

THE IMPACT OF STUDENTS' PERCEPTIONS OF SCHOOL BUILDING
QUALITY AND SELF-CONCEPT ON ACADEMIC OUTCOMES

A Thesis

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ABSTRACT

There have been numerous studies focusing on the impact of school environments on student outcomes, particularly academic achievement. Yet while much of the research literature has tried to solidify the connection between building condition and achievement, few studies have attempted to uncover the exact mechanism through which this relationship exists and the other variables that may play a role in this relationship.

The current study examines the way in which students' perceptions of school building quality and self-concept impact academic outcomes, including absenteeism and scholastic achievement. Twenty-two students were interviewed about their perceptions of the quality of their school building and whether or not the building enabled each of them to achieve academically. Additionally, the students answered questions about their self-efficacy and worth, both generally and within the domain of scholastic achievement. Attendance records, classroom grades from four main subjects, and standardized mathematics and science test scores were obtained for each participant and analyzed alongside findings from the student interviews.

Students' perceptions of safety within the school building predicted their beliefs about their ability to achieve academically. Additionally, students' perceptions of the building's ability to support their academic needs significantly predicted classroom grades, and marginally predicted standardized test scores and a measure of self-concept in the domain of scholastic competence. While self-concept did not mediate the relationship between perceived building quality and academic outcomes, it did moderate the relationship between perceived safety and student absenteeism.

The results of this study have important implications for education policy and for the design of more appropriate, supportive learning environments. Despite the

small sample size, the findings point to notable within-school differences and highlight the value of eliciting student feedback in order to better understand the needs and perceptions of the largest population of school building users.

BIOGRAPHICAL SKETCH

Suzanne Schechtman grew up in the suburbs of Long Island and, like most people, has spent the majority of her time in buildings. After obtaining a BA in Psychology from Washington University in St. Louis (2005) and working for two years as a consulting analyst at a design firm, she went back to school to learn more about the intersection between environmental design and the social sciences. Her goal is to better understand how buildings can be created in a more thoughtful, supportive way so that the needs of the people who spend their time in these environments will be taken into account to inform design decisions, rather than as an afterthought.

I would like to dedicate my thesis to my family, my close friends, and my various mentors for all of their encouragement and support throughout these past two years; I am lucky to have these wonderful people in my life and could not have done this without them.

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CHAPTER 1

INTRODUCTION

We spend a majority of our time inside buildings (Hoskins, 2003), yet most of us rarely think about how much the built environment impacts our overall well-being. We generally have minimal awareness of the way in which buildings and the ambient conditions within them affect our ability to concentrate, engage in work, and interact with other people. We assume that the indoor air we are breathing is clean, that the noise levels we encounter are appropriate, and that the building materials used are non-toxic. We also do not think about how our surroundings may help to define who we are and how, oppositely, who we are affects our perceptions of our environment. Yet, whether we realize it or not, the built environment is impacting us each day in all of these respects as well as many others. While there are many environments worthy of study, one is particularly ubiquitous, extending its influence over each and every one of us at a crucial period in our development. That environment is the school.

In the United States, students spend upwards of six hours each day in school buildings (U.S. Department of Education, 2006). This statistic is particularly concerning when one considers how unhealthy and inadequate this environment can be. From overall building quality to indoor air quality and acoustic issues students are exposed to facility conditions that are not always conducive to learning. There is a wealth of research pointing to the adverse impact of school buildings on students' health, cognitive development, achievement, and overall well-being (e.g., Buckley, Schneider, & Shang, 2004; Earthman, 2004; Evans, 2006; Higgins, Hall, Wall, Woolner, & McCaughey, 2005; Uline & Tschannen-Moran, 2008; Weinstein, 1979). Yet, there is not much being done to ameliorate these issues, and many school buildings remain in a state of disrepair and inadequacy. A survey of the condition of

U.S. school buildings by the U.S. Department of Education (2000) reported that 25% of schools had at least one *building* on site that was less than adequate, and 50% had at least one less-than-adequate building *feature* – such as the roof, floors, plumbing, heating, or ventilation. Since the report came out ten years ago, there has been no indication of any major strides to improve the quality of school buildings around the country.

In fact, the average age of school buildings in the United States is 40 to 50 years old (Buckley, Schneider, & Shang, 2004; Schneider, 2002). While the age of a building does not automatically, inherently predict quality, many of these older buildings are, in fact, poorly maintained and thus more often represent the lower end of the quality spectrum. In addition to their deteriorating quality, the advanced age of school buildings indicates that many children today are learning in spaces that were designed and built with materials, knowledge, and resources from the 1960s.

Furthermore, it is becoming more common for students to attend schools in re-use facilities. Bulkley and Fisler (2003) emphasize the unprecedented growth in the number of charter schools emerging over the past twenty years; the researchers indicate that one of the biggest challenges in opening a charter school is securing appropriate facilities where teaching and learning can take place. As more and more charter and alternative schools pop up, there will be more students attending school in buildings that were not necessarily designed to support the learning process, which could have implications for student learning, engagement, and achievement.

There are extremely high expectations of children and the school system in the United States; students are expected to be able to fully engage in the learning process and make the most of their educational experience, whether or not they are provided adequate resources or subjected to toxic substances or poorly ventilated buildings. A large proportion of school buildings are unhealthy or simply ineffective and

unpleasant learning environments. Yet there is a paradoxically low level of urgency in the policy arena to remedy this situation. This is largely due to the huge costs associated with capital expenditures and maintenance (Boren, 2005), and the lack of research connecting dollar amounts to expenditures and resulting student outcomes (Arsen & Davis, 2006). An estimate of unmet need for capital expenditures and maintenance in United States public schools in 1995 was \$266 billion (Crampton, Thompson, & Hagey, 2001, as cited in Arsen & Davis, p. 7).

Additionally, problems must be framed in such a manner that they will be considered relevant in light of current events, the political climate, and a number of other factors (Kingdon, 1993), and timing is everything. Kingdon describes the way in which a ‘focusing event,’ such as a disaster, often may bring an issue to the forefront of the policy arena (p. 42). In the case of schools, an example would be a roof collapse or a similar crisis that would create a sudden sense of urgency to improve the nation’s building stock; yet, this reactive approach to catastrophic events will not work in favor of students in the long run, especially those who live in certain communities with consistently lower quality school buildings, who experience poorer health, lower achievement, and, as a result, are presented with fewer opportunities in the long run. Unfortunately, policy issues with more long-term outcomes and goals are harder to get on policymakers’ agendas.

While evidence of the effect of school building quality on student outcomes presents very serious concerns, the question of how students perceive the quality of their environment may be just as relevant if not more so. Students’ judgments of their surroundings may play an important role in their beliefs about school, learning, their ability to achieve, and their self-identity in general (Proshansky & Fabian, 1987). There is a need to better understand how children and adolescents’ perceptions of their physical surroundings shape their beliefs about themselves and vice versa, in order to

learn how school buildings can eventually be improved to support students' positive self-concepts and views of education.

In 2005, public school principals were asked to describe the current state of their facilities and it was reported that 44% of schools around the country experience some level of distraction and disturbance due to environmental factors, including acoustic issues, heating and air conditioning, room configurations, and the overall physical condition of ceilings, walls, and other critical elements of the physical infrastructure (U.S. Department of Education, 2007). While it was reported that a *majority* of schools did not experience any interference from facility issues and were therefore considered adequate, a majority of *adequate* facilities is simply not sufficient if the goal is to provide healthy, safe, and enriching educational opportunities for all. 'Adequacy' implies that these facilities have met minimum building standards; it does not specify that the facilities are truly suitable in terms of meeting the needs of children and teachers in these environments. Rather than striving for mere adequacy, there is a need to provide truly supportive environments that exceed the bare minimum.

CHAPTER 2

LITERATURE REVIEW

The role of the school environment

When parents send their children to school, they do not necessarily recognize or fully appreciate the way in which each aspect of the physical environment has the potential to affect their child's performance and well-being. There is a significant body of research highlighting the impact that overall school building quality and a variety of ambient conditions – including indoor air quality, thermal conditions, lighting, ventilation, and noise – have on students' attitudes, behaviors, well-being, and achievement (e.g., Branham, 2004; Earthman, 2004; Evans, 2006; Evans & Maxwell, 1997; Maxwell & Evans, 2000; McGuffey, 1982; Schneider, 2002; Uline & Tschannen-Moran, 2008; Weinstein, 1979). Early research in the field explored diverse topics in the physical setting, including everything from seating position and classroom design to density, crowding, and privacy (Weinstein, 1979), to understand exactly how all of these environmental variables were impacting the overall learning experience and academic outcomes. Researchers have examined the effect of school environments on everything from attendance (Branham, 2004; Duran-Narucki, 2008) and student mobility (Evans, Yoo, & Sipple, 2010) to teacher engagement and retention (Buckley, Schneider, & Shang, 2004; Earthman & Lemasters, 2009; Sanoff, 2007). In one way or another, many of these studies or reviews of literature ultimately discuss the important connection between all of these factors and student achievement.

An early, comprehensive review of literature in the field focused on the impacts of a variety of environmental variables on student attitudes and academic outcomes (Weinstein, 1979). While many of the studies reviewed were focused on the two ends of the education spectrum, higher education and pre-school, Weinstein

performed one of the earliest reviews of more than 100 studies in the field, collecting information from a wide array of disciplines all seeking to understand the effect of the school environment on student outcomes.

Shortly after that, McGuffey (1982) reviewed over 80 studies on a diverse set of topics in the realm of school facilities, including building age, thermal conditions, visibility, paint color, acoustics, open space schools, windowless facilities, and building maintenance. He concluded that while each individual, physical factor in a school building may account for a small amount of the total variance in educational outcomes, when taken together, school buildings as a whole have a significant effect on students and the learning process (p. 276). In particular, old, poorly maintained buildings and buildings with thermal, acoustic, and visibility issues can hinder student learning and achievement.

In a review of research on school facility condition and achievement, Earthman (2004) summarizes numerous articles that pinpoint certain features as highly relevant factors in a child's education. After emphasizing the importance of ensuring students' health and safety first and foremost, he asserts that thermal comfort, indoor air quality, lighting, and acoustics are central to student achievement, based on the breadth of research on each of those topics. He cites research concluding that concentrations of carbon dioxide in classrooms and dust accumulation can be linked to asthma, student absenteeism, and poor academic performance. Other research cited by Earthman presents strong connections between daylighting and higher achievement scores, air-conditioning resulting in improved student performance, and noise distraction leading to poorer academic performance. In the current study, the particular aspects of the physical environment that will be analyzed are acoustics, crowding, safety, privacy, and cleanliness.

Acoustical issues are particularly relevant in schools and anywhere that learning takes place, because intrinsic to the learning process is the basic need for students and teachers to communicate, largely through speaking and listening (Nelson, Soli, & Seltz, 2002). The authors point out that children and adolescents under the age of fifteen need acoustically-sound listening environments to be able to understand what is being spoken, because their language skills are not yet fully developed at that point (p. 2).

When students are in noisy environments, the breakdown in communication can decrease student comprehension, increase student dissatisfaction and stress, and negatively impact learning, whether it is noise external to the school like transportation noise (Bronzaft & McCarthy, 1975; Evans & Maxwell, 1997) or noise within the school due to HVAC systems, lack of sound absorption in classrooms, or open layouts and crowding (Nelson et al.; Schneider, 2002). In particular, it has been theorized that noise affects student outcomes for a number of reasons. Noise may simply cause students to miss critical information; it may create stoppages during lesson time when noise is particularly loud and invasive; and, in the case of chronic, excessive noise, children and adolescents may adapt by learning to filter out all types of noise, both background/irrelevant noise and relevant sounds such as the teacher's voice (Weinstein, 1979). Aside from impacting academic outcomes, noise has been shown to affect mental health, motivation, cognitive processes such as long-term memory, and physiological responses, including blood pressure levels and stress hormones (Evans, 2006).

The impact of noise is evident even at a very early age. Chronic noise exposure in particular has been found to have an effect on pre-reading skills in young children (Maxwell & Evans, 2000), which has implications for the developmentally appropriate acquisition of future reading abilities and language skills. Evans (2006) describes that

the effect of noise on reading abilities in children is evident even when noise levels are low enough that they would not necessarily impair hearing. Ultimately, though, it seems that older children and adolescents may be more affected by noise due to increased exposure over time (p. 426).

Density and crowding are another relevant theme covered in the research literature. While density is an objective measure of the number of people per area, crowding is a perception of high density (Stokols, 1972, as cited in Weinstein, 1979) which leads to a person's discomfort. Weinstein describes that perceptions of crowding depend on "past experiences, personal space preferences, familiarity with the other individuals present, and the type of activity occurring" (p. 586). She reports inconsistent findings in laboratory experiments looking at crowding and task performance, describing the fact that the experiments differed in how density was manipulated (and as a result, whether there was any actual perceived crowding), in the level of task difficulty, and in the degree of physical interaction required for the task. Others contend that density may differ across classroom types and situations (Loewy, 1977, as cited in Weinstein, 1979).

Despite these early inconsistent findings in laboratory settings, a study of the effects of home density on children in New York City found that elementary school students living in high-density public housing had lower standardized reading scores and higher rates of behavioral issues in school than students who lived in low-density public housing (Saegert, 1982). More recent research looking at both home and school density has confirmed and built upon this connection between density and student outcomes. In an urban setting, Maxwell (2003) found that elementary school children's achievement (for girls) and classroom behavior (for boys) was negatively related to spatial density in the classroom as measured by square footage per child. The study additionally found that home density impacted children's stress levels and

academic outcomes. There are also studies that connect crowding to a variety of adverse effects. For instance, crowding in the home and school has been shown to increase social withdrawal, aggression, psychological distress, and feelings of helplessness (Evans, 2006), and overcrowding in schools has been connected to lower graduation rates (Earthman, 2004).

Crowding, noise, and other distractions can create an increased need for privacy. Ahrentzen and Evans (1984) point out that there are a number of different types of distracting elements in a physical setting – such as noise, visual, and kinetic distracters – which might impact students’ behaviors and their need to control their environment in some way. The researchers reported that elementary school children utilize secluded study spaces both inside and outside the classroom, as well as corners of the room, when they wanted to gain a sense of privacy.

Other research has emphasized the effects of toxins, building condition, and ambient environment effects on health, safety, and overall well-being through physiological, socio-emotional, and cognitive processes (Evans, 2006). For instance, studies connect early lead exposure and lead accumulation in the body to such outcomes as IQ deficits, attention problems, slowed reaction times, hyperactivity, and aggression. While the more overt goals of our education system involve the training and socializing of children and adolescents, another main purpose is caretaking. Yet there are many ways in which schools are not safe places for children. The above findings explain problems of safety in terms of health and well-being. Another type of safety issue, that of perceived safety and security, will be discussed in the section on students’ perceptions of building quality.

When taken together, all of these issues have implications for student achievement. There are a number of studies that combine a variety of these singular issues to assess the effects of overall school building condition on academic

achievement. Earthman, Cash, and Berkum (1995) conducted a study looking at student achievement, behavior, and school building condition, as evaluated by school principals at 120 public high schools in North Dakota. Following on the heels of research finding strong, positive relationships between these same variables (e.g., Edwards, 1992 and Cash, 1993, as cited in Earthman, 1998, Earthman et al., and Earthman & Lemasters, 1997), Earthman et al. similarly found there to be a significant relationship between building condition and achievement on tests of basic skills, and building condition and student behavior, when controlling for socioeconomic status. A review of many of these studies by Earthman (1998) points out that a more recent study found an even larger differential – nine- to eleven-point differences – in achievement scores when comparing students at schools with substandard building condition to those at above standard schools. He argues that there is a consistent trend in all of these studies linking overall building condition to student achievement.

Numerous researchers have cited methodological flaws in studies that have allowed school administrators and teachers to assess their own facilities (such as those reviewed by Earthman, 1998), as there may be biases in what are meant to be objective assessments, as well as inconsistencies from school to school. But regardless of this dispute over the soundness of the methodology, the results of these and many other studies consistently indicate a positive relationship between school building condition and student achievement, which is important to note.

Exploring the link between school building quality and achievement

While much of the research on school building condition focuses on the connection between quality and a variety of student outcomes including academic achievement, many studies do not attempt to explicitly address the exact mechanism by which this relationship exists. In other words, what is it about the condition of a

school building that hinders academic achievement? Are there other variables involved in the relationship? While a connection had previously been cited between inadequate school building infrastructure, lower student attendance, and higher drop-out rates (Branham, 2004), Duran-Narucki (2008) was able to formulate a mechanism through which these variables affect academic outcomes. She presents a strong case for attendance as a mediating variable in the relationship between school building condition and standardized test scores for elementary school students in New York City. Using building condition data that was gathered by architects and engineers in 95 elementary schools, Duran-Narucki found that while school building condition predicted test scores, the relationship was largely mediated by school attendance. Poor school building condition predicted lower student attendance rates, which in turn predicted lower achievement scores.

In a recently published study that also evaluated New York City public elementary schools, Evans, Yoo, and Sipple (2010) advanced the research a step further by finding evidence of yet another variable exerting its influence on the relationship between school building quality and academic outcomes. Using New York City Department of Education data on school facility quality and standardized math and reading test scores for students at over 500 elementary schools, the authors found that student mobility at the school level acts as a moderator, such that students who attend low quality school buildings that also have high student mobility are more likely to have lower standardized test scores. Significant main effects were found both for facility quality and student mobility, which indicates that both variables are exerting an influence on student achievement. It is important to emphasize that the researchers did not gather data at the individual level, and thus did not know which students changed schools. Nonetheless, this study and Duran-Narucki's (2008) research emphasize the idea that disruptions in a child's learning experience, either

through absences or movement from school to school, can impact academic achievement. In Evans et al.'s research, the authors accurately theorized that the quality of the school building acts in combination with student mobility to create multiple risk factors in children's learning experiences.

In yet another study that set out to understand the mechanism by which school facility quality impacts student achievement, Uline and Tschannen-Moran (2008) found that school climate mediates the relationship. The researchers surveyed over 1,000 teachers at 80 middle schools on their perceptions of facility quality, the adequacy of resources, and the school climate, defined as the social dynamics and quality of interpersonal relationships in the school (p. 59). Teachers' perceived facility quality at each school was correlated with students' standardized achievement scores in English and math, and when regression analyses were conducted, it was evident that school climate mediated this relationship. Connections such as this one and the findings of Duran-Narucki (2008) and Evans et al. (2010) are crucial in helping to explain how school building quality may be impacting students.

Socio-emotional development, place identity, and the ecological model

One goal of the current exploratory study is to better understand what other student outcomes, aside from academic achievement, are affected by school building quality and whether these variables may have the potential to explain the relationship between school building quality and academic outcomes, as attendance, mobility, and school climate do.

Some research has been conducted looking at the way in which the physical school environment impacts self-concept and socio-emotional outcomes. For instance, Maxwell and Chmielewski (2008) conducted a quasi-experimental study and found that increased personalization of the physical school environment led to improved self-

esteem in kindergarteners and first-grade students. The researchers explained that when children feel more of a connection to their surroundings and are given an opportunity to play an active role in changing their environment, as was demonstrated in this study, it may positively influence their ideas of self-worth and value.

In another study, researchers found that students at an elementary school with permanent student artwork had a greater sense of ownership over the learning process than children at a school with temporary artwork (Killeen, Evans, & Danko, 2003). Sense of ownership for these children consisted of being able to exert control, exhibit territoriality, personalize their school, and participate and involve themselves in the learning environment. By involving students in the design of their school environment, students were able to experience more feelings of ownership and attachment to the space.

In a study looking at competency in child care settings, a scale was created to measure design features that are thought to impact competency (Maxwell, 2007). Maxwell describes the way in which competency, or “the ability to interact effectively with one’s surroundings,” can develop based on the level of control, restoration, privacy, complexity, exploration, legibility, and personalization in a child-care space (p. 230). She found that children in classrooms that were rated on her scale as adequate or better had higher cognitive competency than children in less-than-adequate classrooms.

Simon, Evans, and Maxwell (2007) similarly conducted a study looking at competency and found that, when controlling for household income, elementary school students reported lower ratings of self-competency in buildings that were rated by trained researchers as lower in quality. The results reiterate a concerning picture. As the authors point out, if children in lower quality schools have lower self-

competency beliefs and a negative attitude about their abilities, what will motivate them to do their school work, and what will make them want to go to school at all?

All of these studies connect aspects of the school building to students' socio-emotional development, beliefs about themselves, and self-identity. Yet for a long time, theorists' explanations of the formation of self did not explain or incorporate the relevance of one's physical surroundings. Instead, the main focus was on the significance of other people and the way in which they impact a person's beliefs about him or herself. In reality, the physical environment is never independent from the social environment (Proshansky, Fabian, & Kaminoff, 1983), and it plays a crucial role in the development of our sense of self and identity, whether or not each of us is aware of it. Proshansky et al. describe a concept based on this idea known as place-identity, which refers to "physical setting cognitions that serve to define, maintain, and protect the self-identity of a person" (p. 73), or more succinctly, "the physical-world socialization of the child" (Proshansky & Fabian, 1987, p. 22).

Proshansky et al. (1983) explain that the concept of place-identity describes beliefs, values, expectations, memories, and interpretations that develop and change as people spend more time in significant physical settings, including their home, neighborhood, and school. People's perceptions of their environment can be either positive or negative, based on past experiences in other significant spaces; these cognitions may also be based on the overall quality of the setting, the quality of the social context, and the person's own strength and coping abilities (Proshansky et al.). Each person may thus experience the same environment quite differently from another person (Matthews, 1992).

Proshansky and Fabian (1987) explain that children spend so many years in school settings that they form particular ideas and perceptions of what features help to create a proper learning environment. This is why students' perceptions are so

important in their experience of a space. The quality, the look, and the feel of a school building can tell a student a lot about his or her value in society and the value of his or her education to the community and to society on the whole.

[I]f a building had a broken window and the window was not replaced, all of the other windows would soon be broken. One broken window indicates that no one cares, so continuing the breakage will come at no cost. (Wilson & Kelling, 1982, as cited in Branham, 2004, p. 1112)

This broken window theory, when applied to schools, can refer to the way in which building quality portrays a story to its users and the surrounding community about the value being placed on the users of the building and on their education more generally. Maxwell and Chmielewski (2008) similarly emphasize that

[t]he school and classroom physical environment may not only communicate to the students the school's values but also the larger society's values...If the message is conveyed that children are a low priority, children's self evaluation may eventually reflect that message in a variety of ways including lower self-esteem, lower achievement levels, or lower participation in school or community affairs. (p. 144)

The researchers argue that the physical school environment can dramatically alter children's perceptions of themselves, which has important implications for their self-esteem and overall level of engagement in the learning experience.

As these examples point out, people do not exist in a vacuum, and we cannot understand people's attitudes, beliefs, and behaviors without understanding their environment. Bronfenbrenner (1977) defines the ecology of human development as:

the scientific study of the progressive, mutual accommodation, throughout the life span, between a growing human organism and the changing immediate environments in which it lives, as this process is affected by relations obtaining within and between these immediate settings, as well as the larger social

contexts, both formal and informal, in which the settings are embedded. (p. 514)

In his ecological model, Bronfenbrenner describes the way in which people exist within, impact, and are impacted by a number of nested environments, from the micro-level to the more macro-level. He asserts that a person is defined by the dynamic interactions that exist between the person and the different layers of their environment; as a result, the person cannot be fully understood without this complex context.

The aforementioned studies as well as theories on place identity and human ecology start to pinpoint additional socio-emotional variables that may have the capacity to play a role in the mechanism through which the physical school environment impacts academic outcomes. If the physical school environment impacts children's self-esteem and self-competence, as the research suggests, and beliefs about the self impact one's ability to succeed and achieve academically, it seems natural to theorize that self-identity may play a relevant role in the connection between school building quality and achievement. This idea will be explored in the current study. But first, it will be helpful to look more carefully at different measures of self identity to understand how they define a person's actions, perceptions, and behaviors.

Measures of the self and self identity

There are a number of measures of the self and ways in which we perceive ourselves, and there are subtle differences between these measures. For instance, self-esteem recognizes people's perceptions of their worthiness and capabilities (Gardner & Pierce, 1998), and self-worth is similarly the degree to which a person likes themselves for who they are (Harter, Waters, & Whitesell, 1998); these two concepts are fairly interchangeable, and Gardner and Pierce explain global self-esteem as a general assessment of self-worth.

Slightly different is a concept known as self-efficacy, which is the belief in one's ability to achieve in future scenarios (Bandura, 1977). Bandura (1993) describes efficacy as "people's beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives" (p. 118). According to a study by Collins (1982, as cited in Bandura, 1993, p. 119), children who perform poorly might do so because they lack skills, but they may also perform poorly because they have low perceived self-efficacy, which hinders them from reaching their potential.

A distinction can be made between efficacy expectations and outcome expectations, where the former relates to the belief about performing an action, and the latter relates to whether or not an action will result in a particular outcome (Bandura, 1977). Gecas (1989) argues that efficacy expectations are equivalent to feelings of competency. Efficacy expectancies are thought to vary based on task difficulty, strength of the expectancy, and the ability to generalize from one domain to another (Bandura, 1977, as cited in Tipton & Worthington, 1984).

While much of the literature argues that self-efficacy is domain-specific, some have asserted that self-efficacy can be generalized from one task or domain to another (Tipton & Worthington, 1984). Tipton and Worthington developed a scale to measure the generalized self-efficacy construct and used participant scores on the measure to predict performance on two unrelated tasks: one involving physical self-determination and the other involving behavioral self-control. Based on successful predictions on the two very different types of tasks, the researchers found generalized self-efficacy to be a valid construct.

In this way, self-efficacy is very similar to self-esteem, in that both can be specific to certain tasks, but can also be more generalized traits (Gardner & Pierce, 1998). But self-efficacy differs from self-esteem in that self-esteem focuses on the self

while self-efficacy focuses on the self through completion of a task; self-esteem takes current assessments while self-efficacy focuses on future assessments (Gardner & Pierce, p. 51).

Perhaps most pertinent in this explanation of the different self processes is the following: Bandura (1993) argues that self processes such as self-efficacy mediate the role that environmental influences play on various outcomes, because “[t]hey give meaning and valence to external events” (p. 118). If this is true, it is possible that self-efficacy and other self processes, such as competency and worth, may mediate the effect that the physical environment – for example, the school building – has on student outcomes. Therefore, if a student experiences an environment, it is the interpretation of this environment and the perception of whether or not the environment will enable the student to achieve that may actually impact student achievement.

The current study will measure generalized self-efficacy, global self-worth, and domain-specific scholastic competence, to learn more about which measures of self-identity may play a role in the mechanism through which the built environment impacts academic outcomes. Simon et al. (2007) suggest that perceived self-competency may act as a mediator in the relationship between school building quality and achievement; one of the main goals of the current study is to explore whether this will be validated in the current sample.

Students’ perceptions of school building quality

Most of the literature on school building condition has aimed to capture *objective* measures of quality as evaluated by adults, paying little attention to children and adolescents and their *perceived* school building quality. Yet perceptions may be even more relevant than objective assessments, as they act as a lens through which we

interpret our environment and ourselves. Children and adolescents pick up on various cues in their physical surroundings; even from a young age, children can point to specific features that they believe create a positive learning environment, all connecting back to ideas of comfort, autonomy, opportunity, and personal meaning (David, 1982, as cited in Maxwell, 2000).

Additionally, children and adolescents derive meaning from their experiences in physical spaces, which enables them to judge environments positively or negatively based on these prior experiences. In their study of children's perceptions of poverty and danger based on the presence of physical deterioration in neighborhood settings, Pitner and Astor (2008) found that children were more likely to identify neighborhoods as impoverished and less safe when pictures portrayed decrepit, rundown buildings, in comparison to pictures of almost identical buildings that exhibited implicit signs of place attachment and territoriality. In other words, children made assumptions, based largely on the physical condition of buildings, about how safe they might feel in a particular setting. More generally, the authors indicated children's "responses suggested that physical cues of decay are powerful cognitive and emotional triggers" (p. 336).

Children and adolescents come from a very different vantage point and often interpret the world around them in a very distinct manner from adults. As Ahrentzen and Evans (1989) point out, children differ from adults "in size, cognitions, values, use and control" (p. 18). As a result, they have a very distinct sense of what makes for a comfortable, safe, and engaging learning environment, and their experience of physical space may drastically differ from that of teachers, administrative staff, parents, architects, and engineers.

A small number of studies have been conducted to uncover these differences. Maxwell (2000) conducted research in an urban setting, asking elementary school

students, parents, and teachers which building features contributed to a safe and welcoming school. She found that while certain similarities emerged, students tended to focus on features in the classrooms and bathrooms as being most revealing of a safe and welcoming setting, while adults focused more on the public, shared areas within the school. Clearly, children and adults hone in on different aspects of their surroundings and sometimes ascribe very different meanings to the same spaces. Since children and adolescents are the major user group in schools, it is important to learn more about their perceptions and opinions of the physical space so that researchers better understand how to accommodate their needs.

In research looking at both objective and perceived school building quality in three NYC public elementary schools, researchers found fourth-grade students' perceptions of school building quality to be significantly related to student lateness and perceived scholastic competency (Simon, 2005; Simon et al., 2007). The relationship between perceived building quality and student self-worth was marginally significant at $p < .1$. Additionally, there was evidence of perceived building quality mediating the effect between objective building quality and student lateness.

In an earlier study comparing students', teachers', and architects' perceptions of elementary school buildings, the researchers found that each user group had a distinctly different sense of which features were most salient in the school building (Ahrentzen & Evans, 1989). Even though there were more similarities of opinion between students and teachers as compared to architects, there were still disparities between teacher and student opinion. For instance, while teachers and students had similar requests for improvement (e.g., more windows and floor area), students noted higher levels of noise and distraction than teachers, as a result of certain design features in the school.

Ahrentzen and Evans (1989) concluded that students as a user group need to be included in the design process to ensure that architects are incorporating the needs of this distinct group into the design of the building. While Sanoff (2007) describes the importance of participatory design, which incorporates building users and stakeholders into the design process, his case study of a participatory design process at an elementary school only involved principals and teaching staff, and therefore left out critical information because students' perceptions and opinions were not taken into account.

Summary: Objectives + research questions

Based on a theoretical grounding in concepts of place identity and ecological models of human development, the current research is an exploratory study that aims to gain a better understanding of the way in which the physical school environment impacts student achievement. In particular, a major goal of this study is to uncover specific variables that may help to explain the relationship between building quality and academic outcomes. While there is clearly a wealth of research drawing connections between the physical school environment and student outcomes, including some studies looking at students' socio-emotional outcomes, there is currently no research looking at the connection between the school facility and students' self-efficacy, their beliefs about future achievement.

Additionally, many of the studies described above have focused on elementary school children. There is an opportunity to expand upon this research to understand how students at different ages are affected by their school surroundings. The current research seeks to learn more about how high school students interpret their environment, and how these perceptions may impact their beliefs about themselves and their academic achievement.

In terms of measuring academic achievement, many studies have focused solely on standardized testing scores in order to assess the impact of the school environment on academic outcomes. The current study includes standardized testing scores, but also incorporates students' classroom grades in different subjects over the course of the school year to learn whether different types of academic assessments are sensitive to the influence of the built environment.

Finally, rather than concentrating on objective building quality, this research focuses on students' perceptions of school building quality and the relationship between these perceptions and students' beliefs about themselves, their academic competence, and their ability to achieve. From there, the goal is to elucidate whether students' self-beliefs then impact their attendance and academic achievement.

The major research questions are as follows:

1. Students' perceptions of school building quality, academic outcomes, attendance, and self-concept:
 - a. Do students' overall perceptions of school building quality (PSBQ) and/or perceptions of specific aspects of building quality correlate with academic achievement, attendance, or self-concept?
 - b. Does student self-concept relate to achievement or attendance?
 - c. What predictions can be made based on these relationships?
2. What role might self-concept play in the relationship between perceived school building quality (PSBQ) and academic outcomes?

CHAPTER 3

METHOD

Participants

Participants were recruited from a small charter high school located in a re-use facility in upstate New York. Situated in a small urban area with other public high school options, the school differentiates itself through its commitment to social justice and sustainability education. Parents elect for their children to attend the school by applying through an open lottery system. At the time of the study, the school was in its first year of existence and had a total population of 90 ninth- and tenth-grade students, roughly 40% of who were eligible for free and reduced-price lunch. (The school plans to expand to include the eleventh and twelfth grades as its student body ages over the next two years.) As the building is a re-use facility, not originally designed to be a school, already-existing spaces had to be designated as classroom space. Classrooms therefore varied in size, aesthetics, access to natural light and ventilation, and degree of enclosure, which differs from the more uniform, standardized learning spaces that are often found in more traditional school settings.

Letters were sent home to parents, describing the proposed study and the informed consent process. Students whose parents signed and returned the necessary paperwork were permitted to participate after signing a student assent form. In total, twenty-two (22) high school students participated in the research study. Of the twenty-two, fifteen were in the ninth grade and seven were in the tenth grade. Demographic information, including age, gender, ethnicity, student's country of birth, and parents' countries of birth, was obtained for each participant. The sample included eleven males and eleven females between the ages of 14 and 17. All students were born in the

United States; eighteen of the twenty-two students in the sample were Caucasian, two were African American, and two indicated “Other.”

Apparatuses

(A) Student Interview

Each student participant was surveyed using the following four scales; all scales can be found in the appendix.

1. Perception of School Building Quality Scale

This scale was developed to assess students’ perceptions of the quality of their school building (Simon, 2005; Simon, Evans, & Maxwell, 2007). The questions ask students to report their opinions of certain features within different spaces in the school. The scale is organized into sections that each hone in on a specific space type: the building in general, the classrooms, the school bathrooms, the cafeteria, and the hallways. Questions from the original scale pertaining to the school library were omitted because the particular school involved in the study did not have a dedicated library space. For each space type, students were asked how much they like the particular space, and then asked questions pertaining to noise level in the space, degree of crowding, perceived safety, perceived cleanliness, and perceived level of privacy in each particular space. Examples of questions include:

- How dirty or messy is your school bathroom?
- How crowded do you feel in the cafeteria?
- How safe do you feel in your classrooms?
- How much do you like the hallways in your school?

For each question, there were three response options that students could choose between: “not at all,” “a little,” or “a lot.” Each space type was assessed at the school level, and students were asked to respond with their overall assessment of all spaces of

that particular type. For instance, the question, “How safe do you feel in the school bathroom?” required students to consider how safe they felt, on average, when using any bathroom in the school. Responses were coded so that a higher score indicated a more positive assessment of the quality of the particular feature or space type.

The scale is composed of 27 quantitative questions, followed by a few qualitative, open-ended questions about the student’s favorite and least favorite spaces in the school. It was pilot tested in a previous master’s thesis (Simon, 2005); for the pilot test, Cronbach’s Alpha for the entire quantitative portion was .82 and for the sections on different space types ranged from .49 to .67. For the current sample, Cronbach’s Alpha for the overall quantitative assessment of school building quality was .86. Due to the types of questions posed in each section of the scale, the data in the current study was parsed into sub-scales by space type as well as by topic (e.g., privacy, safety, noise level). Cronbach’s Alpha for the different sub-scales were: classroom quality (.11), Bathroom quality (.81), Cafeteria quality (.57), Hall quality (.75), Perceived lack of noisiness (.52), Perceived lack of crowding (.62), Perceived privacy (.60), Perceived safety (.78), and Perceived cleanliness (.78).

2. Brief Generalized Self-Efficacy Scale

To measure students’ expectations about their general level of competence and ability to achieve and succeed, Tipton and Worthington’s (1994) Brief Generalized Self-Efficacy scale was used. This scale was developed based on the premise that self-efficacy varies along three dimensions, one of which is generality (Bandura, 1977, as cited in Tipton & Worthington, 1984). Tipton and Worthington posited that feelings of self-efficacy from one situation can often be generalized to other similar situations. As a result, the researchers set out to create a scale that would measure the construct of generalized self-efficacy. They measured the construct validity of their scale via two separate studies and found it to be a valid instrument.

The brief form of the instrument consists of ten statements that each fall along a 7-point Likert scale. Participants were asked to rate how strongly they agreed or disagreed with each of the ten statements, from “strongly agree” to “strongly disagree,” with “neither agree nor disagree [with the statement]” as the midpoint.

Examples of the statements include:

- I am a very determined person.
- I can succeed in any endeavor to which I set my mind.
- Nothing is impossible if I really put my mind to it.

In my sample, Cronbach’s Alpha for this scale was .80. For ease of interpretation, scores were coded so that a high score indicates high/positive self-efficacy and a lower score relates to low self-efficacy.

3. Classroom Efficacy Scale

Students were then asked questions regarding how well their classroom enables them to do their school work. Maxwell and Provenzano (2008) created a thirty-one-question scale to measure students’ perceptions of the efficacy of the overall classroom environment. Each statement is aimed at understanding whether particular features within the classroom(s) help or hinder the learning process and the student’s ability to do his/her school work. The scale is patterned after Harter’s (1988) Self-Perception Profile for Adolescents, described below; for each statement, students were asked to respond “Yes” or “No” to whether or not they felt the statement was true for them. As a follow-up question, the researcher conducting the interview then asked whether this was or was not true “Sometimes” or “All the time.” Examples of statements from this measure are:

- I have my own desk in the classroom.
- My desk in my classroom makes me feel like I can do my work.
- When I’m at my desk I can hear what my teacher is saying.
- My classroom is noisy.

- All of my classrooms are good places to work.

This measure was still in the process of being pilot tested when the current study took place. For the current sample, the Cronbach's Alpha for the thirty-one question scale was .31. To increase the reliability of the scale, a subset of sixteen questions with a more refined focus was selected. This subset of sixteen questions had a Cronbach's Alpha of .71. Participant responses were coded to be consistent with the other scales, such that a larger number, or higher score, indicated higher perceived classroom efficacy.

4. Self-Perception Profile for Adolescents

The last portion of the student interview, Harter's Self-Perception Profile for Adolescents (1988), contained questions measuring domain-specific perceived self-competence. Students were asked to report their perceptions of their own adequacy in particular domains. The scale is composed of 45 questions and contains nine subscales – of five questions each – that are each scored separately: scholastic competence, job competence, behavioral conduct, athletic competence, social acceptance, close friendship, romantic appeal, physical appearance, and global self-worth. For each question, the student was presented with a statement that was two-sided; he/she had to decide which portion of the statement was more closely related to his/her own feelings and opinions. For instance, one statement reads, "Some teenagers feel that they are just as smart as others their age, but other teenagers aren't so sure and wonder if they are as smart." Once the student decided which type of teenager was most like him/her, the next decision was to report whether this was "really true" or only "sort of true" for him/her. Harter's scale is well-established and her analyses of reliability and validity for each of the nine subscales can be found in the manual for the scale.

For the purposes of this thesis I analyzed only two of the nine subscales, as the other seven subscales comprise questions from topics that are not particularly relevant

to the study's focus on both generalized and domain-specific measures of self-concept that deal directly with academic achievement. Of the two relevant subscales, one is a measure of domain-specific scholastic competence, assessing students' beliefs about their ability to achieve academically, and the other is a more global measure of self-concept (Cronbach's Alphas listed in parentheses): Scholastic Competence (.85) and Global Self-Worth (.85).

(B) Student Academic Achievement and Attendance Records

In addition to student interviews, student achievement data were obtained for the 2009-2010 school year:

1. Teacher-assessed classroom grades

Teacher-assessed classroom grades were obtained for each trimester in four main subjects: Math, English, Global Studies, and Science. Rather than a grading system along a 100-point or 4-point scale, as typically utilized in public schools, classroom grades consisted of teachers' ratings of students on a number of learning targets. The number of learning targets for each particular subject varied; for example, a student might have five learning targets to strive for in Math class and four different learning targets in English class. Each student received an indication of the degree to which he/she met expectations for each learning target for each class subject. Ratings for each learning target fell along a spectrum based on the following main categories: *incomplete/insufficient evidence* [of meeting expectations for learning target], *beginning* [to meet], *approaching*, *meeting*, and *exceeding* expectations of meeting the target. To ease the analysis of these data in the current study, ratings for each target were placed along a scale from zero to fifteen (see Table 1). Scores for the learning targets for each particular class (e.g., the five targets for Math class) were then averaged so that each student could be given one number "grade" for each subject.

Table 1: Rating Scale for Learning Targets

0	Incomplete/ Insufficient Evidence	8	Approaching/ Meeting
1	Beginning (-)	9	Meeting (-)
2	Beginning	10	Meeting
3	Beginning (+)	11	Meeting (+)
4	Beginning/ Approaching	12	Meeting/ Exceeding
5	Approaching (-)	13	Exceeding (-)
6	Approaching	14	Exceeding
7	Approaching (+)	15	Exceeding (+)

2. End-of-year Regents grades

Each student took both the Science and Math Regents in June 2010, and grades were obtained to be included in the analysis. Tenth-graders also took the Global Studies Regents, but due to the small sample of students who took this exam (seven students), it was not used for current data analysis purposes.

3. Attendance Records

Attendance records were obtained for each student for the 2009-2010 academic year, to learn whether students' perceptions of building quality correlate with their decision to attend school. Attendance will be referred to as "absenteeism" in the results section, as the variable represents the total number of school days missed by the participant during the school year.

(C) School Building Quality Checklist

Lastly, objective data was collected on the quality of the physical school environment, using the School Building Quality Checklist (Simon, Maxwell, & Evans, 2005). The checklist, which was created for use in a previous master's thesis (Simon, 2005), was used to measure various dimensions of the physical school facility, including noise

levels, crowding, ventilation, natural light, odor, layout, safety, personalization opportunities, cleanliness, and classroom equipment. In this study, the checklist was completed by a researcher and a member of the building's facility team for verification of maintenance records.

Procedure

Students and their parents/guardians were provided with information about the study prior to their participation. Parents/Guardians and participants were encouraged to ask questions at any time prior to signing off on their consent, as well as at any point thereafter. All interviews with the student participants took place on school grounds, during school hours, at a time that was convenient for teachers and participants. Each student was interviewed once, and all interviews were conducted individually to ensure anonymity, encourage honest responses, and allow for any questions of clarification throughout the interview.

No deception was used in this study. Students were told that the researcher was interested in learning their opinions about their school building to better understand whether it made it easier or harder for them to do their work. They were also told that they would be asked questions about themselves and how they react in certain situations. The order of the interview questions remained the same throughout the study for all twenty-two participants. Students were presented with instructions at the start of each section of the interview and, with the exception of the Classroom Efficacy Scale, were given the opportunity to read the questions and fill out the answers on their own if they felt comfortable doing so. The Classroom Efficacy Scale was read aloud to every participant to reduce any confusion due to the two-step nature of the questions; in particular, the objective was to avoid confusion over the apparent

overlap between the “Yes, sometimes” response and the “No, sometimes” response, which are in fact two distinct answers.

Data analysis plan

After descriptive statistics were analyzed, including means and standard deviations of continuous data and frequencies of categorical data, Pearson correlations were run to assess whether the relevant, major continuous variables were significantly related to each other. Based on these findings and on the particular research questions posed in the study, simple and multiple regressions were conducted to analyze relationships between predictor and criterion variables.

CHAPTER 4

RESULTS

One of the main goals of the present study was to learn whether students' PSBQ correlates with and predicts achievement (positively), attendance (negatively), and self-concept (positively, both generalized and domain-specific). Additionally, by analyzing whether students' self-concept positively correlates with and predicts academic outcomes, the objective was to learn whether self-concept might play a mediating or moderating role between PSBQ and academic outcomes.

Means and standard deviations of the major variables are presented in Table 2. Average grades for each subject represent an average of grades from three trimesters. The overall grade for the year refers to the average of the four subject-area averages, which are the four subjects that all participants were required to take during the year.

Table 2: Descriptive Statistics of Major Variables

	Measure	Mean	SD
1	Perceived School Building Quality (PSBQ)	2.34	0.285
1.1	Perceived Lack of Noisiness	2.27	0.415
1.2	Perceived Lack of Crowding	2.28	0.471
1.3	Perceived Safety	2.73	0.429
1.4	Perceived Cleanliness	2.27	0.436
2	Classroom Efficacy	3.01	0.285
3	Generalized Self-Efficacy (GSE)	4.80	0.967
4	Global Self-Worth	3.21	0.594
5	Scholastic Competence	3.07	0.643
6	Absenteeism	9.14	7.09
7	Overall Grade for Year	9.26	2.04
8	Average English Grade	9.01	2.42
9	Average Math Grade	9.64	2.67
10	Average Global Studies Grade	8.88	3.39
11	Average Science Grade	9.89	2.26
12	Standardized Science Regents Grade	78.14	13.42
13	Standardized Math Regents Grade	70.50	12.69

Of the PSBQ's nine sub-scales, descriptive statistics and correlations are presented for only four of them – noise, safety, cleanliness, and crowding – due to the lack of significance of the other five sub-scales (classroom quality, bathroom quality, hallway quality, cafeteria quality, and level of privacy) in relation to the criterion variables that are relevant to the current study's research objectives.

Correlations between the major variables are displayed in Table 3; significance levels of $p < .01$, $p < .05$, and $p < .10$ are indicated with asterisks. Due to the small sample size and the fact that this is an exploratory study, it seemed relevant to take a look at correlations that were significant at the $p < .10$ level, to capture potential relationships between variables that might otherwise be overlooked. When citing correlations at the $p < .10$ level, p values are provided.

As presented in Table 3 and as would be predicted, students' overall grades for the year, based on teachers' assessments, are correlated with standardized test scores in science and math. In addition, there are strong positive correlations between sub-scales of perceived school building quality, such that students who, for instance, feel positively about one measure of quality tend to also feel positively about another (e.g., safety and lack of noisiness, lack of noisiness and lack of crowding, cleanliness and lack of crowding).

In response to the research question about the correlations that exist between perceived building quality and student outcomes, a number of relationships arise. First discussed are relationships between perceived school building quality and academic outcomes. Then, relationships between perceived school building quality and student self-concept are presented. Finally, relationships between student self-concept and academic outcomes are presented.

Table 3: Pearson Correlations

Measure	1.1	1.2	1.3	1.4	2	3	4	5	6	7	8	9	10	11	12	13
1 Overall PSBQ	.758*	0.889*	0.629*	0.569*	0.313	-0.370***	0.162	0.065	-0.471**	-0.292	-0.182	-0.125	-0.355	-0.326	-0.009	0.062
1.1 Lack of Noisiness		0.605*	0.455**	0.359	0.249	-0.347	0.067	0.002	-0.418***	-0.248	-0.070	-0.190	-0.260	-0.307	-0.007	0.070
1.2 Lack of Crowding			0.343	0.663*	0.052	-0.465**	-0.01	-0.126	-0.311	-0.242	-0.203	-0.006	-0.398***	-0.198	0.024	0.158
1.3 Safety				-0.013	0.539**	-0.094	0.338	0.438**	-0.555*	-0.026	0.045	-0.058	0.006	-0.078	0.311	0.101
1.4 Cleanliness					0.033	-0.300	-0.074	-0.363***	-0.020	-0.282	-0.221	-0.037	-0.450**	-0.311	-0.198	-0.054
2 Classroom Efficacy						0.044	0.182	0.417***	-0.306	0.327	0.293	0.219	0.444**	0.144	0.421***	0.140
3 GSE							0.227	0.243	0.336	0.316	0.311	0.133	0.320	0.351	-0.026	-0.187
4 Global Self-Worth								0.253	-0.441**	-0.166	-0.097	-0.286	-0.097	-0.091	-0.234	-0.218
5 Scholastic Comp.									-0.219	0.369***	0.293	0.317	0.406***	0.242	0.308	0.218
6 Absenteeism										0.342	0.167	0.358	0.284	0.358	0.137	0.120
7 Overall Grade											0.869*	0.801*	0.912*	0.910*	0.772*	0.446**
8 Avg. English Grade												0.564*	0.767*	0.777*	0.623*	0.256
9 Avg. Math Grade													0.582*	0.635*	0.759*	0.724*
10 Avg. G.S. Grade														0.791*	0.658*	0.282
11 Avg. Science Grade															0.646*	0.269
12 Sci. Regents																0.724*
13 Math Regents																

* = p<.01, ** = p<.05, *** = p<.10

Perceived school building quality, academic achievement, and attendance

While students' overall PSBQ does not significantly correlate with any assessments of academic achievement in the current sample, overall PSBQ and both perceived safety and perceived noise ($p=.053$), two sub-scales within overall PSBQ, are found to be negatively correlated with absenteeism. This indicates that students who are absent from school more often also tend to report more negative perceptions of overall building quality, safety, and noise, and vice versa; on the other hand, students who *attend* school more often are also more likely to have reported more *positive* perceptions of overall building quality, safety, and noise, and vice versa.

Students' perceived classroom efficacy, another measurement of perceived quality, is positively correlated with average global studies grades for the year; in other words, students who believe that their classrooms support their ability to learn and work are also more likely to have achieved higher grades in global studies over the course of the year, and vice versa. Additionally, perceived classroom efficacy positively relates to standardized achievement scores in science ($p=.051$). On the other hand, perceived cleanliness within the school building is negatively correlated with global studies grades, as is perceived *lack* of crowding ($p=.067$), such that lower perceived cleanliness and higher perceived crowding are each related to higher grades in global studies.

Perceived school building quality and self-concept

Perceived safety is positively correlated with perceived scholastic competence, as is perceived classroom efficacy ($p=.054$). At the same time, perceived cleanliness may be negatively related to perceived scholastic competence ($p=.097$), and perceived lack of crowding is negatively correlated with students' perceptions of their generalized self-efficacy, indicating that higher self-efficacy is related to more

perceptions of crowding. Finally, overall PSBQ may be negatively correlated with generalized self-efficacy ($p=.091$), although this relationship was not extremely significant within the current sample.

Self-concept, academic achievement, and attendance

Students’ perceived global self-worth is negatively correlated with absenteeism, and correlations at the .10 level indicate that perceived scholastic competence is positively related to average grades for the year ($p=.091$) and global studies grades ($p=.061$).

Regression analyses

To better understand the relationship between perceptions of building quality, self-concept variables, and academic outcomes, regression equations were calculated. In the case of absenteeism, main and interaction effects were present. While overall PSBQ was negatively correlated with absenteeism, when the regression analysis was performed using the enter method it was found that, in particular, the sub-scale of perceived safety more strongly predicted absenteeism, along with students’ global self-worth and the interaction between perceived safety and global self-worth, $F(3,18)=6.387, p=.004$. Adjusted R square = .435. Significant variables are displayed in Table 4.

Table 4: Multiple Regressions
 Criterion Variable: Absenteeism

Predictor Variables	Unstd. Beta	Std. Error	Std. Beta	t	Sig.
Perceived Safety	-49.827	19.075	-3.013	-2.612	.018
Global Self-Worth	-48.266	20.115	-4.039	-2.399	.027
Safety*Global Self-Worth	15.487	6.910	5.217	2.241	.038

Relations between perceptions of school building quality, self-concept, and academic *achievement* were tested with regression analyses as well. Simple regressions indicated that perceived classroom efficacy significantly predicted average global studies grades for the year, marginally predicted science regents grades, and marginally predicted perceived scholastic competence, as shown in Table 5. An additional simple regression found that perceived safety predicted scholastic competence as well.

Table 5: Simple Regressions – PSBQ, self-concept, and academic achievement

Predictor Variable	Criterion Variable	Unstd. Beta	Std. Error	Std. Beta	t	Sig.
Classroom Efficacy	Avg. GS Grade	4.591	2.071	.444	2.217	.038
Classroom Efficacy	Science Regents	19.834	9.561	.421	2.075	.051
Classroom Efficacy	Schol. Comp	.941	.459	.417	2.050	.054
Perceived Safety	Schol. Comp	.656	.301	.438	2.178	.042
Scholastic Competence	Avg. GS Grade	1.858	.935	.406	1.986	.061

In terms of self-concept and academic achievement, perceived scholastic competence marginally predicted average global studies grades (Table 5), and as a predictor of overall grades for the year became slightly more significant ($p=.068$ vs. original correlation of $p=.091$) when controlling for age, $F(2,19)=4.668$, $p=.022$, Adjusted R square = .259, as presented in Table 6. Perceptions of generalized self-efficacy and global self-worth did not predict academic achievement, nor did absenteeism in this particular sample.

Analyses were also performed in order to understand whether students' perceived self-efficacy for scholastic competence mediated the effects of perceived classroom efficacy on global studies grades. While significant correlations exist

between the three variables, no mediating relationship was found and the regression was non-significant.

Table 6: Multiple Regression

Criterion Variable: Overall Grades for the year

Predictor Variables	Unstd. Beta	Std. Error	Std. Beta	t	Sig.
Scholastic Competence	1.154	.596	.364	1.938	.068
Age	1.272	.543	.440	2.340	.030

Finally, the objective assessment of school building quality was analyzed, and the school was found to be in good condition; a subset of questions from the scale indicated that a variety of features in the school dealing with ventilation, odor, cleanliness, and maintenance were in above-average condition, with no major problems to note. When this score was compared to the average of students' overall PSBQ scores using a one-sample t-test, the two were found to differ significantly ($p < .001$). Perceived cleanliness, perceived lack of noise, and perceived lack of crowding were each significantly lower than the objective measure of quality, while perceived safety was only significantly different (lower) at the $p < .10$ level (Table 7).

Table 7: One-sample T-tests

Comparison to Objective SBQ Score

Variables	t	df	Sig. (2-tailed)	Mean difference
Overall PSBQ	-9.149	21	.000	-.55657
Perceived Lack of Noise	-7.093	21	.000	-.62727
Perceived Lack of Crowding	-6.131	21	.000	-.61591
Perceived Safety	-1.889	21	.073	-.17273
Perceived Cleanliness	-6.751	21	.000	-.62727

Separate from the quantitative findings, a few qualitative questions were posed to the students, including what their favorite and least favorite spaces in the school were. Students were given the opportunity to respond openly about any space type, including classrooms, bathrooms, the cafeteria, hallways, lobby space, or some other common space, yet the majority of students' responses involved classroom spaces. Eighty-two percent of students responded that one of their classrooms was their favorite space, citing aesthetics, size of the space, access to light/ventilation/windows, and noise/location as the major reasons. Seventy-seven percent of students also responded that one of their classrooms was their *least* favorite space, again citing noise/location, size, and aesthetics, as well as the ad hoc, makeshift nature of one of the classrooms in particular.

CHAPTER 5

DISCUSSION

The objective of the current study was to learn more about the relationship between students' perceptions of school building quality, self-concept variables, and academic outcomes, including both attendance and achievement. In particular, the goal was to uncover whether perceived school building quality predicted student self-concept, whether perceived school building quality predicted academic outcomes, and whether student self-concept predicted academic outcomes. Through the analysis of these three sets of relationships, the next step was to analyze whether self-concept played a mediating or moderating role in the relationship between perceived school building quality and academic outcomes.

Perceived classroom efficacy predicted both classroom grades and standardized test scores (global studies grades and, marginally, science regents grades), such that students who perceived the classroom to be a more supportive environment had better grades and test scores. This is similar to previous findings of higher academic achievement at schools objectively rated as having better-quality facilities (e.g., Duran-Narucki, 2008; Earthman, 1998; Earthman, Cash, & Berkum, 1995; Evans, Yoo, & Sipple, 2010; Uline & Tschannen-Moran, 2008). The main difference is that the current study utilized a measure of students' perceptions of how well the physical classroom enables them to do their work, rather than an objective assessment of quality. This finding extends the research literature by uncovering within-school differences in achievement resulting from different students' perceptions of the same physical setting.

Perceived safety and classroom efficacy each predicted students' self-efficacy in the domain of scholastic competence; in other words, students who reported that the

school building felt safe and students who perceived a supportive classroom environment each reported higher scholastic competence. This is similar to previous research finding that some measure of or change in building quality positively predicted students' socio-emotional outcomes (Killeen, Evans, & Danko, 2003; Maxwell, 2007; Maxwell & Chmielewski, 2008). It is also consistent with findings from a study using the same measure of perceived school building quality and a similar measure of domain-specific self-efficacy in elementary school students (Simon, 2005; Simon, Evans, & Maxwell, 2007). Simon found that children's overall perceptions of school building quality predicted scholastic competence.

Students' self-efficacy for scholastic competence marginally predicted overall grades when controlling for age, and also marginally predicted global studies grades, such that students with higher self-efficacy also had higher grades. But self-efficacy for scholastic competence was the only measure of self-concept that came close to significantly predicting academic outcomes. Both generalized self-efficacy and global self-worth, two general measures of self-concept, did not. This may have occurred for a number of reasons, to be discussed in the next section on limitations.

While measures of self-concept in this study were not found to mediate the relationship between perceived school building quality and academic outcomes, one measure did act as a moderator in the relationship between perceived school building quality and student absenteeism. High school students' absenteeism was predicted by their perceptions of safety in the school, self-reports of global self-worth, and the interaction between perceived safety and global self-worth; in other words, students who perceived a lack of safety in the school were more likely to be absent from school, as were students who reported lower global self-worth. Or, on the other hand, students who perceived a higher degree of safety in the school and students who reported higher global self-worth were less likely to be absent from school. In

addition, a significant interaction term indicates that global self-worth moderated the relationship between perceived safety and absenteeism, such that perceptions of a lack of safety more strongly predicted absenteeism for students who reported lower global self-worth.

The finding that a measure of school building quality – in this case perceived safety – predicts absenteeism is consistent with findings from previous research (Branham, 2004; Duran-Narucki, 2008). Branham found that schools with temporary buildings, schools in need of structural repair, and schools with inadequate custodial services had lower attendance rates than schools where the opposite was the case, and Duran-Narucki similarly found that an objective measure of school building condition predicted attendance when controlling for ethnicity, socio-economic status, teacher quality, and school size. While researchers in the previous studies surveyed students in elementary schools, the current study focused on high school students, extending the age range in which these results have been found. Furthermore, while the previous studies focused on *objective* measures of building quality and the current study focused on *subjective* measures, the current results bolster the evidence that school building quality – whether objective or subjective – may very well be impacting students' decisions to attend school.

In fact, the current study extends research on the impact of building quality on attendance because it focuses on perceived quality at the level of the *student*, rather than at the level of the *school* as in the other studies. This is particularly important because even in a building that is objectively adequate in quality, as was the case in the current study, there will still be students who negatively perceive the building and may decide not to attend school, perhaps partly due to this negative perception. In addition, a previous study that was unable to find connections between building quality and attendance did find a statistically significant relationship between

perceived school building quality and student *lateness*, which is another variable at the level of the student that is worthy of continued study, as it may indicate negative feelings toward school and the building that are not captured in attendance data (Simon, 2005). It is important to gain a better understanding of why certain students have negative perceptions of their surroundings and also what particular aspects of the environment are being perceived in a negative light, so that research may better inform the design process to allow for more supportive learning environments.

There are a variety of reasons why students may perceive the building negatively. It may be because the building is of poorer quality than the student's previous schools or current neighborhood and home environment, or perhaps because the student's low self-concept strengthens his/her negative perceptions of his/her surroundings. The findings in the current study provide support for this latter explanation as one potential reason why some students more negatively perceived the school building. The moderating influence of global self-worth helps to portray a more complete picture of the range of variables that impact the way in which perceived school building quality may exert its influence on student outcomes such as attendance.

As Duran-Narucki (2008) portrayed in her research, attendance has implications for academic achievement, as children who go to schools of poorer quality may spend less time in school and may be more likely to perform poorly on measures of academic achievement as a result. The current study was unable to replicate Duran-Narucki's findings of attendance acting as a mediator between building quality and academic achievement; there are a number of potential reasons why this relationship was not present in the current study, which are discussed in the limitations section.

It is important to note that the initial research questions and hypotheses that set the course for the current study indicated a proposed direction of regression relationships based on theoretical considerations outlining the way in which certain variables might relate to each other. These theories – of place identity (Proshansky & Fabian, 1987; Proshansky, Fabian, & Kaminoff, 1983) and an ecological model of human development (Bronfenbrenner, 1977) – explain that peoples’ interactions with their physical surroundings impact their development of a sense of self and define who they are. (For more details on these theories, please refer to the literature review.) As a result, the current study was conducted to uncover whether students’ perceptions of school building quality impact self-concept and academic outcomes – rather than the other way around. But it is of course entirely possible that the opposite relationship exists. Student self-concept and/or academic outcomes could in fact be influencing perceived building quality instead or as well.

It is also important to clarify the difference between predictions and causality, as the current study does not and cannot attempt to provide evidence of the latter. The current research findings of predictive relationships indicate that variations in one variable relate to and predict a trend in another variable; they do not imply that the first variable *caused* the second variable to change in some way. Additional research using more rigorous experimental designs and controls would be needed in order to determine the existence of this type of relationship.

The current study furthers the research on the role of school building quality in student outcomes because it attempts to uncover the particular factors within school building quality that impact students. By grouping the perceived building quality questions into distinct topics (e.g., safety, cleanliness, noise) and then analyzing the data along these lines, the findings from the current study enable a better understanding of which specific features in a school building may be relevant to

students. In the current study, students' responses indicated that safety is an important factor in predicting their absenteeism and their feelings of scholastic competence.

As researchers begin to uncover specific features and aspects of the school building that support students' beliefs about their ability to achieve and actual achievement, the design of learning spaces may be better informed and the current building stock may be improved to better support student outcomes.

Limitations and non-significant findings

A number of relationships were found to be non-significant in the analysis of data from the current sample. For one, there was a non-significant relationship between overall perceptions of school building quality and academic achievement. While overall perceived school building quality was negatively correlated with absenteeism, it was not found to be positively correlated with standardized testing scores or academic grades for the 2009-2010 school year. Additionally, as mentioned above, there was no statistically significant relationship between absenteeism and academic achievement, which runs counter to previous findings in the research literature. A third expectation was to find positive relationships between student self-concept and perceived school building quality, as well as between student self-concept and achievement; yet, the only positive relationships found in these categories related to domain-specific self-efficacy (in scholastic competence), while a negative relationship connected the more generalized measure of self-efficacy to overall perceptions of school building quality and perceived lack of crowding, and no relationships were found between generalized self-efficacy and academic achievement. There are a number of reasons why these non-significant findings may have occurred.

One particularly relevant reason why certain results were not obtained may simply have to do with the fact that, in this exploratory study, the sample size of twenty-two participants was too small. With small samples, results may inherently be more inaccurate and susceptible to individual differences between participants. It can be extremely difficult to find trends in the data, as there may not be enough variation in the sample to allow for many significant results, and the sample may not represent a truly normal distribution.

This was apparent in the case of classroom grades. While the body of research under this topic has generally focused on finding a relationship between building quality and standardized math or reading scores, the current study found connections between perceived building quality and global studies grades. There is not much research focused specifically on global studies grades, and it is somewhat unclear why perceptions of building quality would particularly relate to this classroom subject and not others. But considering that the different scholastic subjects significantly correlated with each other (at the .01 level of significance), it seems that the lack of significant connections between pertinent building quality variables and other classroom subjects may have had more to do with the fact that there was a small sample size, that certain teachers were overly positive in their assessments of all students and may not have distributed grades across a normal distribution¹, or possibly that there was a selection bias in the sample, leading to a larger number of high-achieving participants and thus too little variation in grades.

To clarify, there may have been a greater chance of finding significant relationships with grades in global studies because the mean grade in this particular subject was lower (and closer to the mid-point on the fifteen-point scale) than mean

¹ It is important to note that the grading system at the school is not a traditional one – it is instead based on learning targets – which means that in the school’s first year of existence, teachers might still have been trying to figure out exactly how to properly distribute student grades along the spectrum.

grades in the other three subjects, and there was a wider distribution of student global studies grades than in the other subjects. Additionally, the sample may not have been representative of students in general, or the total population of students at the school, and may instead have been composed of students who were somewhat similar to each other. Parents and students self-selected into the charter school through the open lottery system, which may have created a student population that differs from the typical population at other public schools. In addition, the students who participated in the study had to agree to participate and have their parents sign consent forms. Consent forms were sent home with students rather than through the mail, which meant that students had to be in school on one of two days when forms were distributed and then had to remember to pass the forms along to their parents or guardians. Once in the hands of the parent or guardian, it may have been a particular type of parent who agreed to let their child participate in a research study, or simply someone who had the time or ability to sign a consent form in the first place. For instance, parents who work a lot may not have been around to sign the form.

In the current study, there were many opportunities for biases in the sample, which has implications for why there might have been non-significant results (e.g., relating to absenteeism, or perceived school building quality), and also why certain significant results may not be externally valid.

Perceived School Building Quality

An additional factor to consider is that the school studied was a reuse facility. The fact that the school building was originally built for another purpose means that classrooms were created from available space and ended up being extremely variable from one room to another. Yet in the Perceptions of School Building Quality scale, for instance, participants were asked to rate the facility at the level of space type (e.g.,

classrooms, hallways, bathrooms, cafeteria) rather than by individual classrooms or subjects; they were asked to provide an average assessment of each space type on each particular issue (e.g., noise, crowding, privacy). As a result, if a student had one classroom with poor acoustics and a partial wall adjacent to a very noisy hallway, and then had another classroom set apart from the others, with very little outside or inside noise, all of this rich information would be lost, and the student's assessment of noise in the classroom setting (on average) might have been averaged to become a non-significant value. It may have been more appropriate, based on this particular setting, to ask students questions about rooms by subject (e.g., the science room), which would have also enabled analyses concerning whether the particular classroom affected grades for a particular subject. Alternately, it may have simply made sense to ask additional qualitative questions as follow-ups to the quantitative, average assessments.

The study was also limited by the way in which individual questions were asked in certain measures; in the Perceptions of School Building Quality scale, questions were not always explicit in their relation to the physical space, particularly the questions relating to safety and crowding. While students were instructed to answer based on their perceptions of the physical building, they may have responded based on other factors. For example, in response to a question of how safe the student felt in the classroom, students may have responded that they did not feel safe. Yet without a qualitative follow-up, it is difficult to know whether this was a result of the physical deterioration of the setting, the openness of the perimeter of a classroom, the layout of the desks, the lack (or over abundance) of windows in the space, or perhaps the result of social insecurities rather than building issues. While the social environment and the physical environment are inextricably linked (Proshansky, Fabian, & Kaminoff, 1983), and it is informative to have found that perceived safety predicted absenteeism and also scholastic competence, it would have been useful to

better understand which particular factors made a student feel less/more safe in the physical setting rather than leaving it open to interpretation.

For instance, Maxwell (2000) uncovered this type of information in her research comparing how students, teachers, and parents perceived safety and the welcoming nature of their school building. In her study, fourth through sixth-grade students in an urban setting responded that, among other issues, locked doors to the outside was one particular physical feature that encouraged a feeling of safety in the school.

One concern is that students may have a difficult time reporting what exactly it is about a space that makes them feel unsafe (or crowded, etc.). They may not want to admit what is troubling them, or they may not be conscious of factors within the physical setting that are affecting their attitudes and feelings, and may even falsely attribute their feelings to alternate explanations when pressed for an answer. Future research will need to continue to develop methodologies, such as the one used in Maxwell's (2000) research, to get at the reasoning behind these important perceptions.

Finally, while perceived building quality can explain a lot about a person's actual experience of an environment, in the current study, variations in responses may have been limited because the facility in the current study was objectively found to be in very good condition overall. This may have been why the means of students' perceptions of a variety of school building quality features were above average. It is possible that when a building is in adequate or above average condition, it may not draw much attention from students, which is why perceptions of this particular building, overall, did not relate strongly with many of the other variables of interest. Much of the research on place identity focuses the discussion on the way in which low-quality settings in particular may tell children and adolescents a lot about their value in society (e.g., Branham, 2004; Maxwell & Chmielewski, 2008). Less of the

body of literature has focused on high-quality buildings, and these settings may be less likely to elicit strong or highly variable reactions in participants.

The Ecological model, place identity, and self-concept

Another limitation of the study was that no measurements were taken to get a sense of students' perceptions of their neighborhood quality and home quality, which could very likely play a role in their comparative assessments of the school environment. Bronfenbrenner (1977) emphasizes that the numerous and nested environments within which we live each have an effect on our development and on each other. It may therefore have been relevant to know more about the perceived and objective quality of the variety of settings within which the students exist, especially the neighborhood and home, to provide the ability to control for those factors in the students' lives.

In addition, no measurements were taken of students' perceptions of quality in similar environments (previous schools), earlier in their socio-emotional development. Proshansky and Fabian (1987) discuss the idea that “[a]n individual’s place-identity cognitions relate to the past, the present, and the future. It is the person’s ‘environmental past’ – that is, the early physical space and place cognitions of childhood – that has the most profound influence on the person’s subsequent place identity” (p. 24). Based on this idea, it is likely that our experiences earlier in life form the basis through which we perceive our current surroundings. As a result, it may have been relevant to know more about how the perceived and objective quality of the current school facility compared to previous facilities that the students experienced, as this may very well have tempered participants’ perceptions of the space, and is something that could have been controlled for in the sample. Furthermore, this theory could be interpreted to mean that earlier experiences have a greater influence on our

current sense of self, which means that the high school environment or later environments may have a less significant influence on our internalized sense of our ability to achieve. More research on this topic is warranted.

Along these lines, what if the measurements of generalized self-efficacy represented how the students felt independent of the current school facility? It is unclear how long it might take for an environment to have an effect on our beliefs about ourselves. Students were interviewed in April and May of their first year in this new school setting. It is possible that this was not enough time for the building to have a profound effect on self-efficacy beliefs; as a result, rather than the current facility impacting students' perceived self-concept, reports of self-efficacy and worth could instead have been based largely on previous experiences, which may then have impacted students' perceptions of school building quality in the new facility.

Not only is it unclear how long a person must be in an environment before it begins to exert an influence, but generalized self-concept may simply be a more stable trait that is not as susceptible to large changes over time. Researchers argue that “[s]elf-efficacy gradually emerges through the experiences that an individual accumulates...Frequent situation-specific experiences of personal success across time and across situations give rise to generalized self-efficacy” (Eden & Kinnar, 1991, as cited in Gardner & Pierce, 1998, p. 52). If this is the case, it may be that generalized self-efficacy exerts an influence on perceptions of school building quality, rather than the other way around.

One way to clarify this issue would have been to interview students at the beginning of the year when they first arrived in the new setting. This would have allowed for a comparison to be made between reported self-concept in the beginning of the year and reported self-concept toward the end of the year. All students had been in other schools the year prior to the current study, and it would have been informative

to obtain data at the beginning of the school year to see whether student self-concept, absenteeism, and academic achievement were impacted to some extent by the students' experience in this particular building (while still allowing for maturation influences). While it makes sense to imagine that self-concept would be influenced by perceptions of quality in the current school building – based on theories of place identity and ecological models – without any sort of pre-interview for comparison, it is difficult to know how much of the current self-concept was formed based on the current environment versus previous environments.

For example, certain negative correlations suggest that self-concept may have impacted perceptions of the facility rather than the other way around; generalized self-efficacy was marginally, negatively correlated with overall perceptions of school building quality, and negatively (and significantly) correlated with perceived lack of crowding. The latter result indicates that higher self-efficacy was related to higher perceptions of crowding. As suggested above, it is possible that students came in with specific expectations and beliefs about their ability to achieve, and this informed their experience and perception of the quality of the school building. Those with stronger beliefs about their general ability to achieve may have been more concerned about achieving to a high degree; as a result, they may have seen a lot of students in tight quarters and perceived that the space was crowded and threatened their ability to do well, despite their beliefs that they are capable individuals. At the same time, students who reported lower generalized self-efficacy may have been less concerned about their ability to achieve, and may have interpreted classrooms filled with many students as the perfect atmosphere for socialization opportunities, rather than a negative experience.

Yet, Proshansky and Fabian (1987) point out that most theories of self-identity erroneously focus on the stable nature of the self, when in fact there are many changes

that occur over the course of a person's development. Therefore, it made sense to theorize that the current school building would exert some sort of influence on the ever-changing nature of students' beliefs about their abilities and their self-worth.

A lack of findings may simply have been caused by the small sample, methodological issues, or the fact that there was not very large variation in the generalized self-efficacy scores. Most were on the higher end of the spectrum, which may have been why this measure did not relate to other important variables. If students on the whole had a fairly positive sense of self-efficacy, they may have felt largely in control of their environment, a topic discussed by Bandura (1993). He asserts that

people who are plagued by self-doubts anticipate the futility of efforts to modify their life situation. They produce little change even in environments that provide many potential opportunities. But those who have a firm belief in their efficacy...figure out ways of exercising some control, even in environments containing limited opportunities and many constraints. (p. 125)

Perhaps the students believed they could control their environment, which may have been why this particular environment was not perceived as a threat to their academic achievement. Those with high self-efficacy generally find ways to make the best of their opportunities, according to Bandura, which suggests that even though they perceived more crowding in the current study, they may have felt they could exercise control over their experience. As a result, the negative perception may not have affected their achievement. In a similar finding, those with high self-efficacy in scholastic competence marginally perceived a lack of cleanliness in the building but were nonetheless able to achieve to a high degree despite those perceptions; this perhaps also related to a sense of control over the environment.

Finally, the lack of significant findings between generalized self-concept and academic achievement could very likely be due to the reality that self-concept may not relate directly to actual academic achievement. Bandura (1993) describes that people

who have positive beliefs about themselves do not necessarily achieve to a high degree; there may not have been strong relationships between measures of self-concept and academic grades because students may not accurately assess their scholastic competence or may be overly optimistic and unrealistic about their ability to achieve. While beliefs about one's ability to achieve are extremely relevant in one's ultimate achievement level, that level is relative to one's particular capabilities, which may or may not be very high. Instead, it could be that school building quality directly links to achievement, without any influence from perceived self-concept. Or, it could be that the impact is a small one that is difficult to detect, especially with such a small sample. Finally, the problem could be that self-efficacy is not easily generalizable, as some researchers suggest, which would be why this measure did not relate strongly to perceived building quality or any academic outcomes.

Implications and future research

This research has important implications for education policy. By adding to the vast literature emphasizing the link between facility quality and student achievement via a number of pathways, policy makers will be less able to ignore the pressing need to improve school facilities. They will be more likely to reevaluate the current level of expenditures on school facilities and their upkeep. There is therefore a need to strengthen the research pointing to the way in which school facility condition tells a story to its users about their value and worth.

While this was an exploratory study, the next step would be to obtain much larger sample sizes at a number of different schools and with a number of different age groups, to better understand how self-concept and place identity are developing over time and in a variety of different physical settings. It would be helpful to compare the current sample to students at other schools that have been objectively measured as

being less-than-adequate in quality (since the school in the current study was found to be of adequate quality), to learn how perceptions differ at these different schools, and what particular aspects of the objective and perceived physical setting are impacting students' beliefs about themselves and their ability to achieve. While some research has compared a number of schools on some of these measures (e.g., Simon, 2005), it has been limited to elementary students in New York City public schools. More research needs to be accomplished to continue to uncover the role that self-concept plays in the relationship between objective building quality, perceived quality, and academic outcomes for different age groups and different geographical regions. This expansion of efforts will hopefully lead to more generalizable and externally valid results.

It also might be useful to obtain academic achievement data from previous years prior to the move to a new school, to measure how grades compare after time spent at a new location. Additionally, reports of self-concept and perceptions of school building quality should be measured at the beginning of the year to learn whether they change as more time is spent in a new environment. (Though, self-concept may be subject to maturation effects, so this would also have to be taken into account.)

In addition, the findings linking perceived safety to absenteeism and scholastic competence might need to be explored in future studies to better understand whether the issue is a social matter, a building issue, or perhaps both (e.g., a social issue that could be solved through facility improvements). It might be useful to follow up with qualitative questioning, or somehow tailor the questions to better understand what factors are affecting students that they may or may not realize are important to them.

Bandura (1993) notes that perceived self-efficacy has the ability to impact academic development through students' beliefs in their own abilities, teachers' beliefs in their teaching abilities, and the collective faculty's beliefs about potential for

achievement at the school level. It would be relevant and useful to measure these aspects of teacher self-efficacy and collective efficacy in order to understand the complete picture of the impact of a number of self-efficacy variables on academic achievement. If, for instance, teachers at this particular school had a more positive perception of the environment and their ability to teach, they may have created a more positive environment that impacted students' beliefs about their own ability to achieve and actual achievement. It would also be informative to obtain measures of teachers' perceptions of the school facilities, to compare to students' perceptions.

The built environment is only one of many factors impacting students and their academic achievement; therefore, it is helpful to control for other variables to attempt to delineate the way in which the physical school building in particular is exerting an influence on student outcomes.

Conclusion

One of the main goals of this type of research is to get closer to being able to pinpoint how school environments can be improved to enhance the learning experience for students. By gaining a better understanding of the specific factors in school environments that affect students' self-concept and academic outcomes (e.g., safety, as was uncovered in the current study), researchers will be closer to understanding how designers may build better schools and effectively renovate existing schools. While some research has already found positive correlations between building renovations and student achievement at the elementary school level (Maxwell, 1999), there is a definite need to bolster the knowledge base to better understand what changes create a more effective and engaging learning environment. This will require researchers to conduct experimental and quasi-experimental studies

and utilize methods that will enable them to infer causation between variables rather than mere correlations.

There is little benefit to subjecting students to school facilities that are inadequate or perceived to be inadequate for one reason or another. One way to improve these environments is to elicit student feedback in order to better understand their needs and experiences in the space. As portrayed in the current study, while objective school building quality is extremely relevant to a student's learning experience, perceived building quality may be a more important factor because even higher quality buildings may be perceived negatively by certain users of the space. Therefore, it is important to understand how a variety of users are interpreting their surroundings, and how their beliefs about themselves impact their thoughts about the physical environment. While the small sample size in the current study limits the ability to generalize findings, it is nonetheless valuable to note that there were important within-school differences in perceived building quality in the study, and these perceptions were found to predict academic outcomes in certain instances. The variation in perceptions underscores the importance of including user input when designing new spaces or retrofitting facilities.

In terms of scholastic achievement, there is a need to build and promote a strong sense of efficacy in each student, because self-efficacy determines how a student will choose to respond to his/her prior successes and failures, which determines future anxiety levels and actual academic attainment (Bandura, 1993). Bandura also asserts that those learning environments "that construe ability as an acquirable skill, deemphasize competitive social comparison, and highlight self-comparison of progress and personal accomplishments are well suited for building a sense of efficacy that promotes academic achievement" (p. 125). If this is the case, there is a need to uncover the many ways in which self-efficacy can be bolstered,

including through the impact of the built environment. Once it is elucidated how the built environment is specifically influencing self-concept, it may be easier to build a policy argument for devoting more money to capital expenditures and resources for students in public schools. This research is a step in that direction.

APPENDIX

SCALES FOR STUDENT INTERVIEW

Perceptions of School Building Quality Scale

ID _____

Please answer the following questions about your school building.

General building

1. How much do you like your school?

Not at all _____

A little _____

A lot _____

2. How much do you like your school building?

Not at all _____

A little _____

A lot _____

Classroom

3. How much do you like your classrooms?

Not at all _____

A little _____

A lot _____

4. How much does noise in your various classrooms distract you?

A lot _____

Not at all _____

A little _____

5. In general, how crowded do you feel in your classrooms?

A lot _____

Not at all _____

A little _____

6. How easy is it for you to read or work by yourself in your classrooms?

A lot _____

Not at all _____

A little _____

7. How easy is it for you to talk privately in your classrooms?

A lot _____

Not at all _____

A little _____

8. How safe do you feel in your classrooms?

A lot _____

Not at all _____

A little _____

9. In general, how dirty or messy are your classrooms?

A lot _____

Not at all _____

A little _____

School Bathroom

10. How much do you like your school bathroom?

Not at all _____

A little _____

A lot _____

11. How much does noise in the bathroom distract you?

A lot _____

Not at all _____

A little _____

12. How crowded do you feel in the school bathroom?

A lot _____

Not at all _____

A little _____

13. How easy is it for you to talk privately in the school bathroom?

A lot _____

Not at all _____

A little _____

14. How safe do you feel in your school's bathroom?

A lot _____

Not at all _____

A little _____

15. How dirty or messy is your school bathroom?

A lot _____

Not at all _____

A little _____

Cafeteria

16. How much do you like your school's cafeteria?

Not at all _____

A little _____

A lot _____

17. How much does noise in the cafeteria distract you?

A lot _____

Not at all _____

A little _____

18. How crowded do you feel in the cafeteria?

A lot _____

Not at all _____

A little _____

19. How easy is it for you to talk privately in the cafeteria?

A lot _____

Not at all _____

A little _____

20. How safe do you feel in your school's cafeteria?

A lot _____

Not at all _____

A little _____

21. How dirty or messy is your school's cafeteria?

A lot _____

Not at all _____

A little _____

Hallways

22. How much do you like the hallways in your school?

Not at all _____

A little _____

A lot _____

23. How much does noise in the hallways distract you?

A lot _____

Not at all _____

A little _____

24. How crowded do you feel in the hallways?

A lot _____

Not at all _____

A little _____

25. How easy is it for you to talk privately in the hallways?

A lot _____

Not at all _____

A little _____

26. How safe do you feel in your school's hallways?

A lot _____

Not at all _____

A little _____

27. How dirty or messy are your school's hallways?

A lot _____

Not at all _____

A little _____

28. Do you have your own locker or other personal space in your school? Yes__ No__
Can you personalize (decorate) your locker or other personal space? Yes__ No__

29. What is your favorite space in your school? _____
Why? (Please tell me something about the space itself, not just people or what happens in the space.)

30. What is your least favorite space in your school? _____
Why? (Please tell me something about the space itself, not just people or what happens in the space.)

Please answer a few more questions about yourself.

Your birth date _____ (month/day/year)

Gender (circle one) Male Female

How would you describe yourself (please circle one):

African American/Black, Latino/a, Asian, Asian-American, White, Native American,
Other _____

Where were you born? United States: Yes__ No__ (if no, where _____)

Mother's birth place United States: Yes__ No__ (if no, where _____)

Father's birth place United States: Yes__ No__ (if no, where _____)

Thank you.

Brief Generalized Self-Efficacy Scale

ID _____

(Tipton & Worthington, 1994)

The following statements concern attitudes and feelings you might have about yourself and a variety of situations. You are asked to indicate how strongly you agree or disagree with each of these statements by circling a number, from 1 to 7. The numbers correspond to the following levels of agreement.

1 = Strongly agree

2 = Agree

3 = Slightly agree

4 = Neither agree nor disagree

5 = Slightly disagree

6 = Disagree

7 = Strongly disagree

Work quickly and give your first impression

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. I am a very determined person. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Once I set my mind to a task, almost nothing can stop me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I believe it is shameful to give up something I start. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. Sometimes things just don't seem worth the effort. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. I would rather not try something I'm not good at. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. I can succeed in any endeavor to which I set my mind. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. Nothing is impossible if I really put my mind to it. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. When I have difficulty getting what I want, I just try harder. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. I have more will power than most people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. I would endure physical discomfort to complete a task because I just don't like to give up. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Classroom Efficacy Scale

ID _____

*(Asterisks indicate the subset of sixteen items analyzed in this study.)

1. *I have my own desk in the classroom.
Yes
Sometimes All the Time
No
Sometimes All the Time
2. *My desk in the classroom makes me feel like I can do my work.
Yes
Sometimes All the Time
No
Sometimes All the Time
3. When I'm at my desk I feel:
Close to the teacher.
Sometimes All the Time
Far away from the teacher.
Sometimes All the Time
4. When I'm at my desk I feel:
Near other students.
Sometimes All the Time
Far away from other students.
Sometimes All the Time
5. *When I'm at my desk I can see what my teacher is writing.
Yes
Sometimes All the Time
No
Sometimes All the Time
6. *When I'm at my desk I can hear what my teacher is saying.
Yes
Sometimes All the Time
No
Sometimes All the Time
7. *When I'm at my desk I:
Have enough space.
Sometimes All the Time
Do not have enough space.
Sometimes All the Time
8. *The desks in my classroom are arranged in rows.
Yes
Sometimes All the Time
No
Sometimes All the Time
9. The desks in my classroom are arranged in groups.
Yes
Sometimes All the Time
No
Sometimes All the Time
10. Do conversations in the classroom bother you when you are trying to concentrate?
Yes
Sometimes All the Time
No
Sometimes All the Time

11. If the desks are arranged in rows I can do better work.
 Yes No
 Sometimes All the Time Sometimes All the Time
12. *My classroom is noisy.
 Yes No
 Sometimes All the Time Sometimes All the Time
13. If the desks are arranged in groups I can do better work.
 Yes No
 Sometimes All the Time Sometimes All the Time
14. *When I'm using the computer in the classroom I can easily see what's on the screen.
 Yes No
 Sometimes All the Time Sometimes All the Time
15. When I'm using the computer in the classroom I can easily reach the keyboard.
 Yes No
 Sometimes All the Time Sometimes All the Time
16. When I'm using the computer in the classroom I feel too close to the screen.
 Yes No
 Sometimes All the Time Sometimes All the Time
17. *When I'm using the computer in the classroom I feel far away from the screen.
 Yes No
 Sometimes All the Time Sometimes All the Time
18. When I'm using the computer in the classroom I can easily reach the mouse.
 Yes No
 Sometimes All the Time Sometimes All the Time
19. I am not interrupted by my classmates when I am doing my own work in the classroom.
 Yes No
 Sometimes All the Time Sometimes All the Time
20. *My teachers display (put up) in the classroom:
 Everyone's work Some students' work
 Sometimes All the Time Sometimes All the Time

21. My teachers change classroom displays to match what we are learning:
 Yes No
 Sometimes All the Time Sometimes All the Time
22. *My teachers teach:
 From his/her desk From the front of the room
 Sometimes All the Time Sometimes All the Time
23. *I do well in my school work.
 Yes No
 Sometimes All the Time Sometimes All the Time
24. *I have many friends at school.
 Yes No
 Sometimes All the Time Sometimes All the Time
25. I have trouble paying attention in school.
 Yes No
 Sometimes All the Time Sometimes All the Time
26. *I like my teachers.
 Yes No
 Some of them All of them Some of them All of them
27. I don't get along with other kids.
 Yes No
 Sometimes All the Time Sometimes All the Time
28. *I am proud of myself.
 Yes No
 Sometimes All the Time Sometimes All the Time
29. *All of my classrooms are good places to work.
 Yes No
 Sometimes All the Time Sometimes All the Time
30. I like being in school.
 Yes No
 Sometimes All the Time Sometimes All the Time

Self-Perception Profile for Adolescents
(Harter, 1988)

ID _____

SAMPLE SENTENCE						
Really True for Me	Sort of True for Me					
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers like to go to movies in their spare time	BUT	Other teenagers would rather go to sports events.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are just as smart as others their age	BUT	Other teenagers aren't so sure and wonder if they are as smart.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers find it hard to make friends	BUT	For other teenagers it's pretty easy.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do very well at all kinds of sports	BUT	Other teenagers don't feel that they are very good when it comes to sports.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are not happy with the way they look	BUT	Other teenagers are happy with the way they look.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are ready to do well at a part-time job	BUT	Other teenagers feel that they are not quite ready to handle a part-time job.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that if they are romantically interested in someone, that person will like them back	BUT	Other teenagers worry that when they like someone romantically, that person won't like them back.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers usually do the right thing	BUT	Other teenagers often don't do what they know is right.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are able to make really close friends	BUT	Other teenagers find it hard to make really close friends.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are often disappointed with themselves	BUT	Other teenagers are pretty pleased with themselves.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are pretty slow in finishing their school work	BUT	Other teenagers can do their school work more quickly.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers have a lot of friends	BUT	Other teenagers don't have very many friends.	<input type="checkbox"/>	<input type="checkbox"/>

Really True for Me	Sort of True for Me		BUT		Sort of True for Me	Really True for Me
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers wish their body was different		Other teenagers like their body the way it is.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they don't have enough skills to do well at a job		Other teenagers feel that they do have enough skills to do a job well.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are <i>not</i> dating the people they are really attracted to		Other teenagers are dating those people they are attracted to.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers often get in trouble for the things they do		Other teenagers usually <i>don't</i> do things that get them in trouble	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do have a close friend they can share secrets with		Other teenagers do not have a really close friend they can share secrets with	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers don't like the way they are leading their life		Other teenagers do like the way they are leading their life.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do very well at their classwork		Other teenagers don't do very well at their classwork.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are very hard to like		Other teenagers are really easy to like.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are better than others their age at sports		Other teenagers don't feel they can play as well.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers wish their physical appearance was different		Other teenagers like their physical appearance the way it is.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel they are old enough to get and keep a paying job		Other teenagers do not feel they are old enough, yet, to really handle a job well	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that people their age will be romantically attracted to them		Other teenagers worry about whether people their age will be attracted to them.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel really good about the way they act		Other teenagers <i>don't</i> feel that good about the way they often act	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers wish they had a really close friend to share things with		Other teenagers <i>do</i> have a close friend to share things with.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are happy with themselves most of the time		Other teenagers are often not happy with themselves.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers have trouble figuring out the answers in school		Other teenagers almost always can figure out the answers.	<input type="checkbox"/>	<input type="checkbox"/>

Really True for Me	Sort of True for Me		BUT		Sort of True for Me	Really True for Me
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are popular with others their age		Other teenagers are not very popular.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers don't do well at new outdoor games		Other teenagers are good at new games right away.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think that they are good looking		Other teenagers think that they are not very good looking.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel like they could do better at work they do for pay		Other teenagers feel that they are doing really well at work they do for pay.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are fun and interesting on a date		Other teenagers wonder about how fun and interesting they are on a date.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do things they know they shouldn't do		Other teenagers hardly ever do things they know they shouldn't do.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers find it hard to make friends they can really trust		Other teenagers are able to make close friends they can really trust.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers like the kind of person they are		Other teenagers often wish they were someone else.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are pretty intelligent		Other teenagers question whether they are intelligent.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are socially accepted		Other teenagers wished that more people their age accepted them.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do not feel that they are very athletic		Other teenagers feel that they are very athletic.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers really like their looks		Other teenagers wish they looked different.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are really able to handle the work on a paying job		Other teenagers wonder if they are really doing as good a job at work as they should be doing	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers usually don't go out with the people they would really like to date		Other teenagers do go out with the people they really want to date.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers usually act the way they know they are supposed to		Other teenagers often don't act the way they are supposed to.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers don't have a friend that is close enough to share really personal thoughts with		Other teenagers do have a close friend that they can share personal thoughts and feelings with.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are very happy being the way they are		Other teenagers wish they were different.	<input type="checkbox"/>	<input type="checkbox"/>

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