Which Environmental and Policy Interventions Prevent Childhood Obesity?

Collecting and synthesizing information about strategies and rating the strength of the evidence for their effectiveness

SUMMARY

Despite the importance of preventing childhood obesity, too little is known about which policy and environmental intervention strategies work and which do not. From 2008 to 2011, researchers at Transtria—a public health research and consulting firm in St. Louis—developed and used a review system to collect and synthesize information about intervention strategies that affect diet and activity levels, and to rate the strength of the evidence that supports their effectiveness.

The overall goal was to identify tools to increase healthy eating and active living among children ages 3–18—especially disadvantaged populations where obesity levels are highest and rising fastest. The review also highlighted gaps in the evidence and strategies to address those gaps.

Key Results and Findings

As reported in the Annual Review of Public Health, a forthcoming article in the American Journal of Preventive Medicine, and in reports to RWJF, the research team:

- Identified more than 2,000 resources published between January 2000 and May 2009 in the English language, primarily from peer-reviewed literature, and abstracted 588 of them that met specific inclusion criteria. Resources were identified through searches of Cochrane Collaboration, PubMed and Ovid databases, THOMAS, LexisNexis, and state legislative websites, among other sources.


• Identified four levels of evidence for environmental and policy intervention strategies that have a potential impact on childhood obesity
  — “First-tier effective” strategies demonstrated significant, positive health or behavioral outcomes, and intermediate policy, environmental or economic impacts, in meta-analyses, systematic reviews and other synthesis studies of all available high-quality, peer-reviewed evidence.
  — “Second-tier effective” strategies show significant positive health or behavioral outcomes, and policy, environmental or economic impacts in high-quality, peer reviewed studies and evaluation reports.
  — “Promising” strategies show meaningful, plausible positive health or behavioral outcomes, and policy, environmental or economic impacts.
  — “Emerging” strategies, including newly implemented, untested innovations that appear to be valid
• Identified and rated 12 discrete physical activity intervention strategies and 13 discrete nutrition strategies. Based on the quality and consistency of the evidence:
  — Reviewers rated five physical activity strategies as first-tier effective. These were improved community design; physical activity standards in schools; streets designed to support pedestrians, bicycles, and public transit; neighborhood availability of recreation; and point-of-decision prompts for physical activity.
  — No nutrition intervention strategies earned the designation as first-tier effective.
• Reviewers identified key gaps in research knowledge relating to the reach, effectiveness, adoption, implementation and maintenance of policy and environmental intervention strategies to increase healthy eating and active living among children—especially among children in lower-income and racial/ethnic populations and communities who are at greatest risk for childhood obesity.

Funding

The Robert Wood Johnson Foundation (RWJF) supported this project through three grants totaling $1,101,933.³

CONTEXT

The serious health and economic consequences of the childhood obesity epidemic in the United States make it urgent to implement policy and environmental interventions that have a demonstrated impact on active living and healthy eating. Despite the many interventions underway at local, state, and federal levels—supported by a mix of public

³ Grant ID#s 63675, 65518, and 67413
and private sources—decision-makers have limited access to information about what drives obesity and how it can be reversed.

Indeed, according to the 2005 Institute of Medicine report, *Preventing Childhood Obesity: Health in the Balance,* there is a growing imbalance between the small number of research-tested interventions and a much larger number of promising, but relatively untested practice-based interventions. There is also limited evidence about what works for specific populations, especially lower-income and racial and ethnic groups where obesity rates are highest and rising fastest.

**RWJF’s Interest in This Area**

The goal of RWJF’s funding in childhood obesity is to reverse the epidemic by 2015 by improving access to affordable healthy foods and increasing opportunities for physical activity in schools and communities across the nation.

RWJF’s program staff on the Childhood Obesity Team believed that this project would provide a menu of evidence-based and promising environmental and policy interventions that could help inform the team’s action and advocacy initiatives, and also help shape the team’s research agenda by identifying:

- Areas where more research is critically needed
- Gaps between research and practice
- New or emerging directions for environmental and policy approaches

**THE PROJECT**

The overall goal of the project was to identify replicable, evidence-based policy and environmental strategies to help prevent or reduce childhood obesity, especially in disadvantaged populations, and to accelerate their use.

Assisted by a nine-member working group (see Appendix 1 for members), researchers at Transtria developed a review process to assess the evidence for intervention strategies, identify gaps, and stimulate new thinking about what works. Existing review models,

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such as the RE-AIM framework\(^5\) and National Institutes of Health’s Research-Tested Intervention Programs,\(^6\) informed the process, but could not be adopted wholesale.

Key features of the review system developed by the research team include:

- A **conceptual framework**, which outlines how policies and environments, alone and in combination, can influence social norms, attitudes, behavior, and health in ways that affect physical activity and diet

- An **evidence typology**, which identifies four levels of evidence to rate the design, implementation and applicability of an intervention and its evaluation. The four levels are:

  - *First-tier effective* strategies produce significant, positive health or behavioral outcomes, and intermediate policy, environmental, or economic impacts; they have been identified through structured, systematic reviews, meta-analyses and syntheses of published, high-quality, peer-reviewed studies and evaluation reports.

  - *Second-tier effective* strategies show significant positive health or behavioral outcomes, and policy, environmental or economic impacts, as reported in published high-quality, peer-reviewed studies and evaluation reports.

  - *Promising* strategies show meaningful, plausible positive health or behavioral outcomes, and policy, environmental or economic impacts, based on evidence from published or unpublished evaluation studies or exploratory evaluations.

  - *Emerging* strategies include newly implemented, untested innovations that appear to be valid and may be strong candidates for exploratory evaluation.

- An ongoing **literature search** for evidence resources. Optimally, these capture systematic reviews that aggregate primary research, peer-reviewed research, and grey literature—such as unpublished dissertations, policy briefs, papers and posters from professional meetings, Web-based material, and program summaries of community demonstration projects.

- An **abstraction** process, in which trained research assistants summarize and classify the interventions within one of the four evidence levels. Two research assistants abstract each intervention to ensure high reliability, with discrepancies addressed by the entire review team.

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\(^6\) Research-Tested Intervention Programs provide examples of evidence-based intervention programs developed and tested in the field. More information is available at [http://rtips.cancer.gov/rtips/index.do](http://rtips.cancer.gov/rtips/index.do).
• **Expert review** in which advisory group members review tables, evidence ratings and other summary information for each intervention strategy. In addition to the working group, expert input is provided through two 16-member advisory groups:

  — The research advisory group, made up of research experts from academic and research institutions, professional societies, and government health agencies, is charged with assuring the scientific integrity of the review process. (See Appendix 2 for membership list.)

  The policy and practice advisory group, made up of experts working in the field, is charged with assuring that the review process and findings are relevant to policy and practice. (See Appendix 3 for membership list.)

• A **dissemination** effort to inform the field of review findings. As of May 2012, the research team had shared findings from its work with scientific bodies that included the Centers for Disease Control and Prevention Community Preventive Services Task Force, the Institute of Medicine, and the National Collaborative on Childhood Obesity Research.

**RESULTS AND FINDINGS**

As reported in the *Annual Review of Public Health*, a forthcoming article in the *American Journal of Preventive Medicine*, and in reports to RWJF, the research team:

• **Collected 2,000 evidence resources and abstracted 588 of them.** The plan to conduct searches for grey literature proved impractical, given the time and budgetary constraints, so the project team focused on peer-reviewed literature.

  Resources selected for abstraction met inclusion criteria as environmental or policy intervention strategies that may have an impact on children from disadvantaged populations. They were published in English (or translated to English) between January 2000 and May 2009.

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7 The Community Preventive Services Task Force is an independent, nonfederal, uncompensated body of public health and prevention experts, whose members are appointed by the director of the Centers for Disease Control and Prevention. It produces *The Community Guide*. See [www.thecommunityguide.org/about/task-force-members.html](http://www.thecommunityguide.org/about/task-force-members.html).


9 Brennan LK, Brownson RC and Orleans CT. “Evidence for policy and environmental strategies…” see page 1, footnote 2.

10 They included journals such as *American Journal of Public Health, Science of Health Promotion, Preventive Medicine, Journal of Physical Activity and Health, Pediatrics,* and *Medicine and Science in Sports and Exercise.*
Identified and rated 12 discrete physical activity strategies and 13 discrete nutrition intervention strategies.\(^{11}\) The strategies were based on RWJF’s five key areas of focus for preventing childhood obesity—physical activity and nutrition, school physical activity and nutrition, and reducing screen time. Subintervention strategies were also identified (e.g., point-of-decision prompts to increase use of stairs, access to healthy food options in the community).

Based on the quality and consistency of the evidence, reviewers rated five physical activity strategies as first-tier effective:

- **Community design**: Improved community design (e.g., land use, proximity between commercial and residential destinations) to support physical activity

- **School physical activity & environment**: Physical activity standards to increase time spent in structured or unstructured play, sports or recreation (e.g., physical education, recess, breaks, class) and increased access to facilities and equipment (e.g., playgrounds, fields, courts) to support those activities

- **Street design**: Improved pedestrian-, bicycle-, or transit-oriented design (e.g., reduced building setbacks, increased transit shelters, increased street furniture, such as benches and traffic barriers) to support active choices

- **Neighborhood availability of parks, playgrounds, trails, and recreation centers**: Increased access to facilities that support play, sports, or recreation

- **Point-of-decision prompts for physical activity**: Increased signage for information/navigation/motivation in schools or communities to encourage active choices

No nutrition intervention strategies earned the designation as first-tier effective.

The evidence ratings for other strategies were as follows:

- Six strategies (two in physical activity, four in nutrition) were second-tier effective.

- Five strategies (three in physical activity, two in nutrition) were promising.

- Nine strategies (two in physical activity, seven in nutrition) were emerging.

(See Appendix 4 for a complete list of strategies.)

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\(^{11}\) School wellness policies are included as both a nutrition and physical activity, so the total number of intervention strategies is 24 not 25.
• Reviewers identified gaps in research knowledge about the reach, effectiveness, adoption, implementation and maintenance of policy and environmental intervention strategies to increase healthy eating and active living among children. They also offered recommendations to remedy the gaps:

— *Reach*: Insufficient information is available to determine the social and cultural relevance of policies, the extent to which populations are exposed to policy and environmental changes, and whether study and evaluation samples are representative. New or standardized measures are needed.

— *Effectiveness*: Inconsistent reporting of outcomes limits the ability to compare the effectiveness of interventions. Researchers should be encouraged to use standard measures, such as calories in and calories out.

— *Adoption*: Insufficient information is available about the factors that influence policy decision-making and related appropriation of funds. The factors in the policy-making process that predict the adoption of intervention strategies should be assessed.

— *Implementation*: Measures pertaining to implementation fidelity and contextual conditions are not adequately reported, and the behavioral and health effects of complex interventions are often unclear. Standards measures are needed to assess implementation fidelity. Systems science approaches can provide insight about pathways from policy and environmental changes to outcomes.

— *Maintenance*: Not enough is known about the duration of the behavioral and health effects of intervention strategies or whether changes in policies and environments are maintained. Long-term studies of policy and environmental changes and related outcomes are needed, as are new measures to assess intervention sustainability.

**LESSONS LEARNED**

**Challenges**

According to Laura Brennan, PhD, MPH, the project director, the project faced the following challenges:

• There is wide variation in the way authors of published studies define nutrition, physical activity, and obesity outcomes (e.g., some studies measure fat intake, while others measure sugar intake).

• There is also wide variation in the way authors of published studies define environmental and policy changes (e.g., studies for street design may include facilities and amenities for pedestrians, bicyclists, public transit users, traffic calming, or some combination of these).
• Assessing the relative effectiveness of intervention strategies within multi-component interventions (e.g., school wellness policies that address both nutrition and physical activity) is difficult.

• Managing and reconciling the values and expectations of advisory group members from research, policy, and practice can be demanding (e.g., researchers review strategies with a focus on evaluation design, methods, and measures; policy and practice representatives review strategies with a focus on intervention reach, implementation, costs, innovation, and sustainability).

• There is a lack of systematic reporting of indicators to assess effective, promising or emerging interventions outside peer-reviewed studies.

• The wide range of audiences in research, evaluation, policy and practice settings creates a need to tailor evidence-based recommendations to maintain relevance and usefulness (e.g., an innovative policy may have a wide reach, low costs, and low resource utilization, yet it receives an emerging or promising evidence rating given insufficient research or evaluation data).

Lessons

1. **Adopt appropriately broad definitions of environmental and policy interventions to capture the full range of interventions in the field.** Wide variation in definitions makes comparisons difficult. Using more inclusive standards and describing the range of standards in strategy summaries allow interventions to be compared. (Project Director Brennan)

2. **Be judicious in inferring causality or attributing effects to specific policy and environmental changes when assessing multicomponent interventions.** The nature of policy and environmental strategies requires the capacity to delineate the many moving parts, extract their underlying relationships, and determine the minimum intervention components required to be effective. (Project Director Brennan)

3. **Solicit input from experts in various related fields throughout a project like this one.** The three advisory groups for this project brought expertise from different fields (e.g., nutrition, physical activity) and different disciplines (e.g., research, policy, city planning, urban design, education). The advisors assisted by:
   — Sharing a range of ideas to help develop a more comprehensive framework to guide the review process
   — Identifying audiences, venues and methods for sharing findings at local, state and national levels
   — Identifying peer-reviewed studies and other evidence resources within their own areas of expertise to include in the review process (Project Director Brennan)
4. **Develop guidelines and parameters to help advisors more easily and rapidly assess the evidence through standardized measures.** Differing viewpoints among the advisors, while largely beneficial, made it difficult to gain consensus in a timely manner. Guidelines and parameters made the process more efficient. (Project Director Brennan)

5. **Connect with related initiatives to enhance the efficiency of the research effort.** Organizations such as the CDC’s Community Preventive Services Task Force, the nonprofit Center of Excellence for Training and Research Translation (based at the University of North Carolina) and the Harvard University School of Public Health CHOICES initiative, which is rating varied policy and environmental interventions for their relative efficacy and cost effectiveness, are pursuing research along similar lines. Brennan notes that developing connections to these initiatives helped avoid duplication of efforts and identify areas for collaboration.

6. **Recommendations that grow out of a review must be contextualized to be meaningful to many different audiences in research, evaluation, policy and practice settings.** Although the research team has not yet begun the formal process of disseminating recommendations, Brennan notes that they are weighing the need to tailor dissemination products for each audience.

**AFTERWARD**

The research team will continue to disseminate information about the review system and its findings. Project Director Brennan believes that a review to update ratings and recommendations should ideally be coordinated at least annually, and project staff is seeking funding to support ongoing updates.

**Prepared by:** Robert Crum  
**Reviewed by:** Karyn Feiden and Molly McKaughan  
**Program Officer:** C. Tracy Orleans  
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**Program area:** Childhood Obesity
APPENDIX 1

Working Group

(Current as of the end date of the program; provided by the program’s management; not verified by RWJF.)

Karen Glanz, PhD, MPH
Professor
Department of Biostatistics and Epidemiology
University of Pennsylvania School of Medicine

Debra Haire-Joshu, PhD, MSED
Director
Center for Obesity Prevention and Policy Research
Professor/Associate Dean for Research
Washington University
St. Louis, Mo.

Laura Kettel-Kahn, PhD
Epidemiologist
Division of Nutrition, Physical Activity, and Obesity
Centers for Disease Control and Prevention
Atlanta, Ga.

Maya Rockeymoore, PhD
President & CEO
Leadership for Healthy Communities
Global Policy Solutions
Washington, D.C.

James Sallis, PhD
Director
RWJF’s Active Living Research Program
Professor & Director
Family and Preventive Medicine & Active Living Research
University of California, San Diego
San Diego, Calif.

Janice Sommers, MPH
Project Director
Center for Health Promotion and Disease Prevention
Nutrition Department
Assistant Professor
University of North Carolina, School of Public Health
Chapel Hill, N.C.

Mary Story, PhD, RD
Director
RWJF’s Healthy Eating Research Program
Professor
Division of Epidemiology and Community Health
University of Minnesota School of Public Health
Minneapolis, Minn.

Sarah Strunk, MHA
Director
RWJF’s Active Living by Design Program
Director
RWJF’s Healthy Kids, Healthy Communities Program
University of North Carolina, School of Public Health
Chapel Hill, N.C.

Toni Yancey, MD, MPH
Co-Director
Center to Eliminate Health Disparities
Professor
Department of Health Services
School of Public Health
University of California, Los Angeles
Los Angeles, Calif.
APPENDIX 2

Research Advisory Group

(Current as of the end date of the program; provided by the program’s management; not verified by RWJF.)

**Elizabeth Baker, PhD, MPH**
Co-Director
Prevention Research Center
Professor
Saint Louis University School of Public Health
St. Louis, Mo.

**Debra Haire-Joshu, PhD, MSED**
Director
Center for Obesity Prevention and Policy Research
Professor/Associate Dean for Research
Washington University
St. Louis, Mo.

**Rachel Ballard-Barbash, MD, MPH**
Associate Director
Applied Research Program
Department of Cancer Control and Population Sciences
National Cancer Institute
Bethesda, Md.

**Terry Huang, PhD, MPH**
Professor and Chair
Department of Health Promotion, Social, and Behavioral Health
University of Nebraska Medical Center
College of Public Health
Omaha, Neb.

**Frank Chaloupka, PhD**
Director
IHRP’s Healthy Policy Center
Co-Director
RWJF’s Bridging the Gap Program
Professor
University of Illinois-Chicago
Chicago, Ill.

**Shiriki Kumanyika, PhD, MPH**
Director
African-American Collaborative Obesity Research Network
Senior Advisor & Professor
Center for Public Health Initiatives
University of Pennsylvania School of Medicine

**William Dietz, MD, PhD**
Director
Division of Nutrition, Physical Activity, and Obesity
Centers for Disease Control and Prevention
Atlanta, Ga.

**Marc Manley, MD, MPH**
Vice President & Chief Prevention Officer
Population Health (Center for Prevention)
Blue Cross Blue Shield of Minnesota
Eagan, Minn.

**Eric Finkelstein, PhD, MHA**
Associate Research Professor
Duke Global Health Institute
Duke University
Research Triangle, N.C.

**Robin McKinnon, PhD, MPH**
Health Policy Expert
Risk Factor Monitoring and Methods Branch
Applied Research Program
National Cancer Institute
National Institutes of Health
Bethesda, Md.

**Lawrence W. Green, DrPH**
Professor
School of Medicine
Professor
Helen Diller Family Comprehensive Cancer Center
University of California at San Francisco
San Francisco, Calif.

**Shawna Mercer, PhD**
Director
Guide to Community Preventive Services
Centers for Disease Control and Prevention
Atlanta, Ga.
Meredith Reynolds, PhD
Division of Reproductive Health
Centers for Disease Control and Prevention
Atlanta, Ga.

Barbara Riley, PhD
Executive Director & Associate Professor
Propel Centre for Population Health Impact
University of Waterloo
Waterloo, Ontario
Canada

Eduardo Sanchez, MD, MPH
Director
Institute for Health Policy
University of Texas School of Public Health
Chief Medical Officer & Vice President
Blue Cross Blue Shield of Texas
Austin, Texas

Loel Solomon, PhD, MPP
Vice President
Community Health Initiatives
Kaiser Permanente
Oakland, Calif.

APPENDIX 3

Policy and Practice Advisory Group

(Current as of the end date of the program; provided by the program's management; not verified by RWJF.)

Don Bishop, PhD
Section Manager
Center for Health Promotion
Minnesota Department of Health
St. Paul, Minn.

Elaine Borton, MPH
Owner/Founder
Sage Health Consulting
Denver, Colo.

Leah Ersoylu, PhD
Founder
Ersoylu Consulting
Costa Mesa, Calif.

Harold Goldstein, DrPH
Executive Director
California Center for Public Health Advocacy
Davis, Calif.

Dean Grandin, AICP
Division Manager
City of Orlando Planning Department
City of Orlando
Orlando, Fla.

James Krieger, MD, MPH
Disease Control Officer
Prevention Division
King County Department of Public Health
Seattle, Wash.

Elizabeth Majestic, MS, MPH
Associate Director
Program Development
National Center for Chronic Disease Prevention and Health Promotion
Centers for Disease Control and Prevention
Atlanta, Ga.

Jacqueline Martinez, MPH
Senior Program Director
New York State Health Foundation
New York, N.Y.

Malisa McCreedy, AICP
Pedestrian Program Manager
Charlotte Department of Transportation
Charlotte, N.C.

Leslie Mikkelsen, MPH, RD
Managing Director
Prevention Institute
Oakland, Calif.
APPENDIX 4

Evidence Ratings of Intervention Strategies

The physical-activity and nutritional strategies, and their ratings were published in the Annual Review of Public Health.

Physical Activity Policy and Environment Intervention Strategies

First-Tier Effective Strategies

- **Community Design**: Improved community design (e.g., land use, proximity between commercial and residential destinations) to support physical activity

- **School Physical Activity Policies and Environments**: Physical activity standards to increase time spent in structured or unstructured play, sports or recreation (e.g., physical education, recess, breaks, class) and increased access to facilities and equipment (e.g., playgrounds, fields, courts) to support structured or unstructured play, sports or recreation

- **Street Design**: Improved pedestrian-, bicycle- or transit-oriented design (e.g., reduced building setbacks, increased transit shelters, increased street furniture) to support active choices

- **Neighborhood Availability of Parks, Playgrounds, Trails, and Recreation Centers**: Increased access to facilities that support play, sports, or recreation
Point-of-Decision Prompts for Physical Activity: Increased signage for information/navigation/motivation in schools or communities to encourage active choices

Second-Tier Effective Strategies

Transportation Policies: Improved transportation design standards (e.g., complete streets) and incorporation of multimodal choices into planning products (e.g., transit master plan)

Child Care Physical Activity Policies: Physical activity standards to increase time spent in structured or unstructured play, sports or recreation in preschool, day care, and after-school care

Promising Strategies

Safe Routes to School: Increased access to safe, convenient and fun opportunities to bicycle or walk to and from school (e.g., traffic safety, sidewalks or bike lanes, walking school bus)

Neighborhood Safety (traffic): Increased traffic safety (e.g., increased traffic calming, reduced speed limits, increased street crossing aids, increased street buffers for sidewalks)

Neighborhood Safety (interpersonal): Increased neighborhood safety (e.g., reduced crime rates, reduced physical/social disorder, increased perceptions of safety)

Emerging Strategies

Screen Time: Decreased access to sedentary activities (e.g., reduced television/computer/video game time, television turn-off devices, increased active video games) in schools or child care settings

School Wellness Policies: Comprehensive school policies to address healthy eating, physical activity, and/or BMI assessment to reduce childhood obesity

Nutritional Policy and Environmental Strategies

First-Tier Effective Strategies

None.

Second-Tier Effective Strategies

Childcare Food and Beverage Policies: Nutrition standards to limit access to unhealthy foods/beverages or increase access to healthier choices in preschool, day care, and after-school care
- **School Food and Beverage Policies**: Nutrition standards to limit access to unhealthy foods/beverages or increase access to healthy foods/beverages (e.g., meals, snacks, vending)

- **Food Pricing (schools and communities)**: Changing food prices to increase sale and consumption of healthy foods/beverages and to reduce sale and consumption of unhealthy choices

- **Government Nutrition Assistance Programs**: Reimbursement to food vendors to increase sale and consumption of healthy foods/beverages and to reduce sale and consumption of unhealthy choices among qualifying lower-income individuals and families (e.g., WIC, SNAP)

**Promising Strategies**

- **School Wellness Policies**: Comprehensive school policies to address healthy eating, physical activity, and/or BMI assessment to reduce childhood obesity

- **School and community gardens/greenhouses**: Increased access to gardens/greenhouses and promotion of fruit and vegetable consumption through gardening activities

**Emerging Strategies**

- **Menu Labeling**: Nutrition information provided at the point of purchase for foods/beverages obtained in food retail settings (e.g., fast food/other restaurants, school cafeterias, street kiosks)

- **Neighborhood Availability of Food Stores**: New/redeveloped food stores to increase access, sale and consumption of healthy foods/beverages and reduce unhealthy choices

- **Neighborhood Availability of Restaurants**: New/redeveloped restaurants to increase access, sale and consumption of healthy foods/beverages and reduce unhealthy choices

- **Neighborhood Availability of Food Stores and Restaurants**: New/redeveloped food stores and restaurants to increase access, sale and consumption of healthy foods/beverages and reduce unhealthy choices. (A significant number of studies examined increasing the availability of both food stores and restaurants, and project staff rated it as a separate intervention.)

- **Provision of Free or Subscription Fruits and Vegetables at School**: Distribution of fruits and vegetables to students for free or for a small paid subscription at lunch, breaks and in class.

- **Provision of Drinking Water at School**: Increased access to fresh, potable water in schools to reduce students’ sugar-sweetened beverage consumption
• **Point-of-Purchase Prompts for Healthy Eating:** Cues for healthy eating through product and shelf labeling, prompts, and/or other signage directing students to specify healthy food choices
BIBLIOGRAPHY

(Current as of date of the report; as provided by the grantee organization; not verified by RWJF; items not available from RWJF.)

Articles

Journal Articles
