School Contexts as Social Determinants of Child Health: Current Practices and Implications for Future Public Health Practice

Keng-Yen Huang, PhD, MPH[a]
Sabrina Cheng, BA[a]
Rachelle Theise, PsyD[a]

Public health literature suggests that population health is largely influenced by social determinants of health (SDH), defined as the complex interplay of social and economic systems, including the social and structural conditions in which people are born, grow, live, and work, as well as the systems that are designed to address people's health problems.[1–3] SDH include, but are not limited to, conditions for early childhood development, education, daily living environments, social networks, health services, and economic and social conditions of communities.[4] SDH are shaped by the level of income, power, and resources available at global, national, and local levels. Research suggests that SDH are responsible for most national and global health disparities and inequities,[3] commonly represented at higher incidence, prevalence, and burden of health problems in certain geographic regions and among racial/ethnic, socioeconomic, or gender groups.[5] The application of SDH to address health disparities in the United States is a relatively new approach that emerged in the early 2000s.[6] However, most of this work has focused on adults, with very little attention directed toward children.[7] Because health disparities often take root in early childhood and persist over time,[8,9] addressing health disparities and inequities though SDH must begin in childhood.

In the U.S., health disparities are likely to occur among racial/ethnic minority people because these populations are more likely to be in poverty, face stressors related to disadvantage, and live in communities with fewer resources. The environmental disadvantage accumulates and is likely to lead to experiences of greater social and economic obstacles to health.[8] Many racial/ethnic minority children experience multiple physical and mental health disparities, including higher likelihoods for suboptimal health status, obesity, asthma, behavioral problems, and emotional difficulties. These children are also more likely to attend schools with poorer quality environments and to have limited access to adequate care and services.[10–12] It is projected that racial/ethnic minority people will become the majority of the U.S. population in 2050 (comprising 60% of the population).[13] Because of the rapid population growth and the increasingly important role that children in racial/ethnic minority groups will play in the U.S. economy and civil society during the coming decades, focusing attention

[a]New York University Langone School of Medicine, New York University Child Study Center, New York, NY

Address correspondence to: Keng-Yen Huang, PhD, MPH, New York University Child Study Center, 1 Park Ave., 7th Fl., New York, NY 10016; tel. 212-263-4719; fax 212-263-2476; e-mail <huangk01@nyumc.org>.

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on early childhood disparities is a top priority and will require innovative approaches and partnerships to best address it.

Children spend a considerable amount of time in schools, and, therefore, schools can play a unique and important role in shaping children's health knowledge, attitudes, behaviors, and health outcomes. Studies have shown that children who enroll in poor-quality schools with fewer health resources, more violence, and a distressed school climate are more likely to set forth on a path toward worsened physical and mental health.[8,14,15] Because racial/ethnic minority students tend to be enrolled in poor-quality schools,[16] school determinants must be considered when working to eliminate child health disparities.

The goals of this article are to (*1*) highlight research findings about the domains of school determinants that impact children's physical and mental health, (*2*) provide an overview of existing public health practices that apply the school determinants approach in addressing inequality and health disparities in racial/ethnic minority children, and (*3*) provide suggestions for improving public health and school practices in addressing SDH. We synthesize literature from multiple disciplines, including school policies, education, prevention/intervention research, and environmental health. The article is not intended to be exhaustive but provides an overall picture illustrating ways that school determinants of health have been applied.

SCHOOL DETERMINANTS AND CHILD HEALTH

The Commission on Social Determinants of Health at the World Health Organization (WHO) suggests that a comprehensive SDH approach should include three sequences of research: (*1*) identification of the social determinants that contribute to inequities in health, (*2*) clarification of the mechanisms by which social determinants generate these inequities, and (*3*) documentation of the specific levels of intervention and policy entry points for action on SDH.[6] Guided by these suggestions, a comprehensive approach to SDH for children in school contexts will require identification of school determinants of child health (including understanding patterns of inequities in schools), understanding the mechanisms involved in the impact of school determinants on child health disparities, and applying findings to develop actions to improve upon SDH.

Here, we provide an overview of current research in defining school determinants of child health and evidence for the impact of school determinants on inequalities in child health. In identifying school determinants, we reviewed U.S. and international research, including several recent reviews and large-scale studies conducted by WHO and the Centers for Disease Control and Prevention (CDC)[16–21] that investigated school predictors for child health. After synthesizing the literature, we conceptualized school determinants into six domains:

- Physical and structural environment (e.g., activity space, physical safety, air quality, hazardous environments, and rural/urban location)
- Health policies (e.g., policies for health education and school safety)
- Health programs (e.g., nutrition, physical education, prevention/intervention, and health services)
- Health resources (e.g., availability of nurses, mental health professionals and physical specialists, and links between school and community health resources)
- School climate (e.g., violence/bullying, school norms, academic values, teacher-child relationships, and family-school connections)
- School composition (e.g., average pupils' socioeconomic status [SES], student and staff gender and racial/ethnic composition, and school size)

Studies conducted throughout different countries across the world have found significant associations between school determinants and child health.[20] Several studies have documented that poor school physical and structural environments (e.g., inadequate activity space, little access to athletic facilities, and high presence of tobacco smoke, radon, asbestos, and biological contaminants in the school building) are associated with poor physical health, especially for younger pupils.[22,23] High-quality school health programs that integrate comprehensive sets of courses, services, and practices that meet the health and safety needs of pupils can have positive impacts on child health behaviors (e.g., drug and tobacco use), physical health, and school functioning.[24–28] In addition, more school health resources (e.g., having nurses and physical specialists in schools) are associated with better child physical and mental health.[18,29,30] Interventions that promote a positive school climate (e.g., peer support, community involvement, and high expectations for pupils) can also be effective in reducing pupils' conduct problems and drug use, and in increasing achievement and sense of well-being.[17,24] Furthermore, school composition, such as high average of student SES and small school size, are associated with better mental health.[17,18,21] Overall, school-level determinants explain 4%–40%

of variance on pupils' health behaviors (e.g., smoking habits and alcohol use); school climate (e.g., relationships between teachers and pupils) explains 5%–8% of variance on pupils' well-being; student SES explains 12%–98% of variance on pupils' achievement; and school physical education and fitness programs explain about 10% of variance on child health.[17]

While the general relationship between school determinants and child health is well established, there is a significant dearth of evidence characterizing inequities of school determinants in children or investigating school predictors (e.g., environmental inequities) for child health disparities.[12,31] Although some international efforts (initiated by WHO) have been made to better understand patterns of inequality on children's SDH,[16,20] patterns and magnitude of inequity in the U.S. school system remain unclear. Based on the current school funding strategies, which rely heavily on state and district funding (40%–70% of school funding comes from state sources and 20%–50% comes from local sources) and depend on geographic location and school performance,[32] it would not be difficult to predict widespread inequalities. Furthermore, the recent U.S. economic decline may lead to future drastic budget cuts on school programs and school construction projects. The existing funding approach perpetuates inequities of school health resources, which likely has contributed to consistent child health disparities in the U.S.

PRACTICES IN APPLYING SCHOOL DETERMINANT APPROACHES TO ADDRESS CHILD HEALTH DISPARITIES

Many policies, programs, and strategies have been developed to improve school determinants and to promote U.S. children's health. There is also a substantial effort to integrate research findings into practice. This section provides an overview of existing practices in school settings by the domains of school determinants previously mentioned.

School health policies

School health policies guide the direction of school health activities, which impact pupils' health. In the U.S., there is a substantial effort to develop policies and guidelines for promoting pupils' health, but monitoring/surveillance data for policy implementation were not available until mid-2000, when CDC conducted the School Health Policies and Practices Study (SHPPS, formerly known as the School Health Policies and Programs Study) to review the state, district, school, and classroom level of school policies and health practices.[33] The 2006 SHPPS found that even though many policies have been in place, the adaptation of policies varies by state and by school, and schools do not necessarily comply with or implement the policies.[34] Specifically, most states (75%) had adopted a policy stating that schools would follow national or state health education recommendations in providing child health education. Fourteen health topics were suggested (alcohol/drug use, tobacco use, emotional/mental health, suicide, violence, personal health/wellness, human immunodeficiency virus, human sexuality, injury/safety, nutrition and dietary behavior, dental health, sexually transmitted disease, physical activity/fitness, and pregnancy). However, in practice, only 6% of states require elementary schools to provide health education on all 14 health topics, and 61% of states require the teaching of at least seven of the 14 health topics. Similarly, studies have shown that most states (71%) adopted a policy stating that districts or schools would follow national or state physical education standards, but few states actually implemented the policy, with only 12% of elementary schools providing students with regularly scheduled recess, and fewer than half of elementary schools (44%) requiring students to participate in regular physical activity breaks during the school day.[35] Furthermore, many schools allowed students to be exempt from participation.[36] Although policy adaptation and implementation improved approximately 10% from 2000 to 2006, concerns regarding the low rate of utilization of recommended policies remain.[35]

In addition to variations in policy compliance, school health policies were not developed from an SDH perspective; therefore, policies were not designed to address the inequalities of school determinants or health disparities in racial/ethnic minority children. For example, there is no public policy in place to dedicate more health resources or programming support to schools with inadequate resources or with high concentrations of racial/ethnic minority/low SES students. Additionally, many of these schools cannot implement policies because of lacking resources.[34] These inequalities have rarely been addressed in policy discussion and may partially explain the persistence of child health disparities.[8]

Furthermore, there are limited studies tracking the impact of school policies on child health and evaluating barriers for policy adaptation. Although some studies have suggested that school health policies (e.g., regarding nutrition) can impact pupils' health behaviors (e.g., food consumption during lunch),[37] the effectiveness of most school health policies on children's physical and mental health outcomes remains unclear. It is

also unknown whether schools with varying concentrations of SES or racial/ethnic minority children differ on school policy adaptation and implementation. Improved tracking and monitoring systems will likely help address these important SDH questions.

School health programs

The availability of health services and evidence-based school health programs is another important determinant for children's health. Research has documented a range of school-based health programs, including nutrition and healthy eating (e.g., consumption of food/drinks), obesity/weight control (e.g., physical activities, weight control, obesity, and body image), mental health/behavioral problems/psychological well-being (e.g., suicide prevention, fighting/bullying, conduct problems, and peer relationships), drug use (e.g., tobacco/alcohol/cannabis use), dental health, sexual behavior health, and safety/injury programs.[19,35] Several meta-analyses suggested that multicomponent school-based psychosocial programs can have positive effects on reducing aggression and disruptive behaviors, and promoting social-emotional competence.[24,26,38–40] Similarly, multicomponent school-based obesity prevention programs, which focus on physical activities, nutrition, and the school food environment, tend to be more effective in changing children's knowledge, health behaviors, and body mass index[41] than single-component programs (e.g., programs focusing on dietary intake, eating habits, school food environment, or physical activity alone).[42,43] Findings from this literature suggest that schools can act as important agents in efforts to decrease child health disparities.

Despite the fact that many promising evidence-based programs (EBPs) are available for schools, several gaps remain in programming/implementation practices. First, there is significant variability across schools regarding the type and number of programs offered. For example, most U.S. schools provide basic health services (e.g., height/weight measurements and hearing/eye tests), but fewer schools provide specialized health services for students.[35] In addition, not all schools provide health education or health services (e.g., 68% of schools provide some health education, 91% provide physical education, 77% provide mental health and social services, and 94% provide nutrition services). Most health programs in elementary schools focus on topics such as alcohol/drug use (77%), violence (86%), injury/safety (83%), nutrition/dietary behavior (85%), physical activity/fitness (79%), and tobacco use (76%); however, fewer focus on asthma awareness (45%) or emotional and mental health promotion (67%).[44] Additionally, there are no data tracking the number of programs (total, by categories, or by school characteristics) offered by schools.

Second, EBPs are not always available for high-need schools. High-need schools are often located in poor neighborhoods and lack the resources (e.g., time, funds, and staff) and community support (e.g., families) to implement EBPs.[20] Even when EBPs are offered, the quality of implementation is often unclear or not monitored. For example, within the field of substance use prevention, although multicomponent EBPs are available for schools, only 14% of schools nationwide applied this type of program,[45] and most of these schools (81%) did not implement the programs with fidelity.[46] Similarly, for nutrition services, while many schools sold healthful food and beverages outside of school meal programs, they simultaneously sold items high in fat, sodium, and added sugars,[47] suggesting inconsistencies in implementation that may contribute to limited impact of programs in high-need schools.

Third, most school-based EBPs in the U.S. were developed and tested on white people, and only a third of the studies were based on racial/ethnic minority and low-income families.[27,40] Therefore, there is still a lack of consistent evidence on the effectiveness of school health programs for racial/ethnic minority children.[42,43] Fourth, to our knowledge, no studies in our review applied an SDH perspective to track programming efforts in schools serving low SES families, located in poor neighborhoods, or with high proportions of racial/ethnic minority pupils. The level of programming inequality between low SES and high SES schools remains unclear. Fifth, few studies in our review examined the "dose" (i.e., the frequency and number) of school health programs. It is possible that the frequency and number of health programs provided have different impacts on child physical and mental health outcomes. To better utilize resources and provide more cost-effective programming, these gaps need to be addressed.

Health resources

Inequality in school resources can also result in disparities in children's health.[18,29] Although guidelines have been developed and communicated to school leadership teams, many schools in the U.S. still do not have adequate resources to meet pupils' health needs. For example, an estimated 36% of schools have a full-time school nurse, 78% have a part-time or full-time school counselor, 61% have a school psychologist, and 42% have a full- or part-time social worker.[44] With incomplete infrastructures, schools will be unable to meet the requirements of high-need students.

Regarding service-related resources, the 2006 SHPPS

revealed that only 6% of U.S. schools had a school-based health center that provided physical health services to students,[35] and only 14% delivered mental health and social services through school-based health centers.[48] Although schools have limited resources and capacities for providing many needed services, some schools have external connections and are able to provide referral services outside of schools when needed. Thirty-four percent of schools have arrangements with agencies, organizations, or health-care providers not located on school property to provide services to students when needed.[35] About half of all schools contract or make other arrangements with community-based organizations to provide mental health or social services to students.[48] Given that 10%–40% of U.S. children suffer from chronic physical illnesses,[49] 12%–30% suffer from mental health problems,[50,51] and 8%–25% of racial/ethnic minority children do not receive regular physical health checkups,[8] it seems quite important for schools to at least provide necessary referral services or linkage for pupils who are in need.

Physical environment

Several U.S. government agencies (e.g., Environmental Protection Agency and CDC) have developed practice guidelines for school environment and safety management, but these guidelines were not developed until the mid-2000s.[52–54] Although 43%–67% of states do not require annual inspections for the heating, ventilation, and air conditioning (HVAC) in schools, the majority of U.S. schools (93%–96%) have their HVAC systems and building structures inspected. However, there is less frequent monitoring or inspection of drinking-water outlets for lead or air quality control. For example, the 2006 SHPPS revealed that only about half (51%) of U.S. schools had an indoor air quality (IAQ) management program (defined as a set of specific activities for preventing and resolving IAQ problems), and 50% of schools maintained the American Society of Heating, Refrigerating, and Air Conditioning Engineers' ventilation standards.[55] Although there is great consensus about providing safe school environments for pupils, and most schools provide structural and equipment inspection, the quality of school environments (e.g., drinking water and air quality) is not routinely monitored in most schools. Given that an estimated 14% of U.S. children aged ≤17 years have respiratory problems,[56] it is important to consider better practices to improve and monitor physical qualities of the school environment. For schools in poor neighborhoods or highly polluted areas, monitoring the school environment is even more critical.

School climate

The National School Climate Center defines school climate as "the quality and character of school life . . . [which is] based on patterns of students', parents', and school personnel's experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures."[57] School climate is a multidimensional construct, including safety climate (e.g., feeling of physical safety, rules, and norms; and social-emotional safety), relationships climate (e.g., connectedness, engagement, teacher support, school-community interactions, and social support), teaching and learning climate (e.g., clearly defined sets of norms, expectations, and values related to learning and teaching), and instructional environment (e.g., activities scheduled and student-teacher interactions).[57,58] A compelling and growing body of research has suggested that a positive school climate is associated with more physical and emotional safety, closeness, cooperative learning, group cohesion, behavioral and emotional engagement in the classroom, and greater participation of community members.[58,59] Positive school climate is not only associated with better pupil social and emotional health (e.g., less delinquency and violence) and academic learning, but is also associated with more healthful behaviors (e.g., lower risky sexual and drug use behaviors) and better physical health.[21,24,58,60–63]

School climate as an SDH is a relatively new area of research; therefore, fewer practice standards have been created. Although a growing number of state departments of education now emphasize the importance of school climate, many states have not yet created standards for quality monitoring or improvement, and there is no national policy to guide school practices.[63] In addition, there are limited school climate data, and there is inconsistency in terms of school climate measurement and definition. School climate is not regularly or consistently evaluated in school health or school policy research;[63] therefore, there are fewer program implementation guidelines to help schools create these types of programs. These practice and policy gaps must be addressed to promote better school climate and child health.

PRACTICE RECOMMENDATIONS

Based on our review of the literature on school determinants, we identified several areas where additional research, policies, and practice strategies are needed to better develop action on SDH. In this section, we present five sets of practice recommendations, which were informed by the literature (general strategies)

and our own perspectives in school-based research (specific strategies and examples).

Improving school health policy and program implementation

Many useful practice guidelines and policies have been developed, but the literature indicates there is poor enforcement and implementation of the policies. One useful general strategy might be to review and revise existing policies and better define standards. For example, with health education, there is great variability in the topics offered. It would be useful to clearly define topics that must be covered in school education to ensure that all children receive education on the most important topics. To improve implementation, more research will be needed to understand current barriers. Data will help facilitate discussion and develop better strategies to overcome the barriers. In addition to promoting policies and program implementation, strategies for promoting the quality of implementation should also be considered. One such strategy is to include program implementation indicators (e.g., what is offered, usefulness, and implementation fidelity) in future national school health policy studies (e.g., CDC's SHPPS). These data will be useful in guiding future implementation practices.

Improving policy and impact evaluation

There is also a need to improve policy evaluation research and better understand the impact of health policy on child health. For example, it is crucial to better understand the impact of child health policies and programs (in terms of "dose" and subject areas covered) to develop more cost-effective strategies to provide health programs to more children. We should also consider improving the coordination of existing data-collection efforts, such as coordinating two large national school surveys—the SHPPS and the U.S. Health Behaviors in School-Age Children (HBSC) study. While SHPPS focuses more on policy/programming indicators to better understand policy and programming/service practices, HBSC focuses on child health indicators to better understand U.S. children's health and well-being.[19] It would be useful to coordinate both data collections and link data to better study SDH policy and impact questions.

Using national child health data to guide practice

To become more efficient, it is important to use national child health data to guide practices. For example, public health professionals can use HBSC data to identify areas of health that can be improved upon and geographic regions that have poor child health. By identifying top health issues and at-risk regions, resources can be more effectively used (e.g., provide further physical environmental evaluation and additional support to schools in the at-risk regions) and inequality in school determinants can be addressed.

Developing policy and practice guidelines to promote school climate

As described previously, policy and practice guidelines in school climate determinants are underdeveloped. Perhaps one strategy to reduce this gap is first to hold a series of consensus meetings with research, policy, and practice leaders to define a commonly accepted definition of school climate, and then integrate school climate measures in future national SHPPSs. Better school climate implementation research and data-monitoring systems can be applied to future policy development.

Developing new strategies to reduce inequality of school determinants

Several domains of school determinants have been considered in child health promotion. However, most school health policies and programs were not designed from an SDH perspective and were not designed to address the inequalities of school determinants or health disparities in racial/ethnic minority children. Development of new strategies will require cross-discipline collaboration (e.g., policy experts, research experts, health communication experts, community stakeholders, and clinicians) to facilitate further discussion on this subject. Reducing inequality in school determinants requires not only better resource utilization strategies (e.g., redistributing funding more equally among all schools), but also greater partnership-building between schools and communities (i.e., engaging families in child health promotion and using community networks). Involving communities in strategy development processes can reduce the cost for the schools and provide a more sustainable approach to adequately address this issue.

CONCLUSION

We reviewed school and child health literature and evaluated how SDH have been applied in school contexts. Our review of the literature indicates that an increasing amount of child health research has been conducted based on the SDH framework since 2000. Many important school determinants have been identified, and numerous school health policies and guidelines focusing on school determinants of health have been developed. However, our review of the literature

also revealed several gaps that have hindered public health professionals and policy makers from developing effective action on SDH for child populations. Specifically, we know little about the patterns of inequalities on school determinants among racial/ethnic and socioeconomic subgroups of child populations, and we have a limited understanding of the mechanisms by which inequalities of school determinants contribute to health disparities. Furthermore, inequalities in school health environments are generally ignored during decision-making in U.S. school districts. Additionally, no overarching federal agencies or policies are responsible for ensuring equity of school environments, which potentially allows many inequities and health disparities to exist among children from low-income and low-resource communities. Continued monitoring and dialogue reflective of the inequity in school determinants is necessary to support better strategies to promote child health in vulnerable racial/ethnic minority populations.

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REFERENCES

1. Dunn JR, Dyck I. Social determinants of health in Canada's immigrant population: results from the National Population Health Survey. Soc Sci Med 2000;51:1573-93.
2. World Health Organization, Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. CSDH final report. Geneva: WHO; 2008.
3. Centers for Disease Control and Prevention (US). Establishing a holistic framework to reduce inequities in HIV, viral hepatitis, STDs, and tuberculosis in the United States. Atlanta: Department of Health and Human Services (US); 2010. Also available from: URL: http://www.cdc.gov/socialdeterminants/docs/SDH-White-Paper-2010.pdf [cited 2012 Oct 10].
4. Satcher D. Include a social determinants of health approach to reduce health inequities. Public Health Rep 2010;125 Suppl 4:6-7.
5. Centers for Disease Control and Prevention (US). Adolescent and school health. Health disparities [cited 2012 Oct 10]. Available from: URL: http://www.cdc.gov/healthyyouth/disparities/index.htm
6. World Health Organization, Commission on Social Determinants of Health. A conceptual framework for action on the social determinants of health. 2007 [cited 2012 Oct 10]. Available from: URL: http://www.who.int/social_determinants/resources/csdh_framework_action_05_07.pdf
7. Smedley BD, Stith AY, Nelson AR, editors. Unequal treatment: confronting racial and ethnic disparities in health care. Washington: National Academies Press; 2003.
8. Huang K-Y, Calzada E, Cheng S, Brotman LM. Health disparities in children of immigrants and non-immigrants. Presented at the On New Shores Conference; 2008 Nov 6–7; Guelph, Canada.
9. Starfield B. Social gradients and child health. In: Heggenhougen HK, Quah SR, editors. International encyclopedia of public health. San Diego: Academic Press; 2008. p. 87-101.
10. Blumberg SJ, Olson L, Frankel MR, Osborn L, Srinath KP, Giambo P. Design and operation of the National Survey of Children's Health, 2003. Vital Health Stat 1 2005(43).
11. Flores G, Tomany-Korman SC. Racial and ethnic disparities in medical and dental health, access to care, and use of services in US children. Pediatrics 2008;121:e286-98.
12. Huang KY, Calzada E, Cheng S, Brotman LM. Physical and mental health disparities among young children of Asian immigrants. J Pediatr 2012;160:331-6.
13. Passel JS, Cohn D. U.S. population projections: 2005–2050. Washington: Pew Research Center; 2008. Also available from: URL: http://pewhispanic.org/files/reports/85.pdf [cited 2012 Apr 18].
14. Pianta RC, La Paro KM, Payne C, Cox MJ, Bradley R. The relation of kindergarten classroom environment to teacher, family, and school characteristics and child outcomes. Elem School J 2002;102:225-38.
15. Crosnoe R. Double disadvantage or signs of resilience? The elementary school contexts of children from Mexican immigrant families. Am Educ Res J 2005;42:269-303.
16. World Health Organization. Socio-environmentally determined health inequities among children and adolescents. Summary of outcomes, background papers, and country case studies. 2010 [cited 2012 Oct 10]. Available from: URL: http://www.euro.who.int/__data/assets/pdf_file/0009/135891/e94866.pdf
17. Sellström E, Bremberg S. Is there a "school effect" on pupil outcomes? A review of multilevel studies. J Epidemiol Community Health 2006;60:149-55.
18. Maes L, Lievens J. Can the school make a difference? A multilevel analysis of adolescent risk and health behaviour. Soc Sci Med 2003;56:517-29.
19. National Institutes of Health (US), Eunice Kennedy Shriver National Institute of Child Health and Human Development; Health Resources and Services Administration (US), Maternal and Child Health Bureau. The Health Behaviors in School-Age Children (HBSC) 2005/2006 survey: school report. 2008 [cited 2012 Apr 18]. Available from: URL: http://www.nichd.nih.gov/publications/pubs/upload/HBSC-2005_2006-Final.pdf
20. Currie C, Zanotti C, Morgan A, Currie D, de Looze M, Roberts C, et al., editors. Social determinants of health and well-being among young people. Health Behaviour in School-Aged Children (HBSC) study. International report from the 2009/2010 survey. Copenhagen: WHO; 2012. Also available from: URL: http://www.euro.who.int/__data/assets/pdf_file/0007/167281/E96444_part1.pdf [cited 2012 Apr 2].
21. McNeely CA, Nonnemaker JM, Blum RW. Promoting school connectedness: evidence from the National Longitudinal Study of Adolescent Health. J Sch Health 2002;72:138-46.
22. Davison KK, Lawson CT. Do attributes in the physical environment influence children's physical activity? A review of the literature. Int J Behav Nutr Phys Act 2006;3:19.
23. Earthman GI, Cash CS, Van Berkum D. A statewide study of student achievement and behavior and school building condition. Presented at the Annual Meeting of the Council of Educational Facility Planners International; 1995 Sep 20–23; Dallas. Also available from: URL: http://eric.ed.gov/PDFS/ED387878.pdf [cited 2012 Apr 2].
24. Wilson DB, Gottfredson DC, Najaka SS. School-based prevention of problem behaviors: a meta-analysis. J Quant Criminol 2001;17:247-72.
25. Katz DL, O'Connell M, Njike VY, Yeh MC, Nawaz H. Strategies for the prevention and control of obesity in the school setting: systematic review and meta-analysis. Int J Obes (Lond) 2008;32:1780-9.
26. Calear AL, Christensen H. Systematic review of school-based prevention and early intervention programs for depression. J Adolesc 2010;33:429-38.
27. Durlak JA, Weissberg RP, Dymnicki AB, Taylor RD, Schellinger KB. The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions. Child Dev 2011;82:405-32.
28. Fisher C, Hunt P, Kann L, Kolbe L, Patterson B, Wechsler H. Building a healthier future through school health programs. In: Centers for Disease Control and Prevention (US), National Center for Chronic Disease Prevention and Health Promotion. Promising practices in chronic disease prevention and control: a public health framework for action. Atlanta: CDC; 2003. p. 9—2-25. Also available from: URL: http://www.cdc.gov/healthyyouth/publications/pdf/PP-Ch9.pdf [cited 2012 Oct 10].

29. Zhu W. A multilevel analysis of school factors associated with health-related fitness. Res Q Exerc Sport 1997;68:125-35.
30. Guttu M, Engelke MK, Swanson M. Does the school nurse-to-student ratio make a difference? J Sch Health 2004;74:6-9.
31. Chakraborty J, Zandbergen PA. Children at risk: measuring racial/ethnic disparities in potential exposure to air pollution at school and home. J Epidemiol Community Health 2007;61:1074-9.
32. Sampson N. Environmental justice at school: understanding research, policy, and practice to improve our children's health. J Sch Health 2012;82:246-52.
33. Centers for Disease Control and Prevention (US). School Health Policies and Practices Study (SHPPS) [cited 2012 Apr 2]. Available from: URL: http://www.cdc.gov/HealthyYouth/shpps/index.htm
34. Kelder SH, Springer AS, Barroso CS, Smith CL, Sanchez E, Ranjit N, et al. Implementation of Texas Senate Bill 19 to increase physical activity in elementary schools. J Public Health Policy 2009;30 Suppl 1:S221-47.
35. Kann L, Telljohann SK, Wooley SF. Health education: results from the School Health Policies and Programs Study 2006. J Sch Health 2007;77:408-34.
36. Lee SM, Burgeson CR, Fulton JE, Spain CG. Physical education and physical activity: results from the School Health Policies and Programs Study 2006. J Sch Health 2007;77:435-63.
37. Cullen KW, Watson K, Zakeri I. Improvements in middle school student dietary intake after implementation of the Texas Public School Nutrition Policy. Am J Public Health 2008;98:111-7.
38. Stage SA, Quiroz DR. A meta-analysis of interventions to decrease disruptive classroom behavior in public education settings. School Psychol Rev 1997;26:333-68.
39. Beelmann A, Pfingsten U, Lösel F. Effects of training social competence in children: a meta-analysis of recent evaluation studies. J Clin Child Psychol 1994;23:260-71.
40. Wilson SJ, Lipsey MW. School-based interventions for aggressive and disruptive behavior: update of a meta-analysis. Am J Prev Med 2007;33(2 Suppl):S130-43.
41. Foster GD, Sherman S, Borradaile KE, Grundy KM, Vander Veur SS, Nachmani J, et al. A policy-based school intervention to prevent overweight and obesity. Pediatrics 2008;121:e794-802.
42. Luepker RV, Perry CL, McKinlay SM, Nader PR, Parcel GS, Stone EJ, et al. Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health. CATCH collaborative group. JAMA 1996;275:768-76.
43. Story M, Sherwood NE, Himes JH, Davis M, Jacobs DR Jr, Cartwright Y, et al. An after-school obesity prevention program for African-American girls: the Minnesota GEMS pilot study. Ethn Dis 2003;13(1 Suppl 1):S54-64.
44. Brener ND, Wheeler L, Wolfe LC, Vernon-Smiley M, Caldart-Olson L. Health services: results from the School Health Policies and Programs Study 2006. J Sch Health 2007;77:464-85.
45. Ennett ST, Bauman KE, Pemberton M, Foshee VA, Chuang YC, King TS, et al. Mediation in a family-directed program for prevention of adolescent tobacco and alcohol use. Prev Med 2001;33:333-46.
46. Hallfors D, Godette D. Will the "principles of effectiveness" improve prevention practice? Early findings from a diffusion study. Health Educ Res 2002;17:461-70.
47. O'Toole TP, Anderson S, Miller C, Guthrie J. Nutrition services and foods and beverages available at school: results from the School Health Policies and Programs Study 2006. J Sch Health 2007;77:500-21.
48. Brener ND, Weist M, Adelman H, Taylor L, Vernon-Smiley M. Mental health and social services: results from the School Health Policies and Programs Study 2006. J Sch Health 2007;77:486-99.
49. Stein RE, Silver EJ. Comparing different definitions of chronic conditions in a national data set. Ambul Pediatr 2002;2:63-70.
50. Campbell SB. Behavior problems in preschool children: a review of recent research. J Child Psychol Psychiatry 1995;36:113-49.
51. Wolraich M, Felice ME, Drotar D. The classification of child and adolescent mental diagnoses in primary care: diagnostic and statistical manual for primary care (DSM-PC) child and adolescent version. Elk Grove Village (IL): American Academy of Pediatrics; 1996.
52. Environmental Protection Agency (US). School chemical cleanout campaign (SC3) [cited 2013 Jun 27]. Available from: URL: http://www.epa.gov/region4/rcra/sc3.htm
53. Environmental Protection Agency (US). Voluntary guidelines for states: development and implementation of a school environmental health program [cited 2012 Oct 10]. Available from: URL: http://www.epa.gov/schools/ehguidelines/downloads/ehguidelines.pdf
54. School health guidelines to promote healthy eating and physical activity. MMWR Recomm Rep 2011;60(RR-5):1-76.
55. Jones SE, Axelrad R, Wattigney WA. Healthy and safe school environment, part II. Physical school environment: results from the School Health Policies and Programs Study 2006. J Sch Health 2007;77:544-56.
56. Bloom B, Cohen RA. Summary health statistics for U.S. children: National Health Interview Survey, 2006. Vital Health Stat 10 2007(234).
57. National School Climate Center. School climate [cited 2012 Apr 10]. Available from: URL: http://www.schoolclimate.org/climate
58. Rowe F, Stewart D, Patterson C. Promoting school connectedness through whole school approaches. Health Educ 2007;107:524-42.
59. Center for Social and Emotional Education. School climate research summary—January 2010 [cited 2012 Apr 4]. Available from: URL: http://www.schoolclimate.org/climate/documents/SCBrief_v1n1_Jan2010.pdf
60. MacNeil AJ, Prater DL, Busch S. The effects of school culture and climate on student achievement. Int J Leadership Educ Theor Pract 2009;12:73-84.
61. Centers for Disease Control and Prevention (US). School connectedness: strategies for increasing protective factors among youth. Atlanta: Department of Health and Human Services (US); 2009. Also available from: URL: http://www.cdc.gov/HealthyYouth/AdolescentHealth/pdf/connectedness.pdf [cited 2012 Apr 4].
62. Catalano RF, Haggerty KP, Oesterle S, Fleming CB, Hawkins JD. The importance of bonding to schools for healthy development: findings from the Social Development Research Group. J Sch Health 2004;74:252-61.
63. National School Climate Council. The school climate challenge: narrowing the gap between school climate research and school climate policy, practice guidelines, and teacher education policy. 2007 [cited 2012 Apr 4]. Available from: URL: http://www.ecs.org/school-climate