

Making Summer Matter: The Impact of Youth Employment on Academic Performance

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ABSTRACT

Holding a summer job is a rite of passage in American adolescence, a first rung towards adulthood and self-sufficiency. However, over the past decade, youth employment during the summer has decreased significantly. Summer youth employment has the potential to benefit high school students' educational outcomes and employment trajectories, especially for low-income youth. Despite the potential importance of youth employment during summer, evidence of the impact of summer jobs on youth outcomes is limited to only a few studies. Our research examines summer youth employment, beginning with academic outcomes, by studying New York City's Summer Youth Employment Program (SYEP). SYEP provides jobs to youth ages 14-24, and due to high demand for summer jobs, allocates slots through a random lottery system, allowing for causal estimates of program impact. Our study uses student-level data from the New York City Department of Youth and Community Development (the SYEP administrating agency) and New York City Department of Education, encompassing approximately 300,000 student SYEP applicants for the 2005-2009 program years.

This paper examines the impact of SYEP on a wider range of academic performance outcomes, including test taking, passing rates and scores. It also attends to variation in these outcomes. Our findings suggest that SYEP has positive impacts on some student academic outcomes, and that these effects are heterogeneous. Future analyses will focus on examining program, student and school characteristics that might explain these variations.

INTRODUCTION

Unemployment rates for youth jumped to historical highs after the recession of 2008 and have yet to recover. An important component of this jobs crisis is the lack of available summer jobs for high school students—especially low-income youth. Summer jobs for low-income youth represented a major component of The American Recovery and Reinvestment Act (ARRA), which provided \$1.2 billion for youth employment opportunities and funded 345,000 jobs during the summer of 2009 (Bellotti et al. 2010). However, these funds are no longer available, and many other publicly funded jobs have also experienced reductions in the number of youth they are able to employ.

There is concern that the lack of employment opportunities for youth may hamper their career development, with lasting negative consequences. Prior research suggests that adolescent employment improves net worth and financial well-being as an adult (Painter, 2010; Ruhm, 1995). Work experience may benefit youth, and high school students specifically, through multiple mechanisms. Beyond simply increasing income and work experience, jobs may provide opportunities for students to develop non-cognitive skills and “grit” (Heckman, 2000; Lillydahl, 1990; Mortimer, 2003; Duckworth et al, 2007). Summer work is also considerably less likely than work during the school year to reduce the amount of time and effort allocated to educational pursuits. Further, an emerging body of rigorous research suggests that summer employment programs can lead to short-term decreases in violence and crime (Heller, 2014). Finally, Leos-Urbel (2014) examines impacts on school attendance, using data from a single cohort of applicants to New York City’s Summer Youth Employment Program (SYEP), finding significant positive effects on attendance and tantalizing, but mixed, evidence on the impact on standardized tests in English and Mathematics in high school.

This paper focuses on understanding the impact of summer youth employment on students' academic achievement. We utilize a large data set including more than 190,000 applications to New York City's Summer Youth Employment Program (SYEP), over 4 years, from 2005- 2008, which we match to academic records from the New York City Department of Education (NYCDOE). Importantly, since the number of applicants substantially exceeds the number that can be served, positions are allocated through a random lottery, offering an unusual opportunity to derive estimates of the impact of the program. We use data on New York State's "Regents" exams designed to assess performance in a variety of high school subjects including mathematics (including algebra, geometry and trigonometry), sciences (including biology, chemistry and physics), English, and History. Further, we examine the way in which the impact varies with repeated participation over multiple summers and explore differences in impacts across key subgroups. Future analysis will also examine the impact of SYEP on high school graduation outcomes, student reports of school experiences, attendance and persistence. In an effort to gain insight into the underlying mechanisms, future analyses will examine heterogeneity in treatment effects both by the type of summer job (e.g. summer camp versus retail), and the community based organization (CBO) placing and supervising students in jobs. Finally, using survey data collected by the NYCDOE, we will examine whether and how much SYEP influences students' feelings and attitudes about their education and school.

Preliminary findings suggest small positive effects of SYEP on the number of exams students take and, although impacts on scores are generally insignificant, there is a small positive effect on passing key high school exams. Further, we find that overall the improvements in test taking and passing increase with the number of years a student participates in SYEP – impacts are larger for second time participants and largest for those participating for the third time or

beyond.

I. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

There are a multitude of mechanisms by which summer jobs may improve students' academic outcomes as well as longer term economic success. In this section we draw on the existing literature related to these mechanisms, and highlight current gaps in our knowledge. In addition to improving students' immediate financial well-being and strengthening their resumes, a considerable body of research suggests that work may improve "non-cognitive" skills such as responsibility, positive work habits, time management skills, determination, and self-confidence (Lillydahl, 1990; Mortimer, 2003; Heckman, 2000). Heckman (2000) argues that such non-cognitive skills and motivation are critical for success, and that these skills can be improved at later ages. Also, recent work by Duckworth and colleagues (2007) suggest the importance of grit (defined as perseverance and passion for long-term goal) for success in school.

Painter (2010), using the 1979 cohort of the National Longitudinal Survey of Youth, finds that students with longer high school work experience are associated with more wealth as adults. Moreover, students that work more intensely and over longer periods of time in high school have even higher lifetime wealth accumulation. Further, Painter suggests that employment during the summer might be particularly useful for students because it offers opportunities for full-time employment in jobs that may be otherwise unavailable to high school aged students.

Another mechanism through which summer jobs may influence student success is through academic achievement and attainment. Much of the research examining the impact

of high school student employment on academic and other outcomes has been limited to work during the school year, focusing on the potential tradeoffs between the developmental and financial benefits of working and the possible crowding out of time devoted to academics (Rothstein, 2007; Sabia, 2009; Kalenkoski & Pabilonia, 2009). This research largely suggests that working a moderate number of hours (i.e., less than 20 hours per week) during the school year has either a small positive effect or no effect on outcomes such as school attendance, time spent on homework, and GPA, and that working a lot (i.e., more than 20 hours per week) has negative effects on these outcomes (Lillydahl, 1990; Monahan, Lee, & Steinberg, 2011; Rothstein, 2007; Stern & Briggs, 2001). Most previous research, however, has explicitly excluded work experiences during the summer, when there is considerably less risk of detracting attention from school responsibilities (Painter, 2010; McNeal, 1997).

Relatively few studies have assessed the effects of summer employment on student achievement directly. In their evaluation of the Summer Training and Education Program (STEP), Walker and Vilella-Velez (1992) find improved reading and mathematics test scores for academically behind 14 and 15-year-olds from poor urban families who participated in the program. STEP consisted of half-day summer jobs combined with half-days of academic coursework. The coursework consisted of specially designed remedial reading and mathematics curricula. In addition to higher test scores, participating students had better grade point averages, showed more knowledge about responsible sexual and social behavior, and had higher attendance rates than students from a control group.

Leos-Urbel (2014) estimates the impact of New York City's Summer Youth Employment Program (SYEP) on attendance for the 2007 cohort of students. He finds a significant increase in school attendance in the school year following SYEP participation, with larger

effects among students likely to be at greater risk of low attendance—students 16 years and older with low attendance rates in the previous year. His analysis of impacts on academic performance yielded some evidence that SYEP may increase the likelihood of attempting and passing statewide high school math and English exams.

Finally, another mechanism by which summer jobs may improve student outcomes is by keeping participants occupied in positive and supervised activities. For instance, Anderson & Hughes (2009) find that unstructured time with peers is associated with greater delinquent behavior. Emerging research indicates that summer jobs programs may reduce violent behavior and criminal activity (Heller, 2013; Sum, Trubsky & McHugh, 2013).

II. POLICY CONTEXT

New York City’s Summer Youth Employment program is designed to introduce and prepare youth for future careers, foster skills important for success in the labor market, and provide supplemental income to families. SYEP participants work in a variety of entry-level jobs at community-based organizations (CBOs), government agencies and private sector businesses; most common worksites include summer camps and day care, followed by social or community service agencies and retail. Participants are paid for up to 25 hours per week for up to six (or, in some years, seven) weeks at minimum wage, currently \$7.25 per hour. In addition to work experience, ten percent of participant hours are dedicated to education and training on topics related to time management, financial literacy, workplace readiness and etiquette, career planning and finding employment.

The New York City Department of Youth and Community Development (DYCD)

administers the program and contracts with a variety of CBOs to conduct intake and enrollment, as well as provide training and supervise job placement. All New York City (NYC) residents ages 14-24 are eligible to apply to SYEP.¹ To apply to the program, youth submit an application directly online or through a paper application and select a CBO service provider. Both applications are entered into the central SYEP data system. The system cross-checks across all service provider applications for duplication by matching the Social Security number and name of the applicant to ensure that each youth submits only one application for the program. Each complete application is randomly assigned an identification number. After the application deadline, DYCD assigns each service provider the number of SYEP slots that they are contracted to serve. DYCD then runs a lottery using the data system for each provider. The computerized system, using a random selection algorithm, selects applicants using the identification numbers for each provider according to the number of slots they have been allocated. The system sees each application as an ID number belonging to a provider and does not use any applicant information to determine their selection into the program, with the exception of those who have self-identified as having a disability.

SYEP is funded through a combination of federal (including Workforce Investment Act, Community Services Block Grant and American Recovery and Reinvestment Act funds), state (state TANF and general funds), city (through a city tax levy) and private funds, and changes in the availability of program funding have dictated fluctuations in the number of participants served over time. Specifically, the increase in city and state funding after 2005

¹ SYEP also includes a few separate programs targeted at special populations, including one that serves only youth with disabilities through a separate lottery competition, a special program targeting vulnerable youth in foster care, court-involved or who are runaway/homeless youth that was added in 2009, and a school-year program funded through the Workforce Investment Act that does not use a lottery and guarantees admission. The results presented here focus on the larger general SYEP program and lottery only.

allowed DYCD to increase the number of participants from 33,739 in 2005 to 43,113 participants by 2008. Expansion has not met demand, however, as the number of applications has almost doubled. SYEP received 69,328 applications in 2005; this number grew to 103,189 in 2008.

III. DATA AND SAMPLE

Student-level data for this study come from two primary sources: SYEP files from the DYCD and NYCDOE administrative and survey data files. We have matched students from each of these files for the 2005-2008 program years, encompassing 195,289 student SYEP applications.² Data include an indicator of SYEP lottery result, the CBO provider the student applied to, and, for those students who participate, the type of SYEP work placement, the specific worksite, and number of hours worked. Variables from NYCDOE files include student demographics, school attendance and information about standardized test-taking and performance. Student demographics include gender, race\ethnicity, English proficiency, participation in special education and ESL services, free and reduced price lunch eligibility, grade level, and age.

Each student record includes information on test-taking and performance on New York State standardized tests in a variety of subjects, including English, Math A, Math B, Integrated Algebra and Geometry (which replaced Math A and B in later years), Global History, Earth Science, Biology, Physics and Chemistry. The Regents Examinations are a

² The data matching is a significant hurdle to have cleared, as DYCD and NYCDOE files do not contain a common ID. Data were matched on participant name and date of birth by an approved consultant with a match rate of approximately 70 percent or higher. However, unmatched records include an unknown number of students in private or parochial schools or schools outside of New York City, as well as non-students. The match rate only for NYCDOE students is likely considerably higher. Student files matched to a NYCDOE student ID number for a similar proportion of lottery winners and lottery losers. In order to maintain confidentiality, the data provided to investigators does not include participants' names.

series of tests, aligned with New York State’s Learning Standards, designed and administered by the New York State (NYS) Department of Education, under the authority of the Board of Regents of the University of The State of New York and prepared by teacher examination committees and testing specialists. Examination scores range from 0–100%. Although the specific requirements change over time and students have some flexibility in choosing which exam to take, starting with students who entered 9th grade in 2001, earning a NYS high school diploma (“Regents’ Diploma”) requires passing a set of these exams including mathematics, English, Global History and Geography, US History and Government, and at least one science (e.g. Biology, Chemistry, Physics, Earth Science). More specifically, in order to graduate with a high school diploma, students must score 65 on any one math exam—usually Math A,³ English, Global History and Geography and US History and Government, and one science exam. To earn an Advanced Regents Diploma, students pass an additional mathematics exam, Math B,⁴ and one additional science (at least one life science and one physical science). Additionally, students entering 9th grade in 2007 and prior had the option of graduating with a “Local Diploma,” which required passing any one of five Regents exams with a score of at least 55. This option was gradually phased-out,⁵ and the Local Diploma was not available for students entering 9th grade in 2008 and later. Regents exams in all subjects are offered in June each year, and a limited number of Regents are offered in January and August. There are no mandated grades in which students are eligible or required to take a specific exam, but they typically take the exam at the end of the related

³ Last administered in January 2009 and replaced by Integrated Algebra beginning in June 2008 and Geometry beginning in June 2009.

⁴ Last administered in June 2010 and replaced by Algebra 2 and Trigonometry in June 2009.

⁵ Students entering grade 9 in 2005 were required to score 65 or above on two of the five required Regents exams and score 55 or above on the remaining three; 2006 9th graders were required to score 65 or above on three of the five required exams, and 2007 9th graders, 65 on four of the five required exams.

course. Because the graduation requirements reward passing but do not penalize failing, it is in a student's best interest to take these exams earlier than later. The majority of students elect to take the exams in June at the end of the school year.

Our analyses focus on the impact of SYEP participation on academic outcomes, including test-taking and test-performance. To assess student performance, we examine three test-related outcomes: test taking, passing, and the actual test score. We constructed an indicator variable for whether the student took the Regents exam in a particular subject and variables measuring performance in z-scores for each exam.⁶ We also include indicator variables for whether the student passed the exam at three cut points: 55 (the score required for a Local Diploma available to a subset of students in our sample); 65 (required for a Regents diploma), and 75 (required on English and Math A for admission to CUNY four-year colleges). From these exam-specific indicators, we create seven measures to capture general performance on Regents exams: whether attempted any Regents exams in the school year following SYEP application and the total number of Regents exams attempted, whether passed any exams and total number of exams passed in that school year, the total number of exams passed with a score of 55 or above, the total number of exams passed with a score of 65 or above, the total number of exams passed with a score of 75 or above, and the average (mean) score on all exams taken that year.

Our sample includes all SYEP applicants who were NYC public school students, representing 178,441 applications to the program from 2005- 2008.⁷ Table 1 includes the number of SYEP applicants in each year as well as the number selected, and not selected, by

⁶ z-scores are standardized to have a mean of zero and a standard deviation of one across all students taking that Regents exam in that particular year.

⁷ We exclude duplicate observations for students who submit multiple SYEP applications within a year, and a subgroup who applied to vulnerable youth programs, WIA programs or programs that guaranteed summer jobs and did not use a lottery.

the lottery. Note that the number of applicants increased in each year, and that the percentage of applicants selected to participate decreased. Importantly, as illustrated in more detail in Table 6, some students applied to SYEP more than one time during this time frame, and these 178,441 applications consist of 97,660 unique individuals.

Our impact analyses focus on the 136,542 applications from students who were expected to attend high school in the school year following SYEP and thus likely to take Regents exams.⁸ Table 2 provides descriptive statistics for the outcomes of interest related to student Regents exam attempts and performance. Two-thirds of the sample attempted at least one Regents exam, with an average of 1.33 exams attempted. Roughly half of the sample passed at least one Regents exam, with students passing an average of 0.80 exams per year. The average z-score of -0.09 indicates that this sample performed slightly below the city average.

Estimation Strategy

This paper investigates the impact of SYEP on student academic success in the school year following SYEP participation, exploiting the random assignment of program participants. By comparing academic outcomes of students offered SYEP placements (the treatment group) to outcomes of students not offered placements (control group), we derive intent-to-treat estimates of the impact of SYEP. Since we also have data on whether the student actually participated in an SYEP program and the extent of this involvement, we can also estimate treatment effects of program participation. Our key outcomes are student level measures of attempting, passing, and performance (test scores) on the New York State standardized high school exams, including exams in Mathematics, English, History, and Science. Importantly, because SYEP participation is allocated via lottery, we are able to

⁸ For these analyses we exclude students in grade 7 and lower and grade 12 in the school year prior to SYEP application, students in ungraded special education (who take Regents exams at low rates) and those who were not in New York City schools the school year after SYEP.

obtain causal estimates. If each SYEP lottery is random and there is no differential attrition, within any individual lottery, a simple comparison of means on the outcome of interest between those assigned to SYEP (treatment group) and those not (control group) provides unbiased estimates of the intent-to-treat (ITT) effect, where the treatment is a placement offer from SYEP.⁹ In our analyses, the comparison group is the set of students who applied to SYEP in a particular summer, but who were not offered a placement. These students should be otherwise similar to the students in the treated group across all dimensions and, most importantly, similar in unobserved characteristics, such as motivation and other non-cognitive attributes.¹⁰

We estimate the impact of SYEP using equation (1). Here Y is the outcome of interest for student i in year t such that:

$$1 Y_{it} = \beta_0 + \beta_1 SYEP_{it} + \beta_2 ST_{it} + \delta_{CBO} + \gamma_t + \mu_{it}$$

where SYEP takes a value of 1 if the student i was made the offer to participate in SYEP and 0 if he/she was not. ST is a vector of student characteristics that may influence student performance, such as gender, race/ethnicity, free and reduced price lunch eligibility, limited English proficiency, special education status, ESL status, and grade. δ are provider fixed effects which allow a different intercept for each of the community-based organization (CBOs) providers to control for differences in the selection rates and potential differences in applicants across CBOs. In the model γ are cohort fixed effects, based on a student's first year applying to SYEP and grade in the school year prior to applying to SYEP, and μ is an

⁹ See appendix for verification that the lottery is in fact random.

¹⁰ In order to evaluate the possibility that admission to the program is not random, we estimated the effect of winning the lottery on each pre-existing student characteristic. Specifically, for each observed characteristic, we test whether winning the lottery is uncorrelated by regressing each characteristic on a full set of indicators for CBOs and indicators for receiving treatment interacted with CBO (results are presented in the Appendix, Table 1A). Results from a joint cross-equation cross-model F-test that all treatment-by-CBO interaction coefficients are equal to zero suggest that the lottery selection process was random ($p > .10$).

error term with usual properties. Standard errors are clustered at the CBO level. In this model, β_1 is the primary parameter of interest and captures the impact of assignment to SYEP.

We use seven key measures of academic success related to test-taking and test-performance, including passing and z-scores. Our initial models examine performance across all Regents exams in the school year following SYEP application. These outcomes all capture important measures of educational progress, effort, and ultimately success. In addition to being a necessary pre-condition for graduation, attempting the Regents may also be a signal of academic interest, engagement, and effort. If participation in SYEP encourages students to increase their school effort, they may elect to take more Regents exams than the minimum required for graduation, potentially improving their preparation for college. Further, to the degree that participation in SYEP encourages academic effort, there may be an improvement in student performance on these exams – both in terms of passing and the actual score – if students are more attentive in class or spend more time studying and preparing for exams.

For models where the outcome is an indicator variable (test-taking and test passing), we estimate this equation using linear probability models. Note that although covariates are not necessary to derive unbiased impact estimates when treatment is randomly assigned, model (1) includes student characteristics to improve the precision of our estimates (see Bloom, 2006).

Impact of the second and third year

An important feature of the SYEP program is that each lottery is unrelated to lotteries in the previous and subsequent years. Students who participate in SYEP in year t , therefore, are

eligible to apply again in $t+1$. Thus, there are a group of students who participate in t and apply again in $t+1$. Among this group of previous participants, a randomly assigned group will be offered a placement in $t+1$. Thus, we can derive an estimate of the causal effect of a second year of SYEP, conditional on having participated the year before.

We may imagine that the impact of SYEP may vary for those who had applied (and participated) in previous years. First, for those who apply, win the lottery, and participate in multiple years, there may be a dosage effect, in which participating for more than one summer is important to fully realize the effects of SYEP. Conversely, although the SYEP lottery does not take into account whether a student had applied or participated before, the decision to apply for multiple years itself is not random, and it may be that the types of students who apply for multiple years benefit the most. For example, students who do not have access to alternate activities or means of finding employment, or more motivated students might be more likely to apply for an additional year. Additionally, the decision to apply to SYEP for a second or third year may be due to a positive work experience the first year of SYEP. In other words, a finding of positive or stronger effects in later years could be because there are increasing returns to participants for each year they participate, or simply because the estimates are for the types of students who are most likely to benefit from SYEP in any year.

To estimate the impact of the second year of SYEP, we first re-estimate model (1) but limit the sample based on year of application. First, we limit the sample to include first-time applicants only to estimate the impact of one year. Next, we estimate the impact of winning the SYEP lottery for a second time, limiting the sample to students who had participated in SYEP in a prior year (i.e. applied, won the lottery, and worked in the program) then applied

again. We employ the same strategy for students who participated for two years or more to estimate the impact of winning the lottery for a third year, limiting the sample to the set of students that applied three times, after having participated in the program in the two years prior. Finally, we re-estimate the effect of winning the lottery in the first year, breaking out effects by whether students applied only once or applied again in future years, and then similarly estimate the effect of winning the lottery in the second year by whether the students apply again—for a third time—in future years. Although these last two sets of estimates are correlational and not causal they provide us with a better understanding of the extent to which the effects of SYEP vary across the three groups of students in order to begin to disentangle selection into a second year from the effect of multiple years.

IV. RESULTS

Table 3 presents results for models estimating the impact of SYEP on Regents exam outcomes in the following school year. All models include demographic controls including free and reduced lunch eligibility, race/ethnicity, gender, special education status and English language learner status, as well as CBO, grade, and cohort fixed effects. The results in column 1 indicate that winning the SYEP lottery has a small significant effect on whether students attempt at least one Regents exam. Column 2 indicates a small statistically significant effect of winning the SYEP lottery on the number of exams attempted - an increase of 0.02 exams. Columns 3 and 4 suggest a small significant increase in ever passing any Regents exam, as well as in the number of exams passed, for SYEP lottery winners. Column 5 finds a small significant increase in the number of exams with a score of 55 or higher, and column 6 indicates a small marginally significant effect on the number of exams

with a score of 75 or higher, which constitute a high level of achievement. Finally, column 7 indicates no impact on mean standardized scores on these exams. Taken together, these results suggest that SYEP has a small positive effect on taking and passing Regents exams.

Although Table 3 provides estimates of SYEP impacts for students who won an SYEP lottery, regardless of whether they actually enrolled or worked in the program, Table 4 indicates that only approximately three-quarters of the applicants selected by lottery actually participated in the program. Because not all lottery winners work, in addition to estimating the intent-to-treat (ITT) impact we also estimate the impact of participating in SYEP—i.e. the treatment-on-the-treated (TOT) effect—using a quasi-experimental approach. Specifically, we use instrumental variable analysis in which winning the SYEP lottery indicator serves as an instrument for participation. Table 5 displays estimates of the TOT impact on Regents outcomes. Our results suggest that impacts of participating in SYEP are small and positive, and these effects are approximately 1.3 times greater than the ITT estimates.

The results presented in Tables 3 and 5 represent the impact of SYEP on Regents outcomes in the following school year, irrespective of the number of times that students applied to or participated in SYEP. Table 6 provides information regarding patterns in application to and selection by the SYEP lottery over the four-year study period. While roughly two-thirds of the sample applied in only one year, one-third applied more than once, with 25 percent applying twice, 7 percent applying three times, and 1 percent applying four times. Among these applicants, 39 percent never won the SYEP lottery, 49 percent won once, 11 percent twice, and 2 percent three times.

The next set of tables present results for models estimating the impact of SYEP on

Regents outcomes, taking into account the number of years of participation in the program. Results from these models suggest that the impacts of SYEP are substantively larger for students who participate in SYEP for a second and third year.

The results presented in Table 7 indicate no significant effect of winning the lottery for all first-time applicants, with one exception—a small marginally significant increase in the number of exams with a score of 55 or higher. In contrast, Table 8 suggests that for students that had participated in SYEP in a prior year, winning the lottery for a second year results in significant increases in the likelihood that they ever attempt a Regents exam and ever pass an exam with a score of 65, as well as significant increases in the number of exams attempted and the number passed with a score of 55 and 75. Table 9 presents models estimating the impact of winning the SYEP lottery for students that had participated in two prior years. For these students, the coefficients for ever attempting and the number of exams attempted are positive but not significant, while those for ever passing with a score of 65, the number of exams passed at the 55 and 65 thresholds, as well as the actual standardized test score (z-score) are significant, and larger than for those who won the lottery after having participated in only one prior year.

Table 10 presents models estimating the effects of SYEP for first-year applicants, providing separate estimates by whether the applicants apply again in the future or not. Results suggest that the effect of winning the lottery differs depending on whether students apply again in future years: winning the lottery in the first year of application has small positive effects on students who apply again in the future. This finding holds true across all outcomes. Winning the lottery in the first year appears to have very small, negative effects on students who do not apply for a second time or more. Similarly, results presented in Table 11

suggest that among students who apply for a second time, effects of winning the lottery depend on whether students apply again in the future, for a third time. Winning the lottery has positive effects on the number of exams attempted and the number of exams passed at the 55 threshold for students who apply for a third time. Results suggest winning the lottery has no effect on second-time applicants who do not apply again.

IV. DISCUSSION AND CONCLUSION

Taken together, our estimates suggest that participation in SYEP has, on average, a very small positive effect on taking and passing the standardized tests administered by New York State to measure progress in high school subjects. These average effects mask the significant difference in the impact of participating the first time and participating the second (or third) time. Disentangling these effects reveals, in fact, little or no effect of a single year of participation, but somewhat larger, positive effects for the second and third year of participation. We do, however, find small positive effects for those first year participants who will ultimately participate multiple times. Further analysis will aim to shed light on these findings, for instance by examining the differences in characteristics of students who apply to SYEP for multiple years, compared to those who only apply one time, as well as the characteristics of their first-year jobs or CBOs.

While much additional work remains to be done, the results offer evidence that SYEP improves educational outcomes that have proven stubbornly resistant to interventions. As an example, New York City's Conditional Cash Transfer program offered high school students \$600 incentive for each Regents exam passed—up to five—but yielded no significant effect (Riccio et al., 2013). Interestingly, larger effects were found for students who were deemed

proficient in English Language Arts and Mathematics at the time they enrolled in high school, suggesting this is a subgroup worthy of future investigation in the SYEP analysis.

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Table 1. Sample by lottery outcome, 2005-2008

	Lottery winners	Lottery losers	Total
2005	20,237	11,175	31,412
2006	23,158	14,398	37,556
2007	27,049	24,404	51,453
2008	28,747	29,273	58,020
Total	99,191	79,250	178,441

Note: Sample excludes duplicate observations for students who submit multiple SYEP applications and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery.

Table 2. Regents Exam Outcomes in School Year Following SYEP, 2005-2008

Variable	Mean	Std. Dev.	Min	Max
Attempt any regents exams	0.66	0.47	0	1
Number of regents attempted	1.33	1.24	0	7
Pass any exams (65+)	0.48	0.50	0	1
Number of exams passed (65+)	0.80	1.00	0	7
Number of exams with score 55+	1.00	1.09	0	7
Number of exams with score 75+	0.40	0.76	0	5
Average z-score	-0.09	0.84	-6.06	2.37

Table 3: Baseline models, 2005-2008 SYEP applicants

	Ever attempt (1)	Number attempts (2)	Ever pass 65 (3)	Number pass 65 (4)	Number pass 55 (5)	Number pass 75 (6)	z score (7)
Win lottery	0.008*** (0.002)	0.022*** (0.006)	0.010*** (0.002)	0.019*** (0.005)	0.026*** (0.005)	0.007* (0.004)	0.007 (0.005)
Student Chars	Y	Y	Y	Y	Y	Y	Y
Cohort FX	Y	Y	Y	Y	Y	Y	Y
Provider FX	Y	Y	Y	Y	Y	Y	Y
Observations	136,542	136,542	136,542	136,542	136,542	136,542	90,170
R-squared	0.147	0.234	0.152	0.202	0.204	0.188	0.183

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. A cohort is the year and grade of first application to SYEP. Sample includes all students expected to be in high school following SYEP and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education, and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery. Regents exams include English, Math A, Math B, Geometry, Integrated Algebra, Living Environment/Biology, Physical Setting/Earth Science, Physical Setting/Physics, Physical Setting/Chemistry and Global History and Geography. The mean Regents exam score is calculated as the mean of a student’s z-scores on all Regents exams taken the school year following having applied to SYEP; Regents scores are standardized (z-scored) within test and year of administration. Demographic controls include free and reduced lunch eligibility, race/ethnicity, gender, special education status, English language learner status, ESL status, and grade.

Table 4. SYEP take-up rates, 2005-2008

	% of lottery winners that worked	Number of winners
2005	81.8	15,846
2006	83.6	17,522
2007	73.4	20,043
2008	74.5	20,555
Total	77.9	73,966

Notes: Sample includes all students expected to be in high school following SYEP, and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery.

Table 5: Regents outcomes in school year following SYEP application, treatment-on-treated (TOT) models, 2005-2008 SYEP applicants

	Ever attempt (1)	Number attempts (2)	Ever pass 65 (3)	Number pass 65 (4)	Number pass 55 (5)	Number pass 75 (6)	z score (7)
Win lottery	0.010*** (0.003)	0.029*** (0.007)	0.013*** (0.003)	0.024*** (0.006)	0.034*** (0.006)	0.010* (0.005)	0.009 (0.006)
Student Chars	Y	Y	Y	Y	Y	Y	Y
Cohort FX	Y	Y	Y	Y	Y	Y	Y
Provider FX	Y	Y	Y	Y	Y	Y	Y
Observations	136,542	136,542	136,542	136,542	136,542	136,542	90,170
R-squared	0.081	0.120	0.084	0.100	0.105	0.084	0.094

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. A cohort is the year and grade of first application to SYEP. Sample includes all students expected to be in high school following SYEP, and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery. Regents exams include English, Math A, Math B, Geometry, Integrated Algebra, Biology, Earth Science, Physics, Chemistry and Global History and Geography. Demographic controls include free and reduced lunch eligibility, race/ethnicity, gender, special education status, English language learner status, ESL status, and grade.

Table 6: Cross-tabulation of number of applications and number of wins, 2005-2008

		Number of wins					Total
		0	1	2	3	4	
Number of applications	1	32,081	34,603	0	0	0	66,684
	2	5,072	10,968	7,700	0	0	23,740
	3	572	1,984	2,557	1,369	0	6,482
	4	34	109	265	233	113	754
	Total	37,759	47,664	10,522	1,602	113	97,660

Note: Sample includes all students expected to be in high school following SYEP and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education, and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery.

Table 7: Regression Results, first time SYEP applicants, 2006-2008

	Ever attempt (1)	Number attempts (2)	Ever pass 65 (3)	Number pass 65 (4)	Number pass 55 (5)	Number pass 75 (6)	z score (7)
Win	-0.001 (0.003)	0.010 (0.008)	0.002 (0.003)	0.008 (0.007)	0.012* (0.007)	0.002 (0.007)	0.003 (0.007)
Student Chars	Y	Y	Y	Y	Y	Y	Y
Cohort FX	Y	Y	Y	Y	Y	Y	Y
Provider FX	Y	Y	Y	Y	Y	Y	Y
Observations	68,563	68,563	68,563	68,563	68,563	68,563	46,713
R-squared	0.146	0.248	0.150	0.214	0.216	0.201	0.193

Notes: Standard errors clustered by CBO in parentheses; *** p<0.01, ** p<0.05, * p<0.1. A cohort is defined by the year and grade of first application to SYEP. Sample is limited to SYEP participants applying for the first time and includes all students expected to be in high school following SYEP and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education, and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery. Regents exams include English, Math A, Math B, Geometry, Integrated Algebra, Living Environment/Biology, Physical Setting/Earth Science, Physical Setting/Physics, Physical Setting/Chemistry and Global History and Geography. The mean Regents exam score is calculated as the mean of a student’s z-scores on all Regents exams taken the school year following having applied to SYEP; Regents scores are standardized (z-scored) within test and year of administration. Student characteristics include free and reduced lunch eligibility, race/ethnicity, gender, special education status, English language learner status, ESL status, and grade.

Table 8: Regression results, second-time SYEP applicants, previous participants, 2006-2008

	Ever attempt (1)	Number attempts (2)	Ever pass 65 (3)	Number pass 65 (4)	Number pass 55 (5)	Number pass 75 (6)	z score (7)
Win	0.019** (0.007)	0.035* (0.019)	0.017** (0.008)	0.018 (0.016)	0.039** (0.018)	0.017* (0.009)	0.003 (0.016)
Student Chars	Y	Y	Y	Y	Y	Y	Y
Cohort FX	Y	Y	Y	Y	Y	Y	Y
Provider FX	Y	Y	Y	Y	Y	Y	Y
Observations	18,071	18,071	18,071	18,071	18,071	18,071	12,285
R-squared	0.187	0.275	0.195	0.242	0.235	0.215	0.189

Notes: Standard errors clustered by CBO in parentheses; *** p<0.01, ** p<0.05, * p<0.1. A cohort is defined by the year and grade of first application to SYEP. Sample is limited to SYEP participants applying for the second time and includes all students expected to be in high school following SYEP and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education, and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery. Regents exams include English, Math A, Math B, Geometry, Integrated Algebra, Living Environment/Biology, Physical Setting/Earth Science, Physical Setting/Physics, Physical Setting/Chemistry and Global History and Geography. The mean Regents exam score is calculated as the mean of a student's z-scores on all Regents exams taken the school year following having applied to SYEP; Regents scores are standardized (z-scored) within test and year of administration. Student characteristics include free and reduced lunch eligibility, race/ethnicity, gender, special education status, English language learner status, ESL status, and grade.

Table 9: Regression results, third-time SYEP applicants, two time participants, 2006-2008

	Ever attempt (1)	Number attempts (2)	Ever pass 65 (3)	Number pass 65 (4)	Number pass 55 (5)	Number pass 75 (6)	z score (7)
Win	0.015 (0.016)	0.038 (0.045)	0.031** (0.013)	0.057** (0.026)	0.061* (0.032)	0.008 (0.019)	0.071** (0.033)
Student Chars	Y	Y	Y	Y	Y	Y	Y
Cohort FX	Y	Y	Y	Y	Y	Y	Y
Provider FX	Y	Y	Y	Y	Y	Y	Y
Observations	3,178	3,178	3,178	3,178	3,178	3,178	1,893
R-squared	0.213	0.318	0.238	0.307	0.296	0.254	0.211

Notes: Standard errors clustered by CBO in parentheses; *** p<0.01, ** p<0.05, * p<0.1. A cohort is defined by the year and grade of first application to SYEP. Sample is limited to SYEP participants applying for the third time and includes all students expected to be in high school following SYEP and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education, and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery. Regents exams include English, Math A, Math B, Geometry, Integrated Algebra, Living Environment/Biology, Physical Setting/Earth Science, Physical Setting/Physics, Physical Setting/Chemistry and Global History and Geography. The mean Regents exam score is calculated as the mean of a student's z-scores on all Regents exams taken the school year following having applied to SYEP; Regents scores are standardized (z-scored) within test and year of administration. Student characteristics include free and reduced lunch eligibility, race/ethnicity, gender, special education status, English language learner status, ESL status, and grade.

Table 10: Regression results, first time SYEP applicants by future application, 2006-2008

	Ever attempt (1)	Num attempts (2)	Ever pass 65 (3)	Num pass 65 (4)	Num pass 55 (5)	Num pass 75 (6)	z score (7)
Win x apply again	0.023** (0.009)	0.045*** (0.017)	0.026*** (0.009)	0.042*** (0.015)	0.042*** (0.015)	0.029** (0.012)	0.010 (0.014)
Win	-0.014*** (0.004)	-0.015* (0.008)	-0.010*** (0.004)	-0.013* (0.007)	-0.010 (0.007)	-0.010 (0.007)	-0.003 (0.008)
Will apply again	0.151*** (0.007)	0.303*** (0.013)	0.125*** (0.007)	0.217*** (0.012)	0.263*** (0.011)	0.096*** (0.010)	0.064*** (0.017)
Student Chars	Y	Y	Y	Y	Y	Y	Y
Cohort FX	Y	Y	Y	Y	Y	Y	Y
Provider FX	Y	Y	Y	Y	Y	Y	Y
Observations	68,563	68,563	68,563	68,563	68,563	68,563	46,713
R-squared	0.162	0.257	0.160	0.221	0.226	0.204	0.194

Notes: Standard errors clustered by CBO in parentheses; *** p<0.01, ** p<0.05, * p<0.1. A cohort is defined by the year and grade of first application to SYEP. Sample is limited to SYEP participants applying for the first time and includes all students expected to be in high school following SYEP and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education, and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery. Regents exams include English, Math A, Math B, Geometry, Integrated Algebra, Living Environment/Biology, Physical Setting/Earth Science, Physical Setting/Physics, Physical Setting/Chemistry and Global History and Geography. The mean Regents exam score is calculated as the mean of a student's z-scores on all Regents exams taken the school year following having applied to SYEP; Regents scores are standardized (z-scored) within test and year of administration. Student characteristics include free and reduced lunch eligibility, race/ethnicity, gender, special education status, English language learner status, ESL status, and grade.

Table 11: Regression results, second time SYEP applicants by future applications, 2006-2008

	Ever attempt (1)	Num attempts (2)	Ever pass 65 (3)	Num pass 65 (4)	Num pass 55 (5)	Num pass 75 (6)	z score (7)
Win x apply again	0.020 (0.016)	0.102*** (0.033)	0.020 (0.016)	0.035 (0.032)	0.072** (0.035)	0.016 (0.025)	-0.017 (0.026)
Win	0.007 (0.009)	-0.006 (0.021)	0.006 (0.010)	-0.002 (0.018)	0.007 (0.021)	0.008 (0.011)	0.005 (0.018)
Will apply again	0.147*** (0.013)	0.268*** (0.029)	0.136*** (0.014)	0.246*** (0.030)	0.279*** (0.029)	0.133*** (0.023)	0.089*** (0.029)
Student Chars	Y	Y	Y	Y	Y	Y	Y
Cohort FX	Y	Y	Y	Y	Y	Y	Y
Provider FX	Y	Y	Y	Y	Y	Y	Y
Observations	18,071	18,071	18,071	18,071	18,071	18,071	12,285
R-squared	0.203	0.284	0.207	0.252	0.248	0.220	0.191

Notes: Standard errors clustered by CBO in parentheses; *** p<0.01, ** p<0.05, * p<0.1. A cohort is defined by the year and grade of first application to SYEP. Sample is limited to SYEP participants applying for the second time and includes all students expected to be in high school following SYEP and excludes duplicate observations for students who submit multiple SYEP applications, are in ungraded special education, and a subgroup who applied to vulnerable youth programs or programs that guaranteed summer jobs and did not use a lottery. Regents exams include English, Math A, Math B, Geometry, Integrated Algebra, Living Environment/Biology, Physical Setting/Earth Science, Physical Setting/Physics, Physical Setting/Chemistry and Global History and Geography. The mean Regents exam score is calculated as the mean of a student's z-scores on all Regents exams taken the school year following having applied to SYEP; Regents scores are standardized (z-scored) within test and year of administration. Student characteristics include free and reduced lunch eligibility, race/ethnicity, gender, special education status, English language learner status, ESL status, and grade.

APPENDIX

Table A1: Lottery randomization results

	2005	2006	2007	2008
F	1.01	1.06	1.02	1.06
Prob > F	0.4221	0.1422	0.3316	0.1018

Notes: We are testing if the treatment is uncorrelated with each observed characteristic for each CBO. We implement the test of randomization by regressing each characteristic on a full set of indicators for the CBO and indicators for receiving treatment interacted with CBO attendance.

Table A2: Attrition in year following application to SYEP, Grade 8-11 and alternative program, 2005-08

Grade	% attrition, selected students	% attrition, not selected	% attrition, all SYEP students	N
Grade 8	5.9	5.6	5.8	21,075
Grade 9	7.0	7.5	7.2	51,264
Grade 10	5.2	5.5	5.4	42,921
Grade 11	6.7	6.8	6.8	23,831
Alternative program	49.1	50.7	49.9	1,128
Not in DOE data	83.6	65.6	78.2	6,533
Total	10.9	8.6	9.9	146,674

Notes: Attrition is characterized as not appearing in DOE administrative data in the year following the SYEP lottery. Students in alternative grades are those students that are enrolled in GED completion programs. Students missing grades are students that are not in the DOE the school year of the lottery. Sample excludes students in lotteries that explicitly serve WIA and vulnerable youth, and students that apply to lotteries with perfect selection.

Table A3: Impact of selection on attrition, by grade

	All grades (1)	Grade 8 (2)	Grade 9 (3)	Grade 10 (4)	Grade 11 (5)	Alt program (6)	Missing grade (7)
Win lottery	0.002 (0.001)	0.005 (0.003)	-0.003 (0.002)	0.002 (0.002)	0.002 (0.004)	0.045 (0.027)	0.020 (0.016)
Grade FX	Y	Y	Y	Y	Y	Y	Y
Year FX	Y	Y	Y	Y	Y	Y	Y
CBO FX	Y	Y	Y	Y	Y	Y	Y
Observations	146,752	21,075	51,264	42,921	23,831	1,128	6,533
R-squared	0.275	0.013	0.014	0.011	0.010	0.137	0.258

Notes: Standard errors robust to clustering at the CBO level shown in parentheses (** p<0.01, * p<0.05, * p<0.1). Attrition is characterized as not appearing in DOE administrative data in the year following the SYEP lottery. Students in alternative grades are those students that are enrolled in GED completion programs. Students missing grades are students that are not in the DOE the school year of the lottery. Sample excludes students in lotteries that explicitly serve WIA and vulnerable youth, and students that apply to lotteries with perfect selection.