# Obesity Prevention and Control: Meal or Fruit and Vegetable Snack Interventions Combined with Physical Activity Interventions in Schools

## Summary Evidence Table

Abbreviations Used in This Document:

- Intervention components
  - FFVP: fresh fruit and vegetable program
  - FRPL: free and reduced price lunch
  - FVMM: fruit and vegetables make the marks
  - SBP: school breakfast program

- Outcomes:
  - F&V: fruit and vegetables
  - SSB: sugar sweetened beverage

- Measurement terms
  - BMI: body mass index
  - CI: confidence interval
  - cm: centimeter
  - d: day
  - EDMP: energy dense, micronutrient poor
  - g: grams
  - kcal: kilocalories
  - kJ: kiloJoules
  - min: minutes
  - mL: milliliter
  - mm: millimeter
  - mmHg: millimeters of mercury
  - mmol/L: millimoles per liter
  - oz: ounces
  - pct pts: percentage points
  - serv: servings
  - wk: week
  - yrs: years

- Study design
  - Group RCT: group randomized trial
  - RCT: randomized trial

- Other terms:
  - NA: not applicable
  - NR: not reported
  - NS: not significant
  - SES: socioeconomic status

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Angelopoulos, 2009<br><br>**Study Design:** RCT<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Good | **Study population:** 5th graders<br><br>**Sample size (analytic):** I: 321; C: 325<br><br>**Demographics:**<br>Intervention<br>Mean age: 10.25 yrs<br>Gender: 57.3% female<br>Race/ethnicity: 90.3% Greek, 9.7% immigrants<br>SES: economically disadvantaged area<br><br>Control<br>Mean age: 10.29 yrs<br>Gender: 54.2% female<br>Race/ethnicity: 88.0% Greek, 12.0% immigrants<br>SES: economically disadvantaged area | **Location (urbanicity):** Ioannina Metropolitan area, Greece (urban, rural)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: parents were encouraged to increase FV at home. School canteens had fresh fruit and fresh juice<br><br>PA: Emphasis was placed on increasing children's fun in 2, 45-min PE sessions/wk which were delivered on the playground. Activities were of moderate intensity.<br><br>Education: integrated into existing school curriculum, primarily PE and Science and Environmental classes. Materials were implemented for 1-2 h/wk. Intervention was delivered by school teachers trained by research team. Certain activities were completed at home.<br><br>Components: meals + FV + PE + education + parental involvement<br><br>**Comparison**: usual care<br><br>**Study Period (baseline to post test):** Nov-Dec 2004 to Feb - March 2006 (interventions Jan 2005-Jan 2006 (12 month) | **BMI z-score**<br>Intervention: baseline: 0.87 f/u: 0.41<br>Control: baseline: 0.83 f/u: 0.67<br>**Summary Effect: -0.30, p=0.07**<br><br>**Fruit intake (exchanges/d)**<br>Intervention: baseline: 1.1 f/u: 1.5<br>Control: baseline: 1.3 f/u: 1.1<br>**Summary Effect: 0.6 exchanges/d, p=0.04**<br><br>**Vegetable intake (exchanges/d)**<br>Intervention: baseline: 1.2 f/u: 1.0<br>Control: baseline: 1.1 f/u: 1.2<br>**Summary Effect: -0.2 exchanges/d, p=0.68**<br><br>**Low Nutrient Food Intake (Sweets and Beverages) (exchanges/d)**<br>Intervention: baseline: 2.5 f/u: 1.7<br>Control: baseline: 2.6 f/u: 2.8<br>**Summary Effect: -1.0 exchanges/d, p=0.04**<br><br>**MVPA (min/d)**<br>Intervention: baseline: 41.1 f/u: 43.4<br>Control: baseline: 47.7 f/u: 31.3<br>**Summary Effect: 18.6 min/d, p=0.04**<br><br>Also, reports **SBP** (summary effect -3.5 mmHg) and **DBP** (summary effect -2.8 mmHg)<br><br>**Paper conclusions**: The findings indicate favorable changes in BP and obesity indices after the implementation of a 1-year school-based intervention program. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Arbeit, 1992<br><br>**Study Design:** Group RCT<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** 4-5th grade students<br><br>**Sample size (analytic):** 280<br><br>**Demographics:**<br>Intervention and Control<br>Mean age: 4-5th grade students<br>Gender: NR<br>Race/ethnicity (for public school system): 58% white, 32% black, 2% Hispanic, and 10% other, primarily Vietnamese for the public school system<br>SES: lower to upper-middle income | **Location (urbanicity):** Jefferson Parish, LA<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: School lunch program: Heart Smart school lunch program included providing approximately 1/3 of RDA for total energy (about 600 kcal), 20 g of total fat, 6 g sat fat, and 600 mg or less of sodium. Program extended into classroom by exposing children to CV healthful food items. A heathy alternative for most foods was offered. Salad bar with healthy selections.<br><br>PA: Superkids-Superfit Exercise Program 12 didactic lessons and aerobic activities administered by physical education staff. Activities included jogging, power walking, and other aerobic activity.<br><br>Education: cardiovascular curriculum focused on healthy eating habits and exercise. Teacher-delivered and consisted of 15-35 hours per grade. Program also had component to deter onset of cigarette smoking and other risk-related behaviors.<br><br>Components: School meals + PE classes + education<br><br>**Comparison**: usual care<br><br>**Study Period:** 1985-1986 (9 months) | **1 mile run/walk time (min)**<br><br>Boys:<br>Intervention: baseline: 11.6; f/u: 11.1<br>Control: baseline:13.7 ; f/u: 14.0<br>**Summary Effect: -0.9 min, NR**<br><br>Girls:<br>Intervention: baseline: 13.1; f/u: 13.2<br>Control: baseline:14.3 ; f/u: 15.9<br>**Summary Effect: -1.4 min, NR**<br><br>**Overall Summary Effect (weighted): -1.1 min**<br><br>**Paper conclusions**: The Heart Smart Program demonstrates the feasibility and utility of a comprehensive CV health promotion program in the elementary school. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Bugge, 2012<br><br>**Study Design:** group non-randomized trial<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Good | **Study population:** 1st grade students<br><br>**Sample size (analytic):** 613 (I:362; C: 251)<br><br>**Demographics:**<br>Intervention<br>Mean age: 6.8 yrs<br>Gender: 48% female<br>Race/ethnicity: Danish<br>SES: mixed income<br><br>Control<br>Mean age: 6.7 yrs<br>Gender: 58% female<br>Race/ethnicity: Danish<br>SES: mixed income | **Location (urbanicity):** Ballerup and Tarnby municipality of Copenhagen, Denmark (suburban)<br><br>**Level of Implementation:** District (municipality)<br><br>**Intervention activities:**<br>Diet: School canteens that intended to sell healthy meals and snacks were established over time in the intervention schools with the aim of providing pupils an opportunity to buy nutritious meals in the school hours;<br><br>PA: Two additional physical education (PE) lessons per week: In all intervention schools, the two standard PE lessons per week (90 min) were increased to four PE lessons per week (180 min) throughout. Improvement of schoolyard environment: The schoolyard environment was improved to stimulate the children to be more physically active during recess.<br><br>Education: Health education was incorporated into the general curriculum from the first grade to the third grade. Parents: Parents received regular information concerning a healthy diet from the municipality via newsletters from the school<br><br>Components: meals + PE + improved schoolyard + education<br><br>**Comparison**: usual care | **VO2 peak (ml/kg/min)**<br>Intervention: weight change: 2.64<br>Control: weighted change: 2.04<br>**Adjusted Summary Effect: 0.46 mL/kg/min,** (95% CI: -3.3, 2.4)<br><br>**BMIz**<br>Intervention: weight change: 0.04<br>Control: weighted change: -0.01<br>**Adjusted Summary Effect: +0.03,** (95% CI: -0.14, 0.08)<br><br>**Skinfold Thickness (mm)**<br>Intervention: weight change: 7.52<br>Control: weighted change: 6.00<br>**Adjusted Summary Effect: 1.48 mm,** (95% CI: -3.64, 0.68)<br><br>Also, reports **SBP** (adjusted summary effect: -1.60 mmHg) **Total Energy Intake** (summary effect: 0.0 kcal/d)<br><br>**Paper conclusions**: We did not find any effects on PA, VO2 peak, and fatness, and no differences were statistically significant after Bonferroni corrections. Therefore, our results indicate that a doubling of PE exposure and providing training and equipment may not be sufficient to induce major changes in CVD risk factors in healthy populations, at least not when administered as two double lessons per week. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| | | **Study Period:** 2001/02 to 2004/05 school year (30 months) | |

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|---|---|---|---|
| **Author, Year:** Caballero, 2003<br><br>**Study Design:** group RCT<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** 3rd-5th grade students<br><br>**Sample size (analytic):** 1409 (I:727, C: 682)<br><br>**Demographics:**<br>Intervention and Control<br>Mean age: 7.6 yrs<br>Gender: NR<br>Race/ethnicity: 100% American Indian<br>SES: NR | **Location (urbanicity):** White Mountain Apache and San Carlos Apache, Navajo, Sicangu Lakota and Oglala Lakota, and the Tohono O'odham Nation and Gila River Indian (NR)<br><br>**Level of Implementation:** American Indian Nations<br><br>**Intervention activities:**<br>Diet (food service): school meals (lunch and breakfast) - reduced % of energy from fat to ≤30%, aim to increase lower fat-foods and increase FV<br><br>PA: increase energy expenditure in PE, 3, 30 min PE sessions/week during school (The PE program was based on the SPARK with and American Indian Games module), exercise breaks (2-10 min) during classroom time, guided recess<br>Family: keep families involved, send home information, family fun nights<br><br>Education: curriculum on healthy eating and increased PA. Two 45-min lessons were delivered by teachers each week for 12 week during the 3rd and 4th grades. This was decreased to 8 week during 5th grade.<br><br>Components: lunch + breakfast + PA breaks + PE + parental support + education<br><br>**Comparison**: usual care<br><br>**Study Period:** fall 1997-spring 2000 (fall 2nd grade – spring 5th grade) | **Percent Body Fat**<br>Intervention: baseline: 32.8% f/u: 40.3%<br>Control: baseline: 33.3% f/u: 40.0%<br>**Summary Effect: -0.8 pct pts, NS**<br><br>**Overweight/Obesity Prevalence**<br>Intervention: baseline: 47% f/u: 53%<br>Control: baseline: 48% f/u: 56%<br>**Summary Effect: -2 pct pts, NS**<br><br>**Physical Activity: Motion sensor (average vector magnitude/min)**<br>Intervention: baseline: 282.04 f/u: 267.22<br>Control: baseline: 303.13 f/u: 246.79<br>**Summary Effect: 20.43, p=0.31**<br><br>Also, reports **Total Energy Intake** (summary effect: 265 kcal/d)<br><br>**Paper conclusions**: The study showed that properly trained teachers can achieve significant changes in the health related knowledge and behaviors of 7–10-y-old children with the use of a culturally appropriate classroom curriculum. The intervention showed positive but no statistically significant trend in the level of physical activity during school time. The lack of effect of the intervention on %BF suggests that more intense or longer interventions may be needed to modify the continuing trend toward higher adiposity in this population. |

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|---|---|---|---|
| **Author, Year:** Coleman, 2005<br><br>**Study Design:** Other design with concurrent comparison<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** 3rd – 5th grade students<br><br>**Sample size (analytic):** 744<br><br>**Demographics:**<br>Intervention<br>Mean age: 8.3 yr<br>Gender: 49% female<br>Race/ethnicity: 93% Hispanic schools<br>SES: >80% free or reduced lunch<br><br>Control<br>Mean age: 8.3 yr<br>Gender: 47% female<br>Race/ethnicity: 93% Hispanic schools<br>SES: >80% free or reduced lunch | **Location (urbanicity):** El Paso, TX and Las Cruces, NM (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:** CATCH<br>Diet: worked with food services to decrease the fat content of school meals to less than 30% of total calories, sodium content to between 600 and 1000 mg, and saturated fat to less than 10% of total calories.<br><br>PE: increase time spent in MVPA to more than 40% of class time, and 20% spent in vigorous physical activity. Schools also provided money for purchasing small equipment for PE.<br><br>Education: classroom curriculum Eat Smart Manual.<br><br>Families: provided information on healthier lifestyles.<br><br>**Comparison**:<br>Control schools did not receive any of the El Paso CATCH program materials and did not attend any of the training for the program. However, they received $1000 at the beginning of each school year as an incentive for participation.<br><br>Components: meals + PE + education + family<br><br>**Study Period:** 1998-2001 (30 months) | **Yards run in 9 minutes:**<br>**Girls**<br>Intervention: change in min 9 run: 101 yds<br>Control: change in min 9 run: 92 yds<br>**Summary Effect: 9 yds, p<0.05**<br><br>**Boys**<br>Intervention: change in min 9 run: 126 yds<br>Control: change in min 9 run: 111 yds<br>**Summary Effect: 15 yds, p<0.05**<br><br>**Overweight/Obesity Prevalence**<br>**Girls**<br>Intervention: baseline: 30%<br>Control: baseline: 26%<br>**Summary Effect: -11.0 pct pts**<br><br>**Boys**<br>Intervention: baseline: 40%<br>Control: baseline: 40%<br>**Summary Effect: -8.0 pct pts**<br><br>**Overall Summary Effect (weighted): -9.4 pct pts**<br><br>**Paper conclusions**: The El Paso CATCH intervention successfully slowed the epidemic increase in risk of overweight or overweight seen in control school children. Children in El Paso CATCH schools began the program with rates of risk of overweight or overweight higher than the national rates for Hispanic children and ended the program below national rates for Hispanic children. In contrast, children in comparison control schools ended the study period with rates of risk of overweight or overweight that were higher than national rates for Hispanic children. |

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|---|---|---|---|
| **Author, Year:** Crespo, 2012<br><br>**Study Design:** group RCT<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Good<br><br>This is part of the larger Aventuras Para Ninos study. For this review, only the School/Community Intervention arm met inclusion criteria. | **Study population:** Kindergarten-2nd grade students<br><br>**Sample size (analytic):** 262<br><br>**Demographics:**<br>Mean age: 6.0yrs<br>Gender: 50% female<br>Race/ethnicity: Predominantly Hispanic<br>SES: 35% at poverty level | **Location (urbanicity):** San Diego, CA (urban)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Dietary: Salad bars at every school during lunchtime, nutrition education, community component of a promotora trained in nut and Pa, healthier children's menus at local restaurants<br><br>Physical activity: Recess, physical education classes, and playgrounds were restructured to promote more active leisure time among the students in the school.<br><br>Components: lunch + water + classroom food rules + PE + recess + PA breaks + education + marketing<br><br>**Comparison**: received usual care<br><br>**Study Period:** 2003-04 school year to 2005-06 school year (24 months) | **BMIz**<br>Intervention baseline: 0.87; f/u: 0.99<br>Control baseline: 1.00; f/u: 0.97<br>**Beta: -0.02, p=0.5**<br><br>**Overweight/Obesity Prevalence**<br>Intervention baseline: 47.0%; f/u: 55.0%<br>Control baseline: 49.0%; f/u: 48.0%<br>**Summary Effect: 9.0 pct pts, NR**<br><br>**Overweight Prevalence**<br>Intervention baseline: 19.0%; f/u: 20.0%<br>Control baseline: 18.0%: 13.0%<br>**Summary Effect: 6.0 pct pts, NR**<br><br>**Obesity Prevalence**<br>Intervention baseline: 28.0%; f/u: 35.0%<br>Control baseline: 31.0%; f/u: 35.0%<br>**Summary Effect: 3.0 pct pts, NR**<br><br>**Fruit and Vegetable Intake (servings/d)**<br>Intervention baseline: 1.69; f/u: 1.84<br>Control baseline: 1.80; f/u: 2.27<br>**Beta: -0.07 p=0.5**<br><br>**Sugar Sweetened Beverage Intake (servings/d)**<br>Intervention baseline: 0.83; f/u: 0.67<br>Control baseline: 0.88; f/u: 0.39<br>**Beta: -0.13 p=0.4**<br><br>**Low Nutrient Food Intake (Snacks)**<br>Intervention baseline: 1.39; f/u: 1.02<br>Control baseline: 1.51; f/u: 1.04<br>**Beta: -0.08 p=0.7**<br><br>**Water Intake**<br>Intervention baseline: 2.51; f/u: 3.23<br>Control baseline: 2.44; f/u: 2.87<br>**Beta: 0.03 p=0.8** |

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|---|---|---|---|
| | | | **PA Scale (child PA compared to other children)**<br>Intervention baseline: 2.97; f/u: 3.06<br>Control baseline: 3.00; f/u: 3.28<br>**Beta: 0.09 p=0.2**<br><br>**Paper conclusions**: The intervention was efficacious at changing some child obesity-related health behaviors. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Grydeland, 2014<br><br>**Study Design:** group randomized trial<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** 6th grade students<br><br>**Sample size:** 1324<br><br>**Demographics:**<br>Intervention<br>Mean age: 11.2 years<br>Gender: 50% female<br>Race/ethnicity: NR but Norwegian<br>SES: parental education used as proxy (26.7% <12 years, 36.7% 13-16 years, 36.7% >16 years)<br><br>Control<br>Mean age: 11.2 years<br>Gender: 48% female<br>Race/ethnicity: NR but Norwegian<br>SES: parental education used as proxy (30.9% <12 years, 36.2% 13-16 years, 32.9% >16 years) | **Location (urbanicity):** Southeastern Norway (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: monthly nutrition education lessons, fruit and vegetable breaks (parents provided FV), posters promoting key messages, computer tailored individual advice<br><br>PA: PA education, active commuting campaigns, sports equipment for recess activities, 10-minute physical activity breaks conducted in regular classrooms, provided pedometers<br><br>Parents: sent fact sheets and brochures home to parents<br><br>Components: FV + active commuting campaign + PA equipment + PA breaks + education<br><br>**Comparison**: received usual care<br><br>**Study Period:** September 2007 – May 2009 | **BMIz**<br>Total Sample<br>Intervention: change in BMIz: -0.04<br>Control: change in BMIz: -0.01<br>**Summary Effect: -0.03, p=0.23**<br><br>Girls<br>Intervention: change in BMIz: -0.08<br>Control: change in BMIz: 0.03<br>**Summary Effect: -0.83, p=0.003**<br><br>Boys<br>Intervention: change in BMIz: -0.01<br>Control: change in BMIz: -0.05<br>**Summary Effect: 0.04, p=0.32**<br><br>**Fruit and vegetable intake (times/d)**<br>Intervention: baseline: 20.7; f/u: 21.8<br>Control: baseline: 20.9; f/u: 20.1<br>**Relative change: 9.1%**<br><br>**SSB (dL/d) (Soft drinks + Fruit drinks)**<br>Intervention: baseline: 5.4; f/u: 4.2<br>Control: baseline: 5.6; f/u: 5.1<br>**Relative change: -13.3% (soft drinks p=0.41 and fruit drinks p=0.02)**<br><br>**MVPA (min/d):**<br>Intervention: baseline 63; f/u: 67<br>Control: baseline: 68; f/u: 71<br>**Summary effect: 2.0 min/d, (p=0.45)**<br><br>**Paper conclusions**: Intervention had greater impact on physical activity and weight-related outcomes for girls compared to boys. Favorable results were seen for fruit and sugar-sweetened fruit drinks for children in intervention group. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Hoelscher, 2010 (CATCH Basic Plus)<br><br>**Study Design:** Before-after<br><br>**Suitability of Design**: Least<br><br>**Quality of Execution**: Good | **Study population:** 3rd – 5th grade students<br><br>**Sample size (analytic):** 699<br><br>**Demographics:**<br>Intervention<br>Mean age: 10.0 yrs<br>Gender: 54% female<br>Race/ethnicity: 61% Hispanic; 15% African American; 23% White/Other<br>SES: 90.0% economically disadvantaged | **Location (urbanicity):** Travis Co, TX (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: The original CATCH curriculum was updated with the 2005 US Dietary Guidelines. Increase FV intake and decrease SSB intake, increase CATCH GO foods and healthy meal patterns. Social marketing strategies were included such as morning messages, CATCH signage, messages on school menus.<br>PA: increase MVPA in school PE and activity breaks. Decrease sedentary time, specifically TV viewing<br><br>Components: school lunch + marketing and promotion+ staff involvement + PA breaks + PE policy + education<br><br>**Comparison**: NA<br><br>**Study Period:** 2007-2008 | **Overweight and Obesity Prevalence**<br>Total sample<br>baseline: 42; f/u: 40.7<br>**Summary Effect: -1.3, p=0.33**<br><br>Boys<br>baseline: 45.3; f/u: 43.4<br>**Summary Effect: -1.9, p=0.33**<br><br>Girls<br>baseline: 39.3; f/u: 38.0<br>**Summary Effect: -1.3, p=0.37**<br><br>**Obesity Prevalence**<br>Total sample<br>baseline: 23.9; f/u: 22.0<br>**Summary Effect: -1.9, p=0.21**<br><br>Boys<br>baseline: 29.0; f/u: 25.4<br>**Summary Effect: -3.6, p=0.16**<br><br>Girls<br>baseline: 19.7; f/u: 19.3<br>**Summary Effect: -0.4, p=0.44**<br><br>**Overweight Prevalence**<br>Total sample<br>baseline: 18.1; f/u: 18.7<br>**Summary Effect: -0.6, NR**<br><br>Boys<br>baseline: 16.3; f/u: 18.0<br>**Summary Effect: 1.7, NR**<br><br>Girls<br>baseline: 19.6; f/u: 18.7<br>**Summary Effect: -0.9, NR**<br><br>**FV (times/d)** |

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| | | | Baseline: 4.0; f/u: 4.1<br>**Summary effect: 0.1, p=0.38**<br><br>**SSB (times/d)**<br>Baseline: 1.3; f/u: 1.5<br>**Summary effect: 0.2, p=0.002**<br><br>**Unhealthy food index**<br>Baseline: 5.0; f/u: 5.7<br>**Summary effect: 0.7, p=0.001**<br><br>**Healthy food index**<br>Baseline: 8.2; f/u: 8.5<br>**Summary effect: 0.3, p=0.11**<br><br>**Mean Percent of Class time Spent in MVPA**<br>Baseline: 43.1; f/u: 47.2<br>**Summary effect: 4.1 pct pts, NR**<br><br>**Mean Percent of Class time Spent in VPA**<br>Baseline: 10.3; f/u: 17.0<br>**Summary effect: 6.7 pct pts, NR**<br><br>**Paper conclusions**: Results from this study indicate the need for community level emphasis and involvement in school-based interventions that target underserved populations. |

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|---|---|---|---|
| **Author, Year:** Hoelscher, 2010 (CATCH Basic Plus and Community)<br><br>**Study Design:** Before-after<br><br>**Suitability of Design**: Least<br><br>**Quality of Execution**: Good | **Study population:** 3rd-5th grade students<br><br>**Sample size (analytic):** 471<br><br>**Demographics:**<br>Mean age: 9.85 yrs<br>Gender: 51% female<br>Race/ethnicity: 69% Hispanic; 14% African American; 17% White/Other<br>SES: 88.6% economically disadvantaged | **Location (urbanicity):** Travis Co, TX (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: The CATCH curriculum was updated with the 2005 US Dietary Guidelines. Increase FV intake and decrease SSB intake, increase CATCH GO foods and healthy meal patterns. Social marketing strategies were included such as morning messages, CATCH signage, messages on school menus. Also formed a community partner to school-based CATCH. An activity from the CATCH Community Café menu was selected each semester. Activities included: taste of healthful foods, implementation of school gardening programs.<br><br>PA: increase MVPA in school PE and activity breaks. Decrease sedentary time, specifically TV viewing, PA breaks during class time, after-school PA programs.<br><br>Components: school lunch + marketing and promotion+ staff involvement + PE ed + PA breaks +PE policy + taste test + school gardens + afterschool PA + education<br><br>**Comparison**: NA<br><br>**Study Period:** 2007-2008 | **Overweight and Obesity prevalence**<br>Total sample<br>baseline: 47.4; f/u: 39.1<br>**Summary Effect: -8.3, p=0.005**<br><br>Boys<br>baseline: 51.0; f/u: 43.2<br>**Summary Effect: -7.8, p=0.047**<br><br>Girls<br>baseline: 44.0; f/u: 35.0<br>**Summary Effect: -9.0, p=0.020**<br><br>**Obesity prevalence**<br>Total sample<br>baseline: 32.7; f/u: 30.1<br>**Summary Effect: -2.6, =0.09**<br><br>Boys<br>baseline: 32.7; f/u: 30.1<br>**Summary Effect: -2.6, p=0.27**<br><br>Girls<br>baseline: 23.2; f/u: 18.4<br>**Summary Effect: -4.8, p=0.09**<br><br>**Overweight prevalence**<br>Total sample<br>baseline:; f/u:<br>**Summary Effect:**<br><br>Boys<br>baseline:; f/u:<br>**Summary Effect:**<br><br>Girls<br>baseline:; f/u:<br>**Summary Effect:**<br><br>**FV (times/d)** |

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| | | | Baseline: 3.8; f/u: 4.2<br>**Summary effect: 0.4, p=0.01**<br><br>**SSB (times/d)**<br>Baseline: 1.4; f/u: 1.5<br>**Summary effect: 0.1, p=0.17**<br><br>**Unhealthy food index**<br>Baseline: 5.3; f/u: 5.4<br>**Summary effect: 0.1, p=0.35**<br><br>**Healthy food index**<br>Baseline: 8.1; f/u: 8.5<br>**Summary effect: 0.4, p=0.09**<br><br>**Mean Percent of Class time Spent in MVPA**<br>Baseline:; f/u:<br>**Summary effect: pct pts, NR**<br><br>**Mean Percent of Class time Spent in VPA**<br>Baseline:; f/u:<br>**Summary effect: pct pts, NR**<br><br>**Paper conclusions**: Results from this study indicate the need for community level emphasis and involvement in school-based interventions that target underserved populations, |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Hollar, 2010<br><br>**Study Design:** non-randomized group trial<br><br>**Suitability of Design**: greatest<br><br>**Quality of Execution**: good | **Study population:** elementary students<br><br>**Sample size (analytic):** 2494<br><br>**Demographics:**<br>Mean age: 8yrs (range: 6-13)<br>Gender: 51% female<br>Race/ethnicity: 35.5% White, 7.8% African American, 42.8% Hispanic, 8.4% Other<br>SES: NR | **Location (urbanicity):** Osceola County, Florida (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: Provision of nutritious ingredients and whole foods (acquired via existing public school food distribution networks implementing USDA NSLP) in breakfasts, lunches, and extended day snacks, which modeled nutrition education in the classrooms; the incorporation of a holistic curricula that taught children, parents, and school staff about good nutrition, healthful lifestyle management, and school gardens<br><br>Physical Activity: Increased opportunities for physical activity during the school day in ways that were feasible. The amount and types of physical activity varied among intervention schools throughout the study schools were encouraged to implement daily physical activity in the classroom using a 10- to 15-minute desk-side physical activity program. Schools also were asked to implement structured physical activity during recess time, as much as possible. Other physical activities, such as walking clubs, encouraged children and adults to walk before the start of each school day<br><br>Components: lunch and breakfast change + PA breaks + education + parental support<br><br>**Comparison**: usual care | **BMIz**<br>Boys<br>Intervention: baseline: 0.73; f/u:0.72<br>Control: baseline: 0.77 ; f/u: 0.87<br>**Summary Effect: -0.11, NS**<br><br>Girls<br>Intervention: baseline:0.57; f/u: 0.54<br>Control: baseline: 0.78; f/u: 0.78<br>**Summary Effect: -0.03, p=0.003**<br><br>**Systolic Blood Pressure**<br>Boys<br>Intervention: baseline: 101.2; f/u: 100.3<br>Control: baseline: 101.5; f/u: 101.3<br>**Summary Effect: -0.72, p=0.3**<br><br>Girls<br>Intervention: baseline: 100.1; f/u: 98.5<br>Control: baseline: 99.8; f/u: 100.0<br>**Summary Effect: -1.8, p=0.2**<br><br>**Diastolic Blood Pressure**<br>Boys<br>Intervention: baseline: 61.0; f/u: 60.0<br>Control: baseline: 60.6; f/u: 60.3<br>**Summary Effect: -0.6, p=0.8**<br><br>Girls<br>Intervention: baseline: 61.3; f/u: 60.0<br>Control: baseline: 60.6; f/u: 60.6<br>**Summary Effect: -1.8, p<0.05**<br><br>**Paper conclusions**:<br>School-based obesity prevention interventions that include changes to school-provided meals, nutrition and healthful lifestyle education, and physical activity components show promise in improving health, particularly among elementary-school aged girls. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| | | **Study Period:** Fall 2004 to Spring 2006 | |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Hrafnkelsson 2014<br><br>**Study Design:** Group randomized trial<br><br>**Suitability of Design**: greatest<br><br>**Quality of Execution**: Fair | **Study population:** 2nd graders<br><br>**Sample size (analytic):** 268<br><br>**Demographics:**<br>Intervention<br>Mean age: 7.4 years<br>Gender: not reported<br>Race/ethnicity: not reported<br>SES: not reported<br><br>Control<br>Mean age: 7.3 years<br>Gender: not reported<br>Race/ethnicity: not reported<br>SES: not reported<br><br>Note: groups were paired in terms of social background of students | **Location (urbanicity):** Iceland (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: nutrition education using selected educational strategies and encouraging the offering of fruits and vegetables in school canteens.<br><br>Physical Activity: increased opportunities for physical activity during PE lessons, recess and also during classes where physical activity was to be integrated into various subjects within the general curriculum.<br><br>**Comparison**: usual care<br><br>**Study Period:** Fall 2006 through Fall 2008 | **% Body fat**<br>Intervention: baseline: 23.9%; f/u:NR<br>Control: baseline: 24.8% ; f/u: NR<br>**Summary Effect: 0.14, NS**<br><br>**Fruit and Vegetable Intake (g/d)**<br>Intervention: baseline: 129.8 f/u: 199.7<br>Control: baseline: 173.0 ; f/u: 139.2<br>**Summary Effect: 103.7g/d p<0.05**<br><br>**Sugar-Sweetened Beverage Intake (g/d)**<br>Intervention: baseline: 66.7 f/u: 111.7<br>Control: baseline: 70.0 ; f/u: 120.0<br>**Summary Effect: -5.0 g/d, NS**<br><br>**Low Nutrient Food Intake** (Combined Biscuits and Cakes, Chips and French fries, and Candy Results)<br><br>**Biscuits and Cakes (g/d)**<br>Intervention: baseline: 26.7; f/u: 41.0<br>Control: baseline: 47.7; f/u: 35.2<br>**Summary Effect: -26.8 g/d**<br><br>**Chips and French fries (g/d)**<br>Intervention: baseline:1.2; f/u: 3.2<br>Control: baseline: 0.0; f/u: 9.2<br>**Summary Effect: -7.2 g/d, NS**<br><br>**Candy (g/d)**<br>Intervention: baseline:6.5; f/u: 0.0<br>Control: baseline: 12.3; f/u: 11.7<br>**Summary Effect: -5.9 g/d, NS**<br>**Overall Summary Effect for Low Nutrient Food Intake: -39.9 g/d, NR**<br><br>**Cardiorespiratory Fitness (watts/kg)**<br>Intervention: baseline: NR; f/u: 2.8<br>Control: baseline: NR; f/u: 2.5<br>**Summary Effect: 0.29 watts/kg NS** |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| | | | **Systolic Blood Pressure (mmHg)**<br>Intervention: baseline: 98.1; f/u: 100.4<br>Control: baseline: 99.3; f/u: 106.0<br>**Summary Effect: -4.4**<br><br>**Diastolic Blood Pressure (mmHg)**<br>Intervention: baseline: 59.8; f/u: 62.7<br>Control: baseline: 63.3; f/u: 71.7<br>**Summary Effect: -5.5**<br><br>**Total Cholesterol (mmol/L)**<br>Intervention: baseline: 4.53; f/u: 4.59<br>Control: baseline: 4.29; f/u: 4.28<br>**Summary Effect: 0.07**<br><br>**Total Energy Intake (kcal/d)**<br>Intervention: baseline: 1652.9; f/u: 1841.6<br>Control: baseline: 1657.9; f/u 1871.3<br>**Summary Effect: -24.7**<br><br>**Paper conclusions**: We conclude that having teachers integrate PA and nutrition into the daily routine at school can have a positive effect on children's PA and possibly BP but not significant effects on BMI or other cardiovascular risk factors. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Luepker, 1996<br><br>**Study Design:** Group randomized<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** 3rd – 5th grade students<br><br>**Sample size (analytic):** 4,019<br><br>**Demographics:**<br>Mean age: 8.76 yrs<br>Gender: 48.2% female<br>Race/ethnicity: 69.1% white, 13.2% African American, 3.8% other, 13.9% Hispanic<br>SES: NR | **Location (urbanicity):** La Jolla, CA; Minneapolis, MN; Houston, TX; New Orleans, LA (NR)<br><br>**Level of Implementation:** District<br><br>**Intervention activities:** Child and Adolescent Trial for Cardiovascular Health (CATCH)<br>Diet: Eat Smart was the food service intervention which tried to provide tasty meals lower in fat, saturate fat, and sodium. Food service personnel participated in 1-day training at beginning of each school year.<br>Physical Activity: Increased amount of MVPA during PE class at school to 40% of the PE class. PE specialist and teachers had 1 to 1.5 days of training each year.<br><br>Classroom curriculum - included Adventures of Hearty Heart and Friends, Go for Health -4 and -5. They also had 4 session tobacco cessation program. They consisted of 15, 24, and 16 lessons during 5, 12, and 8 weeks in grades 3, 4, and 5. Each session was 30-40 min and focused on eating patterns and physical activity patterns. Classroom teachers attended 1 - 1.5 days of training.<br>Home - activity packets sent home and required adult participation, 19 packets over 3 years. During 3rd and 4th grade students invited family members to family fun nights (dance performance, healthy snacks, recipes, etc)<br><br>Components: Diet and PA education, PE, meals | **Triceps SF (mm)**<br>Intervention: baseline: 12.4 f/u: 15.2<br>Control: baseline: 12.5 f/u: 15.3<br>**Adjusted Summary Effect: 0.1 mm, p=0.70**<br><br>**Subscapular SF (mm)**<br>Intervention: baseline: 8.2 f/u: 11.02<br>Control: baseline: 8.4 f/u: 11.2<br>**Adjusted Summary Effect: 0.1 mm, p=0.64**<br><br>**Total energy intake (MJ/day)**<br>Intervention: baseline: 8.55 f/u: 8.68<br>Control: baseline: 8.49 f/u: 9.08<br>**Adjusted Summary Effect: -0.46MJ/d, p=0.01**<br><br>**Energy expenditure (kJg/kg)**<br>Intervention: baseline: 9.2 f/u: 10.3<br>Control: baseline: 9.1 f/u: 9.6<br>**Adjusted Summary Effect: -0.46, p=0.01**<br><br>**MVPA (% of PE class)**<br>**Effect: F=2.17, p=.02**<br><br>**MVPA (% of PE class)**<br>**Effect: F2.35, p=0.04**<br><br>**Systolic Blood Pressure**<br>Intervention: baseline:105.2; f/u: 110.0<br>Control: baseline: 104.8; f/u: 109.8<br>**Summary Effect: 0, p=0.97**<br><br>**Diastolic Blood Pressure**<br>Intervention: baseline: 53.5; f/u:56.0<br>Control: baseline: 53.5; f/u: 55.6<br>**Summary Effect: 0.3, p=0.24**<br><br>**Total Cholesterol (mg/dL)**<br>Intervention: baseline: 169.9; f/u: 168.7<br>Control: baseline: 170.7; f/u: 169.5 |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| | | **Comparison**: usual care<br><br>**Study Period:** fall 1991 to spring 1994 | **Summary Effect: -0.01, p=0.68**<br><br>**Paper conclusions**: CATCH provides an important model of a school-based health promotion program for the primary prevention of CVD that should be feasible and effective for America's schools. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Madsen, 2015<br><br>**Study Design:** group RCT<br><br>**Suitability of Design**: greatest<br><br>**Quality of Execution**: good | **Study population:** 3rd-5th graders<br><br>**Sample size:** 676<br><br>**Demographics:**<br><u>Intervention</u><br>Mean age: NR<br>Gender: 48.9% female<br>Race/ethnicity: 6.7% White, 9.0% Black, 52.9% Latino, 14.6% Multiracial, 7.4% Asian, 9.4% Other<br>SES: "low-income"<br><br><u>Control</u><br>Mean age: NR<br>Gender: 54.4% female<br>Race/ethnicity: 6.1% White, 11.7% Black, 45.7% Latino, 12.6% Multiracial, 15.7% Asian, 8.3% Other<br>SES: "low-income" | **Location (urbanicity):** California (urban)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: Each school year, the Registered Dietitian (RD) coach delivered a 12-week nutrition and energy balance education curriculum that included food tastings, PA games to reinforce nutrition messages, and strategies to help students meet their nutrition and PA goals. RD coaches also worked with a team of school staff and parents to implement classroom wellness policies and make improvements in school food, including increased offerings of fruits and vegetables. During the second year of the program, EB4K with Play funding purchased packaging equipment for the district's central kitchen that enabled larger portions of FVs to be served in schools districtwide<br><br>Physical Activity: The Playworks coach structured recess activities before and during school hours to encourage active participation from all students. The Playworks coach also led a PA session with individual classes every other week. Classroom teachers were trained to implement Playworks games and classroom management strategies in their physical education (PE) sessions with students (classroom teachers were responsible for leading PE in this district). Last, Playworks coaches led four afterschool sports leagues throughout each year. Each league lasted for 5 | **BMIz**<br>Intervention: baseline: 1.03 f/u: 0.93<br>Control: baseline: 0.87 f/u: 0.86<br>**Adjusted Summary Effect: -0.07 (-0.14, 0.00)**<br><br>**Fruit consumed at lunch (cups)**<br>Intervention: baseline: 0.4 f/u: 0.3<br>Control: baseline: 0.2 f/u: 0.2<br>**Adjusted Summary Effect: 0.0 (-0.1, 0.1)**<br><br>**Vegetables consumed at lunch (cups)**<br>Intervention: baseline: 0.2 f/u: 0.1<br>Control: baseline: 0.3 f/u: 0.2<br>**Adjusted Summary Effect: -0.0 (-0.2, 0.1)**<br><br>**Drinking SSB yesterday (# times)**<br>Intervention: baseline: 1.1 f/u: 1.0<br>Control: baseline: 1.1 f/u: 1.1<br>**Adjusted Summary Effect: -1.0 (-0.24, 0.1)**<br><br>**Eating salty or sweet snacks yesterday (# times)**<br>Intervention: baseline: 1.7 f/u: 1.6<br>Control: baseline: 1.7 f/u: 1.6<br>**Adjusted Summary Effect: -0.0 (-0.0, 0.0)**<br><br>**School-day MVPA (min)**<br>Intervention: baseline: 22.1 f/u: 21.3<br>Control: baseline: 21.8 f/u: 21.0<br>**Adjusted Summary Effect: -0.1 (-4.5,4.3)**<br><br>**Mile run time (min)**<br>Intervention: baseline: 12.9 f/u: 11.5<br>Control: baseline: 12.8 f/u: 11.6<br>**Adjusted Summary Effect: -0.2 (-0.8, 0.4)**<br><br>**Paper conclusions**: The present evaluation suggests that this intervention improves dietary |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| | | weeks and accommodated 12 different students per team.<br><br>Components: diet education + PA education + lunch + cafeteria marketing + recess + parental support + peer support<br><br>**Comparison**: wait list control<br><br>**Study Period:** Fall 2011-Spring 2013 | knowledge and may have a positive impact on PA and adiposity, particularly in younger children. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Naul, 2012 (Germany)<br><br>**Study Design:** before-after<br><br>**Suitability of Design**: least<br><br>**Quality of Execution**: fair | **Study population:** elementary students<br><br>**Sample size (analytic):** 261<br><br>**Demographics:**<br>Mean age: 7.2y<br>Gender: NR<br>Race/ethnicity: German sample<br>SES: NR | **Location (urbanicity):** Germany (urban)<br><br>**Level of Implementation:** District (municipality)<br><br>**Intervention activities:**<br>Diet: As a part of the general and social studies class, and as additional events in the afternoon and early evening, there will also be separate and joint cookery courses and 'school fruit events' for the schoolchildren and their parents. Similarly, during break periods, many schools organized and prepared a 'healthy breakfast' together with teachers.<br><br>PA: In addition to existing PE classes, at the beginning of the project, all the first-year students received individually tailored support during the third school sport period. In addition, on two afternoons a week, all pupils were offered further differentiated courses provided by local sports clubs in order to continue to encourage individuals' exercise skills and healthy behavior. Each school was cooperating with at least one sports club in the municipality. Walking school bus was also offered.<br><br>Components: Diet ed + PA ed + lunch + FV + PA breaks + PE + walk/bike to school<br><br>**Comparison**: no control group<br><br>**Study Period:** Fall 2006-Fall 2007 | **Overweight/Obesity Prevalence (BMI-for-age 80$^{th}$ percentile or above)**<br>baseline: 7.3%<br>f/u: 5.4%<br>**Summary Effect: -1.9 pct pts**<br><br>**Cardiorespiratory Fitness (6 min run (m))**<br>baseline: 876.1<br>f/u: 944.4<br>**Summary Effect: 68.3m, p=0.001**<br><br>**20-m sprint (sec)**<br>baseline: 4.6<br>f/u: 4.4<br>**Summary Effect: -0.2 s, p=0.001**<br><br>**Paper conclusions**: First results indicate the possibility to counteract obesity and to increase levels of physical fitness and motor development by a multi-component program and a multi-sector approach of intervention. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Naul, 2012 (the Netherlands)<br><br>**Study Design:** before-after<br><br>**Suitability of Design**: least<br><br>**Quality of Execution**: fair | **Study population:** elementary students<br><br>**Sample size (analytic):** 296<br><br>**Demographics:**<br>Mean age: 7.0y<br>Gender: NR<br>Race/ethnicity: Dutch sample<br>SES: NR | **Location (urbanicity):** the Netherlands (urban)<br><br>**Level of Implementation:** District (municipality)<br><br>**Intervention activities:**<br>Diet: As a part of the general and social studies class, and as additional events in the afternoon and early evening, there will also be separate and joint cookery courses and 'school fruit events' for the schoolchildren and their parents. Similarly, during break periods, many schools organized and prepared a 'healthy breakfast' together with teachers.<br><br>PA: In addition to existing PE classes, at the beginning of the project, all the first-year students received individually tailored support during the third school sport period. In addition, on two afternoons a week, all pupils were offered further differentiated courses provided by local sports clubs in order to continue to encourage individuals' exercise skills and healthy behavior. Each school was cooperating with at least one sports club in the municipality. Walking school bus was also offered.<br><br>Components: Diet ed + PA ed + lunch + FV + PA breaks + PE + walk/bike to school<br><br>**Comparison**: no control group<br><br>**Study Period:** Fall 2006-Fall 2007 | **Overweight/Obesity Prevalence (BMI-for-age 80$^{th}$ percentile or above)**<br>baseline 3.3%<br>f/u 4.2%<br>**Summary Effect: 0.90 pct pts**<br><br>**Cardiorespiratory Fitness (6 min run (m))**<br>baseline: 873.8<br>f/u: 914.4<br>**Summary Effect: 40.6 m, p=0.001**<br><br>**20-m sprint (sec)**<br>baseline: 4.8<br>f/u: 4.6<br>**Summary Effect: -0.2 s, p=0.001**<br><br>**Paper conclusions**: First results indicate the possibility to counteract obesity and to increase levels of physical fitness and motor development by a multi-component program and a multi-sector approach of intervention. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Newton, 2010<br><br>**Study Design:** Before-After<br><br>**Suitability of Design**: Least<br><br>**Quality of Execution**: Fair | **Study population:** 2nd-6th graders, private Catholic school<br><br>**Sample size (analytic):** 55<br><br>**Demographics:**<br>Mean age: 9.3yrs<br>Gender: NR<br>Race/ethnicity: 100% Black<br>SES: NR, but tuition required at school | **Location (urbanicity):** Louisiana (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: modified cafeteria menus to meet dietary goals that were hung in the classroom. Healthy choices were announced on the loudspeaker. Teachers were provided healthy nutrition tips.<br>PA: Classrooms provided PA equipment to be used indoors or outdoors. Teachers were encouraged to provide 5 min of PA after every 30 min of instruction and to model daily PA tips that engage students in short bouts of PA and discuss was to promote PA outside of school<br>Parent: encourage families to make changes at home to increase PA and healthy food options. Program had website and bimonthly newsletters sent home.<br><br>Components: Diet ed + PA ed + School lunch change + PA equipment + PA breaks + parental support<br><br>**Comparison**: NA<br><br>**Study Period:** NR (18 month intervention) | Note: have boy girl results for %BF<br><br>**BMI z-score**<br>baseline: 0.8<br>f/u (18 mo): 0.8<br>**Summary Effect: 0.0, NS**<br><br>**%BF**<br>baseline: 25.0<br>f/u (18 mo): 25.3<br>**Summary Effect: 0.3, NS**<br><br>**SAPAC minutes/day**<br>baseline: 54.9<br>f/u (18 mo): 86.5<br>**Summary Effect: 31.6 minutes/day, NS**<br><br>**Paper conclusions**: The program may have resulted in maintenance of percent body fat in boys. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Paradis, 2005<br><br>**Study Design:** Other design with concurrent comparison<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** 1st – 6th grade students<br><br>**Sample size (analytic):** 449<br><br>**Demographics:**<br><br>Mean age: not reported<br>Gender: not reported<br>Race/ethnicity: 100% Mohawk<br>SES: not reported | **Location (urbanicity):** Mohawk community, Quebec, CA<br><br>**Level of Implementation:** District level<br><br>**Intervention activities:**<br>Dietary: Environmental and policy changes include the school nutrition policy that school canteens offer only healthy foods (e.g. low-fat, high fiber) and students are required to bring healthy lunches and snacks.<br><br>Physical activity: Opportunities for regular PA for all schools; one school added extra physical education class per week.<br><br>Health education curriculum delivered in grades 1 through 6 in the community's 2 elementary schools (ten 45-minute lessons per year for each grade). The curriculum includes topics on type 2 diabetes, healthy nutrition (including traditional foods), physical activity and fitness, and other healthy lifestyles. Community activities include regular use of the local newspaper and radio for advertisement, press coverage of events and reporting of results back to the community, promotional events such as contests and family activities, and collaborations with other community organizations.<br><br>Components: Diet ed + meals + PE classes + PA policy<br><br>**Comparison**: usual care | **Sum of Tricep Skinfold and Subscapular Skinfold**<br>Intervention baseline: 18.9<br>Control baseline: 19.9<br>**Summary Effect: -5.7 (subscapular findings significant)**<br><br>**Fruit and Vegetable Intake (frequency scale)**<br>Intervention baseline: 3.05<br>Control baseline: 3.28<br>**Summary Effect: -0.43 (NS)**<br><br>**Sugar Consumption Index (Low Nutrient Food Intake)**<br>Intervention baseline: 2.34<br>Control baseline: 2.18<br>**Summary Effect: +0.11 (NS)**<br><br>**1 mile run/walk time (min) (Cardiorespiratory Fitness)**<br>Intervention baseline: 7.53<br>Control baseline: 8.61<br>**Summary Effect: 2.12 (p<0.01)**<br><br>**Paper conclusions**: The primary study objective to reduce the prevalence of obesity was not achieved (CG staff comment: data not reported). Results from the longitudinal 2-year contrasts suggested that, although BMI was unaffected, both skinfold measures increased less rapidly in the intervention compared with the comparison community. |

| Study | Population Characteristics | Intervention Characteristics | Results |
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| | | **Study Period:** 1994-1996 | |

| Study | Population Characteristics | Intervention Characteristics | Results |
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| **Author, Year:** Resnicow, 1992<br><br>**Study Design:** prospective cohort study<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** elementary school students in grades 1 through 6<br><br>**Sample size:** 1209<br><br>**Demographics:**<br>Mean age: 10.0 years (at posttest)<br>Gender: 57% female<br>Race/ethnicity: 11% white (including Asian), 23% black, 60% Hispanic, 5% other<br>SES: low SES, inner-city population | **Location (urbanicity):** New York City, NY & Houston, TX (urban)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: nutrition education led by teachers, increasing the visibility of low-fat milk, offering "heart healthy" options, modifications to cafeteria facilities including the addition of salad bars, food tasting parties<br><br>PA: student aerobics offered but frequency not reported<br><br>Components: nutrition ed + school lunch + marketing + cafeteria facilities + taste tests + PA breaks<br><br>**Comparison**: received existing health and science curricula<br><br>**Study Period:** February 1988 – June 1990 | **Fruit and vegetable index (higher value indicates greater consumption):**<br>Low exposure: baseline: 6.24; f/u: 5.81<br>Control: baseline: 6.51; f/u: 5.83<br>**Relative change: 3.6%**<br>Moderate exposure: baseline:6.21; f/u: 5.68<br>Control: baseline: 6.51; f/u: 5.83<br>**Relative change: 1.9%**<br>High exposure: baseline: 6.05; f/u: 5.87<br>Control: baseline: 6.51; f/u: 5.83<br>**Relative change: 7.4%**<br><br>**Total cholesterol (mg/dl):**<br>Low exposure: baseline: 171.6; f/u: 165.0<br>Control: baseline: 165.9; f/u: 168.5<br>**Summary effect: -9.2 mg/dl**<br>Moderate exposure: baseline: 168.6; f/u: 165.0<br>Control: baseline: 165.9; f/u: 168.5<br>**Summary effect: -2.6 mg/dl**<br>High exposure: baseline: 165.3; f/u: 157.4<br>Control: baseline: 165.9; f/u: 168.5<br>**Summary effect: -10.5 mg/dl**<br><br>**Systolic blood pressure (mm Hg):**<br>Low exposure: baseline: 99.9; f/u: 103.8<br>Control: baseline: 101.3; f/u: 106.5<br>**Summary effect: -1.3 mm Hg**<br>Moderate exposure: baseline: 101.6; f/u: 103.1<br>Control: baseline: 101.3; f/u: 106.5<br>**Summary effect: -3.7 mm Hg**<br>High exposure: baseline: 102.3; f/u: 102.5<br>Control: baseline: 101.3; f/u: 106.5<br>**Summary effect: -5.0 mm Hg**<br><br>**Paper conclusions**: There were significant program effects in the favorable direction for total cholesterol and systolic blood pressure, but no program effects for dietary outcomes. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Simons-Morton, 1991<br><br>**Study Design:** Other design with concurrent comparison<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:** elementary school<br><br>**Sample size:** unknown<br><br>**Demographics:**<br>Mean age: 3rd – 4th graders<br>Gender: NR<br>Race/ethnicity: 62.3% Anglo-American, 20.9% Mexican-American, and 14.8% Afro-American<br>SES: NR | **Location (urbanicity):** Texas (NR)<br><br>**Level of Implementation**: District<br><br>**Intervention activities:**<br>Diet: Health education plus the school lunch was designed to provide lower-fat, lower-sodium lunches within the context of the existing school lunch program. Food purchasing, menus, recipes, and food preparation practices were modified.<br><br>Physical Activity: Five, 6- to 8-week units, designed to encourage enjoyable MVPA among children during PE classes. Each unit included two or three main cardiovascular fitness activities, such as dancing, running, aerobic games, jump rope, and obstacle courses. Each class session consisted of warmup, fitness development, cool down, and skill development or game activities.<br><br>Components: diet ed + PA ed + school meals + PE classes<br><br>**Comparison**: usual care<br><br>**Study Period:** 3 yrs (dates NR) | **Total energy intake (kcal/d) (Note: this is posttest data only, no pre-test)**<br>Intervention: 2094.5 kcal/d<br>Control: 2135.3 kcal/day<br>**Difference: -40.8 kcal/day, NR**<br><br>**MVPA (min in PE class):**<br>Intervention: baseline:2.88; f/u: 14.99<br>Control: baseline: 0.39; f/u: 3.24<br>**Adjusted Summary Effect: 9.86 min in PE class), NR**<br><br>**Paper conclusions**: This efficacy study demonstrates the feasibility of substantially modifying school lunches and school physical education to improve children's diet and physical activity behavior at school. |

| Study | Population Characteristics | Intervention Characteristics | Results |
|---|---|---|---|
| **Author, Year:** Taylor 2008<br><br>**Study Design:** group RCT<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Good | **Study population:** elementary school<br><br>**Sample size:** 469<br><br>**Demographics:**<br><br>Intervention<br>Age: 7.7 yrs<br>Gender: 44.8% female<br>Race/ethnicity: 82.6% white, 16.5% Maori, <1% Pacific Islander<br>SES: NR<br>Overweight: 32.4%<br><br>Comparison<br>Age: 7.7 yrs<br>Gender: 50.7% female<br>Race/ethnicity: 82.6% white, 16.5% Maori, <1% Pacific Islander<br>SES: NR<br>Overweight: C: 42.5% | **Location (urbanicity):** Otago, New Zealand (suburban, rural)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Diet: free fruit provided for 6 months of the intervention<br><br>Physical activity: Regular breaks and encouragement of PA<br><br>Components: Diet ed + PA ed + water + FV + PA breaks + PA equipment<br><br>**Comparison**: Control schools received payment of 500-1000 for purchase of school equipment<br><br>**Study Period:** 2 years: 8/2003 to 9/2005 | **BMIz**<br>Intervention: baseline: 0.62 FU:<br>Control: baseline: 0.79 FU: 0.47; FU: 0.90<br>**Absolute difference (95% CI): -0.30 (0.36, -0.25)**<br><br>**Prevalence of overweight/obesity combined**<br>Intervention: baseline: 31% FU: 28%<br>Control: baseline: 30% FU: 50%<br>**Absolute difference: -5.0%**<br><br>**Fruit and vegetable servings/d**<br>Intervention: baseline: 7.3; f/u:<br>Control: baseline: 7.2; f/u:<br>**Absolute difference: 1.1 servings/d**<br><br>**Sugar-sweetened Beverage servings/d**<br>Intervention: baseline:4.8; f/u:4.6<br>Control: baseline: 4.8; f/u: 6.0<br>**Absolute difference: -1.2 (-2.3, -0.2) p=0.02**<br><br>**Water servings/d**<br>Intervention: baseline: 5.7; f/u: 7.8<br>Control: baseline: 5.1; f/u: 6.9<br>**Absolute difference: 0.7 (-0.1, 1.3), p=0.07**<br><br>**MVPA (min/d)**<br>Intervention: baseline: nr<br>Control: baseline: nr<br>**Absolute difference: 26 min/d, p<0.05**<br><br>**Papers conclusions:** Continued benefits to weight-related outcomes remained 2 years after intervention |

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| **Author, Year:** Utter, 2011<br><br>**Study Design:** repeat cross sectional with comparison<br><br>**Suitability of Design**: moderate<br><br>**Quality of Execution**: fair | **Study population:** Middle-high school studens<br><br>**Sample size (analytic):** 1612<br><br>**Demographics:**<br><u>Intervention</u><br>Mean age: nr<br>Gender: 49.6% female<br>Race/ethnicity: 70% Pacific, 23.3% Maori, 14.6% Asian/other, 4.4% European<br>SES: nr<br><br><u>Control</u><br>Mean age: nr<br>Gender: 54.3% female<br>Race/ethnicity: 55.4% Pacific, 23.3% Maori, 9.7% Asian/other, 11.6% European<br>SES: socially deprived area | **Location (urbanicity):** New Zealand (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Dietary: There were plans to redesign and rebrand the school canteen but this was only successful in one of four intervention schools due to a school-food service contract with an external provider (and there was no mandate to foster these improvements); schools installed new water fountains and distribution of drink bottles. Breakfast clubs offered 1-2/week that included 30-60min PA session followed by healthy breakfast school gardening program; covered area to sit and eat; schoolwide food and nutrition policy (policy was not further described)<br><br>Physical Activity: The breakfast clubs offered 1-2/week included 30-60 min physical activity sessions, lunch-time activities offered 2-3 times/wk, after-school dance activities organized and offered in response to student interest, health weeks; provision of sporting equipment; resources for external providers/instructors (e.g. dance instructors).<br><br>school gardens + school lunch + school breakfast + built outdoor area for eating + PA breaks + PA equipment (student support)<br><br>**Comparison**: usual care | **BMIz**<br>Intervention: baseline: 1.02; f/u: 1.11<br>Control: baseline: 1.00; f/u: 0.95<br>**Summary Effect: 0.14 , p=0.18**<br><br>**Body Fat (%)**<br>Intervention: baseline:31.30; f/u: 31.82<br>Control: baseline: 30.73; f/u: 30.18<br>**Summary Effect: 1.07, p=0.16**<br><br>**Prevalence of Obesity**<br>Intervention: baseline: 31.9; f/u:34.7<br>Control: baseline: 28.5; f/u: 30.2<br>**Summary Effect: 1.1, p=0.46**<br><br>**Soft Drink Consumption (% consuming on all of past 5 d)**<br>Intervention: baseline: 20.4; f/u: 14.2<br>Control: baseline: 16.6; f/u: 17.5<br>**Summary Effect: -7.1, p=0.42**<br><br>**Lunch-time activity (% yes)**<br>Intervention: baseline: 29.8; f/u: 31.7<br>Control: baseline: 34.2; f/u: 31.2<br>**Summary Effect: 4.9, p=0.57**<br><br>**Assessment of Quality of Life**<br>Intervention: baseline: 0.73; f/u: 0.76<br>Control: baseline: 0.75; f/u: 0.76<br>**Summary Effect: 0.02 p=0.09**<br><br>**Pediatric Quality of Life Inventory**<br>Intervention: baseline: 79.4; f/u: 80.3<br>Control: baseline: 80.4; f/u: 81.1<br>**Summary Effect: 0.23 p=0.81**<br><br>**Paper conclusions**: In conclusion, there were no significant improvements to anthropometry; this may reflect the intervention's lack of intensity, insufficient duration, or that by |

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| | | **Study Period:** Baseline 2005/2006, posttest end of 2008 | adolescence changes in anthropometry and related behaviors are difficult to achieve. |

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| **Author, Year:**<br>Williamson, 2013<br>Williamson, 2007<br><br>**Study Design:** group RCT<br><br>**Suitability of Design**: Greatest<br><br>**Quality of Execution**: Fair | **Study population:**<br>2nd to 6th graders, private Catholic schools<br><br>**Sample size (analytic):** 586<br><br>**Demographics:**<br>Mean age: 9.2yrs<br>Gender: NR<br>Race/ethnicity: 94.9% White, 2.4% Black, 2.7% Other<br>SES: NR | **Location (urbanicity):** Louisiana (NR)<br><br>**Level of Implementation:** School<br><br>**Intervention activities:**<br>Dietary: The goals of the nutrition components of the program were compatible with conventional nutrition recommendations, e.g., five fruits and vegetables per day, 30% of dietary energy from total fat, 10% of dietary energy from saturated fat, and 20 to 30 g fiber/d (24). The Wise Mind staff worked closely with the principal, teachers, and cafeteria personnel to encourage appropriate portion sizes, calories, and nutrient content of school lunches. Posters, handouts, and display items in the classroom and cafeteria promoted the nutrition goals.<br><br>Physical Activity: Teachers were provided with containers filled with indoor play supplies (e.g., balloons, bean bags) and outdoor play supplies (e.g., balls, jump ropes) to promote active play during class time and recess. Posters encouraged the use of these physical activity centers (PACs), and brief lesson plans provided academic games that used the supplies contained in the PACs.<br><br>**Components:** diet ed + PA ed + lunch + PA access + parental support<br>School level intervention<br><br>**Comparison**: Active control schools received an intervention to modify children's beliefs and attitudes | **BMI z-score**<br>Intervention: baseline & f/u: NR<br>Control: baseline & f/u: NR<br>**Summary Effect: "no significant effects related to treatment arm" (p=0.43)**<br><br>**Healthy Eating Index**<br>Intervention: baseline: NR; f/u: 3.3<br>Control baseline: NR; f/u: 0.7<br>**Summary Effect: 2.60 (NS)**<br><br>**Time spent in (all) physical activity:**<br>Intervention: baseline: NR ; f/u: 22 min/d<br>Control: baseline: NR ; f/u: -3 min/d<br>**Summary Effect: 25 min/d (p=0.06)**<br><br>**Paper conclusions:**<br>The finding indicate that this program for children in Grades 2 to 6 was effective for producing behavioral changes, i.e., improved nutrition and increased physical activity. However, in comparison with an active control group, this environmental obesity prevention program did not yield more effective weight gain prevention. |

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| | | regarding the use and abuse of tobacco, alcohol, and illicit drugs so that they reflected "healthier" values.<br><br>**Study Period:**<br>18 month intervention duration | |