairy per day (95% CI: 0.80, 0.28) (1 study)</td>
<td>Increase of 4.1 ounces of milk at lunch, p&lt;0.05 (1 study)</td>
<td>Increase of 1.1 glasses/day; p&lt;0.001 (1 study)</td>
<td>Increase of 0.24 servings of milk/dairy products per day (95% CI: 0.18, 0.31) (1 study)</td>
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<td>Increase of 4.1 ounces of milk at lunch, p&lt;0.05 (1 study)</td>
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**Summary:** No studies

**Summary:** See next row

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<tr>
<td><strong>Fruit Juice Intake</strong></td>
<td>Decrease of 0.01 servings at lunch, NS (1 study)</td>
<td>In School: Odds Ratio 0.73, p&lt;0.05 Out of School: Odds Ratio 0.82, p=0.10 (1 study) Girls: decrease of 0.2 servings per day, p&lt;0.05 Boys: increase of 0.05 servings per day, NS (1 study) <strong>100% Fruit Juice and Water</strong> (1 to 4 scale) At school: increase of 0.33, NS At home: decrease of 0.18, p&lt;0.05 (1 study)</td>
<td>Summary: No studies</td>
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<tr>
<td></td>
<td>Increase of 0.31% in percentage of students reporting fruit juice with breakfast, NS (1 study)</td>
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<td>Summary: Too few studies; included studies no effect</td>
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</table>

**Summary:** Too few studies; included studies no effect
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<table>
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<tr>
<th>Diet Quality Indices</th>
<th>Meal and Fruit and Vegetable Snack Interventions to Increase Healthier Foods and Beverages Provided by Schools</th>
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<tr>
<td>KIDMED (range -4 to 11): Increase of 0.05, NS (1 study)</td>
<td><strong>Total Diet Quality Index:</strong> 0.03, NS (1 study)</td>
<td>Students 80% more likely to report better diet quality after intervention: increase in Prevalence Ratio of 1.8 (95% CI: 1.3, 2.3) (1 study)</td>
<td>Summary: Too few studies; included study favorable</td>
<td>Summary: No studies</td>
</tr>
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<td><strong>Summary:</strong> Too few studies; included study no effect</td>
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</table>

CI = confidence interval; IQI = interquartile interval NS = not significant; RCT = randomized control trial

Weak law arm = weak competitive food laws, rating of 1-2 (scale 0-6); Strong law arm = strong competitive food laws >2 (scale 0-6).

Studies that report BMI z-score and prevalence data are represented in each outcome category.

*Systematic review team calculated overweight and obesity prevalence combined.*
Applicability and Generalizability Issues
Applicability and generalizability are only described for the two recommended interventions. Applicability is not assessed for the other two interventions because the Task Force did not have enough information to determine if the intervention works.

Multicomponent Interventions to Increase Availability of Healthier Foods and Beverages in Schools
Included studies were conducted in the United States (5 studies), Canada (2 studies), and the United Kingdom (2 studies). Studies were conducted in schools alone (7 studies) or in schools plus one or more additional settings (2 studies). Seven studies reported information on urbanization; three reported a mixed setting, three reported an urban setting, and one reported a suburban setting. Interventions were effective across countries, intervention settings, and degree of urbanization.

Interventions were found to be effective among elementary and middle school students. No studies represented high school students only. Two studies included high school students combined with middle school students. All studies demonstrated effectiveness among males and females and included studies had roughly equal numbers of males and females.

Five studies that reported racial and ethnic distributions showed intervention effectiveness across reported groups. Populations were comprised of students in the following reported groups: white (median 19%; 5 studies), black (median 10.0%; 5 studies), Hispanic (median 52.0%; 5 studies), Asian (7.2%; 4 studies), and American Indian/Alaskan Native (0.3%; 1 study). One study showed an intervention effect in low-income populations.

Meal and Fruit and Vegetable Snack Interventions to Increase the Availability of Healthier Foods and Beverages Provided by Schools
Included studies were conducted in the United States (4 studies), Canada (2 studies), Norway (3 studies), the United Kingdom (1 study), the Netherlands (1 study), Spain (1 study), Australia (1 study), Denmark (1 study), and Greece (1 study), and one study took place across three countries (Norway, the Netherlands, and Spain). Studies were conducted in schools alone (14 studies) or in schools plus one or more additional settings (2 studies). Eight studies reported information on urbanization; six reported a mixed setting, one reported a rural setting, and one reported an urban setting. Interventions were effective across countries, intervention settings, and degree of urbanization.

Interventions were found to be effective among elementary and middle school students. No studies represented high school students only. Four studies included high school students with elementary school and middle school students. All studies demonstrated effectiveness among males and females and included studies had roughly equal numbers of males and females.

Six studies that reported racial and ethnic distributions showed intervention effectiveness across reported groups. Populations were comprised of students in the following reported groups: white (median 63.4%; 3 studies), black (median 29.7%; 1 study), Hispanic (median 17.0%; 1 study), and First Nation (100.0%; 2 studies). One study conducted in the Netherlands examined the effectiveness of interventions by race/ethnicity and reported the intervention significantly increased fruit intake among ethnically Dutch children and significantly increased vegetable intake among non-Western children.

Interventions were effective among primarily low-income populations (1 study) or when targeted to low-income First Nation children (2 studies). One study of a program to increase fruit and vegetable intake reported parental education
level was related to effectiveness, reporting that students from the low parental educational group consumed more soda, candy, and chips than did students in the high parental education group at the end of the study.

One study reported greater effects for weight-related outcomes among students who were obese at baseline when compared with students who were overweight or normal weight.

**Data Quality Issues**
Dietary outcomes were based primarily on self-reported data, and weight outcomes were typically measured by trained staff. Common limitations of self-reported dietary data include participants forgetting about consumption of specific foods or beverages, inaccurately estimating portion sizes, and accidentally or purposely failing to report specific items (Grandjean, 2012). Most studies addressed these limitations by using age-appropriate, validated instruments. More than 85% of the studies that provided weight outcomes reported measured height and weight.

It was often difficult to calculate an effect estimate because inconsistent measures were used for diet outcomes. In these instances, findings were summarized qualitatively.

**Other Benefits and Harms**
Included studies identified several additional benefits of these interventions. Children reported an increased liking for fruits and vegetables, and the majority of students and parents rated the fruit and vegetable program as very good. Children increased their intake of specific nutrients and significantly lowered their total cholesterol. One study found that two years after the program, participants reported an increase in vitamin A intake and a decrease in saturated fatty acid intake, and three years after the program they reported an increase in fiber, vitamins A and C, calcium, and sodium intake. Another study found students in the intervention group consumed more vitamin C and dietary fiber than did students in the control group. Yet another study found students reported higher intakes of vitamin C and folate after policies were implemented to improve school lunches in primary schools.

No harms of the intervention were identified. Included studies were reviewed for information about body dissatisfaction or dieting behaviors. One study reported no differences between intervention and control groups for weight perception, weight preference, or current dieting habits. Another study reported no difference between the proportion of participants in intervention and control groups who perceived themselves as too heavy.

**Economic Evidence**
An economic review is pending.

**Considerations for Implementation**
Important considerations include the different possible combinations of components, the levels at which changes are made (i.e., federal, state or provincial, district, or school), and the school capacity for implementing the intervention(s). Some intervention components (e.g., implementing National School Lunch Program guidelines) may be required if a school is participating in the National School Lunch program; other components may be selected. There was not enough evidence from the included studies to evaluate the different combinations of components.

Intervention success is likely to vary based on school characteristics and intervention components. Schools with greater resources are better able to implement interventions with high fidelity as compared with schools that have higher needs. Some school communities may be resistant to change. And interventions that include an educational component must compete with other educational demands in the school. Additionally, for interventions with an educational component, competing demands to meet education requirements during the school day is a consideration.
Evidence Gaps
Additional research and evaluation are needed to fill existing gaps in the evidence base. Evidence gaps are split into three groups: 1) evidence gaps for reviews where a recommendation was made; 2) evidence gaps related to reviews for which there was an insufficient evidence finding; 3) cross-cutting evidence gaps related to all four intervention approaches.

1. Evidence gaps for reviews where a recommendation was made:

   Meal and Snack Interventions to Increase the Availability of Healthier Foods and Beverages Provided by Schools
   - Additional studies in high school settings are needed to increase understanding of intervention effectiveness on older children.
   - The majority of studies were conducted outside the United States; additional studies in the United States would further strengthen the evidence base for U.S. students.

   Multicomponent Interventions Combining Meal and Snack Interventions to Increase Availability of Healthier Foods and Beverages in Schools
   - Future studies should examine which combinations of components are most effective and which components are critical to success.

2. Evidence gaps related to reviews for which there was an insufficient evidence finding:

   - Additional research is needed to move these interventions from an insufficient evidence finding to a recommendation for or against. Literature in this field should be monitored to determine when enough studies have been published to warrant further review.

   Interventions Supporting Healthier Snack Foods and Beverages Sold or Rewarded in Schools
   - Evidence about newer nutrition standards such as Smart Snack in Schools, was not captured in this review. It is unclear if those standards would have a larger effect.

   Interventions to Increase Water Access in Schools
   - Future research should consider different ways to increase access to water (e.g., adding water fountains, allowing water bottles in class) and determine which are more effective.

3. Cross-cutting evidence gaps related to all intervention approaches:

   - Increased consensus about “best measures” for dietary intake outcomes would increase comparability and the ability to synthesize evidence.
   - Studies are needed that examine whether children act as agents of change by discussing changes in the school environment with parents and whether parents incorporate healthier dietary habits at home.
   - Future research could examine how often schools implement interventions with fidelity, and determine what amount of training is needed for faculty.
   - While interventions should be applicable across school-aged populations, more research is needed on the varying effectiveness of interventions by age group, and among high school students in particular.
   - Research should be done to show whether national, state, or local policies are more effective.
• Studies should assess the cumulative effects of adding intervention components or determine if a single component is equally effective.

• Approximately half of the studies reported on weight outcomes; future studies should report weight-related outcomes to increase understanding of intervention effectiveness.

• Studies should report the fat content of milk products and alternatives to dairy.

• Future research could examine if these interventions lead to other health benefits such as improvements in cholesterol or blood pressure.

References


Centers for Disease Control and Prevention. School health guidelines to promote healthy eating and physical activity. MMWR 2011;60(5):1-76.


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