

The Continuing Impact of Democracy Prep Public Schools: Preliminary Report*

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Abstract

This report provides updated estimates of the causal impact of attending a Democracy Prep school on student achievement. It replicates and extends the work of Dobbie (2012), who conducted the first rigorous evaluation of student outcomes for the network's first three cohorts, 2006-2008. The analysis focuses on students who applied to a Democracy Prep middle school in New York City between 2008 and 2013. Democracy Prep grew significantly during these years, providing an opportunity to assess whether it maintained historically strong performance while scaling up. We find that the impact of attending a Democracy Prep school remains large, ranging from 0.20σ per year of enrollment in English language arts (ELA) to 0.29σ in mathematics. We also find a small but statistically significant positive effect on students' daily attendance.

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1 Introduction

This report provides updated estimates of the impact of attending a Democracy Prep charter school on student achievement and daily attendance in grades 6-8. It replicates and extends the work of Dobbie (2012) and Dobbie and Fryer (2013), who conducted the first quasi-experimental evaluation of student outcomes at Democracy Prep Public Schools. The analysis reported here is part of a larger, ongoing study examining the short and long-run effects of Democracy Prep on its students. The larger study is described in greater detail in a later section.

Our approach to measuring the impact of Democracy Prep on student outcomes is comparable to that of Dobbie (2012), Dobbie and Fryer (2013), and others who have rigorously estimated the effects of attending a high-performing charter school.¹ Specifically, we contrast the outcomes of students selected by lottery to attend a Democracy Prep school with the outcomes of students who applied but were not randomly selected to attend. The strength of the lottery design is that it effectively mimics a randomized experiment. Because applicants are offered admission at random, we can be confident the “treatment” and “control” groups are equivalent at baseline and that any average difference in their later outcomes—beyond natural sampling variation—is due to the “treatment” of being offered admission to Democracy Prep.

This analysis focuses on students who applied for admission to a Democracy Prep middle school in New York City between 2008 and 2013.² These cohorts are of a more recent vintage

¹For examples, see Angrist et al. (2010), Abdulkadiroğlu et al. (2009), and Tuttle et al. (2010).

²Democracy Prep now operates schools outside of NYC. This preliminary report focuses exclusively on NYC schools. As noted in Section 3.1, as of this writing, unique identifiers required to match lottery outcomes to NYCDOE administrative data were not available for the 2011 cohort. For now, this cohort is excluded from the analysis. We hope that a match will eventually be possible, enabling us to incorporate the 2011 applicants into a future revision.

than those in the original impact study, who matriculated in 2006, 2007, and 2008. The six years covered by this report were a particularly interesting period in the history of Democracy Prep. The network significantly increased its enrollment in New York City (from 319 students in 2008 to 2,155 in 2013), opened two additional middle schools, expanded grade offerings at its flagship school (adding elementary and high school grades), and took over an existing under-performing charter elementary. This study provides an opportunity to assess whether Democracy Prep has been able to maintain historically strong academic performance in the midst of rapid scale-up.

We find that the effects of attending a Democracy Prep school on math and ELA remain positive and substantial, and are approximately as large as those reported in the original study (Dobbie, 2012). In mathematics, the effect is somewhat larger than that found for the first three cohorts, while in ELA the effect is somewhat smaller. For every additional year enrolled in a Democracy Prep school, we find students scored 0.26 to 0.29 standard deviations (σ) higher in math, on average, than students who applied to Democracy Prep but were not admitted. Admitted students scored 0.20 to 0.22 σ higher in ELA, on average, for each additional year enrolled. We also find admission to a Democracy Prep school had a positive, statistically significant effect on daily attendance rates, approximately 2.3 percentage points per year of enrollment.

In the next section, we provide a brief introductory overview of the Democracy Prep Public Schools network, its educational model, and the population it serves. We also summarize the earlier impact study as a point of departure. Section 3 describes the data we use, defines the sample and outcomes, and details the methods used. Section 4 reports the main regression results and Section 5 concludes by providing an outline of our larger study, and plans for future analyses.

2 Background

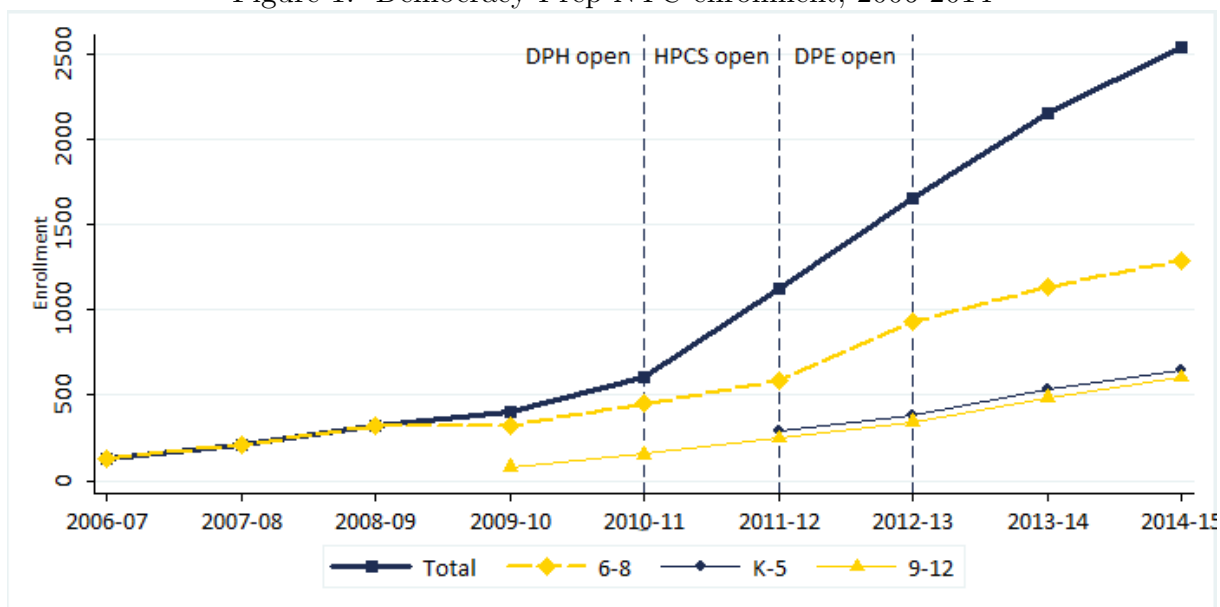
2.1 The Democracy Prep Public Schools

Democracy Prep is a network of public charter schools founded in Harlem in 2005. It enrolled its first class of 6th graders in Fall 2006. Its educational model has seven key components:³ (1) more time for learning; (2) academic rigor; (3) a sophisticated use of data; (4) a respectful school culture; (5) remarkable talent; (6) focus on civic engagement; and (7) a commitment to educating all students in all subjects. The first five of these components are common to other “no excuses” charter management organizations (CMOs) including KIPP, Uncommon Schools, and Achievement First (Tuttle et al., 2010; Angrist et al., 2012). The last two components, particularly the emphasis on civic engagement, are more unique. Students who attend a Democracy Prep school experience longer school days and are instructed in a college-prep academic program that requires Advanced Placement (AP) courses in high school, with a requirement that students pass no fewer than two AP exams with a score of 3 or higher prior to graduation. In high school, Democracy Prep students are required to take Korean language courses and the New York State Regents examination in Korean. All Democracy Prep schools adhere to a “broken windows” approach to school discipline, identifying and addressing small infractions to prevent worse behaviors from occurring. Democracy Prep actively recruits English language learners and special education students, who have traditionally been underrepresented in charter schools (Buckley & Sattin-Bajaj, 2011; Winters, 2015).

Democracy Prep has significantly expanded its operations in NYC since the first class of 131 matriculated in 2006. As shown in Figure 1, enrollment increased over nine years to more

³This section relies heavily on materials provided by Democracy Prep Public Schools.

Figure 1: Democracy Prep NYC enrollment, 2006-2014



Source: NYC DOE Demographic Snapshot (2010-2014) and NCES Common Core of Data (2006-2009). DPH is Democracy Prep Harlem, HPCS is Harlem Prep (the former Harlem Day Charter School), and DPE is Democracy Prep Endeavor.

than 2,500 students across all grade levels (K-12) and four schools. Following incremental growth from 2007-2009, the flagship Democracy Prep Charter School extended into the high school grades in 2010. The first high school class graduated from Democracy Prep in 2012-13. As shown in Table 1, the network opened a second middle school, Democracy Prep Harlem Charter School, in 2010-11. This new school expanded into high school (with 9th grade) and elementary school (with kindergarten) in 2013-14. A third middle school, Democracy Prep Endurance, opened in 2012-13 with an inaugural 6th grade class.

In 2011-12, Democracy Prep Public Schools took an unprecedented step for the network in taking over the Harlem Day Charter School, a long under-performing school at risk of losing its state charter.⁴ Unlike Democracy Prep's previous schools that were rolled out one grade

⁴Barbara Martinez, "Charter School Tries to Save Itself," *The Wall Street Journal*, January 10, 2011.

Table 1: Democracy Prep Public Schools: NYC Schools and Grades Served, by Year

| | Democracy Prep Charter School | Democracy Prep Harlem | Harlem Prep | Democracy Prep Endurance | Bronx Prep Middle/High |
|---------|----------------------------------|--------------------------|-------------|-----------------------------|---------------------------|
| 2006-07 | 6 | | | | |
| 2007-08 | 6-7 | | | | |
| 2008-09 | 6-8 | | | | |
| 2009-10 | 6-9 | | | | |
| 2010-11 | 6-10 | 6 | | | |
| 2011-12 | 6-11 | 6-7 | K-5 | | |
| 2012-13 | 6-12 | 6-8 | K-6 | 6 | |
| 2013-14 | 6-12 | K, 6-9 | K-7 | 6-7 | |
| 2014-15 | 6-12 | K-1, 6-10 | K-8 | 6-8 | 5-12 |

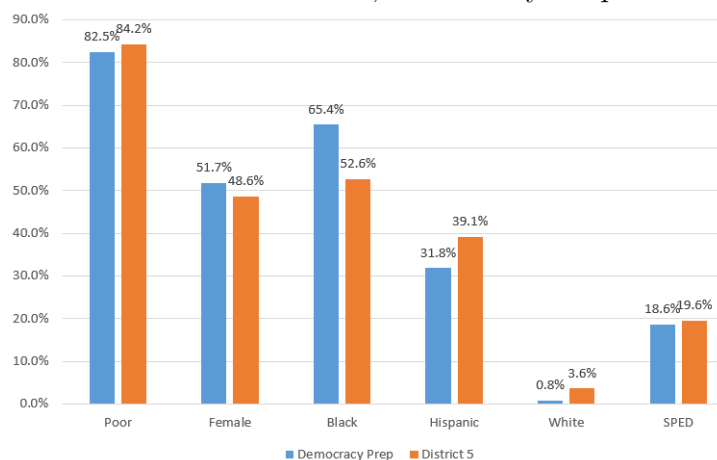
Source: Mark Cheng and Democracy Prep Public Schools. Harlem Prep is the former Harlem Day Charter School, which Democracy Prep restructured in 2011-12. Bronx Preparatory Charter School was taken over by Democracy Prep in 2014-15.

at a time, Harlem Day added 260 already-enrolled students across six grade levels (K-5) into the network. More recently, Democracy Prep assumed control of a failing charter middle/high school, the Bronx Preparatory Charter School, which served 700 students in 5th-12th grade in 2014-15.⁵ The network has also expanded nationally, with new and restructured charter schools in Camden, New Jersey; Baton Rouge, Louisiana; and Washington, D.C.

With three of its four NYC schools located in Harlem’s Community School District (CSD) 5, Democracy Prep Public Schools serve a population of historically disadvantaged students. In the most recent year, 82.5 percent of its students were eligible for free or reduced price meals (household income at or below 130% or 185% of the poverty line, respectively), and 18.6 percent were receiving special education services. 97.1 percent of its enrolled students were Black or Hispanic. As shown in Figure 2, these statistics mirror the demographics of CSD 5, with a few notable exceptions. Democracy Prep students are more likely to be black and less likely to be Hispanic or white than the average CSD 5 student. Democracy Prep does,

⁵Eddie Small, “Democracy Prep Eyeing Takeover of Bronx Prep Charter School,” *DNAinfo*, April 30, 2014. As Bronx Prep will not be fully restructured by Democracy Prep until 2015-16, we excluded them from this study.

Figure 2: Selected Student Characteristics, Democracy Prep Public Schools, 2013-14



Source: New York State School Report Card.

however, serve similar proportions of both poor and special needs students when compared to the district. This is consistent with Democracy Prep’s stated commitment to recruit and enroll special education and other hard-to-reach students. While many NYC charter schools are criticized for underenrollment of special education students, Democracy Prep’s numbers are on par with other nearby traditional public schools.

2.2 Results from Democracy Prep’s initial impact study

Dobbie (2012) estimated the impact of Democracy Prep on its first three cohorts of students for a larger project on charter school effectiveness in NYC (Dobbie & Fryer, 2013). His study focused on students who applied for admission in 2006, 2007, and 2008, and tracked their progress for up to three years.⁶ At the time of their application, Democracy Prep Charter Middle School was the only operating Democracy Prep school. As noted earlier, that school expanded and began offering high school grades in 2009-10.

⁶Dobbie had as many as six years of data for some students (2006-07 through 2010-11), but focused the analysis on outcomes in grades 6-8. For comparability, this report examines the same grade levels.

In the original study, outcomes of students randomly selected for admission to Democracy Prep (“lotteried-in”) were contrasted with those of students who applied but were not selected for admission (“lotteried-out”). The study included a total of six lotteries for admission in grades 6, 7, and 8, although the vast majority of offered seats (90%) were to rising 6th graders. A comparison of mean baseline characteristics of lottery winners and lottery losers found them to be very similar, providing assurance that the lotteries were truly random.⁷

Estimated effects for the first three cohorts were quite large, roughly 0.23 to 0.24 σ for every additional year enrolled in Democracy Prep. These estimates were obtained via a two stage least squares procedure (2SLS), which scales up reduced form “intent-to-treat” estimates by the “first stage” effect of winning a lottery on enrollment (see Section 3.3). Because not all applicants offered a seat enroll, intent-to-treat estimates understate the impact for those who actually enroll (Abdulkadiroğlu et al., 2009). 2SLS provides an estimate of the “treatment-on-treated” effect. Notably, the first stage in the initial study—that is, the effect of winning a lottery on subsequent enrollment—was found to be low in comparison with other charter schools, suggesting Democracy Prep applicants were less likely to accept an offer of admission than applicants to other charter schools. As we show later, applicants’ willingness to accept a Democracy Prep offer has markedly increased since that study.

Finally, the initial impact study estimated the effects of Democracy Prep on attendance and regular academic progress, finding positive but statistically insignificant effects. It reported no evidence of differential impacts by subgroup, although Table 4 of Dobbie (2012) suggests that effects may have been larger for girls (in math), and for non-black and free

⁷As discussed more later, Dobbie (2012) excluded applicants with a sibling already enrolled at Democracy Prep, and applicants who were guaranteed admission—or had a zero probability of admission—as a result of CSD preferences adopted in 2008. Only the *first* application was considered for students who applied more than once. Not all applicants were included in the analysis, as only 79% of applicants could be matched to NYC DOE administrative data. We had a slightly higher matching rate in this study.

lunch eligible students (in ELA). In an in-depth look at school practices, Dobbie (2012) found Democracy Prep had more instructional time, a stronger focus on academic achievement, and more parental outreach than the 35 other NYC charters in the study. Moreover, Democracy Prep students were spending more time on task than their peers in other NYC charters.⁸

3 Data, sample, and methods

3.1 Lottery data and impact sample

For this analysis we began with a listing of all students who applied for admission to a Democracy Prep school in New York City between 2008-09 and 2013-14.⁹ Annual counts of applications and offers to Democracy Prep schools in grades 6-8 are reported in Table 2. For this table we show the counts of *all* applicants to grades 6-8 during these years. Some applicants were excluded from our impact analysis for reasons explained below.

[Table 2 about here]

The total number of grade 6-8 applications rose from 726 in 2008-09 to 1,756 in 2011-12, before falling back to 1,450 in 2013-14. In that year there were approximately 5.4 applications for every middle school seat. In most years, the vast majority of applicants—and awarded seats—were for 6th grade. Offers to 7th and 8th grade applicants were less common, as seats were only available through attrition. In 2009-10, 2010-11, and 2013-14, only a handful of 7th and 8th grade applicants were admitted in the spring lottery. In 2011-12, none were.

⁸Findings on school practices were taken from a survey conducted by Dobbie and Fryer (2013).

⁹Students apply in spring for the subsequent fall. Hence the 2008 cohort refers to students applying for admission in 2008-09; the 2009 cohort refers to students applying for admission in 2009-10, and so on.

Two years (2008-09 and 2012-13) saw comparatively larger numbers of 7th and 8th graders admitted.

Not all applicants in Table 2 were included in the impact analysis, for several reasons. First, we required unique student identifiers to match lottery outcomes to NYC DOE student-level administrative data. We obtained student identifiers for most applicants from the NYCDOE using first and last name, date of birth, and home address.¹⁰ Unfortunately, the large majority of applicants in the 2011 cohort were missing data on their date of birth and home address, leading to a very poor match rate in that year. We therefore excluded all applicants from this cohort. Among the other cohorts, we successfully matched 83.4 percent of applicants (84.5% of lottery winners and 82.9% of lottery losers), a slightly higher match rate than in the initial impact study. Second, a small fraction of grade 6-8 applicants with student identifiers could not be matched to administrative records in grade 6-8.¹¹ Third, not all applicants had an ex ante equal chance of winning the admissions lottery. In 2008-09, Democracy Prep began offering priority admission to residents of CSD 5. This meant residents of the geographic district had a higher probability of winning the lottery than residents outside the district. In some years, non-residents had a very low (if not zero) probability of winning a lottery. Following Dobbie (2012), we excluded students in lotteries where the probability of admission was near zero or one.¹² Similarly, applicants with a sibling currently enrolled in Democracy Prep were given priority admission. We excluded these students from our analysis sample as well.

¹⁰This match was performed by the NYCDOE on behalf of the authors and Democracy Prep Public Schools.

¹¹This could occur if the application grade in the original data was incorrect, for example.

¹²In 2008-09 and 2009-10, only 16 and 9 non-district residents (respectively) were offered seats. We currently lack information about geographic priorities in 2010-11 and thus made no exclusions in that year. In 2012-13, non-residents had a higher probability of selection, due to a large increase in offers. We again made no geographic exclusion in that year. Finally, in 2013-14, only students in CSD 4 and 5 were included.

After making the above exclusions, the sample represented all applicants to Democracy Prep in grades 6-8 that had an approximately equal chance of winning an admissions lottery. Table 3 shows how the number of students in each lottery differs between the original list of applicants (Table 2) and the impact sample. The biggest reductions come from missing student identifiers and excluded out-of-district applicants.

[Table 3 about here]

Panel C of Table 3 represents the main analytic sample: first-time applicants to Democracy Prep in grades 6-8 who had a geographic priority (or were in a lottery with a positive probability of selection) and who did not have a currently enrolled sibling. A total of 2,676 unique students across 15 lotteries were included in the analytic sample, approximately 68.9 percent of which were rising 6th graders.

3.2 Student outcomes and baseline controls

Our outcomes and student background variables were drawn from administrative data representing the universe of students enrolled in the NYC public schools in grades 5-8 between 2006-07 and 2013-14. Fifth grade and 2006-07 data were used only to provide baseline data for 6th graders and 2007-08 applicants. Among other things, the administrative data include student demographics (age, gender, race/ethnicity, country of birth, language spoken at home), program participation (ELL, special education, and eligibility for the subsidized meal program), attendance rates, and scale scores in mathematics and ELA, which we standardized by subject, grade, and year to have a mean of zero and a standard deviation one. Attendance rates were calculated as the percent of total days enrolled that the student was in attendance.

Summary statistics for the impact sample and for the broader populations of students in Democracy Prep schools, other charter schools, and traditional public schools in NYC are reported in Table 4. For this table, students are only counted once—either the first time they are observed in the grade 6-8 data, or in their first year of application to Democracy Prep. Columns (4) and (5) are the lottery winners (N=1,189) and lottery losers (N=1,487) in the impact sample, respectively. For comparison purposes, columns (1) and (2) are all grade 6-8 students in traditional public and charter schools who never applied to Democracy Prep. Column (3) includes all students enrolled at Democracy Prep in grades 6-8, regardless of whether they are in our lottery sample.

[Table 4 about here]

The first thing to notice in Table 4 is that our sample of lottery winners and losers are very similar, on average, at baseline. To see this, column (6) reports the results of tests for differences in the mean characteristics of lottery winners and losers. For these tests, we estimated separate regression models using the student characteristic as the dependent variable and an indicator variable equal to one for lottery winners (and zero for lottery losers) as the key explanatory variable. These models also included lottery effects—that is, dummy variables for the year and grade of application—which effectively provide a contrast of winners and losers in the same lottery. In most cases the differences between the two groups are not large enough to be statistically significant, although there are a few exceptions. For example, lottery winners are somewhat more likely to be black, and less likely to be foreign born or Hispanic.¹³ In an F-test for the joint significance of these student characteristics in predicting a lottery win, the p -value falls above levels of accepted statistical significance.

¹³Some imbalance in the analytic sample is to be expected due to sampling variability. The imperfect match between applications and NYCDOE data can also lead to some imbalance.

Taken together, the analytic sample of lottery winners and losers appears to be balanced. Perhaps most importantly, there were no significant differences in the baseline ELA and math achievement between these two groups.

A second thing to notice in Table 4 are the differences in populations served by Democracy Prep and by other traditional and charter schools in NYC. Democracy Prep students are more likely to be black, less likely to be Hispanic, and more likely to be eligible for free or reduced price meals than other grade 6-8 students citywide, including students in charter schools. Compared to other charter schools, Democracy Prep enrolls a higher share of special education, foreign born, and limited English proficient students. At 0.27 and 0.34 standard deviations below the city average, Democracy Prep students were also substantially lower achieving at baseline than those attending other traditional or charter schools in NYC.

3.3 Empirical methodology

To estimate the impact of attending a Democracy Prep school on student outcomes, we used a two stage least squares (2SLS) instrumental variables procedure. This procedure yields three estimates of interest: the reduced form “intent-to-treat” effect on the outcome, the “first stage” effect on enrollment, and the 2SLS estimate which combines these two to obtain a “treatment-on-treated” effect. The reduced form regression model is the following:

$$A_{it} = \alpha_t + \beta_g + \gamma X_{it} + \delta L_i + \phi_\ell + \epsilon_{it} \quad (1)$$

A_{it} is the achievement (or attendance rate) of student i in year t , α_t and β_g are school year and grade level effects (respectively), and X_{it} is a vector of student-level covariates typically associated with learning outcomes (including baseline test scores, gender, race/ethnicity, free or reduced price meals eligibility, etc.). The ϕ_ℓ are lottery fixed effects—that is, a set of

indicator variables for each year and grade of application. L_i is an indicator variable equal to one if student i won an offer of admission to Democracy Prep (and zero otherwise). ϵ_{it} is a student level error term. The coefficient δ is the intent-to-treat (reduced form) effect of winning a lottery on A_{it} .

The intent-to-treat estimate δ understates the impact of *attending* Democracy Prep since not all students offered a seat ultimately enroll. It is a combination of the average effect for students who do enroll when given the opportunity, and the effect for students who do not enroll (which is presumably zero). To obtain an estimate of the impact of attending Democracy Prep for “compliers,” we next estimate the first stage regression model:

$$DP_{it} = \mu_t + \nu_g + \rho X_{it} + \pi L_i + \tau_\ell + v_g \quad (2)$$

The first stage regression model in 2 estimates the impact (π) of winning a lottery on the cumulative number of years student i has attended a Democracy Prep school through year t (DP_{it} , the dependent variable). Like Equation 1, this model includes year and grade level effects, student covariates, and lottery fixed effects (here, denoted τ_ℓ).

The 2SLS estimate of the treatment effect on the treated is the reduced form estimate divided by the first stage. It can be interpreted as the impact of an additional year of enrollment at Democracy Prep for students who complied with their offer of admission. (One cannot learn from this procedure the potential impact of enrollment for students who did not comply, which may differ).

4 Results

Table 5 reports the results of the models described in Section 3.3. Standard errors (clustered at the student level) are reported in parentheses. Columns (1)-(3) are the results of models without student-level covariates (but which do control for grade, year, and lottery effects), while columns (4)-(6) are from models which include student characteristics (such as baseline achievement). The estimates with and without controls do not differ markedly, which is what one would expect if lottery assignment were not systematically related to student characteristics.

The first stage estimates in columns (1) and (4) are approximately 0.46 to 0.47 in the achievement models, which means lottery winners on average attended 0.46 to 0.47 more years at Democracy Prep when observed in the data than lottery losers. (The first stage differs somewhat for the attendance sample, which is smaller due to missing data). The first stage effect is about 0.18 years higher than the one reported in Dobbie (2012), which suggests lottery winners in 2008-2013 were more likely to enroll (and to remain) in Democracy Prep than were lottery winners in the first three cohorts.

The reduced form estimates in columns (2) and (5) range from 0.091 to 0.101 in ELA and 0.121 to 0.133 in mathematics. The reduced form effect for attendance is 0.011 to 0.023 (attendance is measured in percentage points rather than standard deviation units). These can be interpreted as differences in the outcomes for winners and losers in the same lotteries, after controlling for other observed student characteristics related to these outcomes. Again, they likely understate the effect of attending Democracy Prep since some lottery winners do not enroll.

Finally, the 2SLS estimates in columns (3) and (6) provide our main estimates of the impact of an additional year of Democracy Prep enrollment for students who enroll. These

effects are quite large, and comparable to those found for the first three cohorts (Dobbie, 2012). We find that spending an additional year in a Democracy Prep school is associated with a 0.198 to 0.216 σ increase in ELA achievement and a 0.259 to 0.290 σ increase in math achievement. All of these effects are statistically significant at the 0.01 level or better. For attendance, we find a significant effect only when controlling for baseline student characteristics. The estimated effect size is 0.023 percentage points higher daily attendance for Democracy Prep students, for every additional year enrolled.

Table 6 reports 2SLS estimates for select subsamples of students (boys vs. girls, black vs. nonblack students, and so on). There are some notable differences in the effect sizes for certain subgroups, although the differences are generally not statistically significant. For example, the impact estimate for boys in ELA is 0.264 σ , with a margin of error of 0.19, while the impact estimate for girls is 0.153 σ , with a margin of error of 0.15. Although the effect for girls is quite a bit smaller than that for boys, the difference is not statistically significant. The estimates also suggest a larger effect in ELA for black and low income students, and in attendance for girls and black students.

5 Conclusion

In this report we provided new estimates of the causal impact of attending a Democracy Prep on achievement and attendance, for students in grades 6-8 who applied for admission between 2008 and 2013. These six years were an important period for the charter network, as it extended the curriculum to elementary and high school, opened two new schools, and took over an under-performing charter school. Over a period of nine years (2006-2014), enrollment in Democracy Prep Public Schools increased by a factor of 20. Given this rapid growth, it is natural to ask whether students experienced the same measurable benefits found in the

initial impact evaluation (Dobbie, 2012).

Using comparable methods and sample selection criteria as the earlier evaluation, we found effects of attending a Democracy Prep school that were approximately as large as those estimated for the first three cohorts (2006-2008). These effect sizes—which Dobbie (2012) characterized as “enormous”—are large by any standard in education research. They are more than 2.5 times as large as the impact of the average NYC charter school (particularly in math; see Hoxby & Murarka, 2009, and Dobbie & Fryer, 2013), and 2.5 times as large as the effect of attending the well-known Harlem Children’s Zone (in ELA; see Dobbie & Fryer, 2011).

As noted in the introduction, however, this is the first report in a larger study of the short and long-run effects of Democracy Prep on its students. We anticipate a number of refinements to and extensions of the analysis reported here. First, we hope to increase the number of lotteries and students in the sample by improving the match between Democracy Prep and NYCDOE data. In particular, we hope to obtain student identifiers for the 2011 cohort, which would increase the sample by almost 20 percent. Among other things, the larger sample would provide more opportunities for subgroup analysis.¹⁴ Second, we will explore variability in effects across the different Democracy Prep schools and grade levels. Third, we will incorporate applicants to Democracy Prep schools prior to 6th grade, and long-run outcomes—such as high school graduation—for the middle school cohorts examined here. Finally, we will examine the achievement of students in turnaround schools (including Harlem Prep, Bronx Prep, and Democracy Prep Congress Heights in Washington, D.C.) that did not enter the network through the traditional lottery. (For an example of this approach, see Abdulkadiroğlu et al., 2014).

¹⁴We are also lacking administrative data on charter school students prior to 2008-09. When the data becomes available to us, we will be able to provide estimates for all Democracy Prep cohorts to date.

References

- [1] Abdulkadiroğlu, A., Angrist, J., Cohodes, S. R., Dynarski, S., Fullerton, J., Kane, T. J., & Pathak, P. 2009. "Informing the Debate: Comparing Boston's Charter, Pilot, and Traditional Schools." Boston: The Boston Foundation.
- [2] Abdulkadiroğlu, A., Angrist, J. D., Hull, P. D., & Pathak, P. A. 2014. "Charters Without Lotteries: Testing Takeovers in New Orleans and Boston." National Bureau of Economic Research Working Paper Series #20792.
- [3] Angrist, J. D., Cohodes, S. R., Dynarski, S. M., Pathak, P. A., & Walters, C. R. 2013. "Stand and Deliver: Effects of Boston's Charter High Schools on College Preparation, Entry, and Choice." National Bureau of Economic Research Working Paper #19275.
- [4] Angrist, J. D., Dynarski, S. M., Kane, T. J., & Walters, C. R. 2012. "Who Benefits from KIPP?" *Journal of Policy Analysis and Management*, 31(4): 837-860.
- [5] Angrist, J. D., Pathak, P. A., & Walters, C. R. 2013. "Explaining Charter School Effectiveness." *American Economic Journal: Applied Economics*, 5(4): 1-27.
- [6] Buckley, J., & Sattin-Bajaj, C. 2011. "Are ELL Students Underrepresented in Charter Schools? Demographic Trends in New York City, 2006-2008." *Journal of School Choice*, 5(1): 40-65.
- [7] Dobbie, W. 2012. "The Impact of the Democracy Prep Public Schools." Cambridge, MA: The Education Innovation Laboratory at Harvard University.
- [8] Dobbie, W., & Fryer, R. G. 2011. "Are High-Quality Schools Enough to Increase Achievement among the Poor? Evidence from the Harlem Children's Zone." *American Economic Journal: Applied Economics*, 3(3): 158-187.
- [9] Dobbie, W., & Fryer Jr., R. G. 2013. "Getting beneath the Veil of Effective Schools: Evidence from New York City." *American Economic Journal: Applied Economics*, 5(4): 28-60.
- [10] Tuttle, C. C., Teh, B., Nichols-Barrer, I., Gill, B. P., & Gleason, P. M. 2010. "Student Characteristics and Achievement in 22 KIPP Middle Schools." Princeton, NJ: Mathematica.
- [11] Winters, M. A. 2015. "Understanding the Gap in Special Education Enrollments Between Charter and Traditional Public Schools: Evidence From Denver, Colorado." *Educational Researcher*, 44(4): 228-236.

Table 2: Democracy Prep Grade 6-8 Applicants and Offers, 2008-09 through 2013-14

| Entry year | Grade | Applicants | Offers | Schools |
|------------|-------|------------|--------|------------------|
| 2008-09 | 6-8 | 726 | 144 | DP |
| 2009-10 | 6-8 | 1,268 | 90 | DP |
| 2010-11 | 6-8 | 1,054 | 191 | DP, DPH |
| 2011-12 | 6-8 | 1,756 | 234 | DP, DPH |
| 2012-13 | 6-8 | 1,721 | 1,107 | DP, DPH, DPE, HP |
| 2013-14 | 6-8 | 1,450 | 270 | DP, DPH, DPE, HP |
| 2008-09 | 6 | 470 | 110 | DP |
| 2008-09 | 7 | 214 | 26 | DP |
| 2008-09 | 8 | 42 | 8 | DP |
| 2009-10 | 6 | 774 | 82 | DP |
| 2009-10 | 7 | 341 | 4 | DP |
| 2009-10 | 8 | 153 | 4 | DP |
| 2010-11 | 6 | 733 | 186 | DP, DPH |
| 2010-11 | 7 | 197 | 4 | DP |
| 2010-11 | 8 | 124 | 1 | DP |
| 2011-12 | 6 | 1,232 | 234 | DP, DPH |
| 2011-12 | 7 | 292 | 0 | |
| 2011-12 | 8 | 232 | 0 | |
| 2012-13 | 6 | 1,225 | 916 | DP, DPE, DPH, HP |
| 2012-13 | 7 | 290 | 85 | DP, DPH |
| 2012-13 | 8 | 206 | 106 | DP, DPH |
| 2013-14 | 6 | 842 | 268 | DP, DPE, DPH, HP |
| 2013-14 | 7 | 307 | 2 | DP, DPE, DPH, HP |
| 2013-14 | 8 | 301 | 0 | |

Source: Authors' calculations using applications data from Democracy Prep Public Schools. DP=Democracy Prep Charter School, DPH=Democracy Prep Harlem Charter School, DPE=Democracy Prep Endeavor Charter School, HP=Harlem Prep Charter School. While Democracy Prep assumed control of HP in 2011-12, the first 6th graders were not admitted until 2012-13.

Table 3: Unique students by lottery year and grade

| A. DPPS data matched to NYC DOE data: | | | | | |
|---------------------------------------|-------|-----|-----|-------|-------------------|
| | 6 | 7 | 8 | Total | % of DPPS file |
| 2008-09 | 356 | 174 | 33 | 563 | 77.5% |
| 2009-10 | 494 | 233 | 77 | 804 | 63.4% |
| 2010-11 | 520 | 131 | 101 | 752 | 71.3% |
| 2012-13 | 921 | 188 | 160 | 1,269 | 73.7% |
| 2013-14 | 687 | 220 | 231 | 1,138 | 78.5% |
| Total | 2,978 | 946 | 602 | 4,526 | 72.8% |

| B. Counting student's first lottery only: | | | | | |
|---|-------|-----|-----|-------|-------------------|
| | 6 | 7 | 8 | Total | % of DPPS file |
| 2008-09 | 356 | 174 | 33 | 563 | 77.5% |
| 2009-10 | 494 | 208 | 70 | 772 | 60.9% |
| 2010-11 | 517 | 106 | 74 | 697 | 66.1% |
| 2012-13 | 921 | 188 | 144 | 1,253 | 72.8% |
| 2013-14 | 678 | 175 | 205 | 1,058 | 73.0% |
| Total | 2,966 | 851 | 526 | 4,343 | 69.8% |

| C. Geographic preference and no sibling: | | | | | |
|--|-------|-----|-----|-------|-------------------|
| | 6 | 7 | 8 | Total | % of DPPS file |
| 2008-09 | 171 | 99 | 5 | 275 | 37.9% |
| 2009-10 | 175 | 119 | 32 | 326 | 25.7% |
| 2010-11 | 471 | 92 | 58 | 621 | 58.9% |
| 2012-13 | 892 | 178 | 139 | 1,209 | 70.2% |
| 2013-14 | 160 | 48 | 37 | 245 | 16.9% |
| Total | 1,869 | 536 | 271 | 2,676 | 43.0% |

Notes: the total count of applicants in each panel can be compared to the total number of applicants reported at the top of Table 2. Panel A shows the number of applicants in each grade-year lottery who could be matched to NYC DOE student identifiers. Panel B limits the sample to first-time applicants to Democracy Prep. Panel C excludes students without a geographic preference or with a currently enrolled sibling. “% of DPPS file” is the total number of students in each row expressed as a percentage of applicants in the original Democracy Prep data (Table 2).

Table 4: Summary Statistics at Baseline, AY 2009-2014, Grades 6-8

| | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------------|---------|---------|----------------------|----------------|-----------------|--------------------------------|
| | TPS | Charter | All DPPS enrolled | Won Lottery | Lost Lottery | Balance test <i>p</i> value |
| Student demographics: | | | | | | |
| Female | 0.493 | 0.510 | 0.505 | 0.506 | 0.486 | 0.568 |
| Black | 0.283 | 0.589 | 0.685 | 0.612 | 0.607 | 0.005** |
| Hispanic | 0.392 | 0.340 | 0.296 | 0.363 | 0.364 | 0.027* |
| Asian/other | 0.165 | 0.030 | 0.012 | 0.018 | 0.015 | 0.372 |
| Foreign born | 0.189 | 0.065 | 0.070 | 0.070 | 0.073 | 0.024* |
| No English at home | 0.435 | 0.227 | 0.231 | 0.268 | 0.253 | 0.903 |
| Free/reduced price meals | 0.750 | 0.714 | 0.761 | 0.828 | 0.827 | 0.499 |
| Program participation: | | | | | | |
| Special education | 0.147 | 0.134 | 0.170 | 0.193 | 0.163 | 0.414 |
| Limited English prof. | 0.139 | 0.037 | 0.052 | 0.083 | 0.074 | 0.758 |
| Academic performance: | | | | | | |
| Baseline ELA (<i>z</i> -score) | 0.052 | -0.094 | -0.272 | -0.206 | -0.229 | 0.971 |
| Baseline math (<i>z</i> -score) | 0.043 | -0.023 | -0.341 | -0.272 | -0.306 | 0.549 |
| Baseline ELA missing | 0.160 | 0.214 | 0.212 | 0.065 | 0.081 | 0.498 |
| Baseline math missing | 0.146 | 0.213 | 0.206 | 0.055 | 0.069 | 0.789 |
| Baseline attendance | 0.940 | 0.963 | 0.944 | 0.939 | 0.938 | 0.017* |
| Grade and year: | | | | | | |
| Grade 6 | 0.660 | 0.868 | 0.837 | 0.876 | 0.557 | |
| Grade 7 | 0.157 | 0.074 | 0.087 | 0.061 | 0.312 | |
| Grade 8 | 0.183 | 0.059 | 0.076 | 0.064 | 0.131 | |
| Year 2009 | 0.341 | 0.187 | 0.200 | 0.084 | 0.118 | |
| Year 2010 | 0.122 | 0.099 | 0.055 | 0.042 | 0.186 | |
| Year 2011 | 0.147 | 0.132 | 0.130 | 0.093 | 0.344 | |
| Year 2012 | 0.148 | 0.161 | 0.125 | 0.000 | 0.000 | |
| Year 2013 | 0.123 | 0.179 | 0.259 | 0.661 | 0.284 | |
| Year 2014 | 0.119 | 0.241 | 0.230 | 0.120 | 0.069 | |
| N | 586,163 | 25,099 | 1,625 | 1,189 | 1,487 | |

Notes: in calculating summary statistics for each of the above columns, students are only counted *once*—either the first time they are ever observed in grade 6-8 in NYC (columns 1-3), or the first time they apply for grade 6-8 admission to Democracy Prep (columns 4-5). Traditional public school (TPS) students are grade 6-8 students attending non-charter public schools. Charter school students are any grade 6-8 students attending a NYC charter, who never participated in a Democracy Prep lottery. Democracy Prep (DPPS) enrolled students are all students observed in a Democracy Prep school (regardless of whether or not they are in our lottery sample). All characteristics are measured at baseline, which in most cases is the year prior to the first year observed in this data (e.g. grade 5 for students first observed in 6th grade). Column (6) reports *p*-values from separate regressions of each individual characteristic on an indicator equal to one if the student was offered admission to a Democracy Prep school. These regressions control for lottery fixed effects (initial grade and year of application). Statistically significant differences in these regressions are marked with asterisks. The *p*-value from a joint F-test on all baseline characteristics was 0.079.

Table 5: Impact estimates: grade 6-8 achievement and attendance

| | No covariates: | | | With covariates:: | | |
|----------------|---------------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | First stage | Reduced form | 2SLS | First stage | Reduced form | 2SLS |
| ELA | 0.466*** (0.041) | 0.101** (0.034) | 0.216** (0.074) | 0.460*** (0.040) | 0.091*** (0.027) | 0.198*** (0.060) |
| Math | 0.467*** (0.041) | 0.121** (0.038) | 0.259** (0.079) | 0.458*** (0.040) | 0.133*** (0.028) | 0.290*** (0.058) |
| Attendance | 0.322*** (0.039) | 0.003 (0.003) | 0.011 (0.010) | 0.470*** (0.040) | 0.008* (0.003) | 0.023** (0.009) |
| N - ELA | 5,583 | 5,583 | 5,583 | 5,583 | 5,583 | 5,583 |
| N - Math | 5,576 | 5,576 | 5,576 | 5,576 | 5,576 | 5,576 |
| N - Attendance | 4,858 | 4,858 | 4,858 | 4,858 | 4,858 | 4,858 |

Notes: standard errors in parentheses (clustered at the student level). All models include grade, lottery, and year effects. The sample includes all first time applicants to any Democracy Prep Public School, with an in-district preference and without a currently enrolled sibling. The first stage provides estimates of the effect of winning a lottery on the cumulative years of enrollment at DPPS as of the observed year t . In these columns (1 and 4), the dependent variable is the cumulative years of enrollment at a DPPS. The point estimates differ across the rows due to variation in the number of students in each model. The dependent variable in the reduced form and two-stage least squares (2SLS) columns is shown in the lefthand column (ELA, math, and attendance rate). Covariates used in columns (4)-(6) include the baseline outcome (ELA, math, or attendance), female, black, Hispanic, Asian/other race or ethnicity, foreign born, language other than English spoken at home, free or reduced price meals eligibility, special education status, and limited English proficiency status. ***= significant at 0.001 level, ** = significant at 0.01 level, * = significant at 0.05 level.

Table 6: Subgroup estimates: grade 6-8 achievement and attendance

| | | (1) ELA | (2) Math | (3) Attendance |
|-----------------------|-------|---------------------|---------------------|--------------------|
| Male | 2,804 | 0.264** (0.099) | 0.303** (0.093) | 0.005 (0.014) |
| Female | 2,779 | 0.153* (0.073) | 0.279*** (0.071) | 0.037** (0.011) |
| Black | 3,454 | 0.218** (0.080) | 0.284*** (0.076) | 0.030* (0.012) |
| Nonblack | 2,129 | 0.123 (0.089) | 0.303*** (0.091) | 0.015 (0.014) |
| FRPL eligible | 4,687 | 0.244*** (0.069) | 0.316*** (0.067) | 0.021* (0.010) |
| Not FRPL eligible | 896 | 0.015 (0.125) | 0.220* (0.111) | 0.018 (0.020) |
| Special education | 924 | 0.316 (0.217) | 0.220 (0.214) | 0.081* (0.033) |
| Not special education | 4,661 | 0.167** (0.060) | 0.274*** (0.058) | 0.017 (0.009) |

Notes: standard errors in parentheses (clustered at the student level). All models include grade, lottery, and year effects, as well as relevant student controls. The sample includes all first time applicants to any Democracy Prep Public School, with an in-district preference and without a currently enrolled sibling. Each cell is the result from a separate regression, with the dependent variable listed in each column and the subgroup listed in the row. Only 2SLS estimates are shown, restricting the sample to the subgroup indicated. ***= significant at 0.001 level, ** = significant at 0.01 level, * = significant at 0.05 level.