International Journal of Sustainable Transportation, 9: 602–611

ISSN: 1556-8318 print/1556-8334 online
DOI: 10.1080/15568318.2013.847130

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The Evolution of School Siting and Its Implications for Active Transportation in New Jersey

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Received 30 December 2012, Revised 10 September 2013, Accepted 17 September 2013

The study examines historical changes in size and location of schools in New Jersey and their relevance to children's walking and bicycling to school. It compares the characteristics of schools, students, and surrounding areas of schools established in different decades to identify the critical issues that affect active transportation to school in the state. The study shows that schools in the state have become larger and they are increasingly being located on state and county roads instead of local roads. Pedestrian safety for children seems to be a greater concern in the state than distance to school.

Keywords: active transportation, bicycling, school location, school siting, school transportation, walking

1. Introduction

Recent studies have shown serious concerns about the increasing size of schools, increasing distance between homes and schools, establishment of new schools in unsafe locations, unavailability of alternative transportation modes to schools, and lack of pedestrian infrastructure around schools. Due to the growing concerns, the U.S. Environmental Protection Agency (EPA) and states such as Oregon and California have prepared school siting guidelines to address a number of concerns about the characteristics of new schools. In this general context, this paper examines some of the transportation impacts of the evolving school location patterns in the state of New Jersey.

The objective of this research was to examine the potential need for a set of school siting guidelines for New Jersey modeled after similar guidelines in other parts of the country. To provide a background, the paper begins with a review of literature and a comparison of school trips and parental concerns of New Jersey children with children in other parts of the country. One of the study's primary objectives is to compare the size and location patterns of New Jersey schools established in different time periods so that the transportation impacts of the changes in school siting practices could be fully comprehended. Schools established in different time periods are compared in terms of student enrollment, lot size, and characteristics of students. Another objective of the study is to compare the characteristics of the surroundings of the schools established in different time periods by focusing on the type of roads where they are located, youth pedestrian crashes, population density, transportation mode-use pattern, and socioeconomic characteristics of the residents of the areas.

Because of its relevance to the Safe Routes to School (SRTS) program sponsored by the U.S. Department of Transportation, the study exclusively focuses on New Jersey schools that contain students in kindergarten through the 8th grade (K–8). The oldest of these schools were established during the middle of the 19th century in counties close to New York City, but schools became more dispersed with the rapid growth of population in other counties. Throughout the 20th century, there were periods of both rapid growth and slowdown in school establishment. The state experienced the highest growth of new schools in the 1950s and 1960s, a period that coincided with rapid suburbanization of the population. Interestingly, recent decades have seen a revival of schools in urban areas.

The analysis in this research is based on data from a number of national and state sources. To compare distance to school, travel time to school, and parental perceptions about children's travel to school in New Jersey with other states, data from the 2009 National Household Travel Survey (NHTS) was used (U.S. Department of Transportation 2011). To compare the characteristics and surroundings of New Jersey schools established in different time periods, data were collected or compiled from the New Jersey Department of Education (NJDOE), school officials, the American Community Survey (ACS), the Rutgers Center for Advanced Infrastructure and Transportation, and the New Jersey Office of Information Technology. Although the study compares schools established in different time periods, it may be noted that all comparisons are based on data for the most recent year for which they are available.

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It may be noted at the outset that the terms *urban* and *suburban* have been occasionally used in this paper in reference to school location. In the absence of precise urban–suburban classification of the state's municipalities, a combination of information from the Census and the New Jersey Department of Labor was used in conjunction with the authors' judgment to identify areas as urban or suburban.

2. Background

2.1. Literature Review

Location and size of schools are important to transportation planners because they affect the travel modes of schoolchildren and their parents, as well as the safety of children walking or bicycling to school. When schools are located far from homes, the propensity of children to walk or bicycle to school diminishes. Similarly, when schools are located on or near roads with high traffic volumes and speed, the safety of schoolchildren is compromised. Thus, excessive distance between homes and schools, as well as the location of schools in unsafe environments, can be a deterrent to the efforts to promote walking and bicycling among children under the federal SRTS program. School siting policies and practices that affect the size and location of schools can have serious environmental consequences due to the emission of greenhouse gases by school-related motorized travel, as well as health impacts due to high exposure to bus fumes and diminished physical activity by children (McDonald 2008a; Wilson, Wilson, and Krizek 2007).

Fortunately, school siting practices have come under immense scrutiny by government agencies in recent years. The Environmental Protection Agency (EPA) identified a number of critical issues in a 2003 study about the consequences of changes in school characteristics over time (U.S. Environmental Protection Agency 2003). According to the study, the number of schools nationwide has decreased 70% since World War II, whereas the average number of students per school has increased fivefold, from 127 to 653. In addition to emphasizing that the replacement of small neighborhood schools by larger but fewer schools discourages walking and bicycling among children, the EPA claims that because of a poor walking environment around new schools, many students who live within walking distance currently travel to school predominantly by school bus or household vehicle.

A large number of studies have found that distance between home and school decreases children's propensity to walk or bicycle to school (Ewing, Schroeer, and Greene 2004; McDonald 2007; McDonald 2008a; McDonald 2008b; Stewart 2011; Yarlagadda and Srinivasan 2008). Stewart (2011) identified a large number of studies that showed evidence of distance being a deterrent to walking and bicycling to school. From her research with the U.S. National Household Travel Survey (NHTS) data, McDonald concluded in three studies (McDonald 2007; McDonald 2008a; McDonald 2008b) that distance to school decreases the propensity for active transportation to school. In one of those studies, McDonald (2007) concluded that the increase in distance between home and school can potentially explain about half the decrease in walking and bicycling by schoolchildren between 1969 and 2001.

The increasing distance between homes and schools is partially due to the replacement of small neighborhood schools with large regional schools. Although the association between number of students and schools' academic performance is subject to debate, it can be inferred from some studies that lower student enrollment could be potentially associated with higher academic performance (Andrews, Duncombe, and Yinger 2002; Beaumont and Pianca 2002). Other studies have shown that lower enrollment promotes children's walking and bicycling to school (Falb et al. 2007). Yet, as noted by Beaumont and Pianca (2002), small schools are increasingly being replaced by large regional schools to draw students from larger areas. Some authors have attributed the trend of replacing small schools with large schools to suburbanization, a tendency to build new schools on undeveloped land, and the practice of setting a minimum lot-size requirement for schools (Crider and Hall 2006).

Although distance to school appears to be the most significant deterrent to active transportation to school, studies have shown that urban form and socioeconomic characteristics of neighborhoods also play an important role in determining children's transportation mode to school (Kerr et al. 2006; McMillan 2007). McMillan (2007) found that physical characteristics of homes as well as street characteristics affect children's travel mode to school, whereas Kerr et al. (2006) found that attributes of neighborhoods and streets affect children's travel to school differently in high-income and low-income areas. Although, as shown in Stewart (2011), a large number of variables, including distance to school, sidewalk quality, street connectivity, walkability, land-use mix, and population density, have been found to have a significant effect on walking and bicycling by schoolchildren, in the realm of school siting practices, size of schools and distance to schools have gained the greatest attention. In a bid to address these issues, the EPA published its first School Siting Guidelines in 2011 (U.S. Environmental Protection Agency 2011), which suggests, among other things, considerations regarding distance to school, size of schools, design of schools, cost of school transportation, availability of alternative transportation modes, and sidewalk connectivity. Similar guidelines have been published by at least two states, Oregon and California (California Department of Education 2012; Transportation and Growth Management Program 2005), as well as a metropolitan planning organization (Atlanta Regional Commission 2003).

2.2. Travel to and from School by New Jersey Children

The literature review indicates that a primary transportation-related concern regarding school siting practices nationally is an increasing distance between home and school. Increasing distance appears to decrease walking and bicycling propensity. By increasing dependence on motorized modes, distance increases vehicle miles traveled and greenhouse gas emissions. The second major concern regarding school siting is the location of schools in areas that are not safe for walking or bicycling. School location in unsafe areas increases the exposure of children to crashes, and thereby reduces the likelihood of walking and bicycling.

It is evident from an analysis of 2009 NHTS data that distance to school is a less serious concern in New Jersey compared to most other states, whereas safety of children walking or bicycling to school is a greater concern. According to the NHTS, 13% of New Jersey children ages 5–15 walk to or from school, 45% travel by household vehicle, and 42% take the school bus. The proportion of children walking and making trips by household vehicles in New Jersey is virtually identical to the national average despite the fact that New Jersey children, on average, live closer to school than do children in most states. Although 52% of schoolchildren nationwide live farther than two miles and 71% live farther than one mile from school, 45% of students in New Jersey live farther than two miles and 64% live farther than one mile. In many states, including West Virginia, Delaware, Kentucky, Louisiana, Mississippi, and Tennessee, more than 75% of the students live farther than two miles from school. New Jersey students also spend less time traveling to school compared to students in most other states. Although the average travel time from home to school for New Jersey children ages 5–15 is only 13 minutes, the national average is 16 minutes, and in many states, such as Mississippi, Arkansas, Louisiana, Kentucky, and Delaware, children, on average, spend 20 minutes or more traveling to school.

The NHTS also shows that New Jersey parents are less concerned about distance to school than children's safety. The proportion of New Jersey parents who perceive distance to school as a serious concern (40%) is almost identical to the nation (41%). However, potentially because of the relatively urbanized nature of the state, traffic volume and speed are of far greater concern for New Jersey parents compared to parents nationwide. Although 43% of parents nationwide perceive traffic volume on roads as a serious issue for their children's travel to school, 56% of New Jersey parents are concerned about traffic volume. Similarly, 48% of New Jersey parents consider traffic speed on roads as a serious issue, whereas only 40% of parents nationally show that level of concern. These differences are significant at the 1% level on an independent-sample *t* test. Although the state contains a few older cities with very high crime rates, potentially because most residents live in low-crime areas, a significantly lower proportion of New Jersey parents perceive crime to be a serious issue (8%) compared to the nation as a whole (14%). Overall, the 2009 NHTS data shows that parents in New Jersey are more concerned about traffic volume and speed than distance to school or crime. Their concern about traffic volume and speed could potentially explain why the proportion of children walking to school is not higher in the state than the national average, particularly considering that students in New Jersey, on average, live closer to school.

New Jersey parents have a reason to be concerned about traffic safety when it comes to children walking to school. According to 2009 data from the National Highway Traffic Safety Administration (NHTSA), New Jersey ranks fifth among all states in terms of total number of pedestrian fatalities (National Highway Traffic Safety Administration 2011). Perhaps more important, it is only second to Washington, DC, in terms of pedestrian fatalities as a proportion of total traffic fatalities. Approximately 27% of traffic accident fatalities in the state are pedestrian fatalities.

Pedestrian crashes in New Jersey are not uniformly distributed across its 21 counties. According to a 2011 report prepared by the Alan M. Voorhees Transportation Center of Rutgers University, where geocoded crash data were analyzed for the 2003–2010 period, far more crashes involving pedestrians occur in heavily urban counties such as Essex, Hudson, Bergen, Union, and Passaic than in predominantly suburban counties (Alan M. Voorhees Transportation Center 2011). When normalized by the population of each county, pedestrian crashes in the predominantly urban counties appear to be even more frequent. Although schools may be closer to homes in the urban counties than in the predominantly suburban counties, because of the greater frequency of pedestrian crashes in urban areas, parents may be averse to the idea of children walking to school.

3. Analysis of Schools Established in Different Periods

3.1. Data

Because the primary objective of this research is to examine the characteristics of the New Jersey schools that were established in different time periods, data pertaining to the year of establishment of schools is crucial. According to a list acquired from the Office of School Facilities of the NJDOE, there are 2,445 public schools throughout the state, of which 1,903 include at least 30 students in the K–8 grades. Because the NJDOE data set included establishment years for only 878 schools (46%), additional efforts were necessary to acquire the establishment years for the remaining schools. The establishment years for an additional 675 schools (36%) were obtained by visiting the web pages of individual schools and through an inquiry to school officials by e-mail. For the remaining 350 schools (18%), the establishment years could not be obtained. Although this is a limitation of the data, further examination of the schools showed that the schools with an establishment year are virtually identical to the schools without an establishment year in terms of geographic diversity and number of students per school. For example, the county-specific distribution of the schools with an establishment year is 98% similar to the distribution of all schools, whereas the mean number of K–8 students in the schools with an establishment year is only 0.67% smaller than all schools (443 vs. 446 students). Thus, the schools with data on an establishment year can be considered highly representative of all public schools with 30 or more K–8 students in the state. Figure 1 shows the location of the 1,903 schools in the data set, distinguishing the schools with data on an establishment year from those with missing data on an establishment year.

Additional information on schools, including number of students, racial and ethnic diversity of students, class size, and students' participation in the free-lunch program, was compiled from a publicly available NJDOE data source (New Jersey Department of Education 2011). To examine the socioeconomic characteristics of the areas around schools established in different time periods, data from the 2006–2010 ACS were extracted at the census tract level and aggregated for one-mile buffers around each school by using a GIS (geographic information

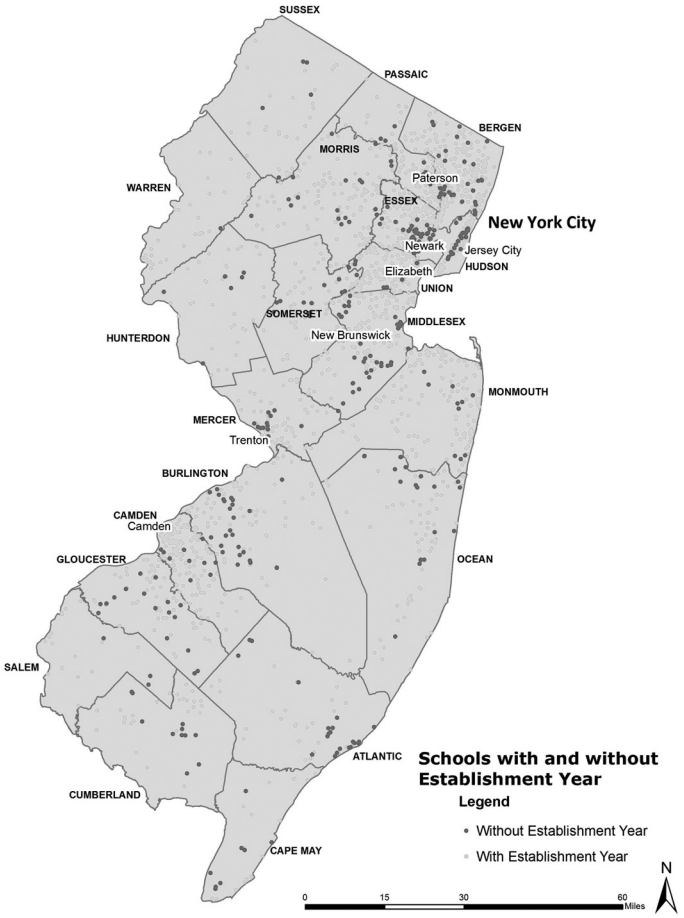

Fig. 1. Public schools with at least 30 K–8 students in New Jersey.

system). All census tracts bisected by a circle with a one-mile radius around a school were included in the buffer. Location-specific geocoded data on pedestrian crashes for the period 2003–2010 were obtained from the Plan4Safety database maintained by the Center for Advanced Infrastructure and Transportation at Rutgers University (2012). This database contains detailed information on all reported crash locations, crash characteristics, and the characteristics of the victims. Finally, data on lot size, or parcel size, of most schools were obtained from the New Jersey Geographic Information Network (New Jersey Office of Information Technology 2012). For schools missing information in this data source, parcel sizes were manually approximated by using GIS polygons.

3.2. Descriptive Analysis of Schools Established in Different Time Periods

To examine the variations in size of New Jersey schools established in different time periods, the mean number of enrolled students and the mean lot size of schools established in different decades are compared in Figure 2. The mean number of students is noticeably higher for newer schools, especially schools established since 1960, compared to older schools. Although the mean lot size of schools established in the 1990s is larger than schools established in other decades, the data does not necessarily show that lot sizes of schools have become larger over time. Overall, the data indicate that newer schools, on average, have more students than older schools, whereas the lot size of schools has fluctuated from decade to decade without showing a pattern of consistent change over time.

On the basis of the national literature, one might expect schools to be increasingly located in suburban areas, but in New Jersey schools appear to be returning to urban areas. Schools established since 1980 appear to be locating with greater frequency in urban areas compared to the schools established in the 1960s and 1970s, although many of the urban areas with new schools are in counties that are usually considered suburban, such as Monmouth, Ocean, and Burlington. A reason for the growth of urban schools in these counties could be the growth of population in their urban centers.

Figure 3 shows the proportion of minority and free-lunch students in schools, as well as the mean number of crashes involving children under age 18 within a half-mile buffer around schools during the eight-year period, 2003–2010. All three variables show a decline up to the 1960s, but they change direction beyond that period, indicating a higher proportion of minority and free-lunch students, as well as a higher frequency of pedestrian crashes in school surroundings, for newer schools. An analysis of race and ethnicity of the population within a one-mile buffer around schools also showed a higher proportion of African American and Hispanic populations around schools established since the 1970s compared to the schools established in the 1950s and 1960s.

A reason for the increase in the number of urban schools in the state may be the introduction of a new funding formula aimed at decreasing disparity between school districts in affluent communities and disadvantaged communities. By virtue of state legislation following several court rulings in the 1980s and early 1990s, often referred to as the Abbott Rulings, currently 31 school districts in disadvantaged communities are designated as School Development Authority (SDA) districts to ensure that they receive additional state aid. Although districts statewide include an average of four K–8 schools, SDA districts typically include a far larger number of schools, many containing more than 20 schools. The recent growth of schools in SDA districts is evident from the fact that 10% of the schools established during the 1940–1959 period and 12% of the schools established in the 1960–1979 period are in SDA districts, whereas 27% of the schools established since 1980 are located in SDA districts.

3.3. A Model Distinguishing Schools Established in Different Periods

Although the descriptive statistics in Figure 2 and Figure 3 provide certain insights, in order to statistically compare the characteristics of schools and their surroundings by establishment period, a multinomial logit model was used. For the modeling purpose, the schools were divided into five discrete categories depending on their year of establishment: the pre-1920 schools, the 1920–1949 schools, the 1950–1959 schools, the 1960–1979 schools, and the post-1979 schools. The categories were chosen to ensure that no category included too many or too few schools.

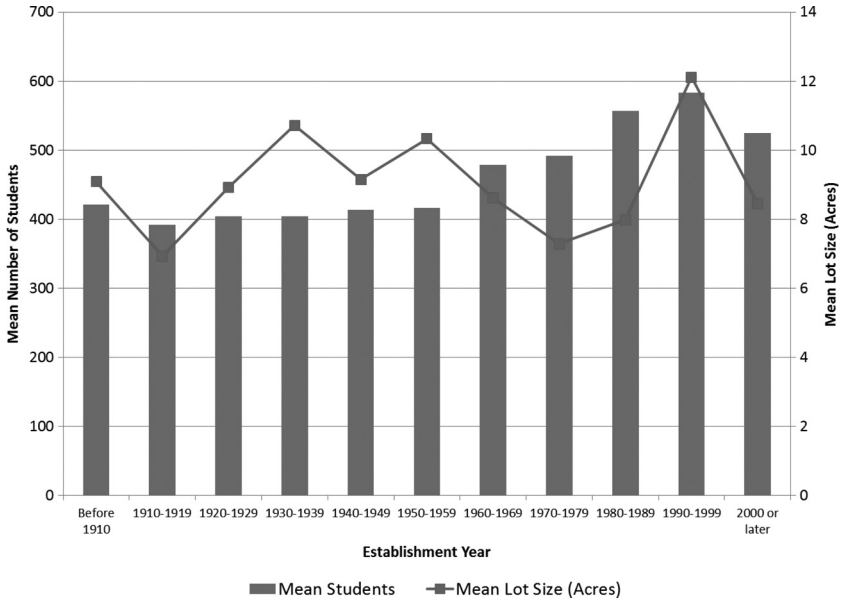

Fig. 2. Mean number of students and plot area of K–8 schools by establishment year.

Since the 1950s experienced a boom in school construction, the schools established during that decade were included as a separate category, whereas two or more decades were combined for the other categories.

The multinomial model treats time periods as categorical instead of continuous or ordinal. The categorical treatment of time allows greater flexibility than an ordinal treatment because it avoids the assumption that the characteristics of the schools changed in a sequential manner from one time period to the next. The results of the model are presented in Table 1.

The means and standard deviations of the independent variables in Table 1 are provided for the five different time periods in Table 2. The F-statistics comparing within-group and between-group variations showed that the variations between time periods were statistically significant for all variables shown in the table. The numerical values of the means in Table 2 show that, compared to the 1960–1979 period, the schools established since 1980 have a greater number of students, whereas their surroundings have greater proportions of African American and Hispanic persons, and a lower proportion of single detached homes. Furthermore, the surroundings of schools established since 1980 experience a greater number of youth pedestrian crashes and fatal pedestrian crashes involving persons of all ages. Finally, a lower proportion of schools established since 1980 are located on local roads compared to schools established during the 1960–1979 period.

In the multinomial model in Table 1, the period 1960–1979 was used as the referent category, meaning that the coefficients

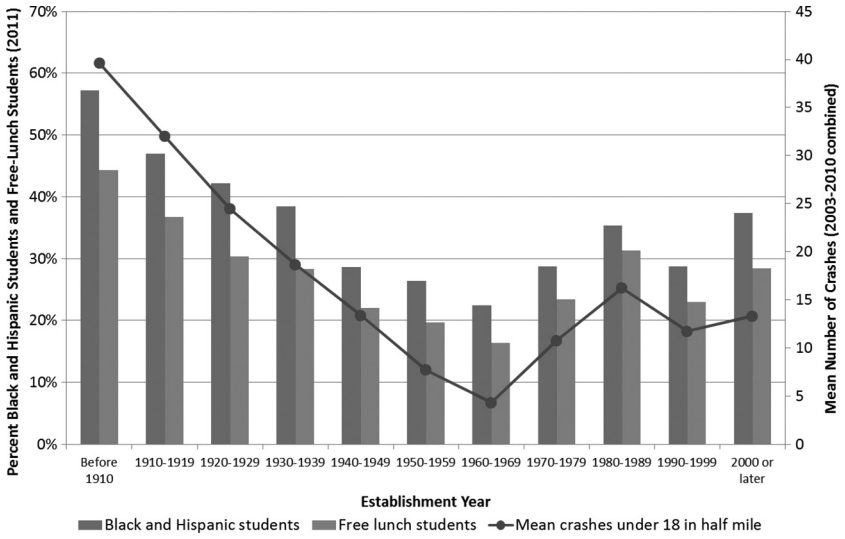

Fig. 3. Proportion of minority and free-lunch students in K–8 schools and crashes involving children under 18 in half-mile buffer of the schools.

Table 1. Results of multinomial logit model comparing K–8 schools established in different time periods

	Pre-1920 schools[a] ($N = 216$)		1920–1949 schools[a] ($N = 375$)		1950–1959 schools[a] ($N = 415$)		Post-1979 schools[a] ($N = 181$)	
Variables	Coefficient	Wald	Coefficient	Wald	Coefficient	Wald	Coefficient	Wald
Intercept	1.247	.04	2.618	.25	3.407	.46	4.946	.59
Number of K–8 students in school	−.003**	39.67	−.002**	37.80	−.001**	15.46	.001*	4.22
Population density in one-mile buffer (per acre)	.032	1.40	.044*	2.91	.025	.86	−.018	.32
Percent African American population in one-mile buffer	−.897	.98	−.233	.08	−.504	.34	.359	.13
Percent Hispanic population in one-mile buffer	1.879	1.86	2.984*	5.91	2.362*	3.64	3.662*	6.54
Per capita income in one-mile buffer (in natural log)	.373	.48	.249	.35	.090	.05	−.787	2.46
Percent of dwellings that are single detached in one-mile buffer	−3.029**	11.54	1.212	2.61	1.606*	5.24	−.194	.05
Percent of commuting trips by automobile in one-mile buffer	−3.391*	3.02	−4.613**	7.59	−3.020	3.33	.900	.17
Average commuting time in one-mile buffer (in minutes)	.002	.00	−.046*	4.85	−.065**	11.61	.048*	4.05
Number of pedestrian crashes for children under age18 in half-mile buffer (2003–10)	.077*	4.73	.060*	3.01	−.010	.07	.051	1.60
Fatal pedestrian crashes for persons of all ages in one-mile buffer (2003–10)	.012	.03	.033	.25	.007	.01	−.041	.24
School located on local road (local road = 1, county or state road = 0)	−.748**	12.29	−.681**	15.29	−.643**	15.63	−.551**	7.32
−2 Log Likelihood	4360							
Chi-Square	489	($p < .0001$)						
Pseudo R-Square (Cox and Snell)	0.28							

[a]Referent category: 1960–1979 schools ($N = 366$).
*Coefficient significant at the 10% level.
**Coefficient significant at the 1% level.

Table 2. Differences between K–8 schools established in different time periods regarding characteristics of schools and surroundings

	Before 1920 schools ($N = 216$)		1920–1949 schools ($N = 375$)		1950s schools ($N = 415$)		1960–1979 schools ($N = 366$)		1980 or later schools ($N = 181$)		Total schools $N = 1553$	
Variables	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Number of K–8 students in school	406	215	405	222	417	197	482	254	551	245	443	231
Population density in one-mile buffer (per acre)	17.56	14.84	11.87	12.18	6.06	6.61	5.04	6.92	7.04	11.19	8.94	11.06
Percent African American population in one-mile buffer	0.19	0.21	0.14	0.17	0.09	0.10	0.09	0.13	0.12	0.14	0.12	0.15
Percent Hispanic population in one-mile buffer	0.23	0.17	0.18	0.17	0.11	0.11	0.09	0.09	0.14	0.16	0.14	0.14
Per capita income in one-mile buffer (in natural log)	10.30	0.36	10.41	0.35	10.51	0.30	10.53	0.31	10.40	0.35	10.45	0.34
Percent of dwellings that are single detached in one-mile buffer	0.43	0.25	0.57	0.24	0.69	0.18	0.70	0.19	0.64	0.24	0.62	0.23
Percent of commuting trips by automobile in one-mile buffer	0.74	0.13	0.79	0.11	0.85	0.08	0.86	0.08	0.85	0.10	0.82	0.11
Average commuting time in one-mile buffer (in minutes)	31.64	3.75	31.43	3.93	31.43	4.24	32.49	4.88	32.38	5.01	31.82	4.38
Number of pedestrian crashes for children under age 18 in half-mile buffer (2003–10)	6.19	6.51	3.83	5.06	1.50	3.41	1.20	2.94	2.28	4.79	2.74	4.77
Fatal pedestrian crashes for persons of all ages in one-mile buffer (2003–10)	2.25	2.65	1.58	2.18	0.77	1.28	0.66	1.40	0.92	1.77	1.16	1.92
Proportion of schools located on local road	0.70	0.46	0.67	0.47	0.62	0.49	0.74	0.44	0.64	0.48	0.67	0.47

of the four models in the table show a comparison of the variables for the four specific time periods in relation to the schools established during the 1960–1979 period. Thus, the negative sign of the statistically significant variable on number of students for the periods pre-1920, 1920–1949, and 1950–1959 indicates that the schools established during these periods, on average, have a smaller number of students than the schools established during the 1960–1979 period, whereas the positive sign of the variable for the post-1979 period indicates that the schools established during this period have a larger number of students.

Several other important observations can be made from the model results. Compared to the 1960–1979 schools, the schools established in the prior decades have a smaller proportion of single detached homes, a smaller proportion of automobile commuters, and a greater proportion of Hispanic residents in their surroundings, all indicating that the older schools are more often located in urban settings compared to the schools established during the 1960–1979 period. The frequency of pedestrian crashes involving children under age 18 within a half-mile buffer is higher for schools established prior to 1950 than for schools established during 1960–1979. Another disturbing fact that emerges from the results is that the older schools are less likely to be located on local roads (or more likely to be located on county or state roads) compared to the schools established during the 1960–1979 period. Although many of the older schools might have been located on local roads at the time of establishment, with the increase in automobile travel and subsequent redesignation of local roads to county or state roads, currently many older schools are located on county or state roads where traffic volumes and speed are generally higher than local roads.

The newest schools—those established in 1980 or later—are different from the schools established in the 1960–1979 period only regarding the number of students, proportion of Hispanic residents in their surroundings, average commute time in the surrounding area, and type of road where schools are located. Although Figure 3 shows that the number of crashes involving youth pedestrian victims is higher around newer schools compared to the schools established in the 1960s, the model does not show statistical significance for the variable on crashes because the referent category includes both the 1960s and 1970s. In fact, the areas surrounding the schools established in the 1970s as well as the schools established since 1980 experience higher youth pedestrian crashes than the schools established in the 1950s and 1960s. Finally, the model shows that the oldest and the newest schools are significantly more likely to be located on state and county roads instead of on local roads compared to the schools established in the 1960s and 1970s. This suggests that the location of the newest schools is influenced, at least to a certain degree, by the intent of reducing travel time for motorized school trips.

3.4. The Factors Associated with School Enrollment

Considering that the increasing size of schools has received a significant level of attention in recent studies, a separate effort was made to examine the factors associated with school enrollment by using the data set for the 1,553 New Jersey schools described previously. Correlation analysis was undertaken in an initial step to examine how school enrollment is associated with other characteristics of the schools and the attributes of the areas where schools are located. The results, not presented in this paper because of space limitations, showed that the number of enrolled students is positively associated with establishment year, percentage of free-lunch students, percentage of Hispanic students, percentage of Asian students, school location in SDA district, and density of children ages 5–14 in surroundings. On the other hand, the number of enrolled students is negatively associated with median household income and the proportion of detached homes in the surrounding area.

An ordinary least squares regression model was subsequently used to examine how these variables are associated with enrollment when the effects of the other variables are controlled for. The results, presented in Table 3, show further evidence that schools in the state are becoming larger over time. Table 3 also shows that enrollment is higher in schools with a high proportion of Asian and Hispanic students, as well as in schools located in areas with a high density of children ages 5–14. In contrast, enrollment is lower in schools located in areas with high household income. No evidence was found that the schools in the SDA districts have higher enrollment than other school districts. The proportion of single-family homes in the surrounding area was also not found to be statistically significant. The correlation and regression results together seem to suggest that the consequences of schools becoming larger are likely to be felt more by the schools in lower-income and minority communities than by the schools in affluent communities.

Table 3. Results of ordinary least square model on number of enrolled K–8 students in school

Variable	Coefficient	*t* value
Intercept	496.23**	10.77
Schools established in 1920 or before	−121.61**	−6.08
Schools established between 1920–1949	−100.18**	−6.09
Schools established during the 1950s	−64.70**	−4.17
Schools established between 1960–1979 (referent)		
Schools established in 1980 or later	60.27**	3.06
Percent free-lunch students in school	−48.60	−1.07
Percent Hispanic students in school	195.80**	4.77
Percent Asian students in school	343.40**	6.72
School in SDA District (SDA = 1, not SDA = 0)	−21.39	−0.88
Persons age 5–14 per acre in one-mile buffer	19.06**	2.59
Median household income in one-mile buffer (in $1,000)	−1.19**	−3.57
Percent single detached homes in one-mile buffer	−22.41	−0.49
F	22	
Adjusted *R*-Square	.13	
N	1553	

**Coefficient significant at the 1% level

4. Discussion

In view of a national concern about evolving school siting practices, especially the increasing distance between homes and schools and the location of schools in unsafe locations, this research examined the current characteristics of the New Jersey schools established in different time periods. It indicated that like the country as a whole, New Jersey schools became larger over the decades. However, this increase in size is reflected only in the number of enrolled students, not in lot size. The NHTS data showed that New Jersey students, on average, live closer to schools than in the country as a whole, and yet the proportions of students walking and being driven to school are virtually the same in the state as the country. New Jersey students appear to walk and bicycle less not because of distance to school, but due to an apprehension about unsafe walking conditions, as reflected in the parents' responses in the NHTS. Pedestrian crash data from the NHTSA also indicates that New Jersey ranks very high in terms of pedestrian fatalities.

Two tendencies in school siting practices in New Jersey require particular attention. First, recent years have seen a revival of school establishment in urban communities. Although schools in the 1950s, 1960s, and 1970s were predominantly established in suburban communities, the newest schools are being established in urban communities at a higher rate than in the previous decades. Many of the new schools are located in SDA districts. Although the tendency to build new schools in urban communities may reduce distance between homes and schools, it also causes concern about the safety of children because urban areas generally account for a far greater number of pedestrian crashes than suburban areas. Although the high crash incidents in urban areas may be associated with higher pedestrian volumes (i.e., exposure), most parents are possibly not informed enough to consider pedestrian exposure when it comes to the safety of their children walking to school. Parents' concern about crashes in urban areas can thus reduce the propensity of walking and bicycling by children in urban areas.

The second tendency relating to school siting practices that deserves attention in New Jersey is the type of road where new schools are being located. Although the schools established in the 1960s and 1970s were predominantly located in suburban areas, they were often located on local roads. In contrast, a larger proportion of the oldest schools are located on state or county roads that usually carry large volumes of vehicular traffic. Schools established since 1980 also tend to be located on state or county roads. Although many of the oldest schools are probably located on county and state roads because of redesignation of roads over the years, the newest schools are seemingly located on county and state roads to accommodate vehicular traffic to and from school.

Statistical analyses in this study showed that household income in school surroundings is negatively associated with school enrollment. This suggests that the issues related to larger schools are less relevant for affluent communities. Since most of the affluent communities are located in the suburbs, pedestrian safety in terms of number of crashes in the vicinity is also less of an issue for schools located in these communities. Because of the revival of schools in urban communities and more frequent occurrence of pedestrian crashes in school surroundings, greater attention is needed for schools located in urban areas.

Finally, this research shows that the relative importance of the concerns regarding school siting may vary from state to state. For example, although increasing distance between homes and schools may be a greater concern for states that are less urbanized than New Jersey, for highly urbanized states such as New Jersey, issues related to pedestrian safety may be more important than distance to school. Furthermore, issues within the same state may vary from place to place, depending on the level of urbanization, traffic conditions, and occurrence of pedestrian crashes, thereby making the task of preparing a statewide set of school siting guidelines more challenging.

Because this study showed that, unlike many other states, the primary issue in New Jersey is not suburbanization of schools or increasing distance between homes and schools, but rather an increase in number of schools in urban areas, the SRTS program run by the New Jersey Department of Transportation decided that improving safety around urban schools through a direct approach is a greater priority at present than preparing a set of statewide school siting guidelines. As a follow-up to this study, the authors, along with other researchers at Rutgers University, are conducting a safety-education program involving urban middle school children and preparing to conduct pedestrian safety audits around selected urban schools with high incidences of youth pedestrian crashes in surrounding areas.

Acknowledgments

Kristen Snuck and Trish Sanchez assisted this research by collecting data on school establishment years. Richard Bartholomew assisted with GIS analysis. The authors are grateful to the reviewers for providing valuable information, insights, and suggestions.

Disclaimer

The contents of this paper reflect the views of the authors and do not necessarily reflect the official views or policies of the Federal Highway Administration or the New Jersey Department of Transportation.

Funding

Research associated with this paper was funded through the Safe Routes to School program of the Federal Highway Administration and obtained through the New Jersey Department of Transportation.

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