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Starting to Succeed: The Impact of CUNY Start on Academic Momentum

Gateway Course Completion

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Summary

This brief presents findings from an evaluation of the CUNY Start program at the City University of New York (CUNY). CUNY Start is a pre-matriculation developmental education intervention for associate degree-seeking students. Using the results of four cohorts of CUNY Start students (Fall 2013 – Spring 2015) and a comparison group of similar students, the brief explores how the program may accelerate academic momentum during the first year of college. Specifically, the analysis looks at the program’s effect on gateway course completion. This work builds on prior research showing that CUNY Start students fulfilled remedial education requirements faster than traditional freshmen. The findings below indicate that CUNY Start sets students on a path to success, particularly those least prepared for college-level coursework and those traditionally underrepresented in higher education.

The following findings comparing CUNY Start participants to traditional students are detailed in the brief below:

- Finding 1.** CUNY Start students were more likely to take and pass gateway courses in their first year.
- Finding 2.** CUNY Start had the largest effect on students with the broadest remedial needs.
- Finding 3.** CUNY Start had a positive effect on gateway course completion for students from underrepresented subgroups.
- Finding 4.** CUNY Start students earned similar grades to their peers in English gateway courses and slightly lower in math gateway courses.

Background

Nationally, fewer than 22 percent of students who enter a public, two-year institution earn a degree in three years (Snyder, de Brey, & Dillow, 2018). Furthermore, many students who enroll in associate degree programs are assessed as not prepared for college-level coursework. Most students are referred to at least one remedial reading, writing, or math class. Previous research shows that taking remedial courses slows academic drive and decreases the likelihood that students will ever earn a degree (Chen, 2016).

Theories of academic momentum suggest that behaviors during students’ first year in college fundamentally affect their academic trajectories. Students who begin college directly after high school and attempt more credits are more likely to finish than their peers who deferred enrollment or took a lighter course load. The effects of these factors are independent of students’ backgrounds, including socioeconomic status and academic preparation (Adelman, 1999, 2006; Attewell, Heil, & Reisel, 2012; Martin, Wilson, Liem, & Ginns, 2013).

Mere credit accumulation, however, does not reveal whether a student is making meaningful progress towards their degree. Most colleges require students to take at least one credit-bearing “gateway” English and math course at the beginning of their academic careers. Previous research has demonstrated positive associations between taking gateway courses early, academic momentum, and degree completion (Cabrera, La Nasa, & Burkum, 2001; Leinbach & Jenkins, 2008; Moore, Shulock, & Offenstien, 2009).

The CUNY Context

CUNY is the largest urban public university system in the United States, with over a quarter-million degree-seeking students, including nearly 100,000 in associate programs. The University serves a population traditionally underrepresented in higher education: 58 percent of students are black or Hispanic, one-third were born outside the United States, 39 percent have household incomes below \$20,000, and more than 40 percent are first-generation college students. In line with national trends, the University struggles with low retention and graduation rates among associate degree students: Just under 20 percent of the Fall 2014 cohort of first-time, full-time freshmen completed their degree in three years (Office of Institutional Research and Assessment, CUNY, 2017). Furthermore, many students come to CUNY underprepared to take on college-level coursework. During the study period, approximately 80 percent of fall freshmen in associate degree programs required remediation in at least one subject area.

Students who do not meet CUNY's standards for academic proficiency in high school take the CUNY Assessment Tests (CATs) prior to entry. Based on their performance, students are either exempted from, or placed into, remediation in one or more basic skills area: reading, writing, and math.^v Students are encouraged to take any non-credit, remedial courses early in their academic careers; however, students often struggle to complete these requirements. During the study period, exit from remediation in reading and writing was based on performance on a subsequent administration of the CAT; exit in math was based on performance on a common departmental final.

Students with remedial needs enter college at a distinct disadvantage. Meeting early momentum benchmarks may mitigate this effect and significantly increase the likelihood that such students graduate (Calcagno, Crosta, Bailey, & Jenkins, 2007). Unfortunately, the pipeline to college-level coursework is often leaky, and only 20 percent of students initially referred to remediation will ever complete a gateway course. Students assigned to multiple levels of remedial education are far less likely to complete these sequences or ever enroll in credit-bearing courses. Even among those who complete their remediation requirements, 30 percent do not continue (Bailey, 2009; Bailey, Jeong, & Cho, 2010; Calcagno et al., 2007; Complete College America, 2016; Denley, 2016; Jenkins & Bailey, 2017).

The negative impacts associated with remediation have raised national interest in effective and scalable alternatives. Previous research on both pre-matriculation and accelerated models for addressing remedial needs found positive effects, linking participation with increased persistence and improved academic performance (Rutschow & Schneider, 2011). Furthermore, given the encouraging impacts of meeting benchmarks of academic momentum, particularly for underprepared students, there is interest in understanding if pre-matriculation and accelerated interventions can put students on a pathway to success.

Motivation and Research Questions

Given the discouraging outcomes for students entering college with remedial needs, there is an imperative to find successful substitutes for traditional remedial pathways. CUNY Start is a developmental education intervention targeting students with significant remedial needs. Participants defer matriculation for one semester to receive intensive preparation in college reading, writing, and/or math, as well as college success advisement (see "What is CUNY Start"). Unlike traditional remedial sequences, CUNY Start enables students, regardless of their depth of need, to address all of their remedial requirements in a single semester. An early evaluation found positive program results, demonstrating that participants were more likely to exit remediation

and continue on to college-level coursework than their peers (Allen & Horenstein, 2013).

This work builds on the prior analysis to assess how the CUNY Start model, specifically deferred enrollment and intensive, single-level remedial courses, affect momentum in the first year. A quasi-experimental approach was used to explore the following research questions:

1. Does CUNY Start participation increase the likelihood that a student takes and passes gateway courses in English and math early in college?
2. Does CUNY Start have different impacts on students based on academic or demographic background?
3. How do CUNY Start alumni perform in gateway courses?

What is CUNY Start?

CUNY Start is a developmental education intervention to help students make a successful transition to college by reducing or eliminating remedial needs prior to enrollment. CUNY Start students defer matriculation for one semester to receive intensive preparation in college reading, writing, and/or math, as well as college success advisement, at a low cost. CUNY Start is offered as a full-time program in all subject areas, and as a part-time program in either math, or reading and writing.

The majority of participants require remediation in all three subject areas and a large proportion need additional instruction in pre-algebra. CUNY Start's original curriculum targets the needs of students significantly underprepared for college. Instructors receive extensive professional development towards implementing the program's unique pedagogical approach.

The program is offered at six CUNY community colleges and two CUNY comprehensive colleges. Additional information can be found at www.cuny.edu/cunystart.

Data and Methods

This study includes a sample of students who entered either CUNY Start (N=5,760) or a CUNY college as a first-time freshman with at least one remedial need (N=39,834) between Fall 2013 and Spring 2015.ⁱ The research sought to understand the effect of CUNY Start on academic momentum, and, specifically, gateway course enrollment and completion. Three primary outcomes were examined, each measured one and two years after entry: (1) passed English gateway course, (2) passed math gateway course, and (3) passed both gateway courses.ⁱⁱ Outcomes were measured from the point of enrollment, either in CUNY Start or as a matriculated first-time freshman.

CUNY Start participants and first-time freshmen in the sample differed substantially across observable variables. These disparities could result in biased estimates of the program's effect in a descriptive comparison of outcomes. In an effort to reduce this bias, propensity score matching (PSM) was employed. PSM allows researchers to identify a comparison group of individuals who are statistically similar to the treatment group (i.e., CUNY Start). The propensity score is the estimated probability that a student would enroll in CUNY Start, conditional on observable variables. By matching students on the propensity score and achieving balance across characteristics, a reduction in bias may be achieved (Dehejia & Wahba, 2002; Rosenbaum & Rubin, 1983).ⁱⁱⁱ

This analysis pulls from multiple data sources including: the CUNY Start program database, maintained by the Office of Research, Evaluation, and Program Support (REPS); the Institutional Research Database (IRDB), maintained by the CUNY Office of Institutional Research and Assessment (OIRA); and the CUNY Application System (CAS).

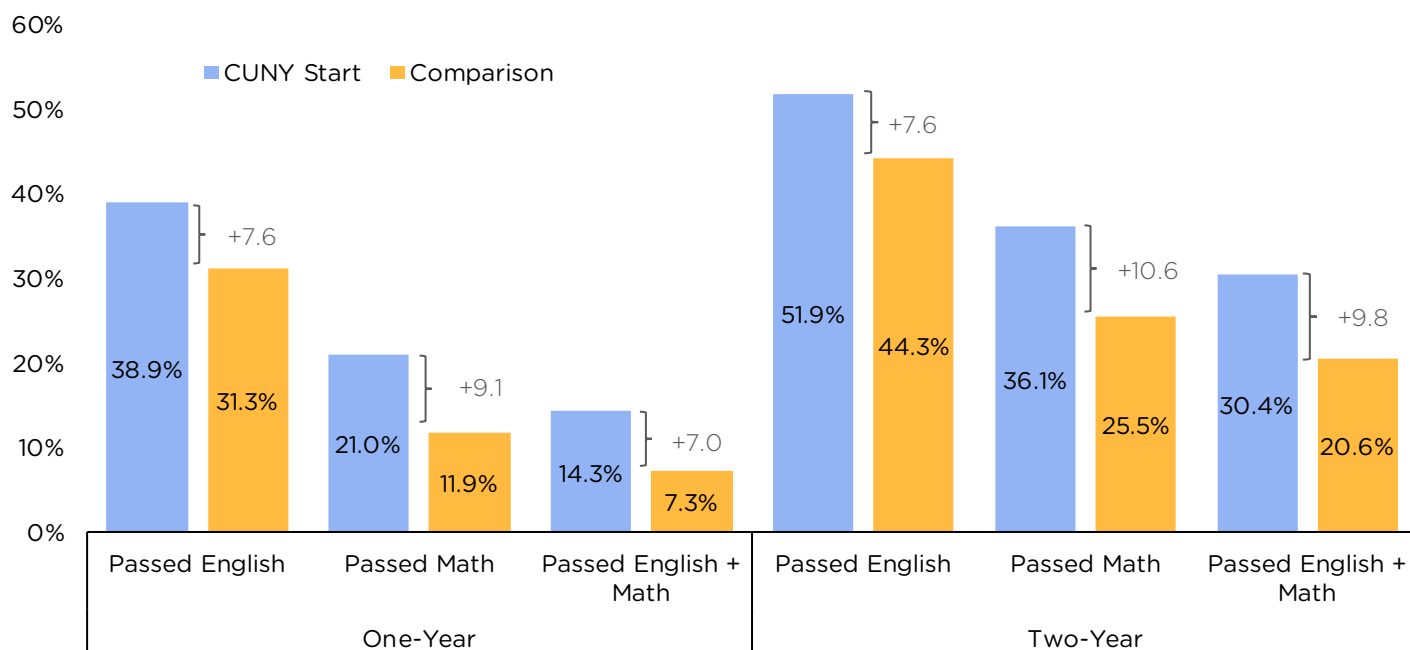
Findings

Finding 1: CUNY Start students were more likely to take and pass gateway courses in their first year.

CUNY Start allows students to accelerate their remedial coursework, and previous research found that after one semester CUNY Start students were more likely to achieve proficiency in basic skills areas than similar students (Allen & Horenstein, 2013). The present study seeks to understand if the effects of CUNY Start extend into the first year and increase students' rate of gateway course completion.

CUNY Start students enrolled in gateway courses at higher rates than comparison students. In the first year, over half (51.6%) of CUNY Start students enrolled in an English course, 8.8 percentage points higher than the matched group; 35.5 percent enrolled in a math course, 20.2 percentage points higher than the matched group; and 27.1 percent enrolled in both an English and math course, 17.2 percentage points higher than the matched group. In total, CUNY Start students enrolled in 18 percent more English gateway courses and 62 percent more math gateway courses within two years of entry than comparison students.

FIGURE 1
Gateway Course Outcomes After One and Two Years



Note: Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students).
(Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB))

CUNY Start students also passed more English and math gateway courses than the matched comparison group within one year of entry. Figure 1 shows the estimated effect of CUNY Start. The strongest results were in math, where students passed at a rate 9.1 percentage points higher

than the comparison group. CUNY Start students also passed both an English and math gateway course at a rate 7.0 percentage points higher than comparison students. Notably, CUNY Start students maintained their advantage across all three measures after two years.^{iv} It is important to note that all academic momentum outcomes were measured from the point of enrollment, either in CUNY Start or freshman year. Therefore, CUNY Start students had one fewer semester as a matriculated student to take and pass courses than their peers in the comparison group. Despite deferring enrollment, CUNY Start students caught up and surpassed the comparison group.

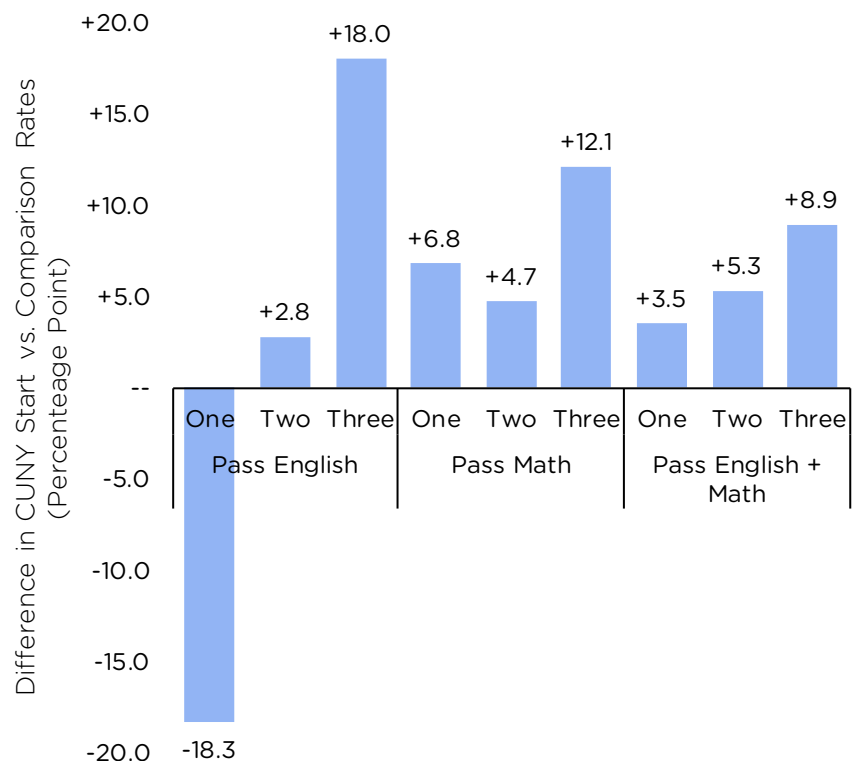
Finding 2: CUNY Start had the largest effect on students with the broadest remedial needs.

CUNY Start targets students who were significantly underprepared for college. Over 50 percent of students in the study entered with remedial needs in three subject areas: reading, writing, and math. In an effort to understand which types of students were best served by this type of intervention, results were disaggregated by remedial need profiles (see Figure 2).

Across all outcomes, results were the strongest for students with remedial needs in all three subject areas. After one year, these triple-remedial CUNY Start students passed English gateway courses at a rate 18.0 percentage points higher than comparison students and passed math gateway courses at a rate 12.1 percentage points higher. Results were similar after two years (not pictured). CUNY Start students with two remedial needs also met benchmarks at a higher rate than comparison students, but effects were more modest, particularly in English.

Only 16.1 percent of students in the sample entered with a single remedial need, and, for almost all these students, that need was in math. The outcomes for single-remedial students varied by subject area. They completed English gateway courses at rates far below comparison students, but still showed advantages of 6.8 and 7.9 percentage points in math after one and two years, respectively. These results suggest that, absent CUNY Start, single-remedial students would be more likely to take an English gateway course in their first year of college; however, these same students would be less likely to progress through traditional math remediation and a math

FIGURE 2
Gateway Course Outcomes After One Year, by Initial Number of Remedial Needs



Note: Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students). Dashed line represents the mean rate for all first-time freshmen with at least one remedial need (51.7%). (Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB))

gateway course during the same period. There is potentially an opportunity cost to students with only one need participating in CUNY Start. Future work will explore the relative effects of delaying completion of an English gateway course compared to the benefit of completing math remediation and passing a math gateway course.

Results by subject area remedial need (i.e., math, reading, and writing) appear in Figure A1 in the Appendix. The vast majority of students in the sample needed remediation in math (95.6%), as did two-thirds in reading (65.6%), and nearly three-quarters in writing (72.0%). CUNY Start students passed English and math gateway courses at higher rates than comparison students in all three subject areas of initial need. Notably, among students who were referred to remediation in reading or writing, CUNY Start students passed English gateway courses within one year at rates 15.0 and 14.7 percentage points higher, respectively, than their peers. Similar to the results for students overall, students with initial remedial need in math passed English gateway courses at a rate 7.8 percentage points higher than comparison group students, and math gateway courses at a rate 10.8 percentage points higher.

Outcomes were also broken out based on CUNY placement exam scores to examine any differences in program-impact by depth of need. The results show an inverse relationship between test performance and the effect of passing CUNY Start. Students scoring the lowest—where more students were clustered—gained the most from participating in CUNY Start, whereas students who exceeded the cut-score and would have been allowed to enroll directly in a gateway course in that subject area experienced negative impacts on passing the related subject's gateway courses.

Finding 3: CUNY Start had a positive effect on gateway course completion for students from underrepresented subgroups.

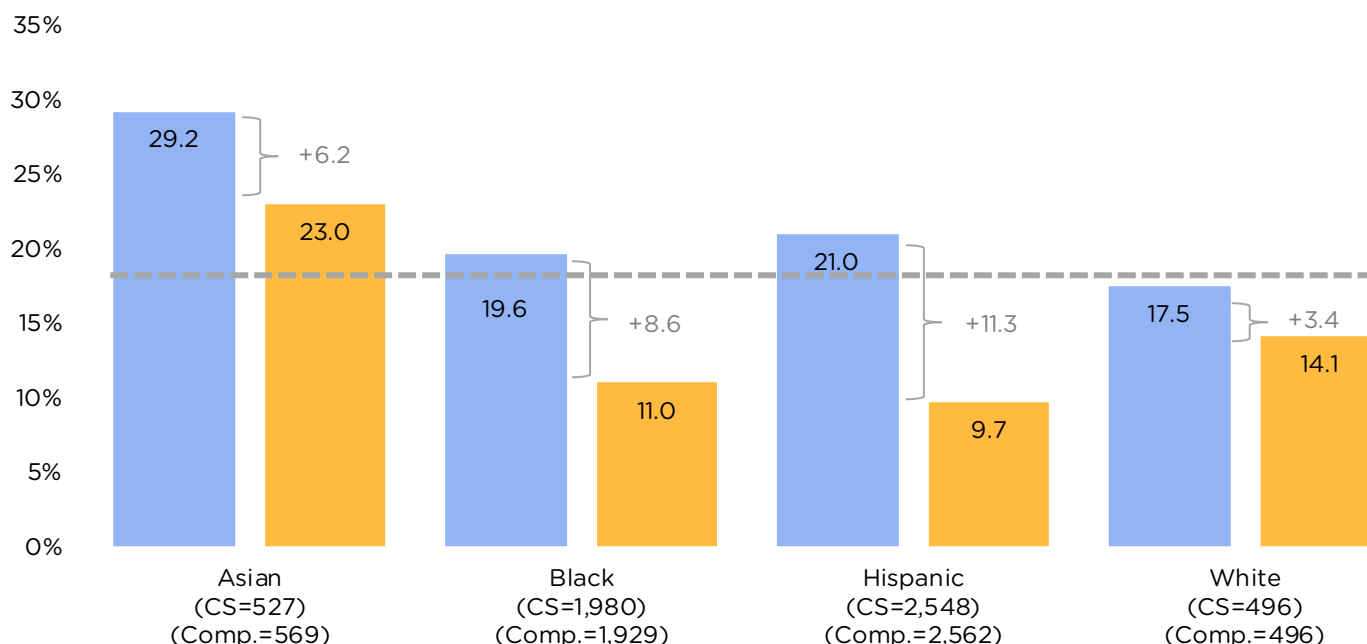
Success in college is deeply influenced by students' personal backgrounds, pre-college experiences, and postsecondary setting. Students from low-income households and first-generation students are less likely to enroll in college than their peers; they are also less likely to graduate (M. J. Bailey & Dynarski, 2011; Cataldi, Bennet, & Chen, 2018; Chen & Carroll, 2005; Duncan & Murnane, 2011; Pascarella, Pierson, Wolniak, & Terenzini, 2004). In addition, there are persistent disparities in postsecondary outcomes for underrepresented groups. At public, two-year institutions, black and Hispanic students have lower graduation rates than white and Asian students. Furthermore, the gap in graduation rates between black and Hispanic and white and Asian students has grown over the past decade (Snyder et al., 2018).

Nearly 80 percent of CUNY Start students in the study were black or Hispanic, and nearly two-thirds of CUNY Start students were the first in their family to go to college. Furthermore, students who begin their postsecondary careers academically underprepared rarely catch up—all students in the study had not met college proficiency standards in at least one subject area (most had not met them in two or more). This research explores one aspect of the intersection of student background and college-readiness by disaggregating the effects of CUNY Start by race and ethnicity.

Figure 3 and Figure A2 in the Appendix show one-year math and English gateway course passing rates broken out by race and ethnicity. In English, Asian, black, and Hispanic students passed at similar rates; Asian students experienced the largest boost over similar students (16.4 percentage points). On average, CUNY Start and comparison students from all subgroups passed English gateway courses at a rate lower than that of all first-time freshmen with at least one remedial

need (51.7%). However, all subgroups of CUNY Start students exceeded the mean rate among all first-time freshmen with reading and/or writing remedial need (30.0%).

FIGURE 3
Passing Math Gateway Courses After One Year, by Race/Ethnicity



Note: Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students). Dashed line represents the mean rate for all first-time freshmen with at least one remedial need (18.5%).

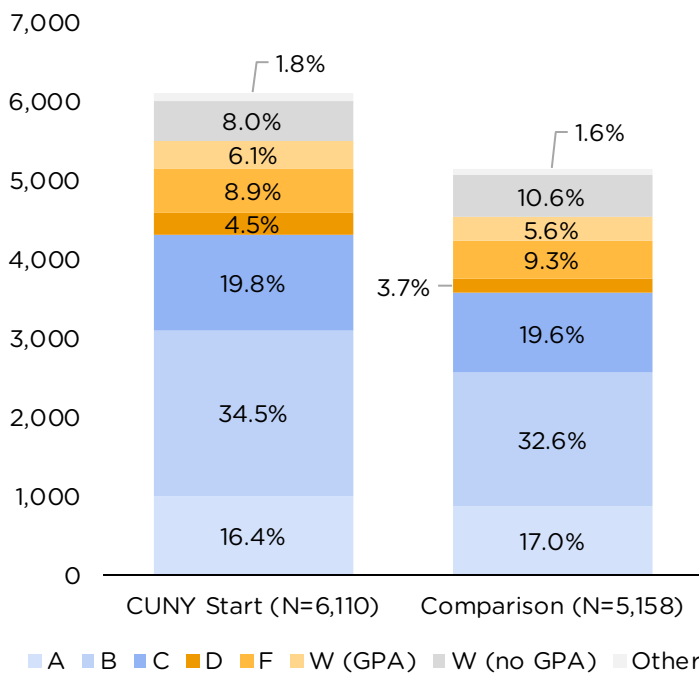
(Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB))

In math, Asian students passed at the highest rate (29.2%), but the largest effects appeared among black and Hispanic students (8.6 and 11.3 percentage points, respectively). Asian, black, and Hispanic CUNY Start students all passed math gateway courses at rates higher than the mean rate for all first-time freshmen with at least one remedial need (18.5%), and all subgroups exceeded the rate of all first-time freshmen with math remedial need (14.2%).

Finding 4: CUNY Start students earned similar grades to their peers in English gateway courses and slightly lower in math gateway courses.

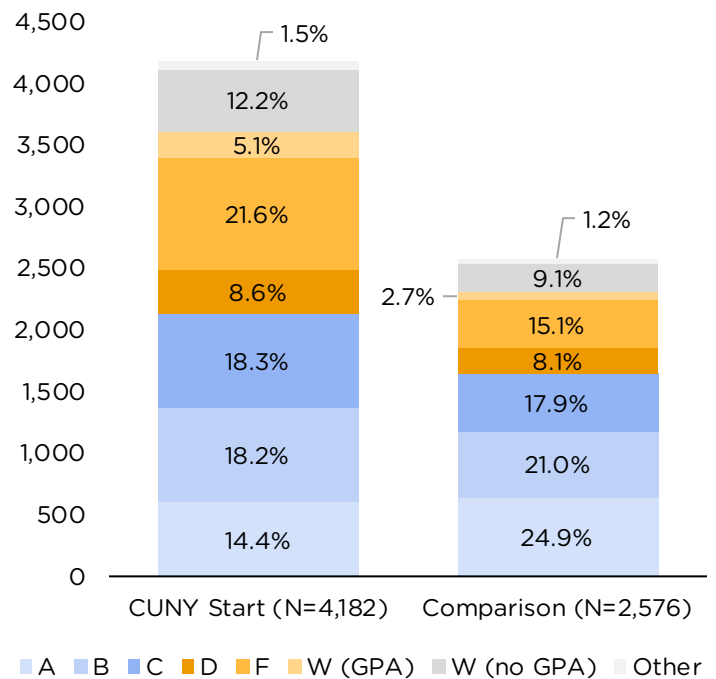
The significantly higher enrollment rates of CUNY Start students could mean that more unprepared students were attempting gateway courses. However, a breakdown of course outcomes among those students who took gateway courses, revealed that CUNY Start and traditional students earned similar grades in English gateway courses; 70.7 percent of enrollments by CUNY Start students resulted in a grade of C or higher, as did 69.2 percent of enrollments by comparison students (Figure 5). In math, comparison group enrollments resulted in positive results at a higher rate (63.8% versus 50.9%) (Figure 6). These results are conditional on enrollment; the disparity in performance does not cancel out the higher enrollment rates of CUNY Start students. Overall, CUNY Start students generated 490 more enrollments with positive outcomes in math gateway courses than did the matched comparison group in the sample.

FIGURE 4
English Gateway Course Enrollments and Grade Distribution



Note: Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students). "Other" includes incomplete or no credit grades. (Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB))

FIGURE 5
Math Gateway Course Enrollments and Grade Distribution



Note: Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students). "Other" includes incomplete or no credit grades. (Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB))

Conclusion

CUNY Start is designed to address remedial education needs in a single semester prior to matriculation into a degree program. The model allows students to bypass potentially long remedial course sequences and reserve financial aid for credit-bearing work. Based on previous research, CUNY Start students are expected to complete their remedial requirements faster than similar traditional first-time freshmen (Allen & Horenstein, 2013). This evaluation sought to understand how the CUNY Start model and its outputs might affect students' first-year academic behaviors. The literature has identified several markers of early academic momentum, including time to enrollment, credit accumulation, prompt major declaration, and gateway course completion. This work focuses on the latter benchmark as an indicator that students were making meaningful progress towards their degrees. This brief is the first to address this question.

The findings detailed above demonstrate a positive link between CUNY Start participation and passing gateway English and math courses early in college. The results were strongest in math and among students with broad remedial need (i.e., triple-remedial students). A subgroup analysis showed that CUNY Start has positive effects for students across all racial and ethnic groups, and, in particular, for Asian students in English, and black and Hispanic students in math. A preliminary exploration of achievement gaps suggests that CUNY Start may effectively shrink

achievement gaps between black and white, and Hispanic and white students in math. Finally, an examination of course enrollment and performance showed that CUNY Start students took far more gateway courses in both subject areas than similar students. This difference was not driven by poor course performance: CUNY Start and comparison students earned nearly identical grades in English gateway courses and moderately lower grades in math gateway courses.

The results of this study further support the efficacy of the CUNY Start model for addressing students' remedial needs prior to matriculation. Despite deferring enrollment for a semester, CUNY Start students met benchmarks of early momentum at higher rates during the same time periods as similar students who entered traditional pathways. The outcomes for students with remedial needs in all three basic skills areas were notable, suggesting that the program can significantly improve the outlook for a population that typically struggles in higher education. College-level math often proves an obstacle to postsecondary success among community college students. Across all findings, the largest effects were observed in math.

As institutions around the country grapple with the substandard outcomes of traditional remediation models, CUNY Start stands out as a viable alternative for students who are significantly underprepared for college. The evaluation of CUNY Start will continue to explore measures of momentum, including revisiting the time to complete remediation and credit accumulation. In addition, future analyses will look at long-term postsecondary outcomes. The results of the evaluation will continue to support the refinement of the program and bolster it as a national model for success.

End Notes

ⁱ CUNY standardized general education requirements across the University (an initiative called "Pathways") in Fall 2013. Students who entered CUNY prior to Fall 2013 were subject to campus-specific academic requirements, making it difficult to accurately track students' completion of gateway coursework.

ⁱⁱ Students were considered to have passed a course if they earned a grade of D or higher. English gateway courses included entry-level English courses, typically "Freshman Composition." All the colleges included in the study require a sequence of two courses; however, in rare cases a student may bypass the first course based on prior test performance or completion of a dual enrollment class in high school. Therefore, passing in English included passing either the first- or second-in-sequence course. Unlike the proscribed set of English gateway courses, students have many options to fulfill their math requirement and may pursue different pathways (e.g., algebra, statistics, quantitative reasoning) depending on their program of study. Math gateway courses were identified as any of those that fulfilled the CUNY general education Pathways "Quantitative Reasoning and Mathematics" requirement.

ⁱⁱⁱ CUNY Start students were matched using a one-to-one matching algorithm without replacement (i.e., a "greedy" match) within cohort and college. The caliper restriction was tweaked by school and semester in order to ensure balance and maximize sample retention, and ranged from 0.05 to 0.1. The overall match included 97 percent of students in the final sample. Students were matched based on demographics (gender, race and ethnicity, age, native language, country of origin, borough of residence) and academic background (initial remedial status, placement exam scores).

^{iv} To ensure that no variation in characteristics were continuing to affect outcomes, a post-match logistic regression analysis using only the matched students was also performed. This analysis yielded similar results, and the calculated marginal effects were within 1.5 percentage points of the estimates provided by the descriptive comparisons of the matched groups. As an additional robustness check, researchers ran a linear probability model on CUNY Start students and all first-time freshmen with remedial needs. The results were similar to those from the PSM analysis (see Table 1).

^v Prior to Fall 2014, cut-scores for placement into remediation varied by CUNY college. During the period included in the study, the scores were aligned between community and comprehensive colleges. In Fall 2014, the University implemented system-wide standards.

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Appendix

TABLE A1
Gateway Course Outcomes After One and Two Years

	Pass Gateway Courses within One Year			Pass Gateway Courses within Two Years		
	English	Math	English + Math	English	Math	English + Math
<i>Propensity Score Matching¹</i>						
CUNY Start Estimated Effect	7.6	9.1	7.0	7.6	10.6	9.8
Sample Size	11,198	11,198	11,198	11,198	11,198	11,198
<i>Logistic Regression of Matched Groups²</i>						
CUNY Start Estimated Effect ³	0.081	0.086	0.070	0.077	0.113	0.099
Odds Ratio	1.435 *** (0.0600)	2.132 *** (0.1200)	2.259 *** (0.1500)	1.365 *** (0.0540)	1.743 *** (0.0770)	1.743 *** (0.0810)
Sample Size	11,198	11,198	11,198	11,198	11,198	11,198
<i>Linear Probability Model⁴</i>						
CUNY Start Estimated Effect	0.073 *** (0.0069)	0.0878 *** (0.0054)	0.074 *** (0.0050)	0.075 *** (0.0070)	0.106 *** (0.0066)	0.102 *** (0.0065)
Constant	0.499 *** (0.0260)	0.004 (0.0210)	-0.077 *** (0.0190)	0.554 *** (0.0270)	0.045 (0.0250)	0.003 (0.0250)
R-Squared	0.1959	0.1920	0.1030	0.1362	0.1701	0.1264
Sample Size	45,594	45,594	45,594	45,594	45,594	45,594

¹ Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students).

² Full model includes fixed effects for college and cohort and controls for demographic characteristics and academic background.

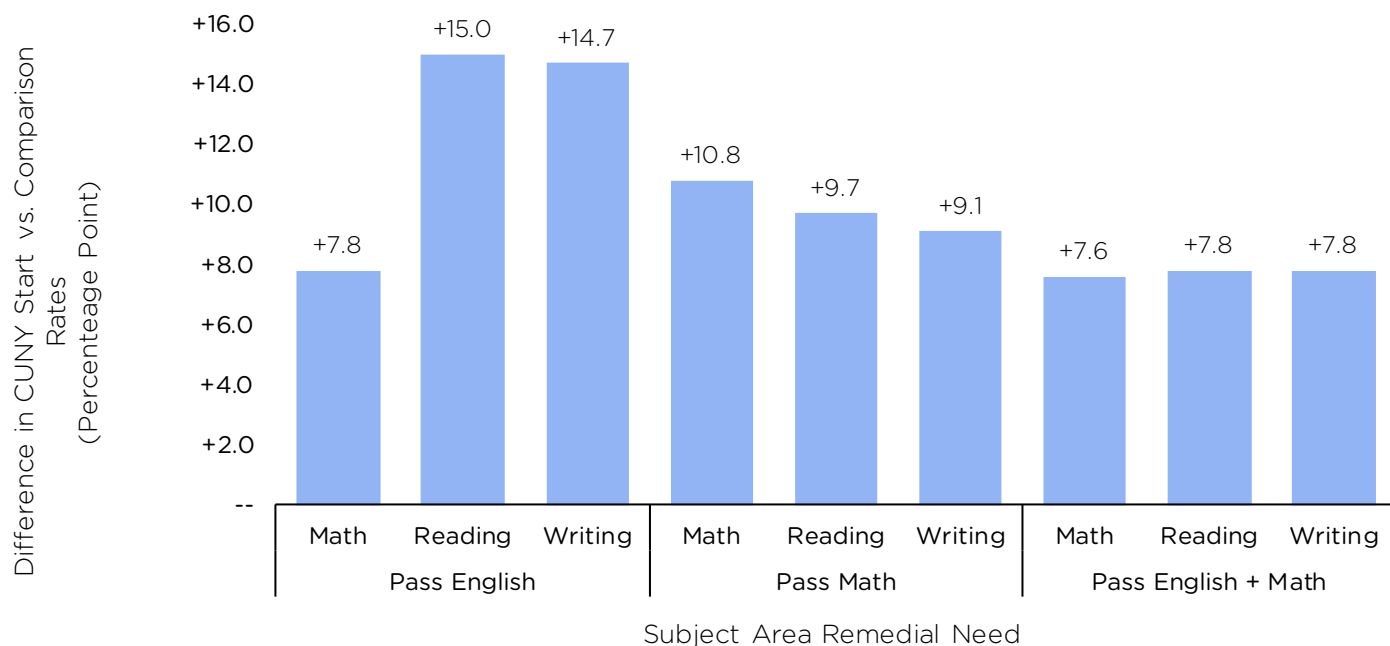
³ Estimated based on the average marginal effect, the change in the predicted probability of each logistic regression model.

⁴ Full model includes fixed effects for college and cohort and controls for demographic characteristics and academic background.

Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB).

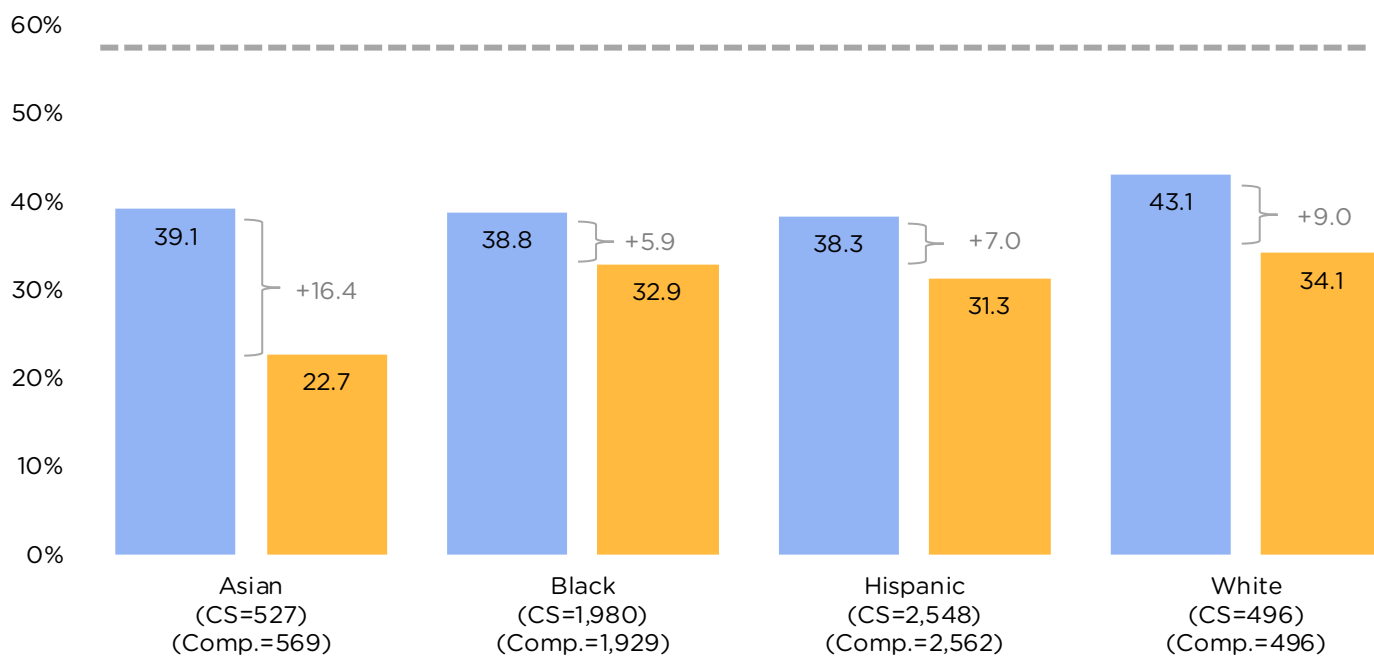
* p < 0.05, ** p < 0.01, *** p < 0.001; standard errors in parentheses.

FIGURE A1
Gateway Course Outcomes After One Year, by Initial Subject Area Remedial Need



Note: Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students). Dashed line represents the mean rate for *all* first-time freshmen with at least one remedial need (51.7%).
(Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB))

FIGURE A2
Passing English Gateway Courses After One Year, by Race/Ethnicity



Note: Results shown from propensity-score analysis of CUNY Start students and CUNY first-time freshmen. Total sample size was 11,198 (5,599 CUNY Start and 5,599 non-CUNY Start students). Dashed line represents the mean rate for *all* first-time freshmen with at least one remedial need (51.7%).
(Source: Authors' calculations using data from the CUNY Institutional Research Database (IRDB))