

Research on the Impact of School Facilities on Students and Teachers

A Summary of Studies Published Since 2000



Independent Variable Type	Independent Variable	Independent Variable Data Source	Dependent Variable	Sample	Results	Author(s)/Year	Study Type
Condition	Facility Condition Grade	Teacher surveys	Teacher retention in coming year	K-12 Teachers in the DC Public Schools (n=835)	Approximately 5% more likely to stay in a building in "A" condition vs. "F" condition	Buckley, Schneider & Shang 2005	Peer-reviewed journal article
	Classroom Condition Ratings	Teacher surveys	Teacher attitudes	Virginia teachers (n=165)	Teachers in schools in satisfactory conditions are significantly more likely to express positive attitudes about their classrooms than teachers in unsatisfactory buildings (across a wide range of indicators, but limited sample prevents causal inferences).	Earthman & Lemasters 2009	Working paper/Report
	Physical Disorder measures	Student surveys	Measures of social disorder and collective efficacy	Schools serving 6-8 graders in a large mid-Atlantic urban school district (n=33)	Path analyses reveal a direct association between physical disorder and social disorder even when prior levels of collective efficacy are controlled. Further, there is evidence that the effects of physical disorder may be operating through increased fear and decreased collective efficacy to affect perceptions of threat/violence.	Plank, Bradshaw & Young 2009	Peer-reviewed journal article
	Facility condition score & condition of individual systems	Principal assessments	Test score; Range of student, teacher, parent and community variables	South Carolina school principals (n=626)	There is a significant relationship between building condition and test scores. Additionally, at least 75% of principals indicated that the adequacy of the school facility impacted teacher attitudes, teacher recruitment and retention, student behavior, and parent and community attitudes and support.	Stevenson 2001	Working paper/Report
	School environment/ambience	Student & principal surveys	Truancy, cigarette, alcohol, and marijuana use	National sample of 8th, 10th & 12th grade students plus school principals (n=70,884 students plus one principal/school in 655 schools)	Results based on multilevel logistic and linear regressions indicate that students are sensitive to schools' ambience and that the association of various aspects of the school's physical environment with students' problem behaviors is positive for all students and greater for 10th-grade students than for 8th- and 12th-grade students.	Kumar, O'Malley & Johnston 2008	Peer-reviewed journal article
	Facility condition rating & condition of individual systems	Principal assessments	Impact of facilities on instruction	National sample of public school principals (n=1085)	Approximately one-third of schools indicated that there was at least one factor that interfered with their ability to deliver instruction to at least a moderate extent (32 percent with regard to permanent buildings, and 35 percent with regard to portable buildings. Across the 9 factors, 6-16% of schools reported that each factor interfered with instruction.	Chaney & Lewis 2007	Working paper/Report
	Number of Unsatisfactory Building Systems (0 vs. 1+)	Administrative data	Test scores, attendance & suspension rates	Schools in New York's Dusches & Columbia counties (n=23)	higher suspension rates (2-9%), lower attendance rates in middle and high school (2-3%), lower test scores (~5%)	Boese & Shaw 2005	Working paper/Report
	Facility Overall Compliance Rating	Administrative data	Test scores (CA API)	Schools in the LA Unified School District (n=509)	Changing from worst to best OCR leads on average to a 36 point increase in a school's API.	Buckley, Schneider & Shang 2004	Working paper/Report
	School condition rating, School age	Administrative data	Test scores (science/math/english)	Texas high schools (n=416)	4-9% difference between students in schools in worst/best condition ; 5-9% difference between students in oldest/newest schools; 4% difference in graduation rates between students in schools in worst/best condition and between students in oldest/newest schools	Blincoe 2008	Dissertation
	Building quality score	Administrative data	Test scores (reading, math & writing)	Wyoming public schools (n=296)	No discernable relationship between test scores and building condition scores	Picus, Marion, Calvo & Glenn 2005	Peer-reviewed journal article
	Six measures of facility condition	Administrative data	Test scores, attendance & teacher experience/turnover	Rural Texas high schools (n=72)	The condition of school facilities has a measurable effect over and above socioeconomic conditions on student achievement and teacher experience/turnover. Most significantly, for every 10% reduction in the percent of portable facility sf/student, test scores increased by 11 points and for every 10% increase deferred maintenance average test scores decreased by 0.61 points.	Sheets 2009	Dissertation
	School building condition index	Administrative data	Test scores and attendance	Elementary schools in New York City (n=95)	In schools with poor facilities students attended less days on average and therefore had lower grades in ELA and Math standardized tests. Attendance was found to be a full mediator for grades in ELA and a partial mediator for grades in Math.	Duran-Narucki 2008	Peer-reviewed journal article
	School condition (in need of repair), % temporary space, custodians/sq ft, & sq ft/student	Administrative data	Student attendance and drop-out rates	Schools in Houston, TX (n=226)	The quality of school infrastructure has a significant effect on school attendance and drop-out rates. Students are less likely to attend schools in need of structural repair, schools that use temporary structures, and schools that have understaffed janitorial services.	Branham 2004	Peer-reviewed journal article
	School condition rating	Commonwealth Assessment of Physical Environment assessment completed by school principals	Test scores (percent passing middle school SOL exam)	Virginia middle schools (n=111)	Percentage of students passing SOLs was 2.2-3.9% higher in English, mathematics and science in standard buildings than it was in substandard buildings	Bullcock 2007	Dissertation
Condition & Design	School facility design & condition grades	Teacher surveys	Test scores and teacher health, attendance, and retention	Teachers in Chicago, IL & Washington, DC (n=688 & 1273 respectively)	Poor facilities affect the health and productivity (attendance) of teachers and make retention of teachers difficult (especially for schools with a condition grade of "C" or less). On the academic side, a shift from the best facilities to the worst decreases student test performance by ~3% (in DC this is for both math and reading, in Chicago for % of students performing at/above grade level).	Schneider 2003	Working paper/Report
Design	Eleven design variables	Researcher-completed assessment using the Design Assessment Scale for Elementary Schools	Test scores (reading, math & writing)	Schools in a large urban Texas school district (n=20)	Many positive correlations between building design variables and student achievement were reported	Hughes 2006	Dissertation
	Three school design elements (movement and circulation, day lighting, and views)	Researcher observation	Test scores (various CA tests at a range of grade levels)	Rural and suburban Georgia schools (n=71)	Significant effects found between high scores on all three design elements and test score results	Tanner 2009	Peer-reviewed journal article
Capital Investment	Passage of a capital bond by the school district	Administrative data	Test scores (various CA tests at a range of grade levels)	California school districts (variable sample by type of analysis, maximum n=948)	Varying results - inconclusive or small positive results in early years, trending up to a peak of 1/6th of a school-level standard deviation six years after bond passage. (however point estimates fall back to zero after).	Cellini, Ferreira, & Rothstein 2008	Working paper/Report
	Total annual state K-12 capital outlay	Administrative data	Test scores (NAEP state averages)	US states (n=50)	Results would predict an increase in NAEP scores of .236 points per additional dollar/pupil invested in infrastructure (based on a .236 structural coefficient across three years of NAEP scores).	Crampton 2009	Peer-reviewed journal article



There has been a slow but steady increase of research on the impact of public school facilities on educational achievement and community outcomes and of the rigor of the research. This summary of studies is part of a larger literature review conducted by the 21st Century School Fund with funding from the Charitable Trust of the Council on Educational Facility Planners International.

The review is designed as an update to the 2002 review “Do School Facilities Affect Academic Outcomes?” by Mark Schneider, originally commissioned by the 21st Century School Fund’s Building Educational Success Together collaborative and then expanded by Dr. Schneider and published by the National Clearinghouse for Educational Facilities.

Recent research continues to point to a small but steadily positive relationship between the quality of a public school facility and a range of academic and community outcomes.

This study reviews the literature on:

- Facilities & academic outcomes
- School building systems
- School facility condition and community factors

This new review, available in October 2009 includes an extensive bibliography of research since 2002 and discusses the need for future school facility research.



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