

### Appendix 3. Effects of Student and Teacher Absenteeism on Academic Performance of Elementary and Secondary School Students: A Review

This appendix summarizes the available scientific findings in the educational, social science, and health research literature on the effects of student and teacher absenteeism (from health and other causes) on learning and academic performance among elementary and secondary school students.

#### Methods

We searched three electronic databases for articles published up till mid-2002: Medline PubMed, Educational Resources Information Center (ERIC), and Current Contents all editions. We also included selected articles cited in the articles identified from the electronic databases, and articles included in the previous broader review (Mendell and Heath 2003).

We review and discuss here articles reporting primary scientific research findings or reviews of the scientific literature, published either in peer-reviewed journals or in proceedings of scientific conferences. We also summarized findings for several journal articles for which abstracts but not the full text were obtained within the time available for this review.

This review covers findings on three relationships discussed in the scientific literature: between *student absenteeism* and *student performance* in school, *teacher absenteeism* and *student performance* in school, and *teacher absenteeism* and *student absenteeism* from school. For each of these topics, available studies were evaluated for the strength of their design and analyses. Studies considered stronger were those with experimental or prospective designs, good measurement methods, and effective control of key potential confounding factors through either study design or multivariate analysis methods. Research on absenteeism and school performance is made difficult by the many mutually related confounding factors that are likely to cause correlations between absence and performance that do not represent causality. These factors, such as poor motivation, chronically poor health, and other personal, familial, or social factors such as socioeconomic status, are likely to cause *both* increased absence and reduced performance in school. Articles reviewed here will be evaluated with attention to how well their design and analyses protect against such potential strong confounding influences.

Even if absenteeism were shown to cause reduced school performance, causes and means of reducing the absenteeism would be diverse and complex. Of special interest here is absence due to illness, particularly illness that may be caused by deficiencies in school environments. Performance decrements caused by such absence might be reduced by improving school environments. Other non-illness-related absence due to a poor school environment (sometimes called "motivational absenteeism") might also be reduced by improved school environments. Such absenteeism, however, cannot be identified in a study as easily as illness-related absence. A number of studies have associated indoor

environmental factors such as lower ventilation rate and outdoor pollutants with increased absenteeism in either workers or students (Mendell and Heath 2003). Because effects of absences from different causes were not distinguished in available research, their independent impacts could not be considered in this report.

## **Results**

We identified 16 articles meeting our criteria from electronic databases: six from Medline PubMed, seven from ERIC, and three from Current Contents, plus additional articles cited within the initially identified articles.

It is usually assumed that a student must be present in school to benefit from the instructional relationship between the teacher and the students, and that absence from class by the student (or the regular teacher) diminishes the achieved learning. Student absenteeism may involve non-sick leave (e.g., religious occasions, family illness, bereavement, truancy) or sick leave (true or feigned illness). Teacher absenteeism may involve non-sick leave (e.g., religious leave, family illness leave, bereavement leave, or training/professional/conference/visitation leave) or sick leave (Ehrenberg et al. 1991). Teachers use sick leave for illness and, in some cases, for covert "paid vacation" unrelated to illness (Ehrenberg et al. 1991). Factors influencing the amount of absenteeism among students or teachers have been discussed elsewhere (Elliott 1979; Norton 1998). A number of studies have associated certain indoor or outdoor pollutants with increased absenteeism in students (Mendell and Heath 2003).

### ***Effects of student absenteeism on student performance in school***

#### ***Prospective observational studies***

Rodgers (2001) reported findings from a follow-up study of Australian university students in a statistics class. The authors used within-person analyses to control for unobserved characteristics of students that were likely to affect both attendance and performance; in both fixed-effects and random-effects models adjusted for a variety of measured individual confounding factors. Each 1 percent increase in attendance resulted in a small but statistically significant increase of 0.05-0.13 points out of 100 possible points accumulated during testing during the study period. A student with the average attendance level of 74 percent would have scored about 1.3-3.4 percentage points lower than an identical student with perfect attendance. The availability of complete lecture notes for all students, facilitating private study after absences, may have caused downward bias in the effects seen (compared to expected effects for conventional classes without such notes available). Also, in order to adjust for individual ability and motivation, the analysis controlled for grades in other simultaneous classes; however, as these were also likely to be affected by attendance, this also would have biased the estimates downward toward no apparent effect. This was the most strongly designed and thoroughly reported study of relationships between attendance and short-term learning as assessed by testing, with potential flaws tending to reduce apparent relationships seen between attendance and performance.

Marburger (2001) reported a carefully designed study of attendance and test performance among university students. Students were significantly more likely to answer incorrectly those test questions covering material taught during days on which the students were absent. This was true even though most students reported reading the class notes of others after absences. The individual-level design of this study effectively canceled out differences between students in various prior influences. This test is a straightforward and valid assessment of the direct causal link between school absenteeism and short-term learning at the college level.

While both these studies are strongly designed, their findings in college students may not apply to primary and secondary students because of the differences in the structure of these different levels of education and in the developmental levels of the students.

O'Brien et al. (1985) reported results of a carefully designed prospective study of achievement in sixth- to eighth-grade students. Although absenteeism was correlated with final achievement test scores, after multivariate adjustment no significant correlation remained. The primary multivariate-adjusted predictors of achievement were the two pretest achievement tests (which in turn were both correlated with student absence during the study). This apparent confounding provides a possible explanation for some of the associations reported in other less carefully designed studies, in which measured performance may not have been independent of prior achievement tests of subjects.

Port (1979) followed Hawaiian students from kindergarten through 10th grade, and, in a carefully designed study, assessed the correlation of various background and school-related factors with scores on standardized tests of achieved skills. The instrument used, the Hawaii State Test of Essential Competencies (HSTEC), tests competencies achieved during an 11-year school career. Absenteeism, although having unadjusted negative correlations with test scores, in a multivariate analysis added essentially nothing to the explanation of variation in HSTEC scores. Most of the explained variation could be accounted for by scores on two tests taken eight years earlier, in second grade.

Summers and Wokfe (1977) reported findings from a large and well-designed study of factors influencing achievement scores over three years among elementary school students. The analysis controlled for previous grades and many socioeconomic factors. The attendance variable studied—unexcused absences (considered an indicator of students' motivation)—was significantly related to changed scores in the achievement tests, particularly in middle- and higher-income students. This finding, however, while it may test the targeted relationship of motivation at school to achievement, does not test the relationship between absences *per se* and performance, independent of the effects of motivation or other potential confounding factors. In particular, illness-related absence, an outcome of key interest with respect to environmental prevention, would generally be *excluded* from the unexcused absences studied. Thus these findings on unexcused absences, concerning only the subset of absenteeism most influenced by current motivation and unrelated to illness, are not likely to be relevant to adverse health effects caused by school environments. They would be relevant, however, to the potential effects of poor quality of *perceived* school environments (e.g., schools perceived as

unhealthy or dangerous) in increasing what is called "motivational absence." But the findings cannot distinguish between the effects on performance of poor motivation and of motivational absence.

*Other observational studies*

Ziomek and Schoenberger (1983) studied educationally disadvantaged students in grades two through six Title I programs, comparing end-of-year achievement tests per student with attendance at both school and Title I programs, adjusting for beginning-of-year achievement scores. They reported statistically significant but small correlations, ranging for each grade from 0.00 to 0.22, with stronger correlations for Title I attendance than for school attendance. No multivariate adjustment for other potential confounders such as gender was included. The study suggests possible weak associations between attendance and achievement but failed to adjust for potential confounders other than prior achievement levels.

Data in a cohort study in Minnesota of asthmatic children and age- and sex-matched controls by Silverstein (2001) show, although the author did not explicitly report it, that greater absenteeism was significantly associated with lower grade point average and, in some analyses, with lower standardized test scores.

Douglas and Ross (1965) studied absence among British primary school students aged 6 to 11 and their mental ability and school performance scores years later. From retrospective analyses of national data, the authors determined that in all social classes but the upper middle, greater absence from school was associated with lower scores for mental ability and school performance, particularly in the lower socioeconomic levels. The researchers, however, suggested that detrimental effects of past absenteeism in primary school might not persist if attendance improves (Douglas and Ross 1965). The analysis did not include multivariate adjustment for prior potential confounding factors.

Ehrenberg et al. (1991) reported findings from a large study of absenteeism among students and teachers in all school districts of New York State (excluding New York City), analyzed with data on pass rates for standardized state tests. Statistical models were adjusted for a wide variety of potential influences including, for teachers, teaching experience, tenure status, class size, and class quality, as well as for sociodemographic characteristics of the districts and communities from which students came (Ehrenberg et al. 1991). Higher levels of student absenteeism were related to a lower percentage of students passing standardized tests (each three additional days of average student absence was related to a 1 to 2.5 percentage point decrease in the proportion of students passing the test (Ehrenberg et al. 1991). However, the authors cautioned that these conclusions apply only to pass rates of students at the lower end of the range of academic talent, not to the relative performance of students well above the passing level, or to aspects of learning not measured by these exams. Furthermore, prior personal factors among students, related to both increased absenteeism and decreased performance, were not considered or ruled out in the analysis.

Safer (1986) performed a case-control comparison of multi-suspended junior high school students with non-multi-suspended, age- and sex-matched junior high school students. The study found that excessive absenteeism (over 16 days per year) in elementary school did not predict non-promotion in elementary school. Excessive absence in junior high school, in contrast, did predict non-promotion in junior high school—excessive absenteeism was associated with 10 times as much non-promotion; however, causality could not be established for this link. The authors point out that the high levels of absence studied might indicate a variety of disruptive personal, familial, and societal factors. For instance, non-promotion in elementary school strongly predicted later excessive absence in junior high school, making it unclear how much the statistical correlation between early excessive absence and later non-promotion in junior high school simply reflected the confounding effects of earlier academic failure. The study could not identify possible confounding factors statistically, due to the lack of multivariate analysis.

O'Neil et al. (1985) reported that increased absenteeism in public school (K-12) students in Connecticut was associated with lower grades, but not with lower scores on achievement tests (which were related to IQ scores).

Gutstadt et al. (1989), in a study of asthmatic children aged 9 to 17 attending an asthma clinic, found no relation of absenteeism to decreased performance on academic tests. Their analysis adjusted for emotional and behavioral problems but not prior performance, motivation, or other such potential confounding factors.

Other peer-reviewed reports, all of cross-sectional studies and not obtained in full nor reviewed here, found strong inverse relationships between absenteeism and class performance (Schmidt 1983; Park and Kerr 1990; Romer 1993; Durden and Ellis 1995). Other non-peer-reviewed reports, not reviewed here, also found at least some relationships between increased student absenteeism and decreased performance on school grades or standardized tests, although these correlations may not have been adjusted for potential confounding by outside factors.

#### *Summary of findings*

Overall, findings were mixed. The two strongest studies (Marburger 2001; Rodgers 2001) both found statistically significant inverse relations between absence and performance. Of the next strongest, which were cross-sectional studies adjusting for potential confounding factors including previous performance, two found a correlation (Ziomeck and Schoenberger 1983), while two did not (Port 1979; O'Brien et al. 1985). Among the remaining studies, which used multivariate adjustments but not for prior performance, or used no multivariate adjustment at all, four findings showed inverse correlations, one was mixed, and one showed positive correlations.

No available studies used experimental or quasi-experimental designs. The strongest available studies (Marburger 2001; Rodgers 2001), however, did control for the most important potential confounders—the social, family, and motivational factors that are difficult to control in observational studies—by design and analyses using within-person

comparisons. (A within-person analysis assesses changes over time for each person separately, preventing distortion in the analysis due to differences between individuals.) This creative approach may be as close as is feasible to experimental approaches to study of relationships between absence and academic performance. The findings of correlations in four of five well-designed studies that controlled for key potential confounders, including both of the most strongly designed studies (Marburger 2001; Rodgers 2001), suggests a direct relationship between increased absence and decreased learning in school; and that this relationship may be causal. The strongest two of these studies, however, were conducted in college classes and may not apply to primary and secondary school students. Another of these studies (Summers and Wokfe 1977) excluded illness-related absence and thus provides evidence only on motivation-related absence. The inverse absence-learning correlations reported by less well-designed studies are only suggestive of causal relationships, because the studies failed to protect the findings, in the design or analysis, from effects on the tested performance of *previous* poor performance or attendance, which might also be strongly related to tested attendance. These less well-designed studies. The overall picture is of a clear correlation between school absenteeism and performance, much of which may be due to mutually associated factors such as motivation or personal factors, but some of which, best assessed by Rodgers (2001) and Marburger (2001), is likely to be causal.

The full strength of this conclusion, however, holds only if the finding relating to college students applies to primary and secondary students in their classes. Furthermore, short-term reduced learning from individual absences may or may not aggregate over time so that chronically increased absenteeism would lead to reduced long-term learning. The summary effect on residual long-term learning of the short-term effects demonstrated by both Rodgers (2001) and Marburger (2001) might be more or less than additive. Demonstrating this, therefore, would be necessary to quantify the long-term effects. Also, the short- and long-term effects in college classes may be smaller or larger than those in primary and secondary school classes.

#### ***Effects of teacher absenteeism on student performance in school***

Teacher absence has been reported to vary with factors such as day of week, month of year, age, gender, performance rating, school level taught, level of teaching license, years of teaching, degree held, school leave provisions, socioeconomic and ethnic mix of students, and level of student achievement (Norton 1998). We have not identified any studies on the relationship of teacher absenteeism to school environments, although a number of studies have associated indoor environmental factors such as lower ventilation rate with absenteeism in (adult) office workers (Mendell and Heath 2003). Teacher absenteeism causes a number of problems for schools, including the monetary costs for substitute teachers as well as the difficulty of finding qualified substitutes (Norton 1998).

Absenteeism of teachers may adversely affect student academic performance if less learning occurs with substitute teachers, or if teacher absenteeism increases student absenteeism, which in turn could decrease performance (Ehrenberg et al. 1991). A review by Elliot (1979) reports that in a study observing and rating teachers for classroom

effectiveness, scores for substitute teachers were strikingly lower than the scores for regular teachers: in elementary school teachers the scores for substitutes were less than one third as high, and in secondary school teachers the scores were only one twentieth as high. Thus, teacher absenteeism could plausibly lower the quality of teaching and thus the environment in which students learn.

Few peer-reviewed studies were available on the relationship between teacher absence and student performance. Ehrenberg et al. (1991) reported that teacher absence at the levels observed did not influence student performance on most of the elementary and secondary school standardized tests assessed, with a negative effect on only one of the 7 tests. However, as previously mentioned, the researchers cautioned that these conclusions apply only to pass rates of students at the lower end of the range of academic talent, not to the relative performance of students well above the passing level, or to aspects of learning not measured by these exams.

Insufficient evidence is available to draw conclusions about the existence or causal nature of this relationship.

#### *Effects of teacher absenteeism on student absence from school*

Only one reported finding on this relationship was identified. Ehrenberg et al. (1991) reported that greater teacher absenteeism was positively associated with greater student absenteeism. The authors suggested that frequent absence of teachers may affect student motivation and attendance, or common factors in the school environment may simultaneously influence both teacher and student absenteeism. The authors reported statistical analyses suggesting that an influence operates between these variables (rather than their parallel changes being caused by some common outside influence), although the direction of influence was not determined.

Insufficient evidence is available to draw conclusions about the existence or causal nature of this relationship.

#### **Discussion**

Findings on relationships between absenteeism and impaired performance in schoolchildren have not been completely consistent, but the strongest available findings suggest a relationship that may be causal, at least for short-term-learning among college students. Evidence on the relationships between teacher absence and student performance, and between teacher absence and student absence, is insufficient for conclusions about the nature of these relationships.

Absenteeism from school by students or teachers may result from a variety of sociodemographic, family, or personal factors, including illnesses, or combinations of these factors. Of special interest to this review is to characterize the effects on performance of absenteeism that is *preventable by improving indoor school environments*. The consideration of illness-related and other specific categories of absence, rather than all absence, would better inform decisions about effective preventive

strategies. However, the consideration of performance decrements in school caused by absence of specific causes was not possible with the available scientific findings.

### *Outstanding research questions*

The nature and magnitude of any causal relationship between student absence and performance still needs clarification. We do not know if the short-term negative effects of absence on performance documented in college students correspond to long-term performance decrements in primary and secondary schoolchildren. We also do not know to what extent performance of students is diminished by absences resulting specifically from illness exacerbated by deficient indoor environments at schools. Whether increased teacher absenteeism also reduces student performance or attendance is also unknown. And finally, we do not know what effects deficient indoor environments in schools have on the attendance of students and teachers at school.

### *Suggested research*

Additional carefully designed research is needed to replicate in primary and secondary schools the best available studies (conducted on college students) on relations between student absence and performance, and to extend these methods to measures of meaningful long-term performance. In particular, to strengthen their ability to assess potential causal relationships, study designs must effectively control for the effects of prior factors that may be strongly correlated with both current absence rates and current attendance. This latter consideration also applies to research on teacher absenteeism and the performance or absenteeism of students.