

*Annual Review of Public Health*

# School Health as a Strategy to Improve Both Public Health and Education

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Annu. Rev. Public Health 2019. 40:443–63

First published as a Review in Advance on December 19, 2018

The *Annual Review of Public Health* is online at [publhealth.annualreviews.org](http://publhealth.annualreviews.org)

<https://doi.org/10.1146/annurev-publhealth-040218-043727>

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## Keywords

adolescents, children, education, school health, schools, students

## Abstract

Because schools materially influence both health and education, they substantially determine the future well-being and economic productivity of populations. Recent research suggests that healthier children learn better and that more educated adults are healthier. School health is a cross-disciplinary field of study and a fundamental strategy that can be used to improve both health and education outcomes. Modern school health programs include 10 interactive components: health education; physical education and physical activity; nutrition environment and services; health services; counseling, psychological, and social services; physical environment; social and emotional climate; family engagement; community involvement; and employee wellness. This review is written for both health and education audiences. It integrates recent research and developments in relationships among health, education, and economic outcomes; health and education systems; the school health program, its components, and their effectiveness; cross-disciplinary collaboration; local, state, national, and international infrastructures and strategies; implementation science; and relevant academic research, training, and service.

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### School health:

a cross-disciplinary field of study and a fundamental strategy that can be used to improve both health and education outcomes

### Whole school, whole community, whole child (WSCC) framework:

CDC currently uses this term for school health programs

### School health programs:

multicomponent programs implemented collaboratively by health, education, and often other organizations to improve both health and education

### School health program components:

include, for example, school health education, services, environments, nutrition, physical activity, and community involvement

### Social determinants of health:

the conditions in which people are born, grow, live, learn, work, and age

## INTRODUCTION AND OVERVIEW

Worldwide, about 1.3 billion young people are enrolled in primary and secondary schools across 241 countries (102). In the United States, about 130,000 public and private schools, in 13,000 school districts, employ 6 million teachers and staff to educate 55 million prekindergarten through grade 12 (PK–12) students every school day, usually for 13 of the most formative years of their lives (81). Among these students, 27% live in a mother-only household; 20% live in poverty; 13% receive special education services for disabilities; and 9% are non-English-speaking learners (82). In a given year, 13–20% of children experience a mental disorder, including anxiety, depression, behavioral or conduct problems, attention-deficit/hyperactivity disorder, and autism spectrum disorders. These disorders appear to be increasing (86). In 2017, 40% of high school students had engaged in sexual intercourse, 39% texted or emailed while driving, 30% used alcohol, 23% had asthma, 20% used marijuana, 16% were overweight, 15% had obesity, 14% inappropriately used prescription pain medicine, 13% used an electronic vapor product, 9% smoked cigarettes, and 7% had attempted suicide (62). In 2015, among 71 nations, US students ranked twenty-third in reading, twenty-fifth in science, and thirty-ninth in mathematics (84).

Public health agencies, medical organizations, and other concerned groups have long worked with schools to protect and improve the lives of young people (54), and school health strategies can be designed to improve both health outcomes and education outcomes (66). In 2015, the US Centers for Disease Control and Prevention (CDC) and ASCD (formerly the Association for Supervision and Curriculum Development), released the new whole school, whole community, whole child (WSCC) framework to disambiguate the school health program into 10 integrated school health program components, which are described in the following review. The purposes of these components are to assure that students are healthy, safe, supported by caring adults, effectively engaged in learning, challenged academically, and prepared to be successful in life (32).

## RELATIONSHIPS AMONG HEALTH, EDUCATION, AND ECONOMIC OUTCOMES

During the past two decades, public health research has documented the effects of various social determinants of health, especially about the powerful and interactive effects of health, education, and poverty/income/wealth, about how disparities in each of these three determinants exacerbate the other two, and about how these disparities accumulate over generations (9, 14, 106, 109, 118).

Because schools materially influence both health and education outcomes, they substantially determine the future well-being and economic productivity of populations. Recent research suggests that healthier children learn better, and, reciprocally, more educated adults lead healthier, more productive, wealthier, and longer lives. More specifically, children learn better if they are not hungry, malnourished, frightened, anxious, hyperactive, sleepy, sedentary, depressed, abusing alcohol or drugs, pregnant, sick, injured, disabled, absent, acting out, dropping out, needing medication, or needing medical or dental care. Reciprocally, adults with less education are more likely to develop unhealthy lifestyles, experience more psychological distress, suffer more illnesses and disabilities, have less healthy children, generate more medical care costs, be less productive at work, earn less, live sicker, and die younger (9, 14, 58, 65, 109, 116–118).

In 2011 and 2015, the World Health Organization (WHO) (109) and the Institute of Medicine (IOM) (58) respectively analyzed relationships among health, education, and economic

development, especially from the perspective of the education sector. Some analysts have employed social ecological frameworks to suggest how reciprocal effects of health and education accrue at individual, community, and larger social/cultural levels from broader social policies and environments (117, 118). Others have used similar frameworks to describe how researchers, practitioners, and policy makers might improve such policies and environments (51). Future research and development could illuminate causal pathways and interactive impacts of policies that support multicomponent school health programs—designed to simultaneously improve both health and education—on longer-term population health, education, and economic outcomes.

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#### Health in All Policies:

a collaborative approach to improving health by incorporating health considerations into decision making across sectors

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## RECENT EVOLUTION OF US HEALTH AND EDUCATION SYSTEMS

### The Health System

In 1998, the IOM suggested that our public health system organizes “what we as a society do collectively to assure the conditions in which people can be healthy,” and it identified schools as an example (55). In the twenty-first century, public health agencies began to pursue a Health in All Policies approach that could enable decision makers in the health sector and in other respective sectors to collaboratively develop policies that could improve priority outcomes in more than one sector simultaneously: for example, to collaboratively develop policies that simultaneously could improve both health and education outcomes (26, 88). Indeed, a former CDC director has argued that “[i]nterventions that address social determinants of health [such as education] have the greatest potential public health benefit ... [and that] the health sector is well positioned to build the support and develop the partnerships required for change” (47, p. 594). As examples, Healthy People 2020—the US 10-year national health objectives—includes objectives to improve student reading skills and high school graduation rates (106); the IOM identified high school graduation as one of the 15 best measures for improving health and health care (59); and the WHO explained to ministries of education how health and education agencies together could help improve both health and education outcomes (110).

### The Education System

In 1965, Congress passed the Elementary and Secondary Education Act to improve the quality of PK–12 education, especially for low-income students; reauthorized it in 2002 to test students and hold schools accountable for meeting student proficiency levels by 2013–2014; and reauthorized it again as the Every Student Succeeds Act (ESSA) of 2015 to consolidate federal education programs and to give states more flexibility to remediate school performance (4, 41, 46, 77). In 2016, the US Department of Labor outlined the nature, evolution, and productivity of the PK–12 education system and concluded that the system must be responsive to changes in the population requiring educational services, such as the increasing prevalence of low-income, mentally and physically challenged, and non-English-speaking students; variations in economic conditions, with many schools and families experiencing tighter budget constraints; and variations in factors influencing student educational outcomes, such as teacher quality, student–teacher ratios, and curriculum quality (87). As an example of the education system’s commitment to improve both health and education, one national nongovernmental education organization has called for the health system to work within the education system—including the education system’s mandates and constraints—instead of assuming that the education system can simply adopt and address health system priorities (6). Future research and development could improve the means for health

**Child friendly schools:** UNICEF uses this term for school health programs

**Coordinated school health programs:** the CDC used this term for school health programs from 1988 to 2014

**Health promoting schools:** WHO uses this term for school health programs

**Healthy schools:** many organizations use this term for school health programs, including the Healthy Schools Campaign

**School health promotion programs:** many organizations use this term for school health programs

**Schools for health:** many European nations use this term for school health programs

**Thriving schools:** Kaiser Permanente uses this term for school health programs

agencies to work within the education system and to improve education outcomes as well as health outcomes. (See the sidebar titled Education System and Health System Data Privacy Laws.)

## EVOLUTION OF THE SCHOOL HEALTH PROGRAM AND EACH OF ITS COMPONENTS

### School Health Programs

School health programs are sometimes called child friendly schools; coordinated school health programs; health promoting schools; healthy schools; school health promotion programs; schools for health; thriving schools; or WSCC programs. They enable education, health, and other agencies to collaboratively integrate multiple school health components that can synergistically improve health and education outcomes among all PK–12 students. These components can be implemented during the school day and during out-of-school time (31).

Such multicomponent programs address the critical health and education needs of all PK–12 children, including prekindergarten and kindergarten children (3- to 5-year-olds) (3) and children with disabilities. In 1975, Congress passed the Individuals with Disabilities Education Act, which mandates the provision of a free and appropriate public school education for eligible 3- to 21-year-olds (<https://sites.ed.gov/idea/?src=pr>). In 2014–2015, 13% of the public school population had a disability that adversely affected their academic performance and thus required special education services. School health program components address these disabilities, including, as examples, asthma, diabetes, epilepsy, attention-deficit/hyperactivity disorder, autism, emotional disturbances, and visual, hearing, and orthopedic impairments (40).

The American School Health Association (ASHA; <http://www.ashaweb.org/>) publishes the *Journal of School Health*, which reports evolving research and developments for all components of the school health program. ASHA also maintains a website that describes an evolving range of initiatives that address all school health components, as does the CDC (<https://www.cdc.gov/healthyyouth/index.htm>, <https://www.cdc.gov/healthyschools/index.htm>), and other national and international organizations listed in the Related Resources section of this review.

For each of the following 10 WSCC components, the CDC offers a definition of the component (22); a review of component laws and policies (18); and periodic assessments—by the CDC’s School Health Policies and Practices Study (<https://www.cdc.gov/healthyyouth/data/shpps/index.htm>) and the CDC’s School Health Profiles (<https://www.cdc.gov/healthyyouth/data/profiles/index.htm>) surveillance systems—of the extent to which each component is implemented variously at state, district, school, and classroom levels. Future research and development could analyze, sustain, and improve surveillance systems established to monitor implementation of each component of the school health program as well as related health and education outcomes.

## EDUCATION SYSTEM AND HEALTH SYSTEM DATA PRIVACY LAWS

To assure the privacy of student education records and student health records respectively, the US Congress passed the Family Educational Rights and Privacy Act (FERPA) of 1974 and the Health Insurance Portability and Accountability Act (HIPAA) of 1996. Those who implement school health interventions and research must comply with these two federal and applicable state laws. The US Department of Education (43) and the Association of State and Territorial Health Officials (7) provide information about requirements to protect the privacy of data about students.

## Health Education

The major causes of deaths, disabilities, illnesses, and social problems among young people and adults are often established during childhood and adolescence. These causes include interrelated (*a*) behaviors that contribute to unintentional injuries and violence; (*b*) sexual behaviors that result in unintended pregnancy and sexually transmitted infections, including HIV infection; (*c*) alcohol and other drug use; (*d*) tobacco use; (*e*) unhealthy dietary behaviors; and (*f*) inadequate physical activity (33). In 1990, the CDC established the Youth Risk Behavior Surveillance System (YRBSS) to biennially monitor these priority health risk behaviors among representative samples of national, state, and large-city students in grades 9–12 and to help school health programs—including school health education—focus on reducing these risk behaviors (33). Planned and sequential comprehensive school health education is taught by teachers specifically trained to help PK–12 students progressively acquire the knowledge, attitudes, and skills they will need during their lifetimes across multiple categorical content areas to acquire health literacy, adopt healthy behaviors, and promote the health of others (22) (see also the sidebar titled School Health Education to Improve Health Literacy).

In 1992, the American Cancer Society organized a “National Action Plan for Comprehensive School Health Education,” which articulated action steps to improve school health education in the United States (5). This plan spawned a set of National [School] Health Education Standards, which merged 10 categorical school health education content areas with the 6 types of YRBSS health risk behaviors listed above to produce 8 school health education standards with performance indicators for various school grade levels. The CDC incorporated these standards (characteristics of an effective school health education curriculum) in its Health Education Curriculum Analysis Tool (<https://www.cdc.gov/healthyyouth/hecat/index.htm>). US national health objectives include four school health education objectives (30). A 2016 survey of US school districts found that, for example, 80% of districts had policies for middle schools to provide health education to prevent tobacco use, 80% had policies to provide education to prevent alcohol and drug abuse, and 71% had policies to provide education to prevent HIV infection (30). In 2015, the ESSA included “health” among 17 other subject areas that could be supported as part of a “well-rounded education,” which presented a new set of opportunities and challenges for school health education (95). The Society for Public Health Education (<https://www.sophe.org/focus-areas/school-health/>) provides evolving information to improve school health education.

### Comprehensive school health education:

provided by teachers trained to help students acquire health literacy, adopt healthy behaviors, and promote the health of others

### Categorical school health education:

examples include education specifically to prevent tobacco use, alcohol and drug use, and HIV infection

## SCHOOL HEALTH EDUCATION TO IMPROVE HEALTH LITERACY

An essential function of our PK–12 education system is to improve literacy. An essential function of our public health system is “[t]o inform, educate, and empower people about health issues” (28). In its 2004 report on health literacy, the IOM defined health literacy as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions; noted that “[a]rguably, the most effective means to improve health literacy is to ensure that education about health is part of the curriculum at all levels of education”; and recommended several national actions to help our nation’s schools improve health literacy (56). In 2010, the United States developed the “National Action Plan to Improve Health Literacy,” in which the third goal is to “[i]ncorporate accurate, standards-based, and developmentally appropriate health and science information and curricula in child care and education through the university level” (105, p. 32).

## Physical Education and Physical Activity

Schools can be instrumental in providing the regular physical activity required for children and adolescents to progressively build strong bones and muscles, improve cardiorespiratory fitness, control weight, reduce anxiety and depression, and reduce risks for obesity, high blood pressure, type 2 diabetes, heart disease, cancer, and osteoporosis (60). In addition, there is increasing evidence that school-based physical activity, including physical education, can help improve academic performance, including cognitive skills and attitudes (e.g., mood, attention/concentration, memory), academic behavior (e.g., attendance, on-task behavior), and academic achievement (e.g., test scores, grades) (90).

In 2010, a coalition of government and nongovernment organizations organized the US National Physical Activity Plan (NPAP) and the National Physical Activity Plan Alliance to assure the long-term success of the NPAP. The NPAP includes evidence-based strategies, tactics, and measurable objectives for each of nine sectors, including the education sector (<http://www.physicalactivityplan.org/index.html>).

In 2013, the CDC and SHAPE America (the Society of Health and Physical Educators) published a guide to articulate, and help schools implement, a multicomponent comprehensive school physical activity program (CSPAP), which includes physical education; physical activity during school (e.g., recess, physical activity breaks); physical activity before and after school (e.g., walk-or bike-to-school programs, intramurals); employee wellness, participation, and role modeling; family engagement; and community involvement (23).

In 2014, the percentage of schools that required physical education ranged by grade level from 43% in kindergarten to 47% in fifth grade and then decreased from 37% in sixth grade to 9% in twelfth grade. The percentage of secondary schools that had implemented a CSPAP ranged from 0% to 10% among surveyed states (83). SHAPE provides evolving information to improve school physical education and activity (<https://www.shapeamerica.org/>).

## Nutrition Environment and Services

Schools help provide the nutrition required for children and adolescents to maintain their health; sustain their accelerated growth and development; and prevent the establishment of behavioral patterns that result in obesity, related physiological risks, and consequent development of diabetes, heart disease, stroke, cancer, and other noncommunicable/chronic diseases later in life (57, 69). In addition, some studies suggest that school nutrition programs can improve academic performance, potentially by supporting brain development, cognition, memory, attention, behavior, and attendance (48).

In 2010, Congress passed the Healthy, Hunger-Free Kids Act (Pub. L. 111–296, 124 Stat. 3183, 42 U.S.C. § 1751), which enabled the US Department of Agriculture (USDA) to improve nutrition standards for the National School Lunch Program (NSLP) and the National School Breakfast Program (NSBP); establish nutrition standards for competing foods and beverages sold to students à la carte via school cafeterias, stores, vending machines, fundraisers, and other means; and improve school food safety. Both the NSLP and NSBP provide meals for “free or at a reduced price” (FRP) for students who are eligible according to income guidelines, as well as at full price for students who do not qualify for the FRP meals. In 2014, at a cost of \$16 billion, 31 million of the nation’s 50 million students received an NSLP meal each day, of which 72% were FRP, and 14 million students received an NSBP meal each day, of which 85% were FRP. One study estimated that 47% of each day’s energy intake was supplied for students who ate both school meals (37).



To improve both health and education, the USDA requires each school district that accepts NSLP and/or NSBP funds to establish and maintain a local school wellness policy for each school in its jurisdiction (104). The CDC has published *School Health Guidelines to Promote Healthy Eating and Physical Activity* (20) and a *Comprehensive Framework for Addressing the Food Nutrition Environment and Services* (24). The USDA (<https://www.fns.usda.gov/school-meals/child-nutrition-programs>), School Nutrition Association (<https://schoolnutrition.org/>), and CDC (<https://www.cdc.gov/healthyschools/nutrition/schoolnutrition.htm>) provide evolving information to improve the school nutrition environment and services.

## Health Services

By working together with students, families, and community service providers, the school nurse (2, 79) and the school physician (1) play increasingly complex, instrumental, and expanding roles in preventing, detecting, and treating health problems and improving the educational performance of all students. The National Association of School Nurses (NASN) recently established the Framework for 21<sup>st</sup> Century School Nursing Practice (79), which characterizes five principles of school nursing, including care coordination (e.g., student health and education care plans, direct care, case management), leadership (e.g., advocacy for policy development and implementation, funding and reimbursement, health care and education reform), quality improvement (e.g., to identify, prioritize, and monitor actions that show the greatest impact on education and health outcomes), community/public health (e.g., to improve both individual and population health and education outcomes, to address social determinants such as student housing and environments), and standards of practice (e.g., clinical guidelines, code of ethics, evidence-based practice, Nurse Practice Acts).

The NASN recommends that every child have access all day, every day, to a full-time registered professional school nurse (79). The American Academy of Pediatrics (AAP) recommends a minimum of one full-time professional school nurse in every school and a school physician to oversee health services in every school district (1). About 63% of the nation's public schools employ full-time school nurses, 19% employ school nurses who work only part-time, and 18% employ no school nurse; the average number of schools served by one school nurse is 3 (111). The School-Based Health Alliance (SBHA) reported that from 1999 to 2014 the number of school-based health centers implemented to provide health services to students within their schools increased from 1,135 to 2,315 (94). In 2015, Medicaid provided \$4 billion for school health services (1% of all Medicaid funding); in 2017, 69% of school superintendents reported that they used Medicaid funding to keep school nurses and other health professionals on staff (89). State laws establish vaccination requirements for children as a condition for public school, private school, and day care attendance (25). The NASN (<https://www.nasn.org/home>), AAP (<https://www.aap.org/en-us/about-the-aap/Councils/Council-on-School-Health/Pages/COSH.aspx>), and SBHA (<http://www.sbh4all.org>) provide evolving information to improve school health services.

## Counseling, Psychological, and Social Services

More than 46% of 13- to-18-year-olds have experienced a mental disorder at some point in their lives, and more than 20% have been diagnosed with a seriously debilitating mental disorder; however, as few as 20% of youth receive services for their mental health needs, and 70–80% of youth who acquire such services receive them at school (64). In addition, the 20% of US students who live in poverty, and the additional 20% who live in near-poverty, are at increased risk for mental, emotional, and behavioral disorders; for physical health and development problems; and for

poor cognitive and language development, learning, and educational achievement (114). Furthermore, in 2011–2012, 48% of children ages 0–17 had experienced at least 1 of 9 adverse childhood experiences (ACEs), which increased their risk of mental and physical health problems, and 23% had experienced 2 or more ACEs. Such adverse experiences include exposure to violence; emotional, physical, or sexual abuse; deprivation; neglect; family discord and divorce; parental substance abuse and mental health problems; parental death or incarceration; and social discrimination (12). In 2014, the National Child Traumatic Stress Network developed a framework for “creating, supporting, and sustaining trauma-informed schools” (80). The provision of insufficient mental health services for the above populations results in compromised physical health, poor educational attainment, substance abuse, legal problems, underemployment, increased health care costs, and other economic costs during childhood and adulthood (12, 64).

In 2013, national organizations that represent school counselors, psychologists, social workers, resource (i.e., school safety/law enforcement) officers, and principals collaboratively developed a “framework for safe and successful schools” (36) to concomitantly improve school climate and safety and to improve student mental health and learning. The framework incorporates a multi-tiered system of school, family, and community supports to provide primary prevention of mental health problems for all students, targeted/secondary prevention for at-risk students, and clinical/tertiary prevention for students with existing problems. The framework also integrates efforts to assure both psychological and physical safety for students in the event of school emergencies such as school violence, natural disasters, or terrorism. Four national organizations provide evolving information to help improve school counseling (<http://www.schoolcounselor.org>), psychological (<http://www.nasponline.org>), social (<http://www.sswaa.org>), and safety (<http://nasro.org>) services.

## Physical Environment

One-sixth of the US population spends every school day in a school facility. State and local governments invest more capital in public school facilities than in any other infrastructure except highways. Research shows that high-quality facilities help improve student health and achievement, improve staff satisfaction and retention, raise property values, and improve education equity. A recent report suggests that, each year, the United States underspends by \$46 billion the amount needed for school facilities (45).

Many school students and staff are variously exposed to inadequate lighting, heating, cooling, and ventilation; lead in paint and drinking water; mold; asbestos; radon; polychlorinated biphenyls; chemicals in paints, glues, carpets, cleaning supplies, pesticides, and copiers; allergens from cockroaches, mice, and rats; lawn chemicals; artificial turf; and pollutants from nearby roads, industries, construction sites, and toxic sites. No federal, state, or local agency is authorized, funded, and staffed to protect students from these threats (44, 85). The US Environmental Protection Agency (<https://www.epa.gov/schools>) and the Healthy Schools Network (<http://www.healthyschools.org/>) provide evolving information to reduce these and other school environmental health hazards.

In addition, about 4 million students are injured on school premises each year, most in playgrounds, athletic fields, and gymnasiums (8), and about 152,000 students are injured and 800 die in school travel each year (100). Furthermore, the US Department of Education (ED) reported that during the 2015–2016 school year nearly 1.1 million serious offenses were reported in public schools, including 789,800 physical attacks or fights without a weapon and 11,900 physical attacks or fights with a weapon; more than 291,100 students were referred to law enforcement agencies



or arrested. Nearly 240 schools (0.2% of all schools) reported at least one incident involving a school-related shooting; more than 100 schools (0.1% of all schools) reported a school-related homicide involving a student, faculty member, or staff member (42). In 2013–2014, there were 48 school-associated violent deaths (74). In 2018, a report on school safety was presented to the president of the United States (42a). The CDC has published “School Health Guidelines to Prevent Unintentional Injuries and Violence” (8) and maintains a Safe Youth, Safe Schools website (<https://www.cdc.gov/features/safeschools/index.html>).

Those responsible for student safety—including all school personnel, first responders, and emergency management, health, and family services staff, among others—collaboratively develop and implement plans to address a wide range of school emergencies such as unintentional injuries, crime, terrorism, violence, shootings, bombings, hazardous material releases, infectious disease outbreaks, fires, tornados, floods, hurricanes, and earthquakes. These plans include means to help schools prevent such emergencies; protect students and staff; and mitigate, respond to, and recover from such emergencies (<http://rem.s.ed.gov/default.aspx>). Especially in nations that experience sustained violence or armed conflict, the provision of education in emergencies is vital to the entire population.

A critical element of the school physical environment is the time at which schools start. Studies have shown that later school start times are associated with improvements in academic, mental health, physical health, public safety, and economic outcomes (53).

More broadly, schools purposefully can be located, constructed, and used to simultaneously improve education, health, safety, community, and economic outcomes (26, 88).

## Social and Emotional Climate

This component of the school health program includes efforts to improve the school social and emotional climate and also to provide learning experiences that can improve student social and emotional competencies (11).

School crime and violence threaten both the physical health and the psychological health of students and school staff, as well as the education enterprise. In recent school years, 65% of public schools reported one or more violent incidents, 21% of 12–18-year-old students reported being bullied at school, and 8% of elementary and 3% of secondary school teachers reported being physically attacked by a student (74). The ED suggests that the school climate is the product of school efforts to foster respectful, trusting, and caring relationships among students, school staff, parents, and community members and that a positive school climate can improve attendance, achievement, and graduation rates. The ED maintains the National Center on Safe Supportive Learning Environments, which provides evolving information and assistance to improve school social and emotional climates (<https://safesupportivelearning.ed.gov/safe-and-healthy-students>).

Among other definitions of social and emotional learning (SEL) (11), the Collaborative for Academic, Social, and Emotional Learning (CASEL; <https://casel.org/>) has defined SEL as the process through which children and adults learn to effectively understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. These social and emotional competencies may drive academic and life success as much as, or more than, traditional academic skills (39, 61). The CASEL website (<https://casel.org/>) provides information to help improve school emotional learning and competencies. The school social and emotional climate, school SEL, and social and emotional competencies are interactive; those who learn effective social and emotional competencies can improve school social and emotional climates (10).

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**Education in emergencies:** including situations of violence, armed conflicts, forced displacement, disasters, and public health emergencies

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## Family Engagement

Parents and other family members play a crucial role in nurturing the education and health of their children, guiding them through various school activities, and advocating for effective school education and school health programs. Research shows that when parents are engaged in schools, students exhibit better behavior, better social skills, fewer health risk behaviors, and higher academic achievement. In addition, school efforts to improve student health are more successful when parents are involved (21).

Students could also play a critical role in advocating for, planning, implementing, evaluating, and improving each of the school health program components. Morse & Allensworth (73) summarized research about engaging students in school and community efforts to improve education and health outcomes, including studies which found that such student empowerment strategies could improve mental health and academic performance and reduce substance abuse, delinquency, and school dropout. The CDC has synthesized research about strategies that students, families, schools, and communities can implement together to improve student health, education, and other outcomes (19). The National Parent Teacher Association (PTA; <https://www.pta.org/home/family-resources/health>) and the CDC (<https://www.cdc.gov/healthyschools/parentengagement/parentsforhealthyschools.htm>) provide evolving information to improve family engagement.

## Community Involvement

Community agencies can do much to help schools improve student health and education outcomes, and schools often collaborate independently with each of one or more governmental and nongovernmental organizations, universities, and businesses (92). As one example, a state or local health department may work with a school in a variety of ways to improve health and education outcomes (75, 76; <http://www.schoolbasedhealthcare.org/>). As another example, a nonprofit hospital may work with a school as a means to improve community health and, thus, to appropriately maintain the hospital's nonprofit tax status (70).

In addition, many schools and communities together are implementing “community schools” that more systematically amalgamate resources from multiple community agencies to provide an “integrated focus on academics, health and social services, youth and community development, and community engagement” (34). Many community schools are open all day, evenings, weekends, and year-round, and they typically provide four functions: integrated student supports, expanded learning time and opportunities, family and community engagement, and collaborative leadership and practices. A recent review of 143 research studies concluded that these functions of well-implemented community schools improved school and student outcomes—including better school climates, student attendance, behavior, and academic achievement—especially for students living in poverty (71). The Coalition for Community Schools (<http://www.communityschools.org/>) provides evolving information to improve systematic community involvement.

## Employee Wellness

Few data are available to assess the physical and psychological health of US teachers and other school employees, with the limited exception of the California Teachers Study, which largely focuses on breast cancer (<https://www.calteachersstudy.org/>). One study found that 46% of K–12 teachers report high daily stress (49), which can result in headache, upset stomach, sleep disturbances, difficulty in concentrating, short temper, psychological disorders (including anxiety and depression), low morale, job dissatisfaction, cardiovascular diseases, musculoskeletal

disorders, workplace injuries, and greater health care expenditures (93). High stress among teachers contributes not only to poor health, but also to increased absenteeism, lower job performance, higher turnover, lower student achievement, and higher education costs (52).

The school employee wellness component integrates each of the other nine components of the school health program, but it is designed specifically for school employees and their families. Such integrated school workplace health programs may be developed with connections to the surrounding community and may include employee health insurance, preventive services (e.g., workplace screening programs, influenza vaccinations), employee assistance programs, access to healthy foods and to school or community fitness facilities, health education programs (e.g., to reduce stress), and a workplace free of health and safety threats. School employee wellness programs can improve employee recruitment, morale, retention, and productivity; reduce risk behaviors (e.g., physical inactivity), risk factors (e.g., stress, obesity, high blood pressure), illnesses, work-related injuries, absences, worker compensation and disability claims, health care and health insurance costs; and increase the likelihood that employees will serve as healthy role models for students and present a positive image of the school to parents and the community (38, 78).

## **EFFECTIVENESS OF COMPONENTS IN IMPROVING HEALTH, EDUCATION, AND ECONOMIC OUTCOMES**

During the past three decades, many individual studies have evaluated the effectiveness of a single school health component. For example, one study found that during the 2009–2010 school year, at a cost of \$79 million, Massachusetts school nurses prevented an estimated \$20 million in medical care costs, an additional \$28 million in parent productivity costs, and \$129 million more in teacher productivity costs (107). In addition, many individual studies have evaluated the effectiveness of two or more combined components. For example, one study of a combined nutrition, physical activity, and family engagement intervention reduced body mass index only among the 30% of participating students who were obese (13). Furthermore, many systematic reviews have synthesized findings from numerous individual studies of one or more combined components. For example, 1 synthesis of 139 intervention studies found that different combinations of school nutrition, physical activity, family engagement, and community involvement components variously produced at least moderate evidence of effectiveness in preventing childhood obesity (108).

Such evaluation research has increasingly identified effective “evidence-based programs or practices” (EBPs). Governmental and nongovernmental organizations in health, education, and other sectors progressively are calling for implementation of EBPs, and a variety of EBP registries (EBPRs) have been developed to characterize, and disseminate information about, available evidence across numerous studies of effectiveness. At least 20 EBPRs rate the effectiveness of relevant health and education interventions (17, 29), including, as examples, the Cochrane Collaboration and the US Community Preventive Services Task Force (CPSTF) Guide to Community Preventive Services. By May 2018, the CPSTF Guide listed 256 systematic reviews of interventions across all settings, including 45 reviews of interventions specifically for school settings, of which there was sufficient evidence to recommend 27 of the 45 reviewed interventions (<https://www.thecommunityguide.org/>).

Recent research suggests that especially by improving health outcomes, school health programs can also improve education outcomes such as student attendance, school engagement, classroom behavior, mood, concentration, memory, standardized test scores, grade point average, grade advancement, and high school completion (9, 27, 63, 69, 72, 91). Future research and development could assess and increase the effectiveness of each component of the school health program, and combinations of these components, to improve health, education, and economic outcomes.

### Collaborative partnerships:

enable independent organizations to combine their respective resources to attain objectives that otherwise would be unattainable

### Cross-disciplinary collaborative research:

research, development, and training that integrates more than one discipline, including multidisciplinary, interdisciplinary, and transdisciplinary approaches

## CROSS-DISCIPLINARY COLLABORATION AND TEAM SCIENCE

Collaborative partnerships, especially between health and education sectors, are essential for schools to improve both health and education outcomes (6, 68, 75, 76). During the past three decades, there has been a growing body of research about means to implement and sustain such partnerships, including, for example, research about inputs such as mission/purpose, partnership resources other than financial (e.g., time), and financial resources; throughputs such as leadership, communication, and roles/structures; and outputs such as additive results, synergy, and antagonism (35). During this same period, the science of team science has evolved to convene scholars from more than one discipline to conduct cross-disciplinary collaborative research, development, and training initiatives, including initiatives to promote multidisciplinary, in which team members from disparate disciplines largely work independently in their separate fields and periodically work together; interdisciplinarity, in which scholars work together more intensively to integrate their divergent perspectives, while remaining anchored in their respective disciplines; and transdisciplinarity, in which team members work together not only to integrate, but also to transcend their respective disciplinary perspectives (96; <https://www.teamsciencetoolkit.cancer.gov/public/Home.aspx>).

Relatedly, in 2015, more than 100 national and international organizations were independently implementing efforts to improve school health in the United States, including 16 education organizations, 32 health organizations, 22 other relevant organizations (e.g., US Congressional Committees, philanthropies, youth organizations), 15 school health organizations, and 31 organizations that respectively focus on 1 of the 10 school health components (see the sidebar titled National and International Organization Efforts to Improve School Health Programs). The large number and separate foci of these organizations reflect the potential either to further divide or to combine organization efforts to support each and all components of the school health program (67). Future research and development could enable health, education, and other relevant organizations—including university faculty in colleges of education, public health, medicine, nursing, and other relevant colleges—to establish cross-disciplinary and team science collaborations that can improve health, education, and economic outcomes.

### NATIONAL AND INTERNATIONAL ORGANIZATION EFFORTS TO IMPROVE SCHOOL HEALTH PROGRAMS

Many health, education, and other types of organizations implement efforts to improve school health programs (67). One can usually find and review the scope of each organization's efforts by accessing the organization's home website and entering "school health" into the website search bar. As examples, the American Public Health Association maintains a Center for School, Health and Education; the Association of State and Territorial Health Officials maintains an evolving Public Health and Schools Toolkit; and the American Academy of Pediatrics and the National Association of Chronic Disease Directors each maintain an active School Health Council. The US Department of Education maintains an Office of Safe and Healthy Students, and ASCD (a national nongovernmental education organization) helps schools implement a Whole Child Approach to Education. The National Conference of State Legislatures, National Governors Association, and Trust for America's Health address a wide range of federal and state school health policies. The World Food Program helps many countries to provide school meals, and Save the Children implements school health and school nutrition programs worldwide.

## LOCAL, STATE, NATIONAL, AND INTERNATIONAL INFRASTRUCTURES AND STRATEGIES

Implementation of effective school health programs requires, in addition to partnerships, operational infrastructures, strategic plans, policies, funding, and appropriate advocacy among collaborating local, state, national, and international organizations (54, 68, 69). Internationally, the WHO (97), UNESCO (101), UNICEF (103), the World Bank (113), and other international organizations have each developed independent infrastructures and strategies to help countries improve their school health programs. As an example, one element of the World Bank's Systems Approach for Better Education Results (SABER) works with countries to improve their school health and school feeding strategies (113). These international organizations often work together as part of a global school health partnership called FRESH (Focusing Resources on Effective School Health); <http://www.schoolsandhealth.org/Pages/FRESH.aspx>.

Within the United States, the US Department of Health and Human Services (DHHS) CDC established the Division of Adolescent and School Health (<https://www.cdc.gov/healthyyouth/index.htm>) in 1988, and the CDC later also established a separate and equally vital School Health Branch (<https://www.cdc.gov/healthyschools/index.htm>); both of these entities work together and strategically collaborate with governmental and nongovernmental health and education organizations at local, state, national, and international levels (68, 69). The ED established an Office of Safe and Healthy Students to provide resources, direct support, and technical assistance to assure the well-being of students (<https://www2.ed.gov/about/offices/list/oes/osh/index.html>). Other federal agencies that address school health include the DHHS Health Resources and Services Administration, National Institutes of Health, and Centers for Medicare and Medicaid Services, as well as agencies within the US Departments of Agriculture, Justice, Interior, Transportation, and Environmental Protection Administration. One budget estimate suggested that, in 2015, 43 separate federal sources provided a total of \$23 billion in technical assistance and funding for various school health components, of which \$21 billion was for school food services (68). As examples of national nongovernmental organization efforts, the National Association of State Boards of Education maintains a State School Health Policy Database ([http://www.nasbe.org/healthy\\_schools/hs/index.php](http://www.nasbe.org/healthy_schools/hs/index.php)), and 40 national nongovernmental organizations collaboratively established a Student Health Advocacy Coalition to help inform the American people and decision makers about the nature and value of various school health policies, programs, research, and development (68). Future research and development could improve school health operational infrastructures, strategic plans, policies, funding, and appropriate advocacy among collaborating local, state, national, and international organizations.

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### Systems Approach for Better Education Results (SABER):

World Bank strategy to help improve education systems at country and global levels

### Focusing Resources on Effective School Health (FRESH):

an international partnership for school health programs

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## IMPLEMENTATION SCIENCE AND ACADEMIC RESEARCH, TRAINING, AND SERVICE

Health and education agencies could employ evolving methods of implementation science to help schools more effectively adopt especially evidence-based school health policies and programs, instead of continuing to rely on passive, unsystematic diffusion (15, 16; <https://prevention.nih.gov/resources-for-researchers/dissemination-and-implementation-resources>). Illustratively, one review reported mixed results from 27 trials designed to assess the effectiveness of methods to help schools implement school health policies and programs to respectively reduce unhealthy eating, inadequate physical activity, tobacco use, or a combination of these risk behaviors (112).

More broadly, however, the extent to which school health programs can improve both public health and education ultimately is dependent on university programs that respectively train and

**R1, R2, and R3  
research universities:**  
Carnegie classification  
of universities that  
respectively maintain  
highest, higher, and  
moderate research  
activity

credential the public health workforce, the education workforce, and each school health component workforce; simultaneously conduct related school health research and development; and provide professional service to sustain and improve school health programs within their own localities, states, nations, and internationally. Faculty who train various school health professionals usually work within one university college, focus on one school health component, and affiliate with one national professional organization. For example, faculty who train physicians to work with schools often work within a college of medicine, focus on the school health services component, and affiliate with the AAP. The AAP suggests that all physicians specializing in the care of children and adolescents acquire the knowledge and skill to identify and manage school problems and that school health be a structured part of relevant medical student, resident, fellow, and continuing education programs (50).

During the past three decades, concomitant with the evolution of the public health education and health promotion disciplines (52, 98, 99, 115), many university programs that trained professionals to implement both the school health education component and the multicomponent school health promotion program migrated from colleges of education to colleges of public health and health sciences. Training future generations of public health professionals—as well as school administrators, teachers, nurses, physicians, physical educators, food service workers, counselors, psychologists, social workers, and health educators—to collaboratively help implement multicomponent school health programs will require organized training leadership and support from their respective professional associations, accreditation agencies, and credentialing agencies and from the Association of Schools and Programs of Public Health (<https://www.aspph.org/teach-research/framing-the-future/>) and the American Association of Colleges for Teacher Education (<https://aacte.org/resources/colleges-of-education-a-national-portrait>). To conduct the research and development required to sustain school health as a strategy that can improve both public health and education outcomes—and to sustain school health professional training programs in R1, R2, and R3 research universities—will require organized research leadership and support from the CDC, the National Institutes of Health, the Institute of Education Sciences, the National Science Foundation, and other relevant research and development agencies.

## SUMMARY POINTS

1. Health, education, and economic productivity are interdependent. Healthier children learn better; and, reciprocally, more educated adults lead healthier, more productive, wealthier, and longer lives.
2. Health and education agencies are increasingly recognizing the need to purposefully address the interdependency of their separate efforts to improve respective health and education outcomes.
3. School health programs enable health, education, and other relevant agencies to collaboratively integrate multiple school health components that can improve both health and education outcomes.
4. Many school health interventions are effective in improving health, education, and economic outcomes.
5. Collaborative partnerships, especially between health and education system agencies, are required for schools to improve both health and education outcomes.



## FUTURE ISSUES

1. Future research and development could illuminate causal pathways and interactive impacts of school health programs—designed to simultaneously improve both health and education—on longer-term population health, education, and economic outcomes.
2. Future research and development could improve means for health agencies to work within the education system and to improve education outcomes as well as health outcomes.
3. Future research and development could analyze, sustain, and improve surveillance systems established to monitor implementation of each component of the school health program, as well as to monitor related health and education outcomes.
4. Future research and development could assess and increase the effectiveness of each component of the school health program, and combinations of components, to improve health, education, and economic outcomes.
5. Future research and development could enable health, education, and other relevant organizations—including university faculty in colleges of education, public health, medicine, nursing, and other relevant colleges—to establish cross-disciplinary and team science collaborations that can improve health, education, and economic outcomes.
6. Future research and development could assess and improve school health operational infrastructures, strategic plans, policies, funding, and appropriate advocacy among collaborating local, state, national, and international organizations.
7. Future research and development could generate more organized means to support university programs that, respectively, train and credential the public health workforce, the education workforce, and each school health component workforce; simultaneously conduct related school health research and development; and provide professional service to sustain school health programs within their own localities, states, and nations, as well as internationally.

## DISCLOSURE STATEMENT

The author served as founding director of the CDC Division of Adolescent and School Health from 1988–2003.

## ACKNOWLEDGMENTS

The author gratefully acknowledges the work of those cited in this article and apologizes to many others in the United States and other nations whose work has not been cited because of space limitations.

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## RELATED RESOURCES

Action for Healthy Kids. <http://www.actionforhealthykids.org/>

Alliance for a Healthier Generation. *Healthy schools*. [https://www.healthiergeneration.org/take\\_action/schools/](https://www.healthiergeneration.org/take_action/schools/)

Healthy Schools Campaign. <https://healthyschoolscampaign.org/>

INEE (Inter-Agency Network for Education in Emergencies). <http://www.ineesite.org/en>

ISHN (International School Health Network). <http://www.internationalschoolhealth.org/>

Kaiser Permanente. *Thriving schools*. <https://thrivingschools.kaiserpermanente.org/>

PCD (Partnership for Child Development). *Schools and health*. <http://www.schoolsandhealth.org/>

SHE (Schools for Health in Europe). <http://www.schools-for-health.eu/she-network>

UNESCO (United Nations Educational, Scientific, and Cultural Organization). *Education for health and well-being*. <https://en.unesco.org/themes/health-education>

WHO (World Health Organization). *School and youth health*. [http://www.who.int/school\\_youth\\_health/en/](http://www.who.int/school_youth_health/en/)



# Contents

## Symposium: Causal Inference and Public Health

Introduction to the Symposium: Causal Inference and Public Health <i>Allison E. Aiello and Lawrence W. Green</i> .....	1
Commentary: Causal Inference for Social Exposures <i>Jay S. Kaufman</i> .....	7
Causal Modeling in Environmental Health <i>Marie-Abèle Bind</i> .....	23
Making Health Research Matter: A Call to Increase Attention to External Validity <i>Amy G. Huebschmann, Ian M. Leavitt, and Russell E. Glasgow</i> .....	45

## Epidemiology and Biostatistics

Introduction to the Symposium: Causal Inference and Public Health <i>Allison E. Aiello and Lawrence W. Green</i> .....	1
Commentary: Causal Inference for Social Exposures <i>Jay S. Kaufman</i> .....	7
Causal Modeling in Environmental Health <i>Marie-Abèle Bind</i> .....	23
Making Health Research Matter: A Call to Increase Attention to External Validity <i>Amy G. Huebschmann, Ian M. Leavitt, and Russell E. Glasgow</i> .....	45
Causes and Patterns of Dementia: An Update in the Era of Redefining Alzheimer's Disease <i>Bryan D. James and David A. Bennett</i> .....	65
Earth Observation: Investigating Noncommunicable Diseases from Space <i>Peng Jia, Alfred Stein, Peter James, Ross C. Brownson, Tong Wu, Qian Xiao, Limin Wang, Clive E. Sabel, and Youfa Wang</i> .....	85
Racism and Health: Evidence and Needed Research <i>David R. Williams, Jourdyn A. Lawrence, and Brigitte A. Davis</i> .....	105

## Social Environment and Behavior

Making Health Research Matter: A Call to Increase Attention to External Validity <i>Amy G. Huebschmann, Ian M. Leavitt, and Russell E. Glasgow</i> .....	45
Interventions to Support Behavioral Self-Management of Chronic Diseases <i>John P. Allegrante, Martin T. Wells, and Janey C. Peterson</i> .....	127
Policies of Exclusion: Implications for the Health of Immigrants and Their Children <i>Krista M. Perreira and Juan M. Pedroza</i> .....	147
Television News Coverage of Public Health Issues and Implications for Public Health Policy and Practice <i>Sarah E. Gollust, Erika Franklin Fowler, and Jeff Niederdeppe</i> .....	167
The Use of Excise Taxes to Reduce Tobacco, Alcohol, and Sugary Beverage Consumption <i>Frank J. Chaloupka, Lisa M. Powell, and Kenneth E. Warner</i> .....	187

## Environmental and Occupational Health

Causal Modeling in Environmental Health <i>Marie-Abèle Bind</i> .....	23
Ambient Air Pollution, Noise, and Late-Life Cognitive Decline and Dementia Risk <i>Kimberly C. Paul, Mary Haan, Elizabeth Rose Mayeda, and Beate R. Ritz</i> .....	203
Brain and Salivary Gland Tumors and Mobile Phone Use: Evaluating the Evidence from Various Epidemiological Study Designs <i>Martin Röösli, Susanna Lagorio, Minouk J. Schoemaker, Joachim Schütz, and Maria Feychting</i> .....	221
Environmental Exposures and Depression: Biological Mechanisms and Epidemiological Evidence <i>Matilda van den Bosch and Andreas Meyer-Lindenberg</i> .....	239
Global Environmental Change and Noncommunicable Disease Risks <i>Howard Frumkin and Andy Haines</i> .....	261
Hazardous Air Pollutants Associated with Upstream Oil and Natural Gas Development: A Critical Synthesis of Current Peer-Reviewed Literature <i>Diane A. Garcia-Gonzales, Seth B.C. Shonkoff, Jake Hays, and Michael Jerrett</i> .....	283

Health Impact Assessment of Transportation Projects and Policies: Living Up to Aims of Advancing Population Health and Health Equity? <i>Brian L. Cole, Kara E. MacLeod, and Raenita Spriggs</i> .....	305
---	-----

## Public Health Practice and Policy

The Use of Excise Taxes to Reduce Tobacco, Alcohol, and Sugary Beverage Consumption <i>Frank J. Chaloupka, Lisa M. Powell, and Kenneth E. Warner</i> .....	187
Aligning Programs and Policies to Support Food Security and Public Health Goals in the United States <i>Hilary K. Seligman and Seth A. Berkowitz</i> .....	319
Happiness and Health <i>Andrew Steptoe</i> .....	339
Realist Synthesis for Public Health: Building an Ontologically Deep Understanding of How Programs Work, For Whom, and In Which Contexts <i>Justin Jagosh</i> .....	361
The Economic Case for the Prevention of Mental Illness <i>David McDaid, A-La Park, and Kristian Wahlbeck</i> .....	373
The Next Generation of Diabetes Translation: A Path to Health Equity <i>Debra Haire-Joshu and Felicia Hill-Briggs</i> .....	391

## Health Services

High-Deductible Health Plans and Prevention <i>Olena Mazurenko, Melinda J.B. Buntin, and Nir Menachemi</i> .....	411
Innovations in Mixed Methods Evaluations <i>Lawrence A. Palinkas, Sapna J. Mendon, and Alison B. Hamilton</i> .....	423
School Health as a Strategy to Improve Both Public Health and Education <i>Lloyd J. Kolbe</i> .....	443
Solving Homelessness from a Complex Systems Perspective: Insights for Prevention Responses <i>Patrick J. Fowler, Peter S. Hovmand, Katherine E. Marcal, and Sanmay Das</i> .....	465

The Digitization of Patient Care: A Review of the Effects of Electronic Health Records on Health Care Quality and Utilization <i>Hilal Atasoy, Brad N. Greenwood, and Jeffrey Scott McCullough</i> .....	487
---	-----

### Indexes

Cumulative Index of Contributing Authors, Volumes 31–40 .....	501
Cumulative Index of Article Titles, Volumes 31–40 .....	508

### Errata

An online log of corrections to *Annual Review of Public Health* articles may be found at <http://www.annualreviews.org/errata/publhealth>