ENSURING THAT NO CHILD IS LEFT BEHIND

How Are Student Health Risks & Resilience related to the Academic Progress of Schools?

THOMAS L. HANSON

GREGORY AUSTIN

JUNE LEE-BAYHA

SUPPORTED BY A GRANT FROM THE STUARTFOUNDATION TO THE CALIFORNIA DEPARTMENT OF EDUCATION

WestEd

Ensuring That No Child Is Left Behind: How Are Student Health Risks & Resilience Related to the Academic Progress of Schools?

Thomas L. Hanson, Gregory Austin, and June Lee-Bayha
Health and Human Development Program, WestEd

SUPPORTED BY A GRANT FROM THE STUART FOUNDATION TO THE CALIFORNIA DEPARTMENT OF EDUCATION

This report summarizes the findings from two longer reports, Hanson, T.L., Austin, G.A., & Lee-Bayha, J. (2003). *Student health risks, resilience, and academic performance: Year 1 report,* and Hanson, T.L. & Austin, G.A. (2003). *Student health risks, resilience, and academic performance in California: Year 2 report, longitudinal analyses.* These longer reports are available on the California Healthy Kids Survey Web site (http://www.wested.org/hks). This work was supported by a grant from the Stuart Foundation to the California Department of Education.

730 Harrison Street
San Francisco, California 94107-1242
tel: 415.565.3000 fax: 415-565-3012
< WestEd.org >

INTRODUCTION

Public schools have come under enormous pressure in recent years to demonstrate academic gains and to address deeply rooted disparities among students of different races, ethnic groups, and income levels. Clearly, boosting academic achievement should be a top priority. Less evident, however, is the long-term effect of supporting this goal by diverting attention and funding from programs that have traditionally supported student health and well-being.

Over the past decade, research studies and reviews have consistently concluded that student health status and achievement are deeply connected. Evidence has been mounting that meeting the basic developmental needs of students — ensuring that they are safe, drug-free, healthy, and resilient — is central to improving their academic performance.[1]

It is time for educators and policymakers to ask some critical questions: Have efforts to boost academic performance overlooked the continuing impact of non-academic barriers to student learning? Even worse, have efforts to raise test scores come at the expense of basic supports for student well-being? Has the pendulum swung so rapidly toward accountability that schools are in danger of losing previous gains?

WESTED'S INQUIRY

To address these questions — and to shed light on the connections between promoting resilience, reducing health-risk behaviors, and improving academic achievement — WestEd set out to investigate how student health risks and resilience are related to the academic progress of schools. We did this by examining how these factors relate to subsequent changes in academic performance.

In an earlier report, we described how student health risk and resilience factors are concurrently related (when measured at a single point in time) to scores on California's Academic Performance Index (API). The API, a summary measure of academic performance for schools, is the cornerstone of California's educational accountability system.[2] The results from these analyses indicated that schools with low API scores have large percentages of students who (1) engage in risky behavior, (2) are exposed to health risks, or (3) have low levels of developmental supports — otherwise known as resilience assets.

The relationship shown between API scores and health risk/resilience, however, was static. It did not reflect how student health risk and resilience were related to improvements in test scores across time. Thus we initiated a longitudinal study to assess the extent to which student exposure to health risks (e.g., lack of physical exercise, poor nutrition, substance use, violence, lack of safety) and low levels of developmental supports or resilience assets (e.g., exposure to high expectations and caring relationships at school) impede raising test scores over time.

THE POLICY CONTEXT

Throughout the country, states are implementing accountability systems to hold students, teachers, and educational administrators responsible for ensuring that students demonstrate acceptable levels of achievement. The centerpiece of most state accountability systems is "high-stakes testing" — student achievement testing in which students, teachers, and/or schools receive rewards or sanctions based on test scores. The practice of implementing such accountability systems has been codified into federal law through the passage of the *No Child Left Behind Act of 2001* (NCLB).

California has been in the forefront of the national accountability movement. In 1999, the *Public Schools Accountability Act* (PSAA) created the state's educational accountability system. The system requires the California Department of Education (CDE) to calculate academic

performance test results for public schools and publish school rankings based on these test scores. California public schools are expected to show improvements in student achievement by meeting annual growth targets. A school that meets the growth target is eligible for rewards under the Governor's Performance Award Program. These rewards consist of monetary incentives for schools and cash bonuses for teachers. A school that fails to meet its annual growth target may be earmarked as needing assistance and financial resources. Or, worse, it may be sanctioned or monitored for interventions such as state takeover.[a]

It is no surprise that accountability measures have had a far-reaching impact on public education in California. Test score results dominate the educational landscape, influencing everything from administrator and teacher reassignments to real estate prices. Schools, governments, and the public are now engaged in a concerted search for — and debate over — strategies to improve school performance.

Much of the renewed emphasis on improving school performance has targeted the implementation of new standards, curricula, teaching techniques, and other practices that focus classroom time directly on academics and raising test scores. Many of these interventions are indispensable for improving academic performance.

Yet not all students are able to benefit from academically oriented reforms. Many children come to school with a variety of health-related problems that make successful learning difficult, if not impossible.[3] Efforts to improve academic performance have not only overlooked the role of non-academic barriers to learning, but at times such efforts have come at the expense of programs that address these barriers. Anecdotal evidence suggests that many schools have cut back on ancillary programs and courses that address the comprehensive health needs of students in order to concentrate more resources on instruction and test-taking skills.[4] Such changes are likely to be shortsighted and counterproductive. Reallocation of resources away from health-related programs and activities that support learning may actually undermine children's academic performance in the long term.

Unfortunately, little attention is being directed toward removing health-related behavioral and environmental barriers to learning. Similarly, support has diminished for efforts to create the conditions that promote student connectedness to school — a connectedness that is essential for student motivation and long-term success.[5]

THE RESEARCH

For this study, we chose to look at how gains in test scores were related to three types of health-related barriers to student learning:

(1) poor physical health indicators, such as lack of exercise and inadequate nutrition;
(2) alcohol, tobacco, and other drug use (including use at school); and
(3) violence, victimization, harassment, and lack of safety at school.

We also looked at how test scores were related to more beneficial influences on student well-being:

(1) caring relationships;
(2) high expectation messages; and
(3) opportunities for participation and contribution.

We used longitudinal, school-level test-score data, as well as data from the state-sponsored California Healthy Kids Survey (CHKS). The CHKS is a comprehensive student self-report assessment tool for monitoring the school environment, student health risks, and resilience assets (see box on page 8). It assesses important non-academic barriers to student

[a] Sanctions appear to be more salient than rewards, especially since funds for these awards have been unavailable in recent California budgets.

Efforts to improve academic performance have not only overlooked the role of non-academic barriers to learning, but at times such efforts have come at the expense of programs that address these barriers.

learning in school and other environments. Together, the CHKS data and the test score data compiled by the state provided an unprecedented opportunity to examine how a variety of different facets of health risk and resilience are related to academic performance across a majority of California's highly diverse schools.

Finally, we examined whether or not student health risk and resilience are differentially related to changes in academic performance in low- and high-performing schools. Because low-performing schools are facing intense pressure to increase test scores, often by cutting back on ancillary programs and courses that address the comprehensive health needs of children — it is particularly important to demonstrate that the relationships of health risk and resilience to academic performance found in the state as a whole also apply in low-performing schools.

FINDINGS

PHYSICAL ACTIVITY, NUTRITION, AND ACADEMIC PERFORMANCE

Over the years, research evidence has concluded that physical activity and nutrition significantly affect student achievement. School physical education programs have shown favorable effects on students' academic achievement through increased concentration and improved

HOW THE ANALYSES WERE PERF ¯ MED

Data Sources
This study relied on 1998-2002 test score data for 7th, 9th, and 11th graders from the Standardized Testing and Reporting Program's (STAR) research files released by the California Department of Education as well as aggregated health risk and resilience data from local school administration of the California Healthy Kids Survey (CHKS). School-level academic performance was assessed by average national percentile rank scores (NPR) on the Stanford Achievement Test (SAT-9) in reading, language (written expression), and mathematics. Data for 20 health risk behaviors were available from the CHKS Core Module from 1,773 secondary schools. Data on 16 resilience assets from the supplementary CHKS Resilience and Youth Development Module (RYDM) were available for 628 schools. A full list of measures is available in Hanson and Austin (2003).

Methods
To create the data set used in the analysis, the CHKS was converted into a school-level database by aggregating individual student responses within schools — with each observation representing a school and each variable in the data representing the school-level average of each item asked in the Core and RYDM Modules (see Hanson and Austin, 2003). This aggregated data set was then merged with the SAT-9 database. Autoregressive regression models were used to examine how health risk and resilience were related to subsequent changes in test scores, after controlling for baseline SAT-9 scores and the racial/ethnic, socioeconomic, and grade composition of the school. Socioeconomic status was measured by parental education and the percentage of students receiving subsidized meals. We also controlled for the percentage of students classified as English language learners. These controls allowed us to examine the relationship between health risk/resilience measures and subsequent changes in test scores in schools, independent of any effects that socio-demographic variables may have on academic performance.

Limitations
Several methodological limitations should be noted in interpreting the results. First, although the results are based on longitudinal data, the data are still only observational. Other factors that we did not consider in our analyses could be responsible for the relationship of health risk/resilience to subsequent changes in test scores. Second, the analysis is based on school-level information, describing how school characteristics are related to each other. Further research is needed to determine how the characteristics of individual students are related to individual academic test scores. Finally, the data come from the secondary schools that chose to conduct the CHKS. The data are not necessarily representative of all California students. This is especially a limitation of the resilience data, which were derived from only 628 schools. These results need to be confirmed analyzing a representative sample of schools.

performance on mathematics, reading, and writing tests.[6] Poor dietary choices, inadequate nutrient intake, and morning fasting have been linked to lower motivation and attentiveness in school, as well as lower academic performance.[7] Rigorous, randomized studies have shown that participation in school breakfast programs is associated with significant improvements in academic functioning — particularly among low-income and/or poorly nourished children.[8]

The results presented in ***Table 1*** and graphically for selected outcomes in ***Figures 1–2*** show that schools with proportionately large numbers of students who engaged in some weekly physical activity and ate nutritiously had greater subsequent gains in test scores than other schools. Additionally, we found in separate analyses that physical activity and nutrition had equally beneficial consequences for test score gains in low- and high-performing schools.

Table 1. Health Risk/Resilience and Subsequent Changes in Test Scores

	Annual Change in SAT-9 Scores (NPR)		
	Reading	Language	Math
PHYSICAL HEALTH			
Any Physical Activity[A]	+**	0	+*
Any Nutritious Intake	+**	+*	0
Breakfast	+**	0	+*
SUBSTANCE USE & AVAILABILITY			
Lifetime ATM Use[B]	0	0	0
Lifetime Hard Drug Use[A]	0	0	0
Lifetime Intoxication	–**	–*	–*
30-day ATM Use[B]	–#	–#	0
30-day Hard Drug Use[A]	0	0	0
Lifetime Intoxication on School Property	–*	–#	–*
30-day ATM Use on School Property[B]	–*	0	–*
Alcohol/Cigarette Availability[A]	0	0	0
Marijuana Availability[A]	0	0	0
Offered Illegal Drugs at School	–**	0	–*
SCHOOL SAFETY ENVIRONMENT			
Harassed	0	0	0
Threatened/Injured with Weapon	–#	0	0
Property Stolen/Damaged	–*	–*	–*
Perceived School Safety	+**	+**	+**
Physical Fight	0	0	0
Weapon Possession	–**	–**	–**

	Annual Change in SAT-9 Scores (NPR)		
	Reading	Language	Math
EXTERNAL RESILIENCE ASSETS			
Total External Assets at School	0	0	+#
Caring Relationships at School	+#	+#	+**
High Expectations at School	+*	0	+#
Meaningful Participation at School	0	+#	0
Total External Assets at Home	0	0	0
Caring Relationships at Home	0	0	0
High Expectations at Home	0	0	0
Meaningful Participation at Home	0	0	0
Total External Assets in Community	0	0	0
Caring Relationships in Community	0	0	0
High Expectations in Community	0	0	0
Meaningful Participation in Community	+*	+#	0
Total External Assets from Peers	0	0	0
Caring Relationships with Peers	0	0	0
High Expectations with Peers	0	0	0
INTERNAL RESILIENCE ASSETS			
Total Internal Resilience Assets	0	0	0
Sadness/Hopelessness	–*	–*	–**

Estimates come from a model that controls for test scores at the year of the survey, grade in school (7th, 9th, 11th), racial/ethnic composition, percentage of students receiving subsidized meals, average parental education, and percentage of English learner students. Outcome variable is change in test score in the year following CHKS administration.

Source: 1998-2002 CHKS and STAR data, school-level analysis.

[A] Measure applicable to high school students only.

[B] Alcohol, Tobacco, and Marijuana (ATM).

\+ Gains in test scores increase as percentage of students in a school with this characteristic increases.

– Gains in test scores decrease as percentage of students in a school with this characteristic increases.

0 Gains in test scores not significantly ($p<.10$) related to percentage of students in a school with this characteristic.

\# Significant at 10%; * Significant at 5%; ** Significant at 1%.

Schools with proportionately large numbers of students who engaged in some weekly physical activity and ate nutritiously had greater subsequent gains in test scores than other schools.

Figure 1 shows that as the percentage of students who engage in physical activity goes up, subsequent gains in test scores increase. For example, the results for reading indicate that in schools where 76% of students reported that they engaged in physical activity in the week prior to the survey, NPR scores (SAT-9) declined by 0.4 one year later. This compares with increases of 0.6 points and 1.7 points in schools where 88% and 100% of students reported engaging in physical activity, respectively.[b]

The pattern for breakfast shown in ***Figure 2*** is even more striking, particularly for reading scores. Reading scores declined by 1 point in schools where 48% of students reported eating breakfast on the day of the survey, and increased by 2.2 points in schools where 76% of students reported eating breakfast. Although the breakfast results for language are not statistically significant, gains in language test scores also appeared to increase as the percentage of students who eat breakfast rises.

Overall, the results suggest that implementation of programs that ensure that all students meet minimum physical education and nutrition standards may help hasten improvements in test scores.

Figure 1. Any Physical Activity & Annual Changes in SAT-9 Scores (NPR)

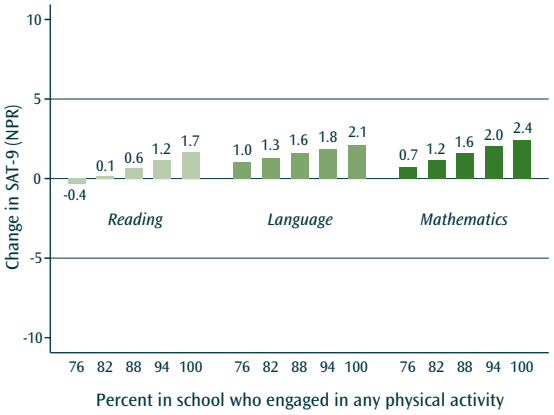
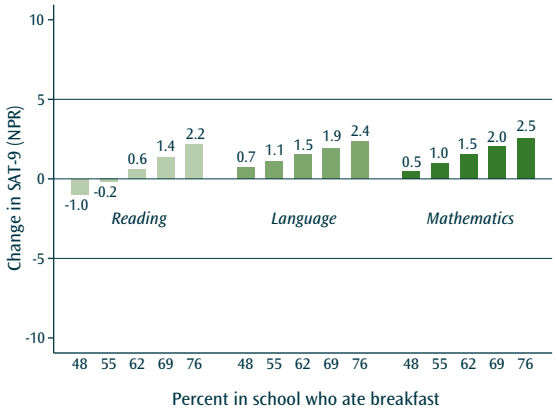


Figure 2. Breakfast Consumption & Annual Changes in SAT-9 Scores (NPR)



[b] The levels of health risk/resilience displayed on the horizontal axis of each figure correspond to deviations from the mean. For example, 76 and 100 are 2 standard deviations from the mean, 82 and 94 are 1 standard deviation from the mean, and 88 represents the mean level of physical activity in the sample.

THE CALIFORNIA HEALTHY KIDS SURVEY

The California Healthy Kids Survey (CHKS) is a comprehensive student self-report health risk and resilience data collection system supported by the California Department of Education (CDE) for use by local school districts. It was developed in 1997 by WestEd in collaboration with Duerr Evaluation Resources and an advisory committee of researchers, teachers, school prevention and health program practitioners, and public agency representatives. It was funded by CDE in response to rising demands for schools to collect and use data to assess student needs, to justify program funding, to guide program development, and to monitor their progress in achieving program goals. The immediate impetus was meeting the requirements of the federal *Safe and Drug-Free Schools and Communities Act* (SDFSCA). The survey is designed to provide a common set of comprehensive health risk and resilience data across the state to guide local program decision-making. Its emphasis is on preventing substance use and violence and on promoting positive youth development and well-being.

The *secondary school survey* used in this analysis has a flexible modular structure that enables local schools and communities to easily customize it to meet local needs and interests, but the state required that all school districts administer the Core Module that assesses key health risk variables involving substance use, violence, and physical health. Schools can choose to administer any of five supplementary modules and also add questions of their own choosing. A single *elementary school* instrument provides comparable, developmentally appropriate data focusing on risk and resilience factors, but it was not used in this analysis. For more details about the CHKS, see WestEd (2002) and the Healthy Kids Survey Web site (http://www.wested.org/hks).

SUBSTANCE USE AND ACADEMIC PERFORMANCE

Evidence drawn from years of research has shown that adolescent substance use is closely connected with academic success.[9] Alcohol, tobacco, and other drug use is also linked to several other school-related factors. These include reduced attention span, lower investment in homework, more negative attitudes toward school, lower motivation, and increased absenteeism.

While the link between substance use and school achievement is clear, the reasons for it are less so. One explanation is that academic difficulties are a consequence of substance use. Studies demonstrating that drug use interferes with the learning process provide support for this explanation.[10] A second theory suggests that students become more likely to engage in unhealthy behaviors (such as substance use) as a consequence of the frustration and estrangement they experience due to poor school performance. A third explanation is that substance use and poor academic performance may not, in fact, be distinct. Instead, each may represent just one aspect of a more generalized tendency toward deviance and unconventionality.[11]

The research literature provides empirical support for each of these explanations.[12] Studies based on longitudinal data suggest that substance use and academic performance are reciprocally related. Substance use appears to reduce subsequent academic performance, and, reciprocally, poor academic performance increases subsequent substance use.[13]

For this study, we examined the relationship of test scores to three general areas of substance use: (1) lifetime and 30-day substance use; (2) substance use/intoxication on school premises; and (3) availability of drugs. As shown in ***Table 1,*** lifetime substance use; 30-day hard drug use; and alcohol, cigarette, and marijuana availability were not significantly associated with subsequent changes in test scores. However, lifetime intoxication, substance use and intoxication at school,

Taken as a whole, these results point to the importance of maintaining a drug-free school in any effort to improve achievement.

and being offered drugs at school were significantly related to changes in test scores. Schools with proportionately large numbers of students who reported ever being intoxicated, who reported using substances or being intoxicated at school, and who reported being offered drugs at school exhibited smaller gains in test scores than other schools.

Taken as a whole, these results point to the importance of maintaining a drug-free school in any effort to improve achievement. ***Figures 3–5*** show how subsequent gains in test scores are related to lifetime intoxication; 30-day alcohol, tobacco, and marijuana use on school premises; and drug offers on school grounds, respectively.

In examining differences across schools, our analyses suggest that substance use was a *greater impediment* to school progress in high-performing schools than in low-performing schools. These results held for six of the ten substance use measures considered: (1) lifetime alcohol, tobacco, or marijuana use; (2) lifetime intoxication; (3) 30-day substance use; (4) lifetime intoxication at school; (5) 30-day substance use at school; and (6) drug offers at school.

As an example of how substance use is differentially related to gains in test scores in low-, medium-, and high-performing schools, the results for 30-day substance use are shown in ***Figure 6.*** Notice how low-performing schools exhibited substantial gains in test scores the following year, while high-performing schools exhibited substantial declines. This pattern is brought about by statistical regression (also known as *regression toward the mean),* whereby units that score low or high on one occasion are more likely to score closer to the mean on a subsequent occasion.

Figure 3. Lifetime Intoxication & Annual Changes in SAT-9 Scores (NPR)

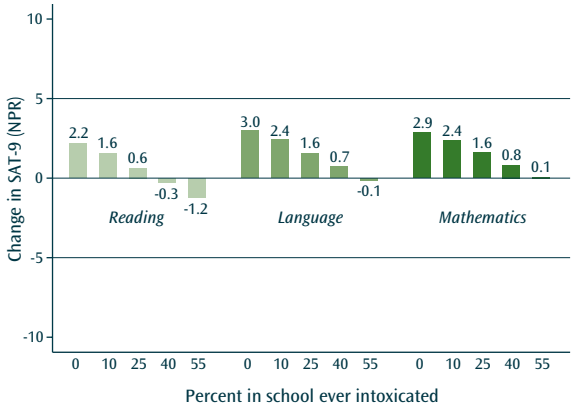


Figure 4. 30-day Substance Use at School & Annual Changes in SAT-9 Scores (NPR)

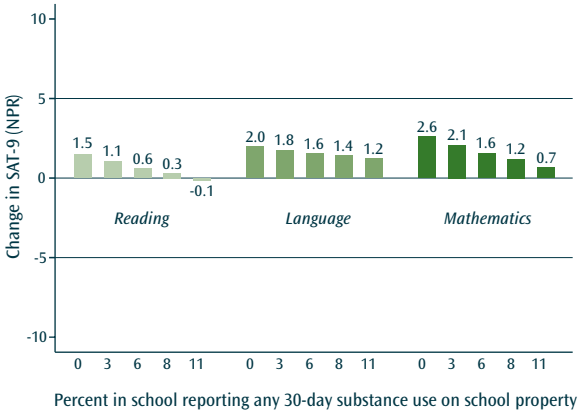
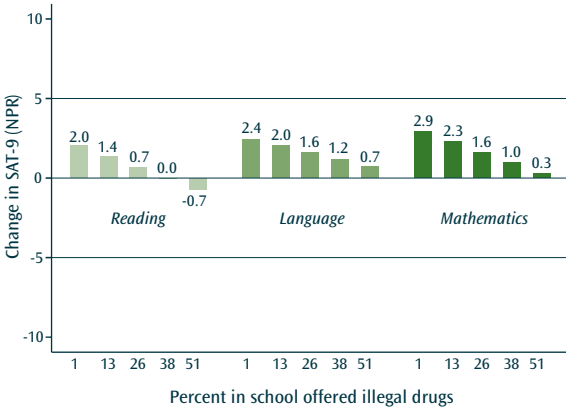
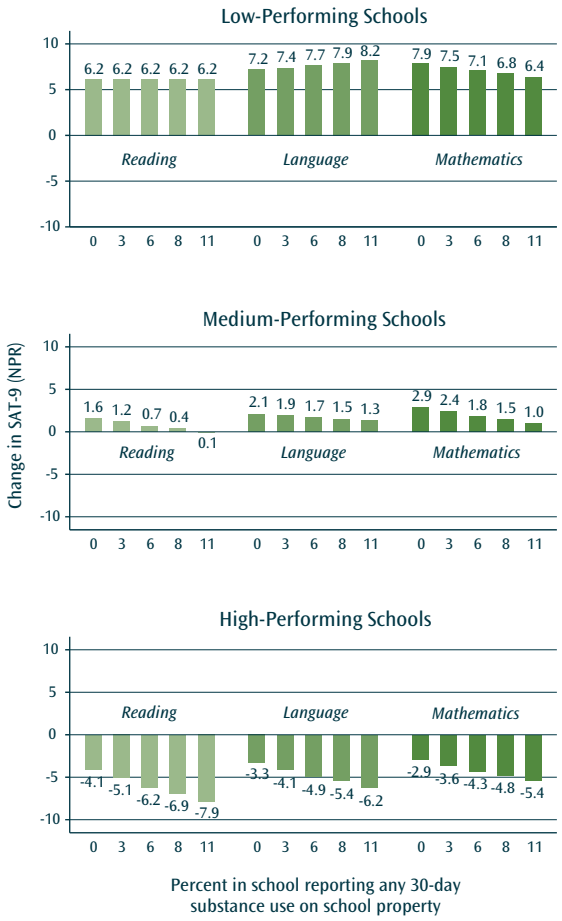


Figure 5. Offered Illegal Drugs at School & Annual Changes in SAT-9 Scores (NPR)



It is possible that low-performing schools encounter impediments to academic performance that are *so different* from other schools, that substance use has little influence on academic progress in these schools.

Figure 6. 30-day Substance Use at School and Annual Changes in SAT-9 Scores (NPR) for Low-, Medium-, and High-Performing Schools



The important thing to notice in ***Figure 6*** is that substance use on school premises appears to have the most deleterious consequences for the academic progress of high-performing schools. The figure shows that 30-day substance use at school appears to be (1) unrelated to changes in reading and language test scores in low-performing schools, (2) moderately related to reductions in test score gains in medium-performing schools, and (3) strongly related to declines in test scores in high-performing schools.

Similar patterns of results were apparent for the other five measures of substance use listed above. It is possible that low-performing schools encounter impediments to academic performance that are *so different* from other schools that substance use has little influence on academic progress in these schools.

SAFETY AT SCHOOL AND ACADEMIC PERFORMANCE

It is intuitively obvious that violence, crime, antisocial behavior, and other types of social disorganization on a school campus can have adverse effects on student learning. Numerous studies demonstrate that bullying and violent actions in school settings have deleterious consequences for students.[14]

Bowen and Bowen (1999) describe three ways in which risky school environments can adversely affect student performance and learning. First, exposure to violence, abuse, and crime on campus can increase emotional and psychological distress experienced by students — which, in turn, can reduce academic performance by diminishing students' capacity to concentrate and expend energy on academic-related matters.

Second, distress associated with exposure to crime, violence, and/or bullying and teasing may directly reduce instruction time by causing students to stay home from school or cut classes.[15] Perceptions of danger at school could also reduce students' psychological engagement with school.[16]

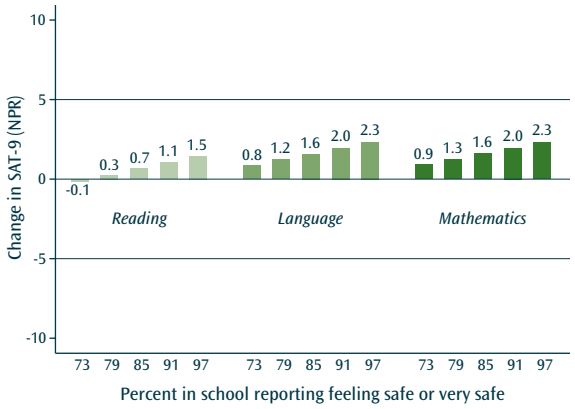
Lastly, crime, violence, and social disorganization at school may affect academic performance by influencing classroom teaching and learning processes. For example, researchers[17] found that children who were disruptive and aggressive in the classroom had a negative impact on their classmates' education by diverting teachers' attention and reducing instruction time.[18]

To measure the role of violence, victimization, and lack of safety in the school environment, we examined how gains in test scores were related to the following: (1) harassment because of race, ethnicity, gender, sexual orientation, or disability; (2) being threatened or injured with a weapon; (3) having property stolen or damaged; (4) engaging in physical fights; (5) weapon possession; and (6) perceptions of school safety.

As shown in ***Table 1***, half of these items were significantly related to subsequent changes in test scores, while half were not. Specifically, reports of harassment, being threatened/injured with a weapon, and physical fighting at school were not significantly related to changes in test scores.

Test score gains were significantly smaller, however, in schools with a high percentage of students who reported having their property stolen or damaged at school, who reported carrying weapons at school, and who reported feeling unsafe at school ***(Figure 7)***. These three factors — theft and vandalism, insecurity, and weapon possession — had equally harmful effects in low- and high-performing schools. Overall, the results suggest that efforts to reduce weapon possession and improve overall school security are not only beneficial to student safety and well-being (the most important outcome of such efforts), but they could also translate into significant gains in test scores.

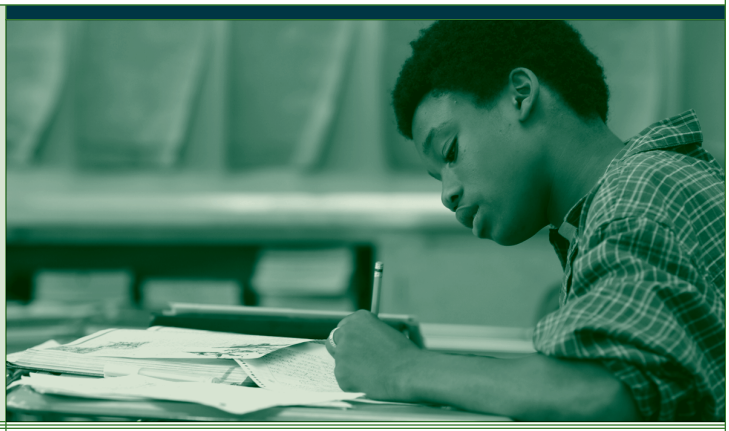
Figure 7. Safety at School & Annual Changes in SAT-9 Scores (NPR)



SCHOOL EXTERNAL RESILIENCE ASSETS AND ACADEMIC PERFORMANCE

Besides examining how changes in test scores are related to *risk factors*, we also examined how *beneficial influences* on child well-being impacted test scores. Studies across a broad variety of fields have begun to identify a clear set of factors related to healthy outcomes for children living in risky environments. Resilience research — studies of positive youth development in the face of environmental threat, stress, and risk — identify these factors as (1) caring relationships, (2) high expectation messages, and (3) opportunities for participation and contribution.[19]

These supports, referred to as external resilience assets or protective factors, are associated with both lack of involvement in health compromising behaviors and with academic success.[20] To maximize opportunities for successful learning and healthy development, these three resources should be available to youth across all significant environments — school, home, community, and peer groups. Attention to these assets in school settings, which can help youth navigate adolescence in healthy ways, hold great promise for comprehensive programs addressing the developmental and academic needs of children.[21]



As shown in ***Table 1***, external resilience assets were not consistently related to annual gains in test scores, with several notable exceptions. Test scores increased more in schools where students reported (1) high levels of caring relationships at school, (2) high expectations at school, and (3) meaningful participation in the community.

These results are presented graphically in ***Figures 8–10.*** Each of these graphs shows a similar pattern. As caring relationships at school, high expectations at school, and meaningful participation in the community increase, subsequent gains in test scores also increase. These results confirm that attention to external resilience assets in school settings show great potential for addressing the academic needs of children.

Table 1 also shows how internal assets and sadness/hopelessness are related to changes in test scores. It turns out that only sadness/hopelessness was associated with changes in test scores across time. As the percentage of students who reported that they felt sad or hopeless increased, subsequent gains in reading, language, and mathematics test scores declined *(see **Figure 11**)*. No evidence was found that external or internal resilience assets provide any more (or less) benefit in low- performing schools than in high-performing schools.

Overall, the findings demonstrate that schools providing caring, supportive, and challenging environments have great potential to help students and improve academic performance.

Figure 8. School Caring Relationships & Annual Changes in SAT-9 Scores (NPR)

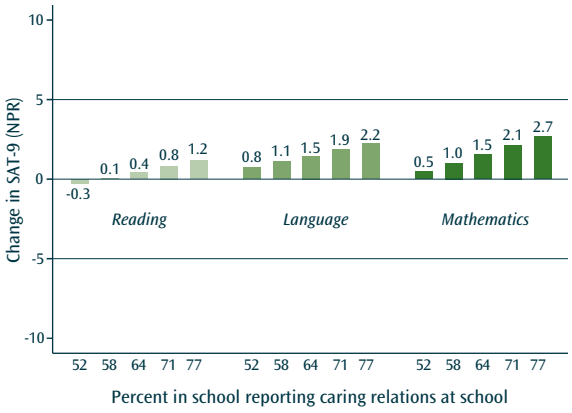
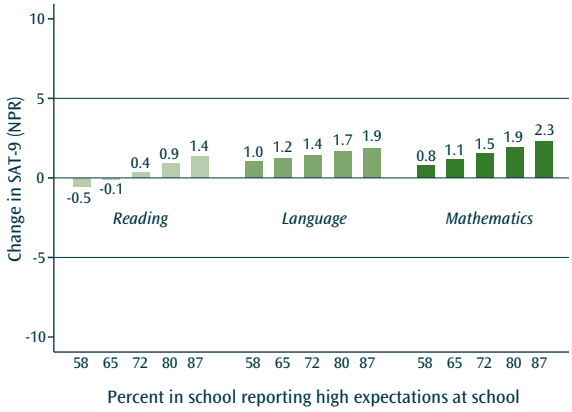


Figure 9. School High Expectations & Annual Changes in SAT-9 Scores (NPR)



Moreover, health risk and low resilience assets typically have equally detrimental consequences for subsequent test score gains in low- and high-performing schools.

Figure 10. Community Meaningful Participation & Annual Changes in SAT-9 Scores (NPR)

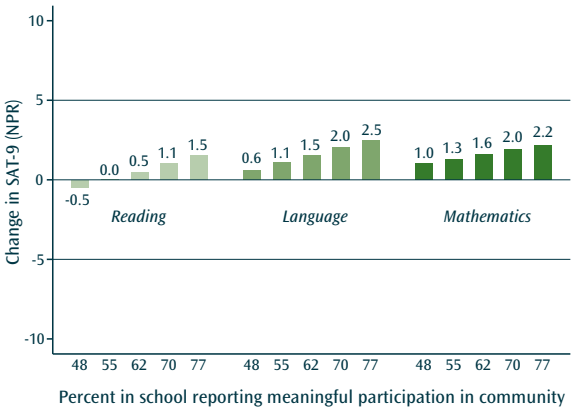
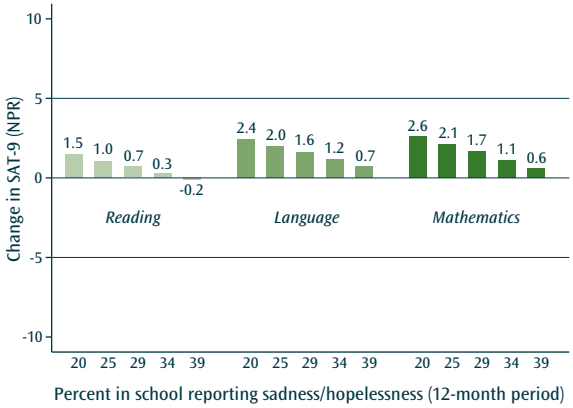


Figure 11. Sadness/Hopelessness & Annual Changes in SAT-9 Scores (NPR)



CONCLUSIONS & IMPLICATIONS

Do health risk and low levels of resilience assets impede the progress of schools in raising test scores? Our analyses suggest that they do. Subsequent test score gains were smaller in California schools with high percentages of students who did not routinely engage in physical activity and healthy eating; who reported ever being intoxicated, using substances at school, and being offered drugs at school; who reported high levels of property theft, vandalism, and weapon possession on school grounds; and who attended schools with high numbers of students who felt unsafe at school. Schools with high percentages of students who reported high levels of caring relationships at school, high expectations at school, and meaningful participation in the community exhibited greater subsequent gains in test scores than other schools.

Overall, these results held for about 40% of the health risk and resilience measures that we examined, even after accounting for socioeconomic differences across schools. Moreover, health risk and low resilience assets typically have equally detrimental consequences for subsequent test score gains in low- and high-performing schools — although substance use and availability appear to have more deleterious consequences for the academic progress of high-performing schools than of low-performing schools. Perhaps low-performing schools encounter impediments to academic performance that are so different from other schools that substance use has little additional influence on academic progress in these schools. Taken as a whole, the results suggest that schools with higher percentages of students who are less engaged in risky behaviors such as substance use and violence, who are more likely to eat nutritiously and exercise, and who report caring relationships and high expectations at school made greater progress in raising test scores.

The results have important policy implications for schools and stakeholders trying to meet accountability demands for improved academic performance. Although the implementation of new standards, curricula, teaching techniques, and other types of practices that focus directly on academics are indispensable for improving academic performance, not all students will benefit from these academically oriented reforms. The results suggest that addressing the health and developmental needs of youth is a critical component of a comprehensive strategy for meeting the accountability demands for improved academic performance. Specifically, district and school leaders can take steps to promote student health and well-being by increasing student access to moderate-to-vigorous physical activity in physical education classes, monitoring the nutritional content of items offered at school, and promoting greater awareness among students about their physical health and nutrition. Crime, violence, antisocial behavior, and other types of social disorganization on a school campus can have adverse consequences on student learning and should be targeted with comprehensive prevention programs. Moreover, practices that provide students with supportive, caring connections to adults at the school who model and support healthy development, and clear and consistent messages that students can and will succeed at high levels, hold great promise for addressing the developmental needs of children and improving student learning. Findings from this study suggest that efforts to improve schools should go beyond the current emphasis on standards and accountability measured by test scores. Policies and practices focusing exclusively on increasing test scores while ignoring the comprehensive health needs of students are almost certain to leave many children, and many schools, behind. ■

ENDNOTES

[1] Allensworth, Lawson, Nicholson, & Wyche 1997; Marx, Wooley, & Northrup 1998; Mitchell 2000; Symons, Cinelli, Janes, & Groff 1997.

[2] Hanson, Austin, & Lee-Bayha 2003.

[3] Council of Chief State School Officers 1998.

[4] Costante 2002; Deutsch 2000.

[5] Center for Mental Health in Schools 2000.

[6] Dwyer, Coonan, Worsley, & Leitch 1979; Sallis et al. 1999; Shephard 1997; Shephard et al. 1984; Symons, Cinelli, Janes, & Groff 1997.

[7] Benton & Roberts 1988; Chandler, Walker, Connolly, & Grantham-McGregor 1995; Pollitt, Leibel, & Greenfield 1981; Pollitt, Lewis, Garza, & Schulman 1982; Schoenthaler, Amos, Doraz, Kelly, & Wakefield 1991; Schoenthaler, Bier, Young, Nichols, & Jansenns 2000; Simeon & Grantham-McGregor 1989.

[8] Meyers, Sampson, Weitzman, Rogers, & Kayne 1989; Murphy et al. 1998; Powell, Walker, Chang, & Grantham-McGregor 1998; Simeon 1998.

[9] Andrews, Duncan, & Hops 1994; Beauvais, Chavez, Oetting, Deffenbacher, & Cornell 1996; Braggio, Pishkin, Gameros, & Brooks 1993; Crum, Ensminger, Ro, & McCord 1996; Dozier & Barnes 1997; Eggert & Herting 1993; Ellickson, Bui, Bell, & McGuigan 1998; Hu, Lin, & Keeler 1998; Mensch & Kandel 1988; Newcomb & Bentler 1986; Schulenberg, Bachman, O'Malley, & Johnson 1994.

[10] Andrews, Duncan, & Hops 1994.

[11] Hirschi 1969; Jessor & Jessor 1977.

[12] Donovan & Jessor 1985; Maguin & Loeber 1996; Newcomb & Bentler 1988.

[13] Andrews, Duncan, & Hops 1994; Crum, Ensminger, Ro, & McCord 1996; Galambos & Silbereisen 1987; Newcomb & Bentler 1988.

[14] Beauvais, Chavez, Oetting, Deffenbacher, & Cornel 1996; Bowen & Bowen 1999; Eccles, Lord, & Midgley 1991; Ellickson, Saner, & McGuigan 1997; Furlong, Chung, Bates, & Morrison 1995; Gronna & Chin-Chance 1999; Herrenkohl et al. 2000; National Center for Educational Statistics 1995.

[15] Leitman, Binns, & Duffet 1995.

[16] Bowen, Richman, Brester, & Bowen 1998.

[17] Lochman, Lampron, Gemmer, & Harris 1987.

[18] Bowen & Bowen 1999.

[19] Benard 1991.

[20] Hawkins, Catalano, & Miller 1992; Masten & Coatsworth 1998; Werner & Smith 1982; 1992.

[21] Flay, Allred, & Ordway 2001; Roth, Brooks-Gunn, Murray, & Foster 1998.

REFERENCES

Allensworth, D., Lawson, E., Nicholson, L., & Wyche, J. (1997). *Schools and health: Our nation's investment*. Washington, DC: National Academy Press.

Andrews, J. A., Duncan, S. C., & Hops, H. (1994). Explaining the relationship between academic motivation and substance use: Effects of family relationships and self-esteem. Paper presented at the Biennial Meeting of the Society for Research on Adolescence, San Diego, CA.

Battistich, V., Solomon, D., Watson, M., & Schaps, E. (1997). Caring school communities. *Educational Psychologist*, *32*(3), 137-151.

Beauvais, F., Chavez, E. L., Oetting, E. R., Deffenbacher, J. L., & Cornell, G. R. (1996). Drug use, violence, and victimization among White American, Mexican American, and American Indian dropouts, students with academic problems, and students in good academic standing. *Journal of Counseling Psychology*, *43*(3), 292-299.

Benard, B. (1991). *Fostering resiliency in kids: Protective factors in the family, school, and community*. Portland, OR: Northwest Educational Research Laboratory.

Benton, D., & Roberts, G. (1988). Effects of vitamin and mineral supplementation on intelligence of a sample of school children. *The Lancet, i*, 140-143.

Bowen, N. K., & Bowen, G. L. (1999). Effects of crime and violence in neighborhoods and schools on the school behavior and performance of adolescents. *Journal of Adolescent Research*, *14*(3), 319-342.

Bowen, G. L., Richman, J. M., Brester, A., & Bowen, N. K. (1998). Sense of school coherence, perceptions of danger at school, and teacher support among youth at risk of school failure. *Child & Adolescent Social Work Journal*, *15*, 273-286.

Braggio, J. T., Pishkin, V., Gameros, T. A., & Brooks, D. L. (1993). Academic achievement and adolescent alcohol abuse. *Journal of Clinical Psychology, 49*, 282-291.

Center for Mental Health in Schools. (2000). *Addressing barriers to student learning and promoting healthy development: A usable research-base*. Los Angeles: UCLA School Mental Health Project.

Chandler, A. M., Walker, S. P., Connolly, K., & Grantham-McGregor, S. (1995). School breakfast improves verbal fluency in undernourished Jamaica children. *Journal of Nutrition, 125*, 894-900.

Costante, C. C. (2002). Healthy learners: The link between health and student achievement. *American School Board Journal*, January, 1-3.

Council of Chief State School Officers. (1998). *Incorporating health-related indicators in education accountability systems*. Washington, DC: Author.

Crum, R. M., Ensminger, M. E., Ro, M. J., & McCord, J. (1996). The association of education achievement and school dropout with risk of alcoholism: A twenty-five-year prospective study of inner-city children. *Journal of Studies on Alcohol,* 318-326.

Deutsch, C. (2000). Common cause: School health and school reform. *Educational Leadership*, March, 8-12.

Donovan, J. E., & Jessor, R. (1985). Structure of problem behavior in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology*, *53*, 890-904.

Dozier, A. L., & Barnes, M. J. (1997). Ethnicity, drug use status and academic performance. *Adolescence 32*(128), 825-837.

Dwyer, T., Coonan, W., Worsley, L., & Leitch, D. (1979). An assessment of the effects of two physical activity programs on coronary heart disease risk factors in primary school children. *Community Health Studies*, *3*, 196-202.

Eccles, J. S., Lord, S., & Midgley, C. (1991). What are we doing to early adolescents? The impact of education contexts on early adolescents. *American Journal of Education, 99*, 521-542.

Eggert, L. L., & Herting, J. R. (1993). Drug involvement among potential dropouts and "typical" youth. *Journal of Drug Education*, *23*(1), 31-55.

Ellickson, P., Bui, K., Bell, R., & McGuigan, K. (1998). Does early drug use increase the risk of dropping out of high school? *Journal of Drug Issues, 28*(2), 357-380.

Ellickson, P., Saner, H., & McGuigan, K. (1997). Profiles of violent youth: Substance use and other concurrent problems. *American Journal of Public Health, 87*(6), 985-991.

Flay, B. R., Allred, C. G., & Ordway, N. (2001). Effects of the Positive Action program on achievement and discipline: Two matched-control comparisons. *Prevention Science, 2*(2), 71-89.

Furlong, M. J., Chung, C., Bates, M., & Morrison, R. L. (1995). Who are the victims of school violence? A comparison of student non-victims and multi-victims. *Education and Treatment of Children, 18*, 282-298.

Galambos, N. L., & Silbereisen, R. K. (1987). Substance use in West German youth: A longitudinal study of adolescents' use of alcohol and tobacco. *Journal of Adolescent Research, 2*, 161-74.

Gronna, S.S., & Chin-Chance, S.A. (1999). Effects of school safety and school characteristics on grade 8 achievement: A mulitlevel analysis. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal.

Hanson, T. L., & Austin, G. A. (2003). *Student health risks, resilience, and academic performance in California: Year 2 report, longitudinal analyses*. San Francisco: WestEd. Retrieved from http://www.wested.org/hks

Hanson, T. L., Austin, G. A., & Lee-Bayha, J. (2003). *Student health risks, resilience, and academic performance: Year 1 report*. San Francisco: WestEd. Retrieved from http://www.wested.org/hks

Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, *112*, 64-105.

Herrenkohl, T. I., Maguin, E., Hill, K. G., Hawkins, D. J., Abbott, R. D., & Catalano, R. F. (2000). Developmental risk factors for youth violence. *Journal of Adolescent Health, 26*, 176-186.

Hirschi, T. (1969). *Causes of delinquency*. Berkeley, CA: University of California Press.

Hu, T., Lin, Z., & Keeler, T. (1998). Teenage smoking, attempts to quit, and school performance. *American Journal of Public Health, 88*(6), 940-943.

Jessor, R., & Jessor, S. (1977). *Problem behavior and psychosocial development.* New York: Academic Press.

Leitman, R., Binns, K., & Duffett, A. (1995). *Between hope and fear: Teens speak out on crime and the community*. New York: Louis Harris and Associates, Inc.

Lochman, J. E., Lampron, L. B., Gemmer, T. C., & Harris, S. R. (1987). Anger coping intervention with aggressive children: A guide to implementation in school settings. In P. A. Keller & S. R. Heyman (Eds.), *Innovations in clinical practice: A source book, 6* (pp. 339-356). Sarasota, FL: Professional Resource Press.

Maguin, E., & Loeber, R. (1996). Academic performance and delinquency. In M. Tonry (Ed.), *Crime and justice: Vol. 20. A review of research* (pp. 145-264). Chicago: University of Chicago Press.

Marx, E., Wooley, S. F., & Northrup, D. (1998). *Health is academic: A guide to coordinated school health programs.* New York: Teachers College Press.

Masten, A., & Coatsworth, D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist, 53,* 205-220.

Mensch, B. S., & Kandel, D. B. (1988). Dropping out of high school and drug involvement. *Sociology of Education, 61,* 95-113.

Meyers, A. F., Sampson, A. E., Weitzman, M., Rogers, B. L., & Kayne, H. (1989). School breakfast program and school performance. *American Journal of Diseases of Children, 143,* 1234-1239.

Mitchell, M. (2000). Schools as catalysts for healthy communities. *Public Health Reports, 115*(2-3), 222-227.

Murphy, J. M., Pagano, M. E., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. E. (1998). The relationship of school breakfast to psychological and academic functioning. *Archives of Pediatrics and Adolescent Medicine, 152,* 899-906.

National Center for Educational Statistics. (1995). *Gangs and victimization at school* (NCES Publication No. 95-740). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Newcomb, M. D., & Bentler, P. M. (1986). Drug use, educational aspirations, and work force involvement: The transition from adolescence to young adulthood. *American Journal of Community Psychology, 14,* 303-321.

Newcomb, M. D., & Bentler, P. M. (1988). *Consequences of adolescent drug use: Impact on the lives of young adults.* Newbury Park, CA: Sage Publications.

Pollitt, E., Leibel, R. L., & Greenfield, D. (1981). Brief fasting, stress, and cognition in children. *American Journal of Clinical Nutrition, 34,* 1526-1533.

Pollitt, E., Lewis, N., Garza, C., & Schulman, R. J. (1982). Fasting and cognitive function. *Journal of Psychiatric Research, 17,* 169-174.

Powell, C. A., Walker, S. P., Chang, S. M., & Grantham-McGregor, S. M. (1998). Nutrition and education: A randomized trial of the effects of breakfast in rural primary school children. *American Journal of Clinical Nutrition, 68,* 873-9.

Roth, J., Brooks-Gunn, J., Murray, L., & Foster, W. (1998). Promoting healthy adolescents: Synthesis of youth development program evaluations. *Journal of Research on Adolescence, 8*(4), 423-459.

Sallis, J. F., McKenzie, T. L., Kolody, B., Lewis, M., Marshall, S., & Rosengard, P. (1999). Effects of health-related physical education on academic achievement: Project SPARK. *Research Quarterly for Exercise and Sport, 70*(2), 127-134.

Schoenthaler, S. J., Amos, S. P., Doraz, W. E., Kelly, M. A., & Wakefield, J. (1991). Controlled trial of vitamin-mineral supplementation on intelligence and brain function. *Personal and Individual Differences, 12*, 343-350.

Schoenthaler, S. J., Bier, I. D., Young, K., Nichols, D., & Jansenns, S. (2000). The effect of vitamin-mineral supplementation on the intelligence of American school children: A randomized, double-blind placebo-controlled trial. *Journal of Alternative and Complementary Medicine, 6,* 19-29.

Schulenberg, J., Bachman, J. G., O'Malley, P. M., & Johnson, L. D. (1994). High school educational success and subsequent substance use: A panel analysis following adolescents into young adulthood. *Journal of Health and Social Behavior, 35*(1), 45-62.

Shephard, R. (1997). Curricular physical activity and academic performance. *Pediatric Exercise Science, 9,* 113-126.

Shephard, R., Volle, M., Lavallée, H., LaBarre, R., Jéquier, J., & Rajic, M. (1984). Required physical activity and academic grades: A controlled longitudinal study. In J. Ilmarinen & I. Valimaki (Eds.), *Children and sport* (pp. 58-63). Berlin: Springer Verlag.

Simeon, D. T. (1998). School feeding in Jamaica: A review of its evaluation. *American Journal of Clinical Nutrition* (Suppl.), 790S-794S.

Simeon, D. T., & Grantham-McGregor, S. (1989). Effects of missing breakfast on the cognitive functions of school children of differing nutritional status. *American Journal of Clinical Nutrition,* 49, 646-653.

Skager, R., & Austin, G. (1998). *Sixth biennial statewide survey of drug and alcohol use among California students in grades 7, 9, and 11.* Sacramento, CA: Office of the Attorney General.

Symons, C. W., Cinelli, B., Janes, T., & Groff, P. (1997). Bridging student health risks and academic achievement through comprehensive school health programs. *Journal of School Health, 67*(6), 220-227.

Werner, E., & Smith, R. (1982). *Vulnerable but invincible: A longitudinal study of resilient children and youth.* New York: McGraw Hill.

Werner, E., & Smith, R. (1992). *Overcoming the odds: High-risk children from birth to adulthood.* Ithaca, NY: Cornell University Press.

WestEd. (2002). *Guidebook for the California Healthy Kids Survey*. San Francisco: WestEd.