School-Based **Physical Health Programs**

Survey of the Research: What We Know Works

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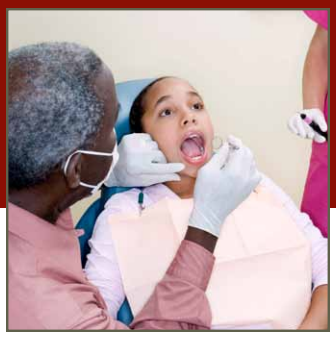
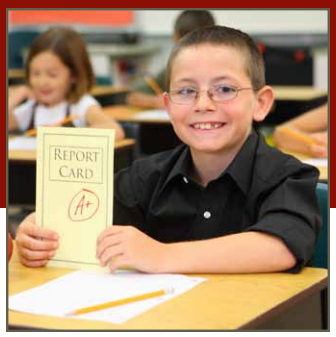
Contents



OVERVIEW

This review of research and evaluation studies seeks to identify effective school-based programs by student grade level (elementary school, middle school, and high school) found to improve student physical health outcomes (including BMI, fruit and vegetable consumption, physical activity, asthma management, and dental care), and where possible, academic and school outcomes (including student grades and school attendance). To the extent possible, this report draws upon experimental studies, the highest level of evidence available, while also drawing upon quasi-experimental studies and basic research studies to identify programming approaches.

Using the Centers for Disease Control and Prevention's Coordinated School Health Program model as a guide, we find that successful school-based physical health programs, in general, adopt a multi-component approach, regardless of the focus of the program. For example, among evaluated programs to improve physical activity, increase nutritional intake, increase access to dental exams, or improve asthma management, effective programs tend to adopt a multi-component approach, which often includes parents.

We also find that school-based physical health programs designed to improve student health outcomes often adopt health promotion strategies such as increasing physical activity and improved nutritional diet. These types of programs tend to be more prevention-focused among elementary school students, compared with middle school students and high school students. Among middle school- and high school-based programs, there appears to be an increased focus on developing more targeted interventions for students who are overweight, obese, or physically inactive.

Currently, there is little research assessing the link between physical health school-based programs and academic outcomes. Therefore, more research and evaluation are needed to assess this link. Nevertheless, despite scant evidence, some research suggests it is possible to improve student academic outcomes by developing programs to improve student physical health.

I. INTRODUCTION

Despite major advances in improving child and adolescent health outcomes over the past 100 years, today's children and adolescents are still faced with a number of serious health-related issues, many of which are chronic. Over the last decade, the percentage of children and adolescents (0-18 years) with asthma has remained steady at 9%,[1] making asthma one of the most common chronic illnesses among this age group.[2] In addition, over the last 30 years, the percentage of children (6-11 years) who are overweight or obese increased from 7% (1976-1980) to 19% (2003-2004); and in that same time frame, the percentage of adolescents (12-17 years) who are overweight or obese increased from 5% (1976-1980) to 17% (2003-2004).[3]

Additionally, 8% of children and adolescents (1-17 years) have teeth that are in fair or poor condition, and 22% of children and adolescents have not visited a dentist within the past year.[4] Unintentional injuries also factor into the lives of many children and adolescents, as motor vehicle traffic crashes are the leading cause of death for children and adolescents (1-17 years), and unintentional falls are the leading cause of nonfatal injuries for children and adolescents.[5]

As part of a healthy lifestyle, the *Dietary Guidelines for Americans* recommend consuming nutrient-dense foods from the basic food groups and restricting the consumption of saturated fat, transfat, cholesterol, added sugar, and salt; these guidelines also recommend engaging in daily physical activity.[6] Besides providing immediate health benefits, engaging in a healthy lifestyle during childhood and adolescence can help reduce the onset of chronic diseases in adulthood such as heart disease, which is the leading cause of death among adults.[7] However, the recommendations from the *Dietary Guidelines for Americans* are not being met among many of the nation's youth. According to the 2007 Youth Risk Behavior Surveillance System (BRFSS) survey of high school students, only 21% of high school students consumed five or more servings of fruits and vegetables during the past week; only 14% of students drank three or more glasses of milk during the past week; and yet 34% of students drank a glass, can, or bottle of non-diet soda in the past week.[8]

Many adolescents also are not engaging in regular physical activity. Approximately one-third of high school students (35%) were physically active, defined as engaging in any type of activity for a total of 60 minutes per day on five or more days during the past week.[9] In today's highly technological world, adolescents are often found in front of a television or computer screen. In fact, 25% of high school students played video or computer games, that were not school-related, for three or more hours per day on an average school day, and 35% of students watched television three or more hours per day on an average school day.[10]

Furthermore, adolescents engage in risky behaviors and activities that can have an impact on their current and future health status. More than one-quarter of high school students (26%) currently smoke cigarettes, cigars, or use smokeless tobacco products.[11] Tobacco consumption has been associated with various cancers, including lung cancer, as well as heart disease.[12] Additionally, more than one-tenth of high school students (11%) rarely or never wore a seatbelt while driving or riding in a car.[13] Among high school students who had ridden a bicycle within the past year, 85% rarely or never wore a bicycle helmet; and among high school students who had ridden a motorcycle during the past year, 34% rarely or never wore a motorcycle helmet.[14]

In sum, despite gains on many fronts, challenges remain; and research is underway to address remaining challenges.

An Association between Physical Health and Academic Outcomes

Another challenge for the US lies in the area of educational attainment and academic achievement. A substantial minority of US students drop out of high school at a time when post-secondary education has become critical to obtaining and retaining employment, while mastery of academic skills is necessary for obtaining a secure and well-paid job.[15]

Recently there has been a greater recognition that healthy children and adolescents make for healthy learners, as well as healthy adults later in life. Studies have

I. INTRODUCTION

linked various child and adolescent health conditions and behaviors with poor academic and school outcomes. For example, studies have consistently found children and adolescents with asthma and other chronic health conditions are more likely to miss school than children without asthma.[16] In fact, asthma is one of the leading reasons for school absenteeism.[17] Children with other types of chronic diseases such as diabetes are found to be at an academic disadvantage in terms of school attendance and academic performance.[18] Obesity has also been associated with poor academic performance and low school attendance, but the reasons for these findings are less well understood and more research is needed.[19]

There are, however, few evaluation studies assessing the effects of school-based physical health programs on academic outcomes, as the majority of these studies assess only health outcomes. However, some recent research has been conducted in this area. A number of recent research studies have examined the implementation of the Centers for Disease Control and Prevention's (CDC) Coordinated School Health Program (CSHP) model on academic outcomes. One study found that even when controlling for factors such as poverty, states adopting components of the CSHP model were met with academic success; specifically, there was a correlation between states with policies promoting student health and having both higher academic scores and high school completion.[20] Another study found there is promise for improved academic performance for schools adopting health services and nutrition services, in particular, from the CSHP model.[21] Additionally, a study of K-12 public schools in the state of Delaware found that schools with higher levels of implementation of the CSHP model had better school-level performance and progress.[22] However, for this study, implementing the CSHP model did not have an effect on specific content such as reading, math, and writing scores; although, over time, there were significant improvements in these areas.

A handful of reviews have also been conducted that specifically examined asthma, nutrition, and physical activity school-based programs and their academic outcomes. A review of school-based nutrition services found that there is some evidence indicating school breakfast programs may improve academic performance and cognitive functioning among severely undernourished students.[23] Another review found that there may be some short-term academic gains, such as improved concentration, from physical activity school-based programs, but there is less evidence of long-term academic gains from physical activity school-based programs.[24] And finally, there is, at best, only weak evidence that school-based asthma programs improve school attendance and academic performance; however, more research is needed.[25]

Coordinated School Physical Health Programs in Schools

As noted, the Centers for Disease Control and Prevention (CDC) developed a Coordinated School Health Program (CSHP) model. The CSHP model was developed to "integrate the activities and resources of education, health, and social service agencies to efficiently and effectively provide a full set of health programs and services."[26] This model comprises a network of eight components[27]:

- Health education
- Physical education
- Health services
- Nutrition services
- Counseling, psychological, and social services
- Healthy school environment
- Health promotion for staff
- Family/community involvement

Together, these components work to develop and reinforce health knowledge, skills, attitudes, and behaviors. As such, these components are linked into a web of mutual support.

Health education covers topics such as personal, family, community, mental, emotional, consumer, and environmental health, sexuality education, injury prevention and safety, nutrition, disease prevention, and substance use and abuse. By covering these topics, students are

equipped to improve or maintain health and reduce engaging in risky health behaviors.[28]

Through a variety of activities, **physical education** provides educational content and learning experiences. These activities include movement, physical fitness, dance, games, and sports. The educational content is used to promote student's physical, mental, emotional, and social development and promote activities students can continue to pursue well into adulthood.[29]

Health services help assess, preserve, and promote student health. These services include ensuring access or referrals to primary health care services, preventing and controlling the spread of communicable diseases and other health conditions, adopting and enforcing a safe school environment, and providing educational and counseling opportunities for promoting and maintaining individual, family, and community health.[30]

Nutrition services provide students with access to nutritious and appropriate meals as well as nutrition and health education.[31]

School-based **counseling and psychological services** are provided to students to improve their mental and emotional health. These services include individual and group assessments, interventions, and referrals for outside services.[32]

A **healthy school environment** includes not only the physical surroundings of the school but also the psychosocial atmosphere and culture of the school, all of which can have an impact on health. The physical environment includes exposures to chemical and other hazards (disinfectants and other cleaning supplies, dust, mold) as well as building conditions such as temperature, noise, and lighting. The psychological environment includes the physical, emotional, and social conditions of the school that may affect student and staff well-being.[33]

Health promotion is not solely for students. **Health promotion for staff** provides an opportunity for school staff to engage in activities that assess their health and teach them about health, heath behaviors, and provide them with fitness activities. Health promotion encourages staff to engage in a healthy lifestyle that will contribute to their own improved health and well-being, and will also create positive role modeling for students.[34]

A coordinated school health program model would not be complete without **family and community involvement** to enhance the health and well-being of students. Examples include school health advisory councils and coalitions, which can build support for school health programs. Schools can also seek out parent and community involvement to address and meet the health needs of students.[35]

Using the CSHP model as a guide, this report focused mainly on five of the eight components, including: health education, physical education, health services, nutrition and diet, and family/community involvement, as these components more directly address student physical health. Given the focus of physical health programs, this report does not address sexual, reproductive, substance use, or mental health, as these topic areas are often not included in school-based physical health programs.

II. METHODOLOGY

This report set out to identify evaluated school-based health programs and research studies that assessed student physical health and, where possible, academic and school outcomes. Programs and studies were identified using various search engines but especially Child Trends LINKS' (Lifecourse Interventions to Nurture Kids Successfully) database of experimental program evaluations as well as PubMed, which is a service of the US National Library of Medicine.

Inclusion criteria included peer-reviewed journal articles about programs that served elementary, middle, or high school students; occurred primarily in the school; and measured physical health outcomes (such as asthma, injuries, dental caries, or body mass index) or health behavior outcomes (such as physical activity or fruit and vegetable consumption) and/or academic and school outcomes (such as grade point average or school attendance). Additionally, programs could be either prevention or intervention, but had to be social, rather than medical, in approach to delivering services.

Many of the programs highlighted in this report employed an experimental evaluation, or random assignment, design. Experimental evaluations are considered the "gold standard" of evaluations, as they rely on a "lottery" system where participants are randomly assigned to either an intervention group that can receive program services or the control group that does not receive these services. The outcomes from these two groups are then compared. Experimental evaluations are the only type of study that can establish the intervention's outcomes were a result of the intervention.[36]

Quasi-experimental evaluations are similar to experimental evaluations, except for one key difference: quasi-experimental evaluations do not randomly assign participants to intervention and control groups. Quasi-experimental evaluations might compare outcomes for individuals receiving an intervention with outcomes for a similar group of individuals not receiving an intervention. This type of study also might compare outcomes for one group of individuals before and after the group's participation in a program such as a pre-test/post-test study design. Quasi-experimental studies can inform discussions of cause and effect, but are not able to definitively establish this link.[37] These types of program evaluation studies are more common within the school setting, as school administrators may not want to withhold an intervention from some students to comprise a comparison group.

While this report presents selected school-based health programs found to improve student physical health and where possible, academic and school outcomes, this report is not intended to serve as a compendium of all school-based health programs. The following programs were selected to be presented in this report because they are considered to be exemplars of school-based programs that improved student physical health, and where possible, academic outcomes; in fact, many of these programs have been highlighted in systematic reviews of student physical health programs that produced positive effects on student physical health. Additionally, programs were selected to be included in this report if published materials provided enough detailed information about the specific components of the program, which can then inform the development of future school-based health programs.

III. SCHOOL-BASED PHYSICAL HEALTH PROGRAMS BY STUDENT GRADE LEVEL

The following sections are organized by student grade level: elementary school (kindergarten through fifth grade), middle school (sixth through eighth grade), and high school (nine through twelfth grade). Each section begins with a brief overview of the 2006 state-level School Health Policies and Practices (SHPP) survey of school administrators, which was conducted by the Centers for Disease Control and Prevention (CDC) for all 50 states and the District of Columbia (DC). This overview serves to highlight school policies across the US in the areas of health education, physical education, health services, and nutrition. Following the policies overview, selected school-based health programs are highlighted to serve as examples of successful school-based physical health programs. Each section concludes with a summary of findings identifying themes and promising practices for school-based health programs.

Elementary School Students (K-5th Grade)

This section begins with findings from the 2006 state-level School Health Policies and Practices (SHPP) survey, as they relate to elementary schools for health education, physical education, nutrition services, and health services. The policies overview is then followed by a highlight of selected elementary school-based health programs found to improve student health outcomes, and where possible, academic and school outcomes. This section concludes with a summary of highlighted programs and a discussion of emerging themes and promising practices for elementary school-based health programs.

State-Level School Health Policies

Health Education

Findings from the School Health Policies and Practices (SHPP) survey indicate that many states require elementary schools to teach students about the following 14 health topics listed in the SHPP survey: alcohol and drug prevention, asthma awareness, emotional and mental health, food-borne illness prevention, HIV prevention, sexuality, injury prevention and safety, nutrition and dietary behavior, sexually transmitted infections prevention, physical activity and fitness, pregnancy prevention, suicide prevention, tobacco use prevention, and violence prevention. However, only three states require all of these 14 health topics to be addressed in elementary schools, and five states do not require any of these health topics to be covered in their health education curriculum for elementary school students.[38] As a result, there is a disparity in the types of health education elementary school children are receiving as part of their school curriculum.

Physical Education

A total of 41 states require elementary schools to teach students about physical education; however, more than one-half of these states have not defined a required amount of school time to be devoted to physical education in elementary schools.[39]

Health Services

States are more likely to require all schools to provide screenings for hearing problems (n=37) or vision problems (n=36) than to assess scoliosis (n=27), body mass index (n=11), or oral health (n=9).[40] While this information is not provided separately for each school level (i.e., elementary, middle, or high school), it suggests not all students are receiving necessary health screenings at school. In addition, most states do not require schools to provide other health services when needed such as sports physicals, dental sealants, crisis intervention, HIV counseling, or identifying emotional or behavioral disorders, among other needed services.[41]

Nutrition and Diet

Increasing access to healthy foods and restricting access to unhealthy foods and competitive foods in the school environment have become important issues in addressing obesity. As of 2006, only 24 states either require or recommend all of their schools make fruits or vegetables available whenever food is offered or sold, and 27 states either require or recommend that all of their schools make healthy beverages available such as bottled water

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or low-fat milk whenever beverages are offered or sold. However, for elementary schools, only 31 states require or recommend that elementary schools prohibit some student access to vending machines for their elementary school students.[42]

Elementary School-Based Programs Addressing Physical Health

A review of the literature found that more often than not, rigorously evaluated elementary school-based health programs addressed nutrition and physical activity in one form or another, including health education, physical education, nutrition and diet, and family involvement. Also, given the prevalence of dental caries and asthma among children, some elementary school-based health programs address these topics through health education and coordinating health care services.

Child and Adolescent Trial for Cardiovascular Health (CATCH)

The Child and Adolescent Trial for Cardiovascular Health (CATCH) program targeted elementary school children to increase physical activity and healthy eating behaviors, with the goal that they can adopt these behaviors in school and at home.[43] This program was delivered to an ethnically diverse group of students in multiple mid-western and east-coast states. CATCH adopted a multi-component approach, including: physical education, school food modifications, health education using classroom curricula, along with parent-child homework activities. The educational component used age-appropriate curricula, including Adventures of Hearty Health and Friends, Go for Health-4, and Go for Health-5. Classroom instructions spanned anywhere from five to eight weeks. Children were also given homework assignments to be completed with a parent. Family Fun Nights were used as a way to include parents and children in activities. As part of the physical education component of the program, teachers introduced students to the idea that physical activity is fun and enjoyable. And, finally, school cafeterias served low-fat, low-sodium meals to students. An experimental evaluation found better student dietary habits and healthy behaviors, and these findings persisted as students moved into middle school;[44] additionally, this program's findings have been replicated in another study, which primarily targeted Latino elementary school students.[45]

High 5

High 5 was a classroom curriculum designed to increase elementary school students' consumption of fruits and vegetables.[46] The majority of students participating in this program were white. This multi-component program included health education, parental involvement, and modifying the school food environment. Fourth grade students were taught the importance of consuming five daily servings of fruits and vegetables using 30-minute instructions spread over 14 sessions. The parent component included weekly parent-child homework assignments to be completed together. Parents were also provided with informational materials and recipes, including refrigerator magnets, to encourage healthy eating behaviors at home. Additionally, school food service managers and workers received trainings on purchasing, preparing, and promoting fruit and vegetable consumption in the school environment. An experimental evaluation found increased knowledge of recommended servings of fruits and vegetables, increased fruit and vegetable consumption, and increased nutritious meal consumption.

School Gardens

One quasi-experimental study provided not only nutrition education, but also hour-long, bi-weekly school gardening sessions, where second grade students planted seeds and maintained the school garden.[47] This program significantly improved students' nutrition knowledge as well as school-based dietary habits such as selecting more fruits and vegetables in the school cafeteria. While young children rarely have the opportunity to make their own food selections, this program suggests that, when children are given a variety of food options in the lunchroom setting, many will select fruits and vegetables.

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School-Based Health Centers

Providing school-based health centers creates a "captive audience" where students can receive on-site services or referrals for needed health care, especially for those without access to health insurance or health care providers. One quasi-experimental study examined the effects of elementary school-based health centers on improving student health outcomes and access to health care services.[48] This study comprised a largely Latino population, where many students received free or reduced-price lunches and did not have health insurance. Staffing at schools with a health center included a comprehensive network of service providers such as a full-time physician assistant and a part-time physician who provided preventive care; a full-time licensed counselor who provided necessary individual, group, or family counseling; a full-time community outreach worker who made home visits and organized health-related events such as health fairs; and a full-time health technician who managed the health center and provided student tracking and appointment scheduling. Services provided at these school-based health centers included more than just what was required by Colorado state law such as triage and screenings; these schools also provided mental health and dental services. This study found children with access to a school-based health center had significantly reduced difficulty in receiving health care for the treatment of illnesses and injuries, immunizations, and physical examinations, compared with students without access to a school-based health center. This study also found students with access to a school-based health center were more likely than those without such access to have had an annual dental examination and were less likely to have visited the emergency department.

ForsythKids

Dental caries are an often unrecognized childhood disease but can be prevented through routine dental examinations and dental care. ForsythKids, a multi-component program, included schools, dental care providers, and parents; this program was developed for elementary school children in first through third grade, who were primarily from lower-income families, to provide high quality dental care that was safe, effective, efficient, personalized, timely, and equitable.[49] As part of the dental examination, dental hygienists provided oral hygiene instruction, toothbrushes, and fluoride toothpaste to children. They also applied dental sealants to their teeth to prevent tooth decay. While this program did not take place within schools, schools were used to reach students and the school nurse contacted ForsythKids staff when a student had a dental emergency, which was then addressed by ForsythKids staff. A quasi-experimental evaluation found that, at the start of the program, nearly three-quarters of students had untreated tooth decay or fillings for their primary teeth, and nearly one-third of students had untreated tooth decay in their permanent teeth. However, six months after the intervention, tooth decay was reduced by one-half for students with their primary teeth and by one-third for students with their permanent teeth. Another program in which dentists volunteered their time to examine students' teeth at elementary schools, where at least 40% of students received free or reduce-priced lunches, also suggest it is possible to establish a link between schools and dentists to improve student dental health outcomes.[50]

Healthy Learners Asthma Initiative

Some school-based health programs have been developed to specifically address the prevalence of asthma among elementary school children. The Healthy Learners Asthma Initiative was born out of a partnership among schools, clinics, parents, and children with asthma.[51] Most of the students with asthma participating in this program were black and came from lower-income families. The primary goal of this program was to improve asthma management in the schools. As part of this program, an asthma coordinator and resource nurse were hired; school health nurses and other health staff were trained in asthma management; and clinics received staff training on asthma management national guidelines to implement standards of asthma care and develop asthma action plans. An experimental evaluation of the Healthy Learners Asthma Initiative found impacts on improved asthma-related management;

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however, there was no impact on school attendance.[52] Other research has also found, in general, a lack of an association between school-based asthma education and management programs and school attendance, particularly for this age group.[53,54,55]

Summary and Promising Practices for Elementary School-Based Physical Health Programs

The evaluated programs highlighted in this section were selected to serve as examples of effective approaches for delivering school-based health programs to elementary school students. More often than not, these elementary school-based health programs did not address physical health by relying solely on one approach. Some programs provided health education, physical education, and nutrition services; or they provided health education and physical education; or they provided health education and health services; most programs also included parents and some programs included health care providers.

One common theme emerging from these evaluated programs is that, while educating elementary school children about topics such as general health, asthma, nutrition, and physical activity are important, especially at a young age, education alone will not change behaviors and improve student health outcomes. Evaluated programs appearing to be successful at improving student health outcomes tend to rely on multiple approaches, indicating the importance of the Coordinated School Health Program model.

While multiple approaches were often adopted by health programs, another common theme emerging from the literature is the inclusion of parents; in fact, nearly all of the highlighted programs included parents. How parents were included in these programs differed, as some program activities invited parents to school functions, while other program activities provided parent-child homework assignments, among other activities.

Another theme surfacing from these evaluated programs was the adoption of classroom curricula as part of the health education instruction, particularly for areas of physical education and nutrition. Physical education and nutrition education programs often relied on a formal curriculum to deliver healthy lifestyle information and messages to elementary school students.

Many of the evaluated elementary school-based health programs promoted a healthy diet and physically active lifestyle through nutrition education, physical education, and/or school cafeteria food modifications; however, it appears that most elementary school-based programs focused on prevention rather than intervention strategies in addressing these areas. Highlighted programs, and other programs in the literature, seem to suggest elementary school-based health promotion programs include all children in their programs rather than targeting children who are obese, overweight, or physically inactive.

Of note among many of the evaluated obesity-related prevention strategies employed by a handful of health promotion programs included modifications to the school food environment. The success of this approach suggests that, when included with other program components, modifying the school food environment may be a promising practice for elementary school children. However, changing the school food environment has not always been met with successful nutritional outcomes or reduced BMI among elementary school children. For example, one experimental evaluation of an elementary school-based program, not highlighted in this report, did not improve nutritional behaviors or BMI, even though this program was multi-component and took place over a couple of years.[56] Yet, one research study using data from the Early Childhood Longitudinal Study-Kindergarten cohort found elementary-age children enrolled in schools with an administrative policy allowing sweetened beverages were significantly more likely to consume sweetened beverages than children enrolled in schools without such a policy.[57] Therefore, more research is needed in this area to assess the effects of modifying the school food environment on improving students' nutritional eating habits and BMI as well as academic and school outcomes.

A review of the literature suggests one approach that may not be effective in reducing obesity among elementary

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school children is the use of the BMI report card to communicate with parents their child's weight status.[58,59] For example, an experimental evaluation of one elementary school-based program employing this approach found the BMI report card did nothing more than inform parents of their children's weight status; this program did not change behaviors.[60] In fact, some researchers are concerned that using the BMI report card may lead to skipped meals and other unhealthy dieting behaviors; such behaviors among younger children, who have not completed puberty, may have an effect on growth.[61]

For those elementary school students with acute or chronic health conditions, including asthma, programs were developed to address these areas. The highlighted school-based programs suggest it is possible to provide health education and health services to children with health conditions or with limited access to health care. However, there is little available evidence that these health programs also improve student academic and school outcomes; therefore, more research is needed.

In fact, regardless of the program's focus, few program evaluation studies have examined the link between improving health outcomes and academic and school outcomes among elementary school students. For example, for the few physical activity programs that did assess this link, most programs do not appear to generally improve long-term achievement.[62] One research study using data from the Early Childhood Longitudinal Study Kindergarten Class found that elementary school girls enrolled in more than 70 hours of school-based physical education had higher achievement in mathematics and reading scores compared with girls who had lower amounts of physical education; however, physical education was not associated with academic achievement among boys.[63] A quasi-experimental program evaluation also produced similar findings, where there were academic improvements among elementary school girls but not boys.[64] In addition, Project SPARK (Sports, Play, and Active Recreation for Kids), was a school-based physical education program for fourth and fifth grade students, where students were given physical education instruction three times a week for 30 minutes each week to address health and skills fitness. The experimental evaluation of SPARK found that while the program was able to increase physical activity, there were generally few improvements on academic achievement.[65] As a result, more rigorous research is needed in this area to assess what health program components can improve student academic and school outcomes.

It is also important to note the dearth of rigorous evaluation studies for basic health screenings. It seems that screenings for visual, auditory, dental, and immunization issues would represent efficient ways to enhance both physical health and educational success. While many states require schools to provide students with, for example, vision screenings, referrals for follow-up services with appropriate health care providers remains an important barrier to improving student vision, especially among low-income students.[66] More research is needed to assess effective ways schools can screen students and ensure appropriate follow-up services are obtained.

Finally, another area in need of further research is injury prevention. Even though falls are the leading cause of nonfatal injury among young children,[67] few school-based programs address injury prevention, and none were found that produced positive impacts. For example, one experimentally evaluated bicycle safety program, Kids Can Bike, provided a two-hour safety skills instruction for elementary school children as part of a bicycle safety festival. At the conclusion, there were no impacts on knowledge, attitudes, or riding behaviors.[68] More research is needed to assess how to effectively teach children about injury and injury prevention.

Middle School Students (6th-8th Grade)

This section begins with findings from the 2006 state-level School Health Policies and Practices (SHPP) survey of school administrators, as they pertain to schools serving middle school students in areas of health education, physical education, nutrition services, and health services. The policies overview is then followed by a highlight of selected middle school-based programs that improved student health outcomes and where possible,

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academic and school outcomes. This section concludes with a summary of highlighted programs and a discussion of emerging themes and promising practices for middle school-based health programs.

State-Level School Health Policies

Health Education

According to the 2006 School Health Policies and Practices Survey, while many states require schools to cover a variety of health topics, ranging from asthma awareness to tobacco use prevention, only 10 states require their middle schools to cover all health topics for their students, and seven states do not require any of these health topics to be covered for their middle school students.[69] As a result, not all middle school students are receiving similar information about a range of health topics.

Physical Education

In the U.S., 40 states require schools to teach middle school students about physical education, and only 17 states have set a recommended amount of time that should be used during the school day for physical education.[70]

Health Services

As noted earlier, states are more likely to require all of their schools to provide screenings for hearing problems (n=37) or vision problems (n=36) than to assess scoliosis (n=27), body mass index (n=11), or oral health (n=9).[71] While this information is not provided separately for each school level, it highlights differences in the types of school-based health screenings students receive. As a result, there is considerable variation in the school-based services and treatment available to students, including middle school students, across states.

Nutrition and Diet

As noted earlier, only 24 states either require or recommend that all of their schools make fruits or vegetables available whenever food is offered or sold, and 27 states either require or recommend all of their schools make healthy beverages available such as bottled water or low-fat milk whenever beverages are offered or sold. However, specific to middle schools, only 28 states require or recommend middle schools prohibit some student access to vending machines for their students.[72]

Middle School-Based Programs Addressing Physical Health

A review of the literature revealed that, in many cases, school-based physical health programs combined middle-school students either with elementary school students or high school students in their service delivery. However, the programs identified, below, focused primarily on middle school students. Among this student population, most school-based health programs were designed to improve physical activity and nutritional intake either through prevention or intervention strategies. Despite the obesity focus of many programs, some middle school-based programs have been developed to address body dissatisfaction as well.

School-Based Exercise and Education Program

This multi-component school-based program targeted middle school students by combining exercise with health education to improve blood pressure and reduce body fat.[73] Program services were delivered to a student population where nearly two-thirds were white, one-quarter were black, and approximately three-quarters of students were from lower- or moderate-income households. The exercise component of the program included student participation in 30 minutes of aerobic exercise three days a week for a total of eight weeks. Aerobic exercise included various lifestyle activities such as soccer, basketball, and strength and endurance training. These program sessions took place during students' regularly scheduled physical education classes and differed from the standard physical education curriculum, as program sessions focused on aerobic exercise rather than skill building. The education component of the program included curriculum-based instruction on the risks associated with smoking and the health benefits of participating in exercise and physical activities. Similar to the exercise component, the curriculum-based instruction

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component was presented to students over an eight-week period, with two classes per week. An experimental evaluation found short-term impacts on lowered blood pressure and aerobic power. While there was no impact on reduced BMI, there was an impact on reduced skinfold thickness.

EatFit

EatFit, a nutrition education program, was designed to improve dietary and physical activity skills and behaviors among adolescents 11 to 15 years of age.[74] This school-based program was divided into three components: workbook; web-based assessment; and teacher-led classroom curriculum. Each student received a 20-page workbook that provided information, worksheets, quizzes, and games. The web-based assessment assisted students in their own personalized diet assessment, where students recorded their 24-hour diet, established personal goals, and received personalized feedback. The curriculum included nine experiential lessons teaching students skills, practice behaviors, and goal performance feedback. Dietary topics included: dietary and physical activity goal setting, reading food labels, eating at fast-food restaurants, learning about physical activities, and understanding media influence. A small quasi-experimental evaluation assessed the short-term benefits of this program on student academic performance and found improvements in listening and speaking, mathematical reasoning, and algebra; but there were no improvements in understanding and calculating statistics (such as mean, median, and mode).[75]

Lifestyle-Focused Physical Activity Program

This school-based program specifically targeted 12-year-old children who were at or above the 95th percentile for body mass index (BMI) by age; this program was delivered to a rural student population.[76] This multi-component program was designed to increase physical activity, reduce BMI, improve fasting insulin, and improve glucose levels by providing nutritional education and physical activity. The nutritional education component provided students with information and materials derived from the Food Guide Pyramid's recommendations for healthy eating. The physical activity component was delivered to students during their regularly scheduled physical education classes. During these physical activity sessions, less emphasis was placed on competitive games; instead, students were encouraged to participate in lifestyle activities such as walking and bicycling. These classes were tailored to each student's skills. The intervention was implemented five times every two weeks in 45-minute sessions over a nine-month period. An experimental evaluation found decreased body fat, increased cardiovascular fitness and maximum oxygen consumption, and improvements in insulin and glucose levels.

Weight Management Program for Mexican-American Children

Given the prevalence of overweight and obesity among Mexican-American children, this multi-component school-based program was developed to improve weight loss as well as quality of life for sixth- and seventh-grade Mexican-American children whose body mass index (BMI) placed them at or above the 85th percentile for their age.[77] Children participating in this instructor-led intervention received one nutrition class and four physical activity classes weekly for a duration of 12 weeks; English was the primary language used to deliver these instructions. Children also learned behavioral strategies to increase healthy behaviors; these strategies included self-monitoring, goal setting, and controlling environmental cues. Children were offered monthly evening parent training sessions as well. After the 12-week intensive phase of the intervention, monthly booster sessions were provided to children. An experimental evaluation found reduced BMI and improved physical quality of life; there were no improvements on psychosocial quality of life, though.

5-2-1 Go!

Many physical activity programs have targeted, either directly or indirectly, young adolescent girls, as girls have been found to be less likely than boys to engage in physical activity.[78] Planet Health, a school-based program targeting middle-school students, provided curriculum-based instruction about decreasing sedentary behaviors

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and increasing healthy eating.[79] While an experimental evaluation of this program did not reduce BMI or fruit and vegetable consumption for all students, there were impacts on reduced television viewing, reduced BMI, and increased fruit and vegetable consumption among girls only; additionally, and unexpectedly, girls enrolled in Plant Health were less likely to report weight control behavior disorders.[80] Given these latter findings, the 5-2-1 Go! program was developed to further assess the impact of the Plant Health program curriculum instruction, along with the School Health Index for Physical Activity and Healthy Eating, on weight control behavior disorders among middle school girls and boys.[81] More specifically, the Planet Health curriculum used in the 5-2-1 Go! program provided students with health messages addressing physical activity, television viewing, and consumption of fruits, vegetables, and fats; these messages were incorporated into students' classes such as mathematics, science, and physical education classes. The School Health Index, a self-assessment guide to examine personal physical activity and nutrition policies and programs, included multiple modules to help schools address nutrition and physical activity throughout their school day such as physical education, school polices, and the school environment. This multi-component program was implemented for a duration of two years—sixth through seventh grade, where more than 80% of students were white and approximately one-third of students had a BMI placing them at the 85th percentile or greater. An experimental evaluation of the 5-2-1 Go! program found an impact on fewer girls reporting engaging in disordered weight-control behaviors such as using diet pills and engaging in purging behaviors; there were no differences for boys, though.

Staying Healthy—Asthma Responsible and Prepared (SHARP)

While younger children are more likely than adolescents to have asthma-related emergency department visits and hospitalizations, adolescents are more likely than younger children to have frequent exacerbations of asthma and to have more near-fatal asthma episodes.[82] Despite the dangers of asthma among middle-school adolescents, few programs target this age group, particularly those with an evaluated experimental design. The Staying Healthy—Asthma Responsible and Prepared (SHARP) program was developed specifically for middle-school students with asthma who are in fourth through sixth grades; SHARP was a collaborative program between school staff and community asthma coalition members.[83] This program addressed cognitive, behavioral, and psychosocial aspects of asthma management that affect quality of life outcomes. There were two main components to the SHARP program—student and community. As part of the student component, students met for 50-minute sessions once a week; these 10 week sessions took place during school hours. As part of the community component, families, friends, and schoolteachers were invited by students to participate in activities during the early weekday or the weekend. Using the Acceptance of Asthma Model, children were taught how to accept their asthma as a chronic condition, which can promote long-term asthma management and health. An experimental evaluation found impacts on asthma knowledge, use of risk reduction behaviors, and participation in life activities.

Summary and Promising Practices for Middle School-Based Physical Health Programs

The evaluated programs presented in this section were chosen to serve as examples of effective approaches for delivering school-based health programs to middle school students. Similar to elementary school-based health programs, middle school-based health programs producing positive outcomes on student health also tended to adopt a multi-component approach to program service delivery such as coupling nutrition education with physical education. In fact, most programs targeting this age group focused on physical activity and/or nutrition education. Of note, few, if any, evaluated programs appeared to address issues such as dental health programs for middle school students. In addition, few evaluations focus on screening programs that identify health issues such as problems with vision and hearing. Since adequate sight and hearing are important to school success, such health screenings, plus referrals, represent an important but relatively non-researched opportunity.

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A review of the program evaluation literature revealed that, as students move into middle school, there appear to be more physical activity and nutrition programs designed for specific student populations; however, there were some evaluated programs that continued to be designed for all middle school students. Some programs, such as the School-Based Exercise and Education program, targeted all middle school students and improved both blood pressure and fitness but did not improve BMI; other programs such as the Weight Management program specifically targeted Mexican-American middle school students who were either overweight or obese and improved BMI and physical quality of life. While these programs both sought to reduce BMI as part of their program, the Weight Management program reduced BMI among overweight and obese Mexican-American children, and the School-based Exercise and Education program targeting all children did not reduce BMI. Other research has found that programs targeting overweight and obese children with multiple program components tend to be more successful in reducing BMI.[84]

One promising practice for physical activity programs targeting middle-school students may be providing activities that are non-competitive. Highlighted programs that improved students' physical activity behaviors tended to provide students with multiple options for physically active lifestyle activities such as bicycling or aerobic activities. These programs also tended to provide more tailored approaches to each student's interests.

While many obesity-related programs have been developed, and some have been highlighted in this report, it appears that middle school-based health programs also begin to address weight disorder behaviors, particularly for adolescent girls. There has been some concern that obesity prevention and intervention programs may have an unintended consequence among participants such as body dissatisfaction. However, the 5-2-1 Go! program was a multi-component program delivered to adolescent girls and boys, some of whom were overweight and obese at the start of the program. This multi-component program was able to reduce disordered weight-control behaviors among girls, but not boys. Other programs have produced similar results even when not delivered to overweight or obese students. For example, the experimentally evaluated multi-component program, Healthy School-Healthy Kids, targeted sixth and seventh grade students to reduce body dissatisfaction and weight teasing for all students and reduce weight-loss behaviors (girls) or excessive muscle-building behaviors (boys). This program reduced internalizations of media-based body ideals among all students and reduced disordered eating among adolescent girls; more specifically, this program appeared to be more successful among students who were classified as high risk. However, more research is needed to assess effective ways in which to reach adolescent boys, who demonstrate body dissatisfaction differently than girls, as adolescent boys tend to focus on bulking up with muscle while girls tend to focus on losing weight.[85]

Additionally, similar to elementary school-based programs, research suggests that sending children home with a BMI report card for their parents may not be an effective strategy in addressing obesity among middle school children.[86] For example, one program, designed for a middle school student population, found that overweight and obese children, especially girls, were uncomfortable with having their weight measurements taken and were more likely to engage in unhealthy dieting behaviors such as skipping meals.[87]

Taken together, these obesity-related programs suggest a promising practice for addressing obesity while not, inadvertently, increasing weight-disordered behaviors among adolescents may be to develop programs that promote a healthy lifestyle. Promoting a healthy lifestyle appears achievable through a multi-component approach of increasing physical activity and a healthy diet—and not specifically focusing on student weight or weight-loss, per se. This distinction may seem slight, but it may reap promising rewards for future programs. However, only additional research can assess if obesity and weight-loss programs have a detrimental effect on students' self-perception and weight-disordered behaviors.

Of course, not all middle school-based programs are

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focused on physical activity and nutrition. While few rigorously evaluated asthma school-based programs for middle-school students exist, these programs suggest it is possible to reach middle-school students with asthma to improve their health outcomes, as demonstrated by the SHARP program. A quasi-experimental evaluation of Kickin' Asthma,[88] another multi-component program, also has been able to improve quality of life indicators such as fewer night sleep disturbances and fewer emergency department visits among middle-school age students with asthma. These findings remain encouraging in that it is possible to continue to improve asthma-related outcomes for students with asthma in middle school, but a multi-component approach, including parents and school staff, appear to remain important.

Despite gains in health through middle school-based programs, few evaluated health programs assessed academic and school outcomes in addition to assessing health; as a result, more research is needed to assess the link between school health programs with health and academic outcomes such as improved academic grades and/or reduced school absences.

High School Students (9th-12th grade)

This section begins with findings from the 2006 state-level School Health Policies and Practices (SHPP) survey of school administrators, as they relate to schools serving high school students in areas of health education, physical education, nutrition services, and health services. The policies overview is then followed by a highlight of selected high school-based programs found to improve student health outcomes, and where possible, academic and school outcomes. This section concludes with a summary of highlighted programs and a discussion of emerging themes and promising practices for high school-based health programs.

State-Level School Health Policies

Health Education

According to the School Health Policies and Practices (SHPP) survey, many states require schools to teach students about a range of health topics listed in the SHPP survey such as alcohol and drug prevention, emotional and mental health, sexuality, injury prevention and safety, among other areas. However, only 11 states require their high schools to address all health topics and six states do not require any health topic to be covered in their health education curriculum for high school students.[89] As a result, high school students across the US are not consistently receiving a variety of health information as part of their school curriculum.

Physical Education

A total of 44 states require high schools to teach students about physical education, and 32 states have established a required amount of time that should be devoted to physical education during the school day for high school students. Greater numbers of high schools, compared with elementary and middle schools, require physical education and have established a required amount of time that should be set aside for physical education.[90]

Health Services

As noted earlier, states are more likely to require all of their schools to provide screenings for hearing problems (n=37) or vision problems (n=36) than to assess scoliosis (n=27), body mass index (n=11), or oral health (n=9).[91] Again, while this information is not provided separately for each school level, this information suggests students, including high school students, are not receiving all necessary health screenings while at school.

Nutrition and Diet

As noted earlier, only 24 states either require or recommend all of their schools make fruits or vegetables available whenever food is offered or sold, and 27 states either require or recommend all of their schools make healthy beverages available such as bottled water or low-fat milk whenever beverages are offered or sold. However, specific to high schools, only 28 states require or recommend high schools prohibit some student access to vending machines.[92]

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High School-Based Programs Addressing Physical Health

A review of the literature on evaluated school-based programs that target high school students indicates that programs for this age group more often address sexual, reproductive, and/or mental health along with substance use. However, as previously noted, these areas are not included in this report of physical health programs. Nevertheless, some high school-based programs continue to address physical health and healthy behaviors through improved physical activity and nutrition; more specifically, some programs have been developed targeting adolescent girls or adolescent boys.

Stanford Adolescent Heart Health Program

Stanford Adolescent Heart Health Program, a cardiovascular disease risk reduction program, was designed for tenth grade students, where 69% of participants were white, 2% were black, and 13% were Asian.[93] Using the Stanford Adolescent Heart Health curriculum, self-regulatory skills, self-efficacy, and social pressure resistance skills were emphasized throughout the program. The curriculum comprised 16 classroom sessions, each spanning approximately 50 minutes, and contains five component modules: tobacco use prevention/cessation, physical activity, nutrition, stress and coping, and personal problem solving. Each of the five modules provided students with information on the effects of health behaviors; cognitive and behavioral skills that can enable them to change personal behavior; specific skills for resisting negative social influences; and practices in using skills to improve performance. An experimental evaluation found improved regular exercise, improved heart rate, intentions to select healthy foods, and reduced BMI and skinfold thickness.

Gimme 5: High School

This program was designed for high school students and began when students were enrolled in ninth grade and continued for three years. This multi-component program included a mass media campaign, workshop sessions, school food modification, and parents.[94] The media campaign was the primary strategy to promote awareness and positive attitudes towards fruit and vegetable consumption; the campaign comprised monthly promotions of individual fruits and vegetables and was accompanied by nutritional messages, along with monthly taste-testings, contests, posters, and cafeteria displays. The workshop sessions, each lasting 55 minutes, were facilitated by the use of a curriculum and addressed knowledge, attitudes, and skills. The cafeterias increased availability and variety of fruits and vegetables. Coupons and brochures were sent to parents as well as taste-testing recipes and food tips. An experimental evaluation found improvements in fruit and vegetable consumption during the first and second year of the intervention, but not for the third year of the intervention.

Lifestyle Education for Activity Program (LEAP)

As adolescent girls continue to lag behind adolescent boys in physically active behaviors, some school-based physical activity programs have been developed that specifically target adolescent girls. Lifestyle Education for Activity Program (LEAP), a multi-component school-based program, was designed to alter school instructional practices to increase support for physical activity among incoming freshman high school girls.[95] Approximately one-half of participants were white and one-half were black. Six components of the Coordinated School Health Program model guided the development of LEAP, including: physical education, health education, school environment, school health services, faculty/staff health promotion, and family/community involvement. There were two primary components to LEAP—instructional and environmental. The instructional component sought to improve physical activity self-efficacy and enjoyment; teach physical and behavioral skills; and engage girls in moderate-to-vigorous physical activity during physical education classes. Physical education included girl-friendly, choice-based programs designed to build activity skills and reinforce participation in physical activity, both inside and outside of school. Activities typically enjoyed by girls such as aerobics, dance, walking, self-defense, martial arts, and weight training were offered in addition to more traditional competi-

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tive sports and other activities. LEAP health education lessons taught girls about the necessary skills for adopting and maintaining a physically active lifestyle. The environment component was designed to create a school environment supporting physical activity among girls. These activities included role modeling by faculty and staff, promoting physical activity by the school nurse, and family- and community-based activities. An experimental evaluation found an impact on increased regular vigorous physical activity such as engaging in physical activities for 30 or more minutes; however, there was no impact on reduced body mass index (BMI).

Project FAB

Project FAB, a high school-based program, specifically targeted sedentary adolescent girls in 10th or 11th grade, and was adapted from the Project GRAD program for college students.[96] Among the adolescent girls participating in the program, one-half (53%) were white, 29% were Hispanic, and 8% were Asian; no boys were included in the program. As part of Project FAB, girls enrolled in a special physical education class, where they met five days a week for approximately 60 minutes per day. Activities included aerobic dance, basketball, swimming, and Tae Bo. In addition, once a week students received a lecture that highlighted the health benefits of physical activity and provided strategies for becoming more physically active. Targets for modification included self-efficacy, social support, perceived barriers, perceived benefits, and enjoyment of exercise, and strategies for change included self-monitoring, goal setting, and problem solving. An experimental evaluation found impacts on cardiovascular fitness, engaging in lifestyle activities such as walking up stairs rather than taking an elevator, and engaging in light, moderate, and hard physical activity; however, there were no impacts on BMI or body fat.

Adolescent Training and Learning to Avoid Steroids (ATLAS)

The ATLAS program was specifically developed for high school athletic boys to lower the use of anabolic steroids. This multi-component program included education sessions, weight-training sessions, and also included parents. Using a curriculum, the educational component included seven small-group classroom sessions, each lasting 45 minutes, which were led by coaches and peer educators; these sessions were used to deliver anti-steroid messages and addressed strength training and nutrition as well as risk factors for steroid use. Students were also encouraged to practice and role-play steroid refusal skills. Weight-training sessions demonstrated weight-lifting techniques and reinforced other elements covered in the classroom curriculum. Parents were provided with a description of the program as well as its goals. An experimental evaluation of the program found short-term impacts on increased intentions to reduce steroid use as well as steroid use. By one year after the intervention, however, there were no differences in steroid use; however, there were impacts on improved nutrition.

School-Based Health Clinics

While few studies assess the academic outcomes of school-based health clinics, one recent quasi-experimental study examined the relationship between high school-based health clinics and academic achievement.[97] For this study in Seattle, Washington, students using school-based health clinics were more likely than non-users to be female, black or Native American, receiving a free school lunch, and to be enrolled in special education classes. The study examined students receiving mental health services and medical services. Over the five semester study period, there was a greater rate of school attendance among all students using school-based health clinics compared with non-users; there were no changes in attendance among students specifically using mental health services. Additionally, there was a greater rate of increasing grade point average (GPA) among all students using school-based health clinics compared with non-users. More specifically, students using mental health school-based services experienced a greater rate of increase in their GPA, while this finding was not the case for students using medical school-based services.

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Summary and Promising Practices for High School-Based Physical Health Programs

The evaluated programs presented in this section were identified as examples of effective approaches for delivering school-based health programs to high school students. Similar to elementary and middle school-based physical health programs, rigorously evaluated high school-based health programs have adopted a multi-component approach, and these programs have tended to produce positive health outcomes among high school students. Also similar was the primary focus on improving physical activity and nutrition education among students, particularly adolescent girls.

These findings suggest it remains possible to improve the nutritional diet of students, even those in high school, but a long-term, multi-component approach appears necessary. The Gimme 5 program for high school students was able to improve consumption of fruits and vegetables among students, but this program adopted multiple approaches and took place over the course of three years; however, as noted, this program did not sustain improved fruit and vegetable intake by the third year. As a result, more research will be needed as to how to continuously improve nutritional intake among students throughout their high school years.

A common theme among the highlighted physical activity programs, in addition to the fact that they were multi-component, was the focus on providing non-competitive sporting activities such as aerobics. Similar to middle school-based programs, this finding may represent a promising practice to improve students', particularly adolescent girls', physically active behaviors. For example, both LEAP and Project FAB, which targeted adolescent girls, provided varied options of physical activities for improving health and fitness—such as aerobic, swimming, bicycling, and other activities that are less competitive in nature. Despite the fact that Project FAB specifically targeted sedentary adolescent girls while LEAP targeted all adolescent girls, these programs suggest a promising practice for reaching girls to improve their physically active behaviors may be to provide them with a variety of "girl-friendly" activities.

However, while physical activity programs were able to improve physically active behaviors among adolescent girls, these programs were not able to reduce body fat or BMI. In fact, reducing student weight, regardless of gender, has proven difficult for school-based programs[98] and more research will be needed in this area. Nevertheless, the Stanford Adolescent Heart Health Program stands out as one program that was able to reduce BMI among all students. Additionally, more research will be needed to assess what program components are effective in reaching high school boys to improve physically active behaviors.

While some non-competitive physical activities such as bicycling were promoted by evaluated programs, it is rare to find injury prevention messages delivered to a student population, particularly a high school student population. Riding a bicycle can provide many health benefits; and yet, serious injury can result. The impact of many bicycle-related injuries can be reduced through proper use of a bicycle helmet. Few programs, however, exist in this area. Nevertheless, one school-based bicycle prevention program, Skills for Preventing Injury in Youth, was designed for ninth grade students and was able to reduce riding a bicycle without a helmet. While more research is needed, this research study suggests it is possible to reach high school students with injury prevention messages.

For many, high school represents a rite of passage to begin the process of learning how to drive; however, given that motor vehicle traffic crashes are the leading cause of death among adolescents, some school-based programs have been developed to address driving behaviors such as drinking and driving or riding with drivers who have been drinking. One review of the literature found some evidence to suggest that school-based instruction can be effective in reducing the number of teens who ride with a driver who had been drinking but more research is needed to assess whether such programs can have an effect on drunk driving among teens.[99] Additionally, one small quasi-experimental study found schools that adopted a seatbelt use policy as a way of maintaining school parking privileges were able to increase use of

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seatbelts.[100] More research is needed in this area, with larger sample sizes; however, this finding suggests that encouraging schools to adopt injury prevention policies, such as seatbelt use, may be one promising practice.

Compared with elementary school students, it appears there is less focus on improving access to health care services such as dental care within high school. However, as noted with the school-based clinic program in Seattle, such school-based health clinics exist for the high school student population and provide needed services. In fact, this program was able to improve academic outcomes. Also, there have been studies assessing improving immunizations among high school students, especially given that there are new licenses for immunizations among this student population, including human papilloma virus (HVP). One research study found that within school-based health centers, students were receiving vaccinations.[101] And others have noted that in order to effectively reach students for immunizations, a coordinated effort including schools and parents is needed.[102]

IV. CONCLUSIONS AND IMPLICATIONS

Most of the rigorously evaluated physical health programs highlighted in this report incorporated at least two or more components of the Coordinated School Health Program model. A common theme running throughout school-based health programs has been a focus on promoting good physical health. Generally, health promotion programming has been delivered to students to improve physical activity and nutrition through targeted health education instruction and physical activities tailored to students' interests, as well as including parents and trying to change the school environment. To a lesser extent, health promotion also occurs in the form of dental sealants and examinations, injury prevention messages and policies, and chronic disease education. However, these health areas were not consistently and equally addressed throughout students' schooling in terms of programs and/or policies; there appears to be a greater range of physical health program services for elementary school students compared with high school students. Because cardiovascular disease is the leading cause of death among adults, it is not surprising that the majority of school-based health programs focus on improving physical activity and nutrition; nevertheless, all of these health areas are important throughout the lifecourse of infancy, childhood, adolescences, and adulthood and could be addressed through students' schooling. Developing programs specifically targeting younger children does not mean that, as they age, they will continue to adopt healthy behaviors;[103] these health promotion messages, such as good nutrition and physical activity, will need to be reinforced throughout the lifecourse.

Surprisingly little evaluation has focused on screening interventions. Screening for vision, hearing, dental and other issues is often mandated, which seems relatively manageable in a school setting, and could be highly relevant to school success; therefore, the lack of evaluations on the effectiveness of this approach seems to be a critical gap.

Most rigorously evaluated school-based health programs sought to address the issue of obesity in one form or another such as physical activity and nutrition. As researchers have suggested, little is known about whether physical inactivity, poor nutritional intake, or both factors equally contribute to childhood obesity;[104] however, school-based health programs may want to consider relying on a multi-component approach, especially given that most schools are already equipped to provide physical education and nutritional education services to students. Also, schools may want to focus on a healthy lifestyle approach for all students, rather than target specific student populations.

While most school-based programs were focused on promoting good physical health and healthy lifestyles, other programs highlighted in this report provided specific health services such as school-based health centers, and more specifically, dental care and asthma management. These programs also were often delivered through a multi-component approach that involved the student as well as family and school staff and were often met with success in improved student health. However, there is little research on the academic and school outcomes of these students, and more research is needed.

Additionally, injury prevention was less often addressed, especially among middle school students; however, motor vehicle crash prevention programming was, not surprisingly, more common among high school students. More research is needed to assess the effects of injury prevention programs, particularly for school attendance.

In fact, one common theme throughout this report is the lack of academic outcomes among the outcomes assessed in the evaluations of school-based health programs; more research will be needed to assess the academic and school benefits of improving student health. Based on available research, this link makes sense, but surprisingly few evaluation studies have assessed whether health services enhance academic outcomes. Improved student health may have an indirect effect on academic outcomes, including improved self-esteem or concentration. However, without rigorous program evaluation studies assessing school-based health programs on academic and school outcomes, researchers, policymakers, and program planners will have few op-

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tions on which to rely when developing and advocating for school-based health programs.

Based on the review of evaluated school-based physical health programs, a number of take-away conclusions can be drawn:

- There is considerable research evidence to suggest that students in good physical health perform better in school and have better school attendance, compared with students who are not in good physical health.
- Many states have adopted school policies that address student health through health education, nutrition services, physical education, and some screenings. Another School Health Policies and Practices survey is expected in 2012, which will allow for the continued tracking of school-based policies and practices as they related to student physical health.
- Surprisingly few school-based interventions that address student health have been rigorously evaluated. Moreover, we have found no programs that address risk factors (such as poverty) and protective factors (such as family) for student physical health that have been rigorously evaluated in a systematic way.
- A range of health programs and services are offered to elementary school students, but there are, in general, fewer comprehensive physical health and screening programs offered to high school students. Although mental health, pregnancy prevention, sexual and reproductive health, and substance use program were not examined for this report, it appears that physical health programs were replaced with programs to reduce risky behaviors among high school students.
- School-based evaluation studies that examine physical health outcomes typically do not also assess academic outcomes. Because basic research studies have found that health is associated with educational success and academic attainment, more rigorous evaluations of school-based health interventions that assess academic outcomes are needed.

In conclusion, Table 1, below, presents a list of options that schools administrators can adopt to help improve student physical health. These options include adopting healthier food choices during lunch time, providing opportunities to engage in physical activity, providing annual screenings and appropriate referrals for those students who screen for a particular health problem. Other options include having parents provide basic contact information, health insurance information, healthcare provider information, as well as signed release forms. Such information can facilitate in efficiently and effectively handling emergency situations during school hours. Additionally, there are other options that school administrators may want to avoid such as denying students physical education or recess time as punishment for bad behavior and using high-calorie and high-fat foods as rewards for good behavior.

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Table 1. Actions schools can adopt, and avoid, to improve student physical health

ACTIONS SCHOOLS CAN ADOPT	ACTIONS SCHOOLS CAN AVOID
Ensure cafeterias substitute whole milk with low-fat/no-fat milk during lunch time	Avoid using high-calorie drinks and high-fat foods as rewards for good student behavior
Ensure cafeterias provide students with options for fruits and vegetables during lunch time	Avoid excluding students from physical education classes and/or recess as punishment for bad behavior
Restrict student access to vending machines during school hours	Do not assume that calculating student Body Mass Index and sending the BMI score home to parents or other caretakers will affect obesity.
Provide students with opportunities for physical activity during the school day such as physical education classes, lunchtime recess, or possibly after school hours	
Provide students with annual vision, dental, and hearing screenings	
Provide students with appropriate referrals for follow-up services among those who screen for vision, dental, or hearing problems	
Provide students with age-appropriate health information around a variety of topics such as healthy diet, physical activity, injury prevention, substance use prevention	
Prohibit tobacco use by middle- and high-school students and school faculty in and around school grounds	
Hire a school nurse/health practitioner to provide students with annual screenings and needed healthcare, especially for students with chronic health conditions (diabetes, asthma)	
Encourage parents to provide schools with contact information, insurance information, healthcare provider information, and signed release forms in cases of student emergencies	
Identify structural/building risks to student injury such as playground equipment and fencing	

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