

School building condition, school attendance, and academic achievement in New York City public schools: A mediation model

Valkiria Durán-Narucki*

Graduate Center, City University of New York, USA

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Abstract

Little is known about how the condition of school facilities affects academic outcomes. This study examines the role of school attendance as a mediator in the relationship between facilities in disrepair and student grades in city and state tests. Data on building condition and results from English Language Arts (ELA) and Mathematics (Math) standardized tests were analyzed using a sample of 95 elementary schools in New York City. Variables relevant to academic achievement such as ethnicity, socioeconomic status, teacher quality, and school size were used as covariates. In run-down school 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. This study provides empirical evidence of the effects of building quality on academic outcomes and considers the social justice issues related to this phenomenon.

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1. Introduction

Two important lawsuits have recently addressed the impact of school facilities on the academic achievement of students in the public system. In the case of *Williams v. the State of California* (2002), Fine, Burns, Payne, and Torre (2004) argued that the poor condition of school buildings contributes to “systematically under-educate poor and working class youth, and youth of color”. In the *Campaign for Fiscal Equity v. State of New York*; the New York Supreme Court stated that: “[...] the physical condition of New York City’s schools has a negative effect upon the academic performance of the City’s public school students. However, the magnitude of that effect is unclear from the evidence at trial” (Campaign for Fiscal Equity, 2001).

The current study attempts to clarify the role that the condition of school facilities plays in academic outcomes; in other words, how does the condition of the physical environment of the school affect the achievement of students?

Historically, the environment has been described in psychology and education as a backdrop or at best as an inanimate participant in “higher order” mental processes. However, in the last decades ecological and environmental psychology’s theoretical developments have offered a different perspective by conceptualizing the environment as an active part of the person–environment system (Altman, 1991; Heft, 2001). From this point of view, physical environments play an important role in the behaviors or cultural practices that take place within them. The quality of the environment, the presence and condition of its features, the decay that it suffers, and the level at which it is maintained, are all factors in the quality of the activities that take place in it.

School settings, as significant participants in the person–environment system, bear great relevance for the intellectual processes that take place within them because developmental and learning processes occur not only in a specific school with specific characteristics; but the characteristics of the school are an *intrinsic* part of these processes. Within this theoretical stance, the quality of schools as environments specifically created for learning is

*Tel.: +1 201 861 4140; fax: +1 212 817 1533.

E-mail address: VDuran@gc.cuny.edu

then related to the quality of the learning activities that take place in them.

1.1. The role of the physical environment in academic outcomes

The school is the most important setting, after the home, in the development of children. Psychological effects of the environment on children have been shown in terms of crowding (e.g. Evans, Lepore, Shejwal, & Palsane, 1998); noise (e.g. Evans & Maxwell, 1997), greenness (e.g. Wells, 2000); and lighting (Hathaway, 1995). Design aspects of the environments in which children spend their time, such as the presence of private spaces or whether they are child-scaled, also affect children's behavior (Moore, 1994; Weinstein, 1987; Wohlwill & Heft, 1987).

Until 1979, the research on the physical environment of the school focused on the impact of six environmental variables: seating position, classroom design, density, privacy, noise and the presence or absence of windows on student behavior, attitudes and achievement (Weinstein, 1979).

Research specific to the condition of educational facilities and their relationship to academic achievement is very limited. Some unpublished studies have connected deficient facilities to educational outcomes (Cash, 1993; Hines, 1997; Lemasters, 1997); however, they suffer from serious conceptual or methodological problems. The studies either relied on school personnel reports regarding the condition of the buildings (Cash, 1993; Hines, 1997), did not include measures of teacher quality, ethnicity or school size in their assessment (Hines, 1997) or lacked statistical testing of their hypotheses (Lemasters, 1997).

There are several studies that take a more comprehensive approach. In a study, Berner (1993) found that the condition of school buildings in Washington, DC was predictive of students' achievement scores. Berner's model looked at how parental involvement predicted the condition of school buildings, which in turn predicted academic achievement. One limitation of this study, however, was the lack of control of other variables that could also have an impact on achievement. Maxwell's (1999) examination of student performance in 21 public schools that were renovated in Syracuse, NY found that after the renovations Mathematics test scores improved for 3rd and 6th graders, but reading scores did not. In a more recent study, Maxwell (2007) found that the quality of a classroom's physical environment affects preschool children's cognitive competence. In classrooms that were rated higher on physical characteristics related to attributes such as control, privacy, complexity, etc., children scored higher on a measure of cognitive abilities than peers in classrooms with lower ratings.

O'Neil and Oates (2001) investigated the impact of school facilities on student achievement, behavior, attendance, and teacher turnover. The authors found a positive relationship between building condition and achievement

on standardized tests. Student achievement was higher in newer buildings and in buildings with higher condition ratings. This study however, was limited in that it relied on school principals' reports as a measurement of the condition of the school facilities and in that its analyses were correlational. In her study of Milwaukee public schools, Lewis (2001) found that facility condition impacts student performance even when individual differences, such as SES, attendance, ethnicity, truancy and suspension rates are controlled.

None of these studies, however, looked into mediating factors in the relationship between facilities and academic outcomes. How do poor facilities affect student outcomes, and through which mechanisms? From the perspective of environmental psychology and education, there is a need for the development of a theoretical model that explains the phenomenon further (Earthman & Lemasters, 1996).

Understanding the role of the quality of the physical environment is crucial to children's development. Current research on cultural psychology demonstrates that the functioning of children cannot be separated from the contexts of their activities because they learn by actively participating in the ongoing activities in their surrounding environment (Rogoff & Morelli, 1989; Rogoff, Paradise, Mejia Araúz, Correa-Chávez, & Angelillo, 2003). Throughout life, individuals are taught and learn to recognize and use the functional properties of objects and places (Heft, 2001). This is an interactive process between the user and the environment in which the quality of the environment is essential to the quality of the activities that take place in it. Through this process, children can learn not only appropriate behaviors and concepts, but also about their place in the world.

1.2. A social justice issue

Children living in poor urban environments may be particularly affected by the condition of the school buildings that they attend. Recent studies have shown that children living in poverty are at higher risk for socio-emotional difficulties and that this risk can be partially explained by the exposure to suboptimal environments (Evans & English, 2002). Furthermore, Evans and Stecker (2004), found that chronic and acute exposure to environmental stressors is linked to deficits in task performance and to experiencing learned helplessness. These factors can affect academic success. Research also documents that there is an inverse relationship between SES and environmental risk factors such as hazardous waste, ambient and indoor air pollutants, water quality, housing quality, and neighborhood conditions among others (Evans & Kantrowitz, 2002). Children who live in poverty are exposed to multiple environmental risk factors, which in turn affect their health and well-being. These factors can affect their school success.

The poor condition of school buildings is a widespread and important problem. A survey conducted by the

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