Power of Parks

Outdoor Spaces and Academic Performance of Boston Public Schools

Introduction

Outdoor play is vital in the development of children physically and socially. The role of play is also important for learning in classrooms settings. As a child grows older and works through their schooling, less time throughout the day is spent playing. Opportunities for play, especially outdoor play, are still important for the practice and development of social skills. These skills can allow students to better communicate and work with peers and teachers in a classroom and achieve academic success.
In order to determine the importance of this outdoor space on academic success, this project compares the amount of publicly accessible open space surrounding a school to standardized test scores. Socioeconomic status (SES) was also mapped to show that there are other factors that can have a more drastic effect on academic performance.

Results

The correlation test showed that there is a very minute relationship between CPI and the amount of public open space per student with a Pearson Correlation value found to be 0.28. There are some areas which showed major deviations between the CPI and the acres per student and some which show a higher level of correlation. These are shown below along with census block group denoting average household income. In the Brookline area, where there is a relatively high average income, there is also a low amount of public access space, but a very high CPI. In Roxbury, there is a relatively low average income, a fairly average amount of public space, but a very low CPI. In Medford, there is a relatively higher amount of public space as well as a relatively higher CPI.

Schools in…	Average School CPI	Public Open Spaces (Acres/Student)	Average Income by Block Group
Greater Boston	62.48	0.187	$49,600
Brookline	86.41	0.0746	$88,600
Medford	73.95	0.4746	$47,100
Roxbury	51.08	0.1296	$26,700

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Intro GIS, Fall 2016

Projection: NAD 1983, State Plane Massachusetts

Data Sources:

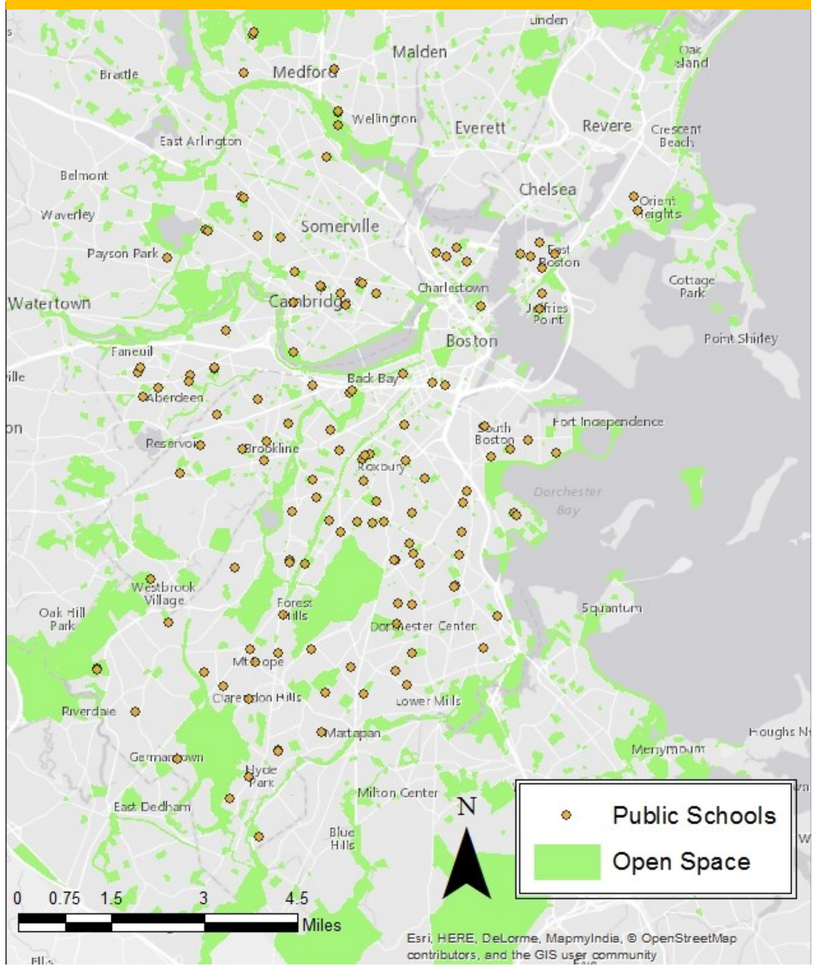
2016 Spring MCAS Test Results, Mass Department of Education—*http://profiles.doe.mass.edu/state_report/mcas.aspx*

Schools, MassGIS—*http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/schools.html*

Protected and Recreational Open Space, MassGIS—*http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/osp.html*

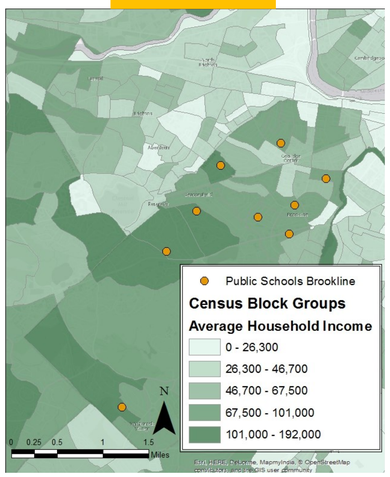
2010 Census Block Group data, ESRI Demographics, from Tufts M: Drive

Boston Public Schools

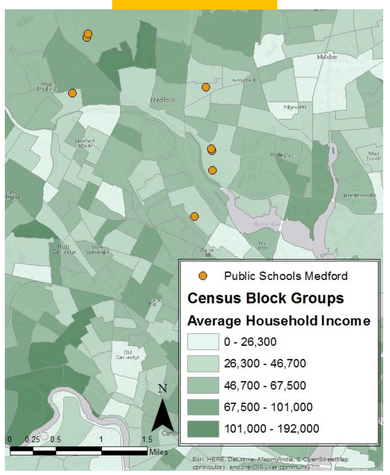


Neighborhood Schools with Household Income

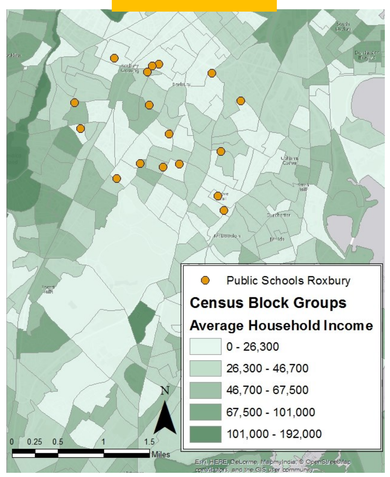
Brookline



Medford



Roxbury



Methods

Map

Public access open space and schools were downloaded as polygons and points respectively from MassGIS. Schools were selected for based on their type as public schools, then joined to test score data for the science portion of the test. Test data was obtained from Massachusetts Department of Elementary and Secondary Education for the MCAS test taken in the spring of 2016. Public space was selected for from the open space layer by attributes correlating to public use only. Public space was also selected for areas greater than one acre in order to cut out any road medians or small lots that could not be fully utilized as open play spaces. A buffer of 0.5 miles was formed around the school points. A union was used on the school buffer and open space layers. Area in acres was calculated for all polygons in this layer. All polygons in this union layer were also selected by attribute if they had a School ID value and an Open space ID value, to give all of the polygons which are both public access open space, and within 0.5 miles of a school. Using an attribute join based on School ID the data for public spaces within 0.5 miles of a school was joined to points of each school, giving a table the provided all test score data and acreage to public access open space. A layer was added using 2010 Census data for block groups. The block group data was symbolized based on average income.

Data Analysis

Using IBM SPSS statistics, each school was run using a bivariate correlational test of Composite Performance Index (CPI) and the Acres of public space per student. CPI is calculated by the Massachusetts Department of Education by assigning each student a score of 100, 75, 50, 25, or 0, and averaging scores per school.

Conclusion

The state of Massachusetts has long been a leader in education, especially in looking at the success of public primary and secondary schools. However, there are still major flaws in the public education system in Boston and Massachusetts as a whole. In order to combat these challenges, it is important to know what factors play a role in academic achievement, and in this study it is shown that socioeconomic status of the region around a school plays a huge role in determining the success of students at a school level. In public schools, test scores are more effected by household income than by the area of public open space within walking distance of the school.

This study would benefit from looking at more schools in neighborhoods that have a more median annual income. As we see in the Medford region, where income is closer to the mean, test scores correlate with the amount of open space. Finding large areas that have a uniform SES is difficult to do in an urban setting where everything is closer together, and expanding the study area to include more schools that are farther from the densely populated city could give a better understanding of the effects of public open spaces on academic success.