

# Are High-Quality Schools Enough to Increase Achievement Among the Poor?

## Evidence from the Harlem Children's Zone\*

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### Web Appendix

#### **Appendix A: Complete List of Harlem Children's Zone Programs**

##### *COMMUNITY INVESTMENTS*

###### Early Childhood Programs

*The Baby College* offers nine-week parenting workshops to expectant parents and those raising a child up to three years old.

*The Three Year Old Journey* works with parents of children who have won the HCZ Promise Academy charter school lottery. Held on Saturdays over several months, it teaches parents about their child's development, building language skills and parenting skills.

*Get Ready for Pre-K* involves children in small and large group activities that are designed to increase socialization skills, build routines, and provide exposure to their first classroom experience. The program has a particular focus on the development of pre-literacy skills. In order to prepare children for September entry into Harlem Gems Universal Pre-K or

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Head Start, four-year-old children attend Get Ready for Pre-K from 8 AM to 6 PM every day for six weeks during the preceding summer.

*Harlem Gems* Universal Pre-K is an all-day pre-kindergarten program that gets children ready to enter kindergarten. Classes have a 4:1 child-to-adult ratio, teach English, Spanish and French, and run from 8 a.m. to 6 p.m. HCZ runs three pre-kindergarten sites, serving over 250 children.

The *Harlem Gems Head Start* follows the same model as the Universal Pre-K but has a few important differences: 1) children can enter the Head Start at three or four years of age, thus a sizable proportion of the participants receive two years of instruction in the program, (2) because of income guidelines, students in Head Start tend to come from families with lower socioeconomic status than that of Universal Pre-K participants, and (3) while lead teachers at the UPK have master's degrees, Head Start teachers have bachelor's degrees.

#### Public Elementary School Programs

*Harlem Peacemakers* funded in part by AmeriCorps, trains young people who are committed to making their neighborhoods safe for children and families. The agency has Peacemakers working as teaching assistants in seven public schools and the HCZ Promise Academy charter school.

#### Public Middle School Programs

The *TRUCE Fitness and Nutrition Center* offers free classes to children in karate, fitness and dance. Participants also learn about health and nutrition, as well as receiving regular academic assistance. The program is focused on developing middle-school youth, grades 5-8.

*A Cut Above* is an after-school program that helps students in the critical-but-difficult middle-school years. Supporting students who are not in the HCZ Promise Academy charter school, it provides academic help, leadership development, as well as high school and college preparation.

### Public High School Programs

*TRUCE Arts & Media* (The Renaissance University for Community Education) does youth development through the arts and media, working with youth in grades 9-12 on academic growth, career readiness as well as fostering media literacy and artistic ability.

The *Employment and Technology* center teaches computer and job-related skills to teens and adults.

*Learn to Earn* is an after-school program that helps high-school juniors and seniors improve their academic skills, as well as preparing them for college and the job market.

### College Programs

The *College Success Office* supports students who have graduated from high school and HCZ programs. It helps them get into the most appropriate college, then assists them throughout their college years.

### Family, Community and Health Programs

*Community Pride* organizes tenant and block associations, helping many hundreds of tenants convert their city-owned buildings into tenant-owned co-ops.

*Single Stop* offers access to a wide variety of services - from counseling to financial advice to legal consultations - at several locations each week.

The *HCZ Asthma Initiative* works closely with asthmatic children and their families so they can learn to manage the disease and lessen its effects.

The *Healthy Living Initiative* (formerly the Obesity Initiative) is a multi-pronged program to help children and their families reverse the alarming trend toward obesity and its health effects.

#### The Beacon Center Program

The *Beacon programs* turn school buildings into community centers, offering programs during the afternoon, evening and weekend. They offer programs for youth and adults from education to the arts to recreation. Each summer, they offer all-day camp so children have a safe, enriching place to spend their time instead of hanging out on the street.

#### Foster Care Prevention Services

The HCZ Foster Care Prevention programs work to stabilize and strengthen families so that their children are not placed in foster care. They include:

The *Family Development Program*, which serves 120 families and specializes in access to mental-health professionals who collaborate with caseworkers to support therapeutic interventions.

The *Family Support Center*, which serves 90 families, and specializes in providing crisis-intervention services, referrals, advocacy, as well as groups on parenting and anger management.

The *Midtown Family Place*, which has 45 families and is based in Hell's Kitchen. It provides counseling, referrals and advocacy, as well as an after-school and summer program for children ages 5-12, a literacy program, and a food pantry.

*Project CLASS* (Clean Living and Staying Sober), which serves as many as 50 families. It specializes in providing referrals to drug- and alcohol-abuse programs, as well as creating, implementing and monitoring drug- treatment service plans. It also includes the Babies Initiative, which is offered to 20 families with children ages five and under who are at immediate risk of being put in foster care. This intensive program works to get family members whatever services they need in order to stabilize.

*Truancy-Prevention*, which has 90 families with at-risk children, and conducts groups on domestic violence, groups on parenting called the Parenting Journey, as well as a group for teenagers.

## ***SCHOOL INVESTMENTS***

### **Promise Academy Charter Schools in HCZ**

The Promise Academy and Promise Academy II in HCZ provides a comprehensive college-preparatory educational program, with an extended school day and school year. Both Promise Academy and Promise Academy II will eventually serve children from kindergarten through twelfth grade, bringing a strong focus on literacy and mathematics (over two hours of

literacy instruction and over 90 minutes of mathematics instruction each day) within a safe, structured and personalized environment. Each of the academies will be divided into four smaller “schools” (primary, elementary, middle, and high school) that will emphasize personalized relationships between students, teachers and families.

The academic day runs from 8 AM until 4 PM, approximately 20 percent longer than the vast majority of surrounding traditional public schools. Students also have the opportunity to participate in after-school programming from 4 PM – 6 PM. The academic year consists of 210 days of school, an increase over the 180 days required by law, which includes a 25-day mandatory summer program.

In 2006, a health clinic opened in the Promise Academy middle-school building so the students could get free medical, dental and mental-health services. The Harlem Children’s Health Project is a partnership of the Children’s Health Fund, the Mailman School of Public Health at Columbia University, New York-Presbyterian Hospital and HCZ. In addition, the clinic works with the elementary schools to identify children’s unmet health needs and to facilitate necessary care.

## **Appendix B: Data Appendix**

Data for this project come from files at Harlem Children's Zone and administrative data on student demographics and outcomes from the New York City Department of Education (NYCDOE). This appendix describes these data sets and details the procedures used to clean and match them.

### **Data Sets**

#### **A. Harlem Children's Zone**

The data from Harlem Children's Zone consist of lottery files from the 2004 and 2005 elementary school lotteries and the 2005 and 2006 middle school lotteries, and student assessments from the Iowa Test of Basic of Skills for all Promise Academy students. A typical student's data include her first name, last name, birth date, parents' or guardians' names, home address, lottery outcome, and ITBS achievement test scores. From the lottery files we exclude applicants with a sibling already enrolled in the Promise Academy (as they are automatically admitted) and applicants with sibling in the same lottery (as they have a higher chance of winning the lottery). Table 1 details the number of included applicants in each of the four lotteries.

We do not have data from the 2004 and 2008 middle school lotteries or elementary school lotteries after 2006. In the fall of 2007, Promise Academy did not enroll a new sixth-grade

cohort. The 2008 middle school lottery was for entering 5<sup>th</sup> grade students, while all other middle school lotteries were for entering 6<sup>th</sup> grade students.

Promise Academy II held both a kindergarten and first-grade lottery their first year, enrolling 40 students in each grade. After their first year of operation, Promise Academy II relocated, and in the process lost a number of students. To simplify our analysis and abstract from the issues created by this relocation, we focus our analysis on the Promise Academy.

### B. New York Department of Education Data

The NYCDOE data contain student-level administrative data on approximately 1.1 million students across the five boroughs of the NYC metropolitan area. The data include information on student race, gender, free and reduced-price lunch eligibility, attendance, and matriculation for all students and state math and ELA test scores for students in grades three through eight. The data also include a student's first and last name, birth date, and address. We have NYCDOE data spanning the 2003 – 2004 to 2009 – 2010 school years, with data on test scores and demographic data through the 1999 – 2000 school year.

### *STATE ASSESSMENTS*

The state math and ELA tests, developed by McGraw-Hill, are high-stakes exams conducted in the winters of third through eighth grade. Sample tests can be found at <http://www.emsc.nysed.gov/osa/testsample.html> Students in third, fifth, and seventh grades must score level 2 or above (out of 4) on both tests to advance to the next grade without attending summer school. The math test includes questions on number sense and operations, algebra, geometry, measurement, and statistics. Tests in the earlier grades emphasize more basic content

such as number sense and operations, while later tests focus on advanced topics such as algebra and geometry. The ELA test is designed to assess students on three learning standards – information and understanding, literary response and expression, critical analysis and evaluation – and includes multiple-choice and short-response sections based on a reading and listening section, along with a brief editing task. Content breakdown by grade and additional exam information is available at <http://www.emsc.nysed.gov/osa/pub/reports.shtml>

All public-school students, including those attending charters, are required to take the math and ELA tests unless they are medically excused or have a severe disability. Students with moderate disabilities or who are English Language Learners must take both tests, but may be granted special accommodations (additional time, translation services, and so on) at the discretion of school or state administrators. In our analysis the test scores are normalized to have a mean of zero and a standard deviation of one for each grade and year across the entire New York City sample. For students that are retained and retake the same test, we use the first available test score.

### *DEMOGRAPHIC VARIABLES*

Demographic variables that should not vary from year to year (race, gender) were pulled from New York City test score files from 1999 - 2000 through 2009 - 2010, with precedence given to the most recent files. Race consisted of the following categories: black, Hispanic, and other race. These categories were considered mutually exclusive. Gender was coded as male, female, or missing.

Demographic variables that may vary from year to year (free lunch status, English Language Learner status, and special education designation) were pulled from the relevant NYC

enrollment file. A student was considered eligible for free lunch if he was coded as “A” or “1” in the raw data, which corresponds to free lunch, or “2”, which corresponds to reduced-price lunch. A student was considered non-free lunch if the student was coded as a “3” in the NYC enrollment file, which corresponds to full price lunch. All other values, including blanks, were coded as missing. A student is income-eligible for free lunch if her family income is below 130 percent of the federal poverty guidelines, or categorically eligible if (1) the student’s household receives assistance under the Food Stamp Program, the Food Distribution Program on Indian Reservations (FDPIR), or the Temporary Assistance for Needy Children Program (TANF); (2) the student was enrolled in Head Start on the basis of meeting that program’s low-income criteria, (3) the student is homeless, (4) the student is a migrant child, or (5) the student is a runaway child receiving assistance from a program under the Runaway and Homeless Youth Act and is identified by the local educational liaison. A student is eligible for reduced-price lunch if family income is between 130 and 185 percent of federal poverty guidelines.

For English Language Learner status, a student was given a value of one if he was coded as “Y” for the limited English proficiency variable. All other students in the enrollment file were coded as zero for English Language Learner status. Special education was coded similarly.

### *ATTENDANCE*

We construct measures of absenteeism and matriculation using the NYCDOE data. Absenteeism is measured as the total number of absences a student accumulates during the first 180 days of the school year. After the first 180 days, the NYCDOE no longer collects absence data from schools.

## *MATRICULATION*

Matriculation is an indicator for whether a student is “on-time” given her expected grade. We impute an expected grade using the student’s birth date and New York law on school entry age.

## *DISTANCE TO BOUNDARY*

Using the student addresses provided by the NYCDOE, we also calculated the distance from each student’s home to the nearest point on the boundary of the Harlem Children’s Zone using arcGIS. When multiple addresses were available for a single student, we use the earliest available address. Note that for all students the earliest available address is 2003 – 2004, as enrollment data is not available before this year. Another approach is to use the student’s address closest to the date of the lottery. The results are not sensitive to this alternative. A student is defined as living “in the Zone” if they live completely inside or touching the boundaries of the original 24-block Zone.

## **Match from the Harlem Children’s Zone Data to the NYCDOE Administrative Data**

The HCZ data were matched to the New York City administrative data using the maximum amount of information available. Match keys were used in the following order: (1) last name, first name, date of birth with various versions of the names (abbreviations, alternative spellings, hyphenated vs. non-hyphenated); (2) last name, first name, and various versions of the date of birth (most often the month and day reversed); (3) last name, first name, prior school, and prior grade with various likely adjustments to prior grade; (4) name, date of birth, and prior grade. Once these match keys had been run, the remaining data were matched by hand considering all available variables. Match rates were 95.0 percent for the winners of the

kindergarten lottery (N=212), 95.3 percent for the losers of the kindergarten lottery (N=217), 93.0 percent for the winners of the middle-school lottery (N=211), and 88.8 percent for the losers of the middle-school lottery (N=401). These numbers are comparable to the match rates achieved by others using similar data (Hoxby and Murarka, 2009).

In our final elementary school sample we only include students for who we have test scores in 2009 – 2010, the most recent year available. Match rates to this sample were 84.1 percent for the winners of the kindergarten lottery (N=212), 78.4 percent for the losers of the kindergarten lottery (N=217). In our final middle school sample we only include students for who we have test scores through eighth grade, but include students who drop out in high school. Match rates to this sample 82.9 percent for the winners of the middle-school lottery (N=211), and 79.2 percent for the losers of the middle-school lottery (N=401). Details of the match rates for each lottery cohort are reported in Table 1.

### **Constructing the Sibling Data Set**

We construct the sibling data set by linking students entered in Promise Academy middle school lottery to their siblings in other New York City schools, dropping the linked siblings if they are enrolled at the Promise Academy. Siblings are defined as any student pair who share a last name and address at least once between the 2003 – 2004 and 2009 – 2010 school years.

### **Appendix C: Cost-Benefit Calculation**

This appendix describes the assumptions underlying our cost-benefit calculation.

#### *Costs*

The total per-pupil costs of the Promise Academy charter schools in HCZ can be calculated with relative ease. The New York Department of Education provided every charter school, including the Promise Academy, \$12,443 per pupil in 2008-2009. HCZ estimates that they added an additional \$4,657 per-pupil for in-school costs and approximately \$2,172 per pupil for after-school and “wrap-around” programs. This implies that HCZ spends \$19,272 per pupil at the Promise Academy. To put this in perspective, the median school district in New York State spent \$16,171 per pupil in 2006, and the district at the 95<sup>th</sup> percentile cutpoint spent \$33,521 per pupil (Zhou and Johnson, 2008).

#### *Benefits of Achievement*

There are relatively few studies relating test scores to later life outcomes. Currie and Thomas (2001) find that a one standard deviation increase in reading scores at age seven is associated with an 8.0 percent increase in wages at 33, and a one standard deviation increase in math scores is associated with 7.8 percent higher wages. Using our middle school lottery 2SLS estimates from Table 3 - 0.210 in math and 0.04 in ELA - suggests a  $(0.210 * 7.6 + 0.04 * 0.8) = 1.6$  percent increase in wages for every year a student is enrolled at the Promise Academy. Neal and Johnson (1996) find that a one standard deviation increase in AFQT scores at ages 15 – 18 is

associated with a 20 percent increase in wages at ages 26 to 29. Taking an average of the estimated HCZ effect across math and reading, this corresponds to a  $(0.125 * 0.2) = 2.5$  percent increase in wages.<sup>1</sup> Levitt and Lochner (2001) find that a one-quartile increase in AFQT scores is associated with a 3 to 4 percent decrease in self-reported property and violent crime participation. Assuming normality and using the average effect across both math and reading, this implies a  $(0.125/0.67) * (0.03 \text{ to } 0.04) = 0.55 \text{ to } 0.75$  percent decrease in criminal participation for each year a student is enrolled. Auld and Sidhu (2005) find that a one standard deviation increase in AFQT scores is associated with a 20 to 30 percent decrease in the probability of reporting a health limitation, implying a  $(0.125) * (0.2 \text{ to } 0.3) = 2.5 \text{ to } 3.75$  percent decrease for each year a student is enrolled at the Promise Academy. Elias (2005) and Kaestner (2009) report similar findings using self-reported health status.

### *Benefits of Attainment*

If the Promise Academy affects educational attainment as dramatically as achievement, the implied benefits are enormous (Angrist and Krueger, 1991; Card, 1999; Lantz et al., 1998; Card, 2001; Lochner and Moretti, 2004; Pettit and Western, 2004; Lleras-Muney, 2005; Belfield, 2006; Cutler and Lleras-Muney, 2006; Rouse, 2006; Levin et al., 2007; Oreopoulos, 2007; Kaestner, 2009). The public benefits alone would more than justify the costs. Using 2003 and 2004 Current Population Survey (CPS) data and the NBER TAXSIM, Rouse (2006) finds that present value lifetime earnings at age 20 of black male high school dropouts are \$292,200 versus

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<sup>1</sup> Kruger (2003) suggests three reasons why Neal and Johnson (1996) find a larger effect of test scores on wages than Currie and Thomas (2001). First, students were older when they took the AFQT exam, and there is evidence of mean regression in test scores. Second, Currie and Thomas simultaneously enter the highly correlated reading and mathematics scores in the wage regression, whereas Neal and Johnson (1996) use just a single test score. Finally, the British and American labor markets are different in ways that may change the correlation between test scores and wages.

\$601,800 for high school graduates--this means that the average black male dropout contributes \$118,000 in income taxes over his lifetime versus \$222,400 for a high school graduate. Accounting for property and sales taxes increases these figures by 5 percent. Overall, each additional black male high school graduate would produce a present value at age 20 of \$167,600 in additional tax revenue. Using data from the 2002 Medical Expenditure Panel Survey (MEPS) combined with enrollment costs from the National Health Accounts (NHA), Levin et al. (2007) estimate that over the lifetime, each additional high school graduate would result in savings in public health costs with a net present value of \$33,500 at age 20. Using data from the Bureau of Justice Statistics as well as FBI Uniform Crime Rate data, Belfield (2006) estimates that converting a black male high school dropout to a graduate is associated with criminal justice cost savings of \$55,500. Taken together, this implies a public benefit of approximately \$256,700 per new high school graduate.