ANNENBERG
BROWN UNIVERSITY

EdWorkingPaper No. 22-532

A Bridge to Graduation: Post-Secondary Effects of an Alternative Pathway for Students Who Fail High School Exit Exams

Jane Arnold Lincove
University of Maryland, Baltimore County

Catherine Mata
University of Maryland, Baltimore County

Kalena E. Cortes
Texas A&M University

High school exit exams are meant to standardize the quality of public high schools and to ensure that students graduate with a set of basic skills and knowledge. Evidence suggests that a common perverse effect of exit exams is an increase in dropout for students who have difficulty passing tests, with a larger effect on minority students. To mitigate this, some states offer alternative, non-tested pathways to graduation for students who have failed their exit exams. This study investigates the post-secondary effects of an alternative high school graduation program. Among students who initially fail an exit exam, those who eventually graduate through an alternative project-based pathway have lower college enrollment, but similar employment outcomes to students who graduate by retaking and passing their exit exams. Compared to similar students who fail to complete high school, those students who take the alternative pathway have better post-secondary outcomes in both education and employment.

VERSION: February 2022

Suggested citation: Lincove, Jane Arnold, Catherine Mata, and Kalena E. Cortes. (2022). A Bridge to Graduation: Post-Secondary Effects of an Alternative Pathway for Students Who Fail High School Exit Exams. (EdWorkingPaper: 22-532). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/7437-wr22

A Bridge to Graduation: Post-Secondary Effects of an Alternative Pathway for Students Who Fail High School Exit Exams

Jane Arnold Lincove, Catherine Mata, and Kalena E. Cortes*

This version: February 3, 2022

Abstract

High school exit exams are meant to standardize the quality of public high schools and to ensure that students graduate with a set of basic skills and knowledge. Evidence suggests that a common perverse effect of exit exams is an increase in dropout for students who have difficulty passing tests, with a larger effect on minority students. To mitigate this, some states offer alternative, non-tested pathways to graduation for students who have failed their exit exams. This study investigates the post-secondary effects of an alternative high school graduation program. Among students who initially fail an exit exam, those who eventually graduate through an alternative project-based pathway have lower college enrollment, but similar employment outcomes to students who graduate by retaking and passing their exit exams. Compared to similar students who fail to complete high school, those students who take the alternative pathway have better post-secondary outcomes in both education and employment.

JEL Classification: I21, I24, J18.
Key words: High School Exit Exams, High School Graduation, Post-secondary Education, Labor Market Outcomes, Employment, Earnings.

---

* Lincove: University of Maryland, Baltimore County (email: jlincove@umbc.edu). Mata: University of Maryland, Baltimore County (email: cmatah1@umbc.edu). Cortes: The Bush School of Government and Public Service, 4220 TAMU, 2088 Allen Building, Texas A&M University, College Station, TX 77843; Research Fellow at the Institute for the Study of Labor (IZA); and Research Associate at the National Bureau of Economic Research (e-mail: kcortes@tamu.edu). This research was supported by the Spencer Foundation through grant 201700051. We thank Celeste K. Carruthers, Daniel Mangrum, Maria Padilla-Romo, Katharine O. Strunk, seminar and conference participants at the University of Tennessee, the Federal Reserve Bank of New York, the American Economic Association, Association for Education Finance and Policy, the Association for Public Policy Analysis and Management, and the Southern Economic Association for helpful feedback. We are also grateful to Angela Henneberger, Ross Goldstein, Dara Zeelander Shaw, Amir Francois, and other Maryland stakeholders for assistance, data access, and policy information. This research was supported in part by the Maryland Longitudinal Data System (MLDS) Center. We are grateful for the assistance provided by the MLDS Center. All opinions are the authors' and do not represent the opinion of the MLDS Center or its partner agencies. Institutional support was provided by the University of Maryland, Baltimore County and Texas A&M University.

I. INTRODUCTION

Across the nation, state-mandated high school exit exams are used to demonstrate that students have acquired specific skills and knowledge before entering college or the job market. While exit exams have a long history in some U.S. states, most policies requiring exit exams were implemented as part of the standards-based instruction and testing movement from 1980 to the 2000s (Dee and Jacob, 2007). This period saw an unprecedented expansion in the number of states requiring exit exams as well as the scope of subject areas tested (Hemelt and Marcotte, 2013). By 2012, 31 states required exit exams, and 26 made passing exit exams a requirement for graduation (McIntosh, 2011). State exit exam requirements affected an estimated 76 percent of all students and 84 percent of students of color in public high schools in the US (McIntosh, 2011).

Mandated exit exams are intended to hold schools and students accountable for meeting minimum standards for high school completion. However, prior research links exam requirements to unintended increases in high school dropout, particularly among students of color (Dee and Jacob, 2007; Holme et al., 2010; Hemelt and Marcotte, 2013; Ou, 2010; Papay, Murnane, and Willet, 2010; Reardon et al., 2010; Warren, Jenkins, and Kulick, 2006). As a mitigating strategy, some states provide an alternative pathway for those who fail exams – either by passing alternative exams or through non-tested pathways such as portfolios or projects. Hemelt and Marcotte (2013) found that states that implemented exit exams without an alternative, non-tested pathway experienced increases in high school dropout, while states with non-tested pathways did not. This suggests that non-tested alternatives mitigate the negative effects of exit exams on high school completion. However, less is known about consequences for students' post-secondary success. If high school exit exams ensure that students have achieved the basic skills for graduation, it is

important to examine whether students on non-tested pathways graduate with equivalent human capital.

In this study, we compare the human capital formation of high schoolers who do and do not pass exit exams, by investigating college and workforce outcomes for students who completed Maryland's *non-test-based* high school graduation option. Maryland's Bridge Program for High School Validation (Bridge) allows students who fail exit exams to graduate by completing projects and portfolios that are judged by a local review panel. Importantly, students who Bridge receive the same high school diploma as students who pass high school exit exams, so college admission officers and employers are not able to use the student's graduation pathway as an explicit signal of the student's human capital. Thus, the Bridge program provides an excellent opportunity to examine the question of whether non-test-based graduation requirements allow students to graduate with equivalent human capital to those who pass exit exams.

We focus our analysis on post-secondary education and labor market outcomes for students who initially failed Maryland's high school exit exams, comparing students on different graduate pathways in a matched sample that is similar in past school performance, demographics, and motivation to graduate. Our analysis focuses on the approximately one-quarter of Maryland's high school seniors that fails at least one exit exam on multiple attempts. To investigate whether graduates have similar human capital acquisition, we compare Bridge program completers to matched students who initially failed but passed exit exams on retakes. Because colleges and employers cannot differentiate Bridge completers from test passers, this analysis investigates whether non-test alternatives provide similar levels of skill development as passing exit exams. To investigate the benefits of the non-tested pathway as a high school dropout prevention strategy, we also compare Bridge program completers to students who attempt all the exit exams but still fail

to graduate from high school. Bridge completers and those without a high school diploma do vary in the signal sent to employers. Hence, this second analysis investigates the degree to which completing a high school degree through the Bridge program is preferable to non-completion.

We find that students who took the Bridge pathway to high school graduation were less likely to attend college than students who passed their exit exams by 3-6 percentage points, but employment rates were similar for both groups of students. Effects on quarterly wages vary depending on which of Maryland's three subject area exams were completed through Bridge and whether the student was attending college while working. Compared to similar students who fail to complete high school, students who took the Bridge pathway had better post-secondary outcomes in both education and employment. Subgroup analysis suggests that Bridge is particularly advantageous for students at highest risk for dropout.

II. RELEVANT LITERATURE

The effects of state-mandated high exit exams are documented in several studies. In general, exit exams have produced few of the anticipated benefits and many unintended consequences. States that require exit exams for graduation have seen an associated increase in high school drop-out rates (Hemelt and Marcotte, 2013; Warren, Jenkins, and Kulick, 2006). This unintended effect has both efficiency and equity consequences, as the increase disproportionally affects students who are most at risk to drop out from high school, including students of color (Dee and Jacob, 2007; Hemelt and Marcotte, 2013), English language learners (Hemelt and Marcotte, 2013; Holme et al., 2010; Ou, 2010), and students in poverty (Papay, Murnane, and Willet, 2010; Dee and Jacob, 2007). At the same time, there is little evidence that the implementation of high school exit exams has improved post-secondary and labor market outcomes for graduates. While

high school graduates clearly do better in their labor market prospects than dropouts, there is no evidence that exit exams mandates positively affect employment or earnings (Warren, Grodsky, and Lee, 2008).

The effects of variations in state exit exam policies were studied by Hemelt and Marcotte (2013). The authors classify four variations in state policies that allow students to graduate without passing exit exams: (1) alternative tests such as Advanced Placement tests, SAT, or ACT scores, (2) evidence other than standardized tests, such as, school grades, teachers' recommendations, and portfolio projects, (3) waiver mechanisms, and (4) alternative credentials, such as, a certificate of attendance. Hemelt and Marcotte (2013) found significant increases in high school dropout rates due to the implementation of exit exams in states that do not provide any of these alternatives. Most notably, the authors found no increase in high school dropout rates due to implementing exit exams in the states, including Maryland, where students could use an alternative pathway to graduation that is not test based.

A well-studied example of Hemelt and Marcotte's first policy alternative is the General Educational Development (GED) certificate, which provides a high school equivalency certificate to students who pass a battery of four tests. Obtaining a GED certificate might not be strictly equivalent to a regular high school diploma, because colleges and employers can observe if a student has as GED certificate or a high school diploma. By inducing students to drop out of high school, the GED option leads some students to lose the benefits of a high school degree (Heckman, Humpries, and Mader, 2011). Like high school exit exams, the research on GEDs as a test-based alternative pathway to high school graduation suggests there are undesired effects including reductions in graduation rates (Heckman et al., 2012; Tyler, Murnane, and Willet, 2000) and college access (Heckman, Humphries and Mader, 2011; Maralani, 2011). In terms of employment

opportunities, research shows that GED recipients are more similar to high school dropouts than to high school graduates (Heckman et al., 2012). According to Heckman, Humphries and Mader (2011), GED recipients have higher achievement test scores than dropouts because they complete more years of high school, but once scholastic ability is accounted for, GED recipients are equivalent to uncredentialed dropouts in terms of their labor market outcomes. In terms of its effectiveness as an alternative pathway to graduation, studies suggest that a graduate with a GED certificate is better off than a high school dropout, but worse off than a graduate who passed an exit exam.

The contribution of our study is to investigate whether taking a non-test-based pathway to graduation also diminishes post-secondary opportunities for students. While previous work suggests that non-tested pathways improve graduation rates for states with exit exams (Hemelt and Marcotte, 2013), it is unclear if they are detrimental or beneficial for students after they leave high school. We also build on prior studies on the GED pathway in two important ways. First, because the Maryland Bridge program does not require students to pass additional tests to graduate from high school, we can better understand if the tests themselves matter for future student success. Second, unlike GED completers, Bridge completers receive the same diploma as students who pass exit exams, so here we can better tease out post-secondary differences due to human capital differences from those due to employer perceptions based on the differential signals of diplomas versus GEDs.

III. MARYLAND'S ALTERNATIVE PATHWAY TO GRADUATION

Since 2005, Maryland has required high school exit exams with a non-test-based alternative for students who failed their exit exams. This study focuses on four cohorts of high school seniors that entered 9th grade between fall 2008 and 2011, and reached on-time graduation between spring

2012 and 2015. During this time period all students were required to pass three end-of-course High School Assessments (HSA) in algebra, biology, and English.[1] Maryland's HSA's had the typical characteristics of most state exit exams – content was aligned with state standards, exit exams were often integrated as a final exam in courses, students could retake multiple times to pass, and passing was required for high school graduation.[2,3] The three required HSA's were taken at the conclusion of enrollment in the associated courses, typically in 9th or 10th grade.

To avoid the risk of increased high school dropout due to failed exit exams, the Bridge program provides a second pathway to graduation by providing evidence of acquisition of basic skills and standards for graduation through projects, portfolios, and other work. By state rules, students were eligible to Bridge in a subject area only after attempting and failing the subject area exit exam twice. After the second failure, teachers helped students design a Bridge project based on their performance on the failed exit exams, identifying which standards were demonstrated through correct test answers and which needed additional work or evidence. The projects were judged by a district review board. Students who passed a Bridge project in a subject fulfilled the exit exam requirement in that subject. Importantly, for our analysis, eligible students could also attempt to pass exams through unlimited retakes. Students could Bridge in any or all the three required subject areas and were also free to attempt retakes while simultaneously pursuing the Bridge option. In practice, students could graduate through any combination of bridging and test-passing in the three subject areas.

[1] A fourth exam in U.S. Government was initially given to some cohorts but was not required for graduation.
[2] Throughout this paper we will refer to Maryland's HSAs generically as exit exams.
[3] During the 2014-15 school year, Maryland adopted the Common Core standards and began using the Common Core-aligned Partnership for Assessment of Readiness for College and Careers (PARCC) tests in place of Maryland HSAs to fulfill the exit exam requirements. Our study period ends before this transition took place.

The Bridge program is implemented locally by the Maryland's 24 local school districts. While the Bridge program documentation asserts that completing Bridge is "no easier" than passing an exit exam (Maryland State Department of Education, 2021), specific expectations and outcomes are subjective, and local review boards might apply qualitatively different criteria.[4] Thus, the Bridge experience and the choice to retake tests or to pursue Bridge likely varied from the student perspective based on local design. In practice, selection into the alternative pathway was dependent on failing an exit exam twice, but also likely to vary based on recommendations from teachers, counselors, and peers at the school level as well. Thus, our empirical methods, discussed below, are designed to overcome problem of both observable and unobservable selection into the Bridge pathway.

IV. DATA SOURCES AND SAMPLE SELECTION

To analyze the post-secondary effects of the Bridge program on eligible students, we use administrative data from the Maryland Longitudinal Data Systems Center (MLDSC). MLDSC is a state agency and research center that houses several mergeable, de-identified databases from public PK-12 schools, public and private post-secondary institutions, and the state's Unemployment Insurance system (UI). For this study, we include high school seniors from four cohorts that initially entered Maryland public high schools from fall 2008 through fall 2011. These students were subject to an exit exam policy that required passing HSA's or completing the Bridge program in algebra, biology, and English. We observe Bridge completion in administrative records

[4] For more information refer to: https://mdk12.msde.maryland.gov/assessments/hsa/Pages/High-School-Assessments(HSA).aspx.

for students who successfully completed the program and graduated.[5] In our main analysis, we follow these four cohorts of students in the MLDSC data from 8th grade through four years of high school plus one year after their on-time high school graduation date. [6]

The administrative high school data allow us to observe tests scores for all students on attempted exit exams. Thus, we can perfectly observe who is eligible to Bridge, and we restrict our analysis to these eligible students. Bridge-eligible students failed at least one exam at least two times, and thus reflect a lower part of the test and ability distribution within the state. While students were eligible to Bridge after just two failed attempts, many students attempted additional retakes of an exam before either passing, completing Bridge, or ultimately not completing high school. To test whether the choice of graduation pathway is influential for post-secondary outcomes, we divide the population of students who are eligible to Bridge in each subject into three mutually exclusive groups of students: (1) *bridgers* are students who completed the Bridge program and graduated high school; (2) *test passers* are students who eventually passed the exit exam and graduated high school, and (3) *non-completers* are students who failed to complete high school.

Our empirical objective is to test first, whether students who complete Bridge to graduate acquire similar skills and abilities through the Bridge process to the skills and abilities acquired through persistent retesting; and second, whether students who complete Bridge and graduate have superior skills and abilities to students who fail to complete high school. While we can perfectly observe both Bridge eligibility and high school completion outcomes for all students, selection

[5] Some students may have simultaneously attempted a Bridge program and test retakes. While we can observe all test attempts and their outcomes, we only observe Bridge in administrative data if the student completed Bridge. We cannot observe failed attempts to graduate via a Bridge program.

[6] We identify high school completion in spring of the fourth year of high school and measure post-secondary outcomes from September-August of the next academic year. Our results are robust to analysis based on five-year high school graduation outcomes and two years of post-secondary college and workforce participation. Results are available upon request. A small number of non-completers graduate at the end of a fifth year, either through Bridge or test passing.

into each pathway is clearly not random. Students self-select with influence from teachers, parents, and peers. For this reason, we add a rich set of observable student characteristics from the administrative data to support the empirical strategy described below. This includes student demographics, such as, race/ethnicity, gender, special education designations, whether they were ever identified as eligible for free or reduced-price lunch, whether they were ever identified for a Title I support program, and whether they were ever homeless.

Like prior studies of exit exams (Papay, Murnane, and Willett, 2010; Warren and Edwards, 2005) we also include 8th grade indicators of academic and behavioral outcomes. This avoids the endogeneity of measures of high school academic engagement and performance measures and the results of exams given during high school, as well as the decision to pursue an alternative pathway such as Bridge. For example, a student who fails an algebra exit exam twice in 9th grade might have a teacher recommend retesting or Bridge based on her classroom behavior. This student might also respond to the failure by skipping school and eventually dropping out. The underlying assumption here is that while a student's 8th grade measures might be predictive of the student's performance on their high school exit exams, 8th grade measures are not influenced by performance on exit exams taken during high school. We therefore include a range of pre-high school academic performance measures and school engagement indicators including test scores on mandatory middle school exams in math, English language arts (ELA), and science, the number of times a student was suspended in 8th grade, and the student's 8th grade attendance rate.

Post-high school outcomes are obtained from two distinct data sources. First, we locate students in the MLDSC post-secondary enrollment files, which include all students at Maryland's public and private two- and four-year institutions and Maryland high school graduates who appear in the National Student Clearinghouse (NSC). The broad coverage of these two data sources

provides us with confidence that we can locate all students enrolled in post-secondary institutions in the U.S. Second, we link student records with Maryland UI employment data. This allows us to identify employment status and total quarterly wages for eligible jobs. It should be noted that jobs such as military enlistment and informal employment, which are common among young adults who struggled to complete high school, are not recorded in the UI system. We also cannot observe employment outside of Maryland, including those who work in neighboring states and the District of Columbia that share labor markets with Maryland. Thus, our results for labor market outcomes are limited to only a portion of possible employment.

With the objective of isolating the effects of the Bridge program from other factors that influence high school completion and secondary outcomes, we make several other data restrictions. Sorting into the Bridge program likely varies considerably by school district and school. Districts administer the Bridge program and assess the projects, while schools enroll students and design the projects. To avoid potential exposure to multiple Bridge program norms, we restrict our analysis to students who were enrolled in the same school district for all years of high school. We allow students to transfer high schools within the district one time during grades 9-12, and we exclude students who transferred more than once. Finally, because bridgers show a commitment to graduate from high school, we might overstate the Bridge program effects if we compare them to non-completers who dropped out early or did not even attempt to pass their exams. Thus, we restrict our comparisons to students who appear in the fall enrollment of their senior year of high school and at least attempted to pass the three required exams. This increases the likelihood that students in the sample are similar in their motivation to graduate, having already invested four years in high school and completed the courses that include exit exams.

Out of approximately 200,000 high school seniors in four cohorts, the data restrictions described above reduce our sample to 139,757 students who have exit exams scores in all three subject areas and full 8th grade records.[7] Table 1 summarizes post-secondary outcomes for the restricted subsample. Outcomes are measured in the first year after on-time high school graduation (i.e., graduated high school within four years of 9th grade enrollment). Recent high school graduates vary in their labor force goals depending on their college enrollment with some not participating at all during in college, some combining work and college, and some exclusively working and not attending college. Because college enrollment confounds average measures of labor market outcomes in this age group, we report employment and wage statistics separately by enrollment status. Note that our available wage measure is quarterly reports of total UI-eligible earnings. We average wages across four quarters that began in September of a student's on-time high school graduation year. We cannot determine hourly wages or hours worked, so any differences in this wage measure might be attributable to differences in hours, differences in hourly wage, or both.

Figure 1 shows the distribution of high school seniors across four pathways: initially passing all exit exams, graduating through exam retakes, graduating through Bridge, or non-completion (no diploma). Among seniors in the sample, 73.6 percent passed all exit exams on the first or second attempt, 15 percent passed all tests on retakes (test-passers), 8.4 percent bridged in at least one subject (bridgers), and 3 percent did not complete high school by the end of the fourth year (non-completers). Summing up the latter three groups, 26.4 percent of all seniors were eligible to Bridge, and among eligible students, 32 percent were bridgers, 57 percent were test-passes, and 11 percent were non-completers. Eligibility to Bridge was substantially higher among

[7] Approximately 30,000 students changed districts in high school, 12,000 have more than 2 school transfers or atypical grade progression, and 18,000 are missing 8th grade variables.

subpopulations at higher risk for dropout including Black students (45.6 percent), students ever eligible for free or reduced-priced lunch (43.4 percent), and special education students (60.7 percent).[8] These groups were also more likely to complete Bridge conditioned on eligibility with 39.3 percent of eligible Black students, 35.9 percent of eligible low-income students, and 42.2 percent of eligible special education students graduating through Bridge completion.

As expected, students who are never eligible to Bridge are more likely to attend college and earn higher wages than those who fail exit exams. Among those who are eligible to Bridge, the summary statistics for all outcomes in Table 1 suggest that students who Bridge are substantially worse off than test passers but better-off than non-completers in college enrollment rates, employment rates, and wages. Our empirical strategies in the next section investigates whether this is due to selection or meaningful differences in acquisition of basic skills in human capital formation.

V. EMPIRICAL STRATEGY

Our empirical objective is to measure the effect of Bridge completion on post-secondary outcomes, relative to other pathways. We begin by selecting for our analytic sample, only students who are eligible to Bridge from the subsample of seniors described in Table 1. This includes nearly 37,000 students of which 32 percent completed Bridge. Selection into the Bridge program is a non-random choice likely based on a combination of many factors at the student, classroom, school, and district level. At the district level, each review board could set its own expectations for evidence of completion. At the school or classroom level, teachers and counselors determined what

[8] We will use the term low-income students interchangeably for students ever eligible for free or reduced-priced lunch (FRPL) in this paper. The percentage of students eligible for FRPL under the National School Lunch Program provides a proxy measure for the concentration of low-income students within a school.

advice was given to students about graduation options – for example, whether they were advised to retake exit exams, retake courses that included exit exam materials, undergo a test-prep intervention, or attempt the Bridge pathway. At the student level, preferences for tests versus projects, self-efficacy, and peer behavior likely influence the choice to retest or to Bridge. Thus, simple comparison of postsecondary outcomes and simple regression analysis are biased due to selective sorting on unobservable student and school characteristics that influence some students to Bridge while other students retest or simply dropout of high school. It is not appropriate, for example, to compare a student who bridges in algebra after getting a very low-test score and being advised by teachers that retakes are likely futile to another student who almost passes and receives study aides before retesting again.

Empirically, there is no available strategy to identify the causal effects of Bridge that fully overcomes unobservable factors in self-selection such as self-confidence, interactions with teachers, and individual preferences for testing versus other types of assessments. Thus, our empirical methods seek to make the best use of the observable characteristics available in the MLDSC database to create matched comparisons between bridgers who are similar across observable and unobservable characteristics that influence both the decision to Bridge and post-secondary outcomes. To reduce selection bias on what we cannot observe in the data, our main analysis follows the cell fixed-effects model approach recommended by Angrist, Pathak, and Walters (2013), and also applied in other studies, such as, Dale and Krueger (2002). Here we compare the postsecondary outcomes within cells (j) of characteristics that likely influence sorting. We estimate the following regression specification:

$$Y_{ijc} = \alpha + \beta_k \cdot Bridge_{ik} + \gamma \cdot X_i + \theta_j + \delta_c + \varepsilon_{ijc} \quad (1)$$

where student i from high school cohort c is a member of a cell j that includes students with identical characteristics who were all eligible to Bridge in subject k. Y_{ijc} is a post-secondary outcome that is predicted as a function of whether the student i completed the Bridge program in subject k (algebra, biology, or English). X_i is a vector of student characteristics that can vary within j. θ_j is a fixed effect identifying membership in cell group j, and δ_c identifies membership in a freshman year cohort c.

The coefficients of interest are β_k's, which reflect the within-group difference in outcomes for students who Bridge in subject area k and students who do not. Thus, the selection of shared characteristics for determining membership in a cell group j is critical to establishing β as an unbiased estimator of the effect of the Bridge program. The cells of student groupings must be constructed to be sufficiently similar for plausible causal comparison while also large enough for precise estimation of differences in the postsecondary outcomes (Angrist, Pathak, and Walters, 2013). We include in each cell group j students who attended the same high school in the same school district, with the same gender, race/ethnicity, and FRPL status. Because the decision to complete the Bridge program is likely related to the probability of passing on a retake exam, we also match within bins of the second failing test score in subject area k: 0-25 points, 26-50 points, or more than 50 points from passing the exit exam. The final matched samples for our analysis include students in cells that contain at least one bridger and one non-bridger (i.e., test-passer or non-completer).

We include in X_i additional controls for student characteristics in high school (special education, Title I, and homelessness), and 8th grade indicators of academic performance, attendance, and behavior (measured by the number of times a student was suspended). We also include scores on the student's first attempted exit exams in all three subject areas (i.e., algebra,

biology, and English), the exit exam score on the student's second failed test score in the subject area k, and the number of subjects (1 to 3) in which the student was eligible to do the Bridge program.[9]

As a robustness check for all analysis, we employ a propensity score matching strategy. This second estimation strategy exploits a larger set of observable student characteristics to predict the probability that a student chooses the Bridge program as:

$$pscore_{isc} = probability(Bridge_{ik} = 1) = \alpha + X_{ik} \cdot \gamma + \pi_s + \delta_c + \varepsilon_{isc} \quad (2).$$

Here, we estimate a propensity to complete Bridge as a function of a full set of student characteristics including exit exam scores, student demographics, socio-economic status, 8th grade variables, high school attended (π_s), and high school cohort (δ_c). Because the Bridge effects likely vary across the ability distribution, we use local linear matching to compare postsecondary outcomes for bridgers to a PSM constructed comparison group of students who were either test passers or non-completers.

Since Maryland students can Bridge in multiple subjects, we estimate equations (1) and (2) for three unique but overlapping data sets of students eligible to Bridge in algebra, biology, and English. In the aggregate, these estimates speak to the overall effect of non-tested pathways. Individually, these point estimates also provide information about whether non-tested pathways have different effects in different subject areas. Our postsecondary outcomes include three measures of college access (enrollment in any college, enrollment in a two-year college, enrollment in a four-year college) and two measures of workforce engagement (employment at any point in the first post-secondary year and average quarterly wages (logged) conditioned on

[9] Actual exam scores range from 240-650 with cut scores for passing at 396 (English), 400 (biology), and 412 (algebra). Our analysis and tables include a transformed score measured in points from the cut score.

employment). Because many college students are balancing work and school, employment outcomes are estimated separately for those who are and are not enrolled in college.

To answer our research questions, we divide the sample of students eligible to Bridge into two analytic samples in each of three subject areas for a total of six samples. Sample 1 includes bridgers and test passers and, for estimates of equation (1) is restricted to students in grouping cells that contain at least one bridger and one test-passer in the focus subject. Table 2 provides the summary statistics for these subsamples, including the full sample and the reduced matched-regression subsamples. Sample 2 includes bridgers and high school non-completers. Table 3 provides the summary statistics for these subsamples. Compared to Maryland students as a whole, students who are eligible to Bridge reflect a population at higher risk of dropout including higher rates of poverty, special education, and homelessness. Black and Hispanic students are overrepresented in the Bridge-eligible samples, while white students are underrepresented. Appendices 1 and 2 show the differences in means for bridgers versus test passers and bridgers versus non-completers, respectively. There are many substantial differences across the groups including lower exit exam score among bridgers and an overrepresentation of Black, FRPL, and special education students in the groups that opts to complete Bridge. These differences support our analytic approach to match students within cells of students who are demographically similar and with similar failing exam scores.

We also conducted several disaggregated analyses and robustness checks. First, we estimate equation (1) in each subject area for student subgroups with the highest rates of both Bridge eligibility and high school non-completion in Maryland – Black students, low-income students, and special education students. Because the decision to Bridge in one subject area is likely associated with performance in other subjects, and many students are represented in multiple

subject area subsamples, we also estimate outcomes for students who were eligible to Bridge in all three subject areas. Here we control for first and second attempted exam scores in all subject areas where the student was eligible to do the Bridge program. Finally, because Bridge rates vary substantially across districts, we conduct a subgroup analysis for students in the three districts with the highest Bridge take-up rates in the state.[10]

VI. RESULTS

A. Results by Subject Areas

Table 4 shows the matched sample regression results of the effects for students who bridged relative to test passers (analytic sample 1) for each subject exam: algebra (panel A), biology (panel B), and English (panel C). Overall, we find that students who Bridge in any subject are less likely to attend college by about 6 percentage points, and about 3 percentage points less likely each at both two-year and four-year colleges, respectively. Workforce opportunities and wages for bridgers are mostly similar to test-passers. We find no effects of Bridge on the probability of employment whether the student is in college or not. For wages, bridgers who are employed and not in college earn 11.7 percent less in wages than similar students who passed the algebra exam. Based off the mean quarterly earnings for this regression subsample of approximately $1,800, bridgers earned an estimated $210 less than similar test-passers. We find no wage difference in biology and English and no differences in any subjects for students who are working and attending college.

[10] This subset includes the state's three largest and most diverse districts: Baltimore City, Baltimore County, and Prince George's County. These districts report both the highest exam failure rates and the highest Bridge completion rates in the state.

Table 5 shows matched regression results for students who bridged compared to students who did not complete high school. Here, Bridge completers are substantially better off in postsecondary and labor force opportunities. We find that students who Bridge in any subject area are more likely to attend any college by about 6-9 percentage points. This effect comes mostly from a higher likelihood of Bridge students enrolling in a two-year college. Bridge completers in all subjects are also more likely to be employed by 7-9 percentage points if not enrolled in college. For students who are not in college, bridging in biology is associated with 26 percent wage increase, and bridging in English with a 19 percent wage increase over non-completers. Bridging in algebra is associated with a 7 percent wage difference, but this coefficient is not statistically significant. For those who are enrolled in college, bridging in biology is also associated with an increased likelihood of employment and higher wages by nearly 18 percent.

B. Student Subgroup Analysis

Tables 6 and 7 show the results for the subgroup analysis for Black students (panel A), FRPL-eligible students (panel B), and special education students (panel C). In the subgroup matched regressions, we continue to include a cell fixed effect based on all other matching characteristics (race, gender, school, school district, and test-score bins). In each student subgroup, we observe that, on average, bridgers compared to test passers (Table 6) are worse off in college access and wages, but have similar rates of employment. Whereas, in each student subgroup, bridgers compared to high school non-completers (Table 7) are substantially better off in college access, employment, and wages.

Results in Table 6 reveal that Black students, free or reduced-price lunch students, and special education students who Bridge in any subject are less likely to enroll in any college after high school by 6-8 percentages points compared to similar students who were test-passers. In all

three student subgroups, those who Bridge in algebra and are not enrolled in college also have lower wages by 12-25 percent. For Black students only, bridging in biology is also associated with lower wages. However, in comparing bridgers to test-passers, we find no differences in employment rates for any of these student subgroups, and there are no wage differences for students who enroll in college.

In sharp contrast, Black, FRPL-eligible, and special education students who bridged are more likely to attend any college by 5-9 percentage points than high school non-completers, with most of these effects coming from Bridge students enrolling in a two-year college (Table 7). For those not attending college, bridgers in any subject are more likely to be employed by 7-15 percentage points, and wages are higher by up to 38 percent for Black and FRPL students who Bridge in biology or English and special education students who Bridge in English. For students who are enrolled in college, subgroups employment outcomes are similar for those who Bridge and non-completers, except for higher employment and wages for Black students who Bridge in Biology.

We also conducted subgroup analysis for students with the highest propensity to Bridge either due to individual test performance or district policies. For individual test performance, we include only students who failed all three exit exams more than once, and were thus eligible to Bridge in all subjects. For district policies, we include students from three Maryland districts with the highest Bridge completion rates. These results are reported in Appendices 3 and 4 for comparison to test passers and high school non-completers, respectively. The results are similar to those for the full samples shown in Tables 4 and 5, except that the negative effects of Bridge compared to test passers for college enrollment are concentrated among four-year college attendance for these students instead of two-year college attendance. Results comparing students

who Bridge to non-completers in these high-risk groups again show substantial employment benefits of bridging for those who are not enrolled in college.

C. Robustness of Matching Strategy

The cell-matched fixed effects estimation strategy has the advantage of controlling for unobservable group factors, but also the disadvantage of excluding students in cells where there are either all bridgers or all non-bridgers. As shown in Tables 2 and 3, we lose 25 to 40 percent of the analytic samples through this requirement. Omitted cells might include students in small schools, students in small minority groups within their schools, and students in schools and districts that either rarely use Bridge or almost always use Bridge as an intervention to promote high school completion. To probe whether our previous empirical strategy does not influence our findings, we also employ a propensity score matching (PSM) strategy with local-linear regression techniques for matching students with similar propensity scores. This second matching strategy exploits our full set of observable student characteristics to also predict the probability that a student chooses the Bridge program, and substantially more students can be included relative to the cell-matched fixed effects method, as fewer than 10 percent of students are off common support in the PSM specifications. Appendices 4 and 5 show that the PSM-matched samples achieve covariate balance across most variables, and where differences are still statistically significant, the size of group differences is substantially reduced to reflect practically similar values.

Tables 8 and 9 report average treatment effects (ATE) estimate by PSM replication of results in Tables 4 and 5, respectively.[11] PSM results are remarkably similar to those from the cell-matched fixed effects regressions. We confirm that bridgers are less likely to attend college than test passers (Table 8) with an ATE of 7-9 points percentage points, most of this effect comes from

[11] Subgroup PSM results available on request.

differences in attendance at two-year colleges. PSM also shows that when bridging in algebra only, bridgers make about 6 percent less in wages than test-passers. Unique to the PSM estimate, this wage effect is significant both for those who attend and do not attend college while employed. PSM results also confirm and strengthen the cell-matched fixed effect regression results for bridgers compared to high school non-completers (Table 9). In all three subject areas, the PSM results suggest that bridgers are more likely to attend two-year colleges, more likely to be employed if not in college, and, among those not in college, earn substantially higher wages than non-completers with a similar propensity to Bridge.

VII. CONCLUSION

High school exit exams are meant to standardize the quality of public high schools and to ensure that all students graduate with a set of basic skills and knowledge. However, a growing amount of research suggests that an unfortunate perverse effect of these exit exams is an increase of dropout for students who have difficulty passing tests, with a disproportionate effect on disadvantaged students. In response to these consistent findings, states have been rolling back their exit exam requirements (Larsen, 2020). Also, due to the recent COVID-19 pandemic, school closures and the difficulty of administering tests remotely to students, it is likely that relatively few 2020 and 2021 high school graduates were able to attempt and pass their high school exit exams.

Where tests are decreasing in popularity or feasibility, educational policy innovations to ensure standards while deemphasizing exit exams might be increasingly useful. These policies fit in a larger conversation about the burden of test-based accountability on students and the appropriate use of tests overall. Importantly, alternative pathways to high school graduation will

not serve students well if such policies allow students to graduate with inadequate human capital for college and the workforce. By examining the post-secondary outcomes of students who were eligible to participate in Maryland's Bridge program, this study begins to fill a gap in the literature on high school exit exams by analyzing the efficacy of an educational policy that allows students to graduate based on projects and portfolios instead of tests. A clear advantage of Bridge is that students exit high school with a regular diploma that provides a signal to employers that they have achieved high school graduation standards. We find that students who pursue this pathway in Maryland have substantially better post-secondary outcomes than similar students who do not complete high school.

Students who complete Bridge and test passers are likely indistinguishable to employers, because they receive the same high school diploma, and we find that Bridge completers are employed at similar rates to test passers after high school. While there is no evidence that Bridge reduces the likelihood of UI-eligible employment, there is some indication of reduced returns to schooling. Bridge completers in algebra earn about 11-25 percent lower in wages than students who retake the algebra exam after initially failing. However, we find no wage differences based on bridging in biology or English. This suggests that studying for exit exams in some subject areas might further enhance the returns to human capital for some students, while some exit exams are less useful. It is possible that math exams generate meaningful human capital, while projects and portfolios are adequate or superior at generating human capital in other subject areas. For example, our results show that Bridge completers in biology and English earn between 19-26 percent more than students who do not complete high school, suggesting a human capital benefit of project-based learning in science.

We also find that students who Bridge compared to test passers are less likely to attend either two-year or four-year colleges. Since most two-year colleges are open-enrollment, this is likely due to differences in student choices rather than to differences in college admissions probabilities. Although it is unclear in our data what might explain this, failure to pass high school exit exams might signal to students that they are also less likely to succeed in college, and non-tested pathways, such as Bridge, might be improved by provide supports and encouragement to apply to college.

Overall, our study provides initial evidence that non-test alternatives in some subjects have the potential to enhance post-secondary opportunities for students who fail exit exams without a substantial loss in human capital. Building on the aggregate statewide results of Hemelt and Marcotte (2013), we add evidence at the student level that those who complete alternative pathways to high school graduation are somewhat disadvantaged in college access compared to those who pass tests, but substantially more advantaged in both college and workforce outcomes than those students who fail to complete high school. This finding is robust to student subgroups that are most at-risk for non-completion and most drawn to non-test alternatives including special education students, low-income students, and those who fail exams in all three subjects. Overall, our study suggests that alternative pathways are a useful complement to exit exams to build human capital and prevent high school non-completion. However, special attention should be paid on the design of alternative graduation policies in order to allow graduates to be appropriately prepared for post-secondary success.

REFERENCES

Angrist, Joshua D., Parag A. Pathak, and Christopher R. Walters. 2013. "Explaining Charter School Effectiveness." *American Economic Journal: Applied Economics* 5(4): 1–27. https://doi.org/10.2307/43189451.

Dale, Stacy Berg and Krueger, Alan . 2002. Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables." *Quarterly Journal of Economics* 117(4): 1491-1527.

Dee, Thomas S., and Brian A. Jacob. 2007. "Do High School Exit Exams Influence Educational Attainment or Labor Market Performance?" In *Standards-Based Reform and the Poverty Gap. Lessons for "No Child Left Behind"*, ed. Adam Gamoran, chap. 6. Brookings Institution Press.

Heckman, James J., John Eric Humphries, Paul A. LaFontaine, and Pedro L. Rodríguez. 2012. "Taking the Easy Way Out: How the GED Testing Program Induces Students to Drop Out." *Journal of Labor Economics* 30(3): 495–520.

Heckman, James J., John Eric Humphries, and Nicholas Mader. 2011. The GED. In Handbook of the economics of education, vol. 3, ed. Eric A. Hanushek, Stephen Machin, and Ludger Woßmann, chap. 9. Amsterdam: North-Holland Elsevier.

Hemelt, Steven W., and Dave E. Marcotte. 2013. "High School Exit Exams and Dropout in an Era of Increased Accountability." *Journal of Policy Analysis and Management* 32(2): 323–49.

Holme, Jennifer Jellison, Meredith P. Richards, Jo Beth Jimerson, and Rebecca W. Cohen. 2010. "Assessing the Effects of High School Exit Examinations." *Review of Educational Research* 80 (4): 476–526.

Larsen, M. F. 2020. "High School Exit Exams are Tough on Crime: Fewer Arrests Where Diplomas Require a Test." *Education Next* 20(3): 60-66.

Maralani, Vida. 2011. "From GED to College: Age Trajectories of Nontraditional Educational Paths." *American Educational Research Journal* 48 (5): 1058–90.

Maryland State Department of Education. 2021. HSA: High School Assessment Program. https://mdk12.msde.maryland.gov/assessments/hsa/Pages/High-School-Assessments(HSA).aspx. Accessed on November 1, 2021.

McIntosh, Shelby. 2011. "State high school tests: Changes in state policies and the impact of college and career readiness movement." Washington, DC: Center for Education Policy. Accessed at https://files.eric.ed.gov/fulltext/ED530163.pdf

Ou, Dongshu. 2010. “To Leave or Not to Leave? A Regression Discontinuity Analysis of the Impact of Failing the High School Exit Exam.” *Economics of Education Review*. *Special Issue in Honor of Henry M. Levin* 29(2): 171–86.

Papay, John P., Richard J. Murnane, and John B. Willett. 2010. “The Consequences of High School Exit Examinations for Low-Performing Urban Students: Evidence From Massachusetts.” *Educational Evaluation and Policy Analysis* 32(1): 5–23.

Reardon, Sean F., Nicole Arshan, Allison Atteberry, and Michal Kurlaender. 2010. “Effects of Failing a High School Exit Exam on Course Taking, Achievement, Persistence, and Graduation.” *Educational Evaluation and Policy Analysis* 32(4): 498–520.

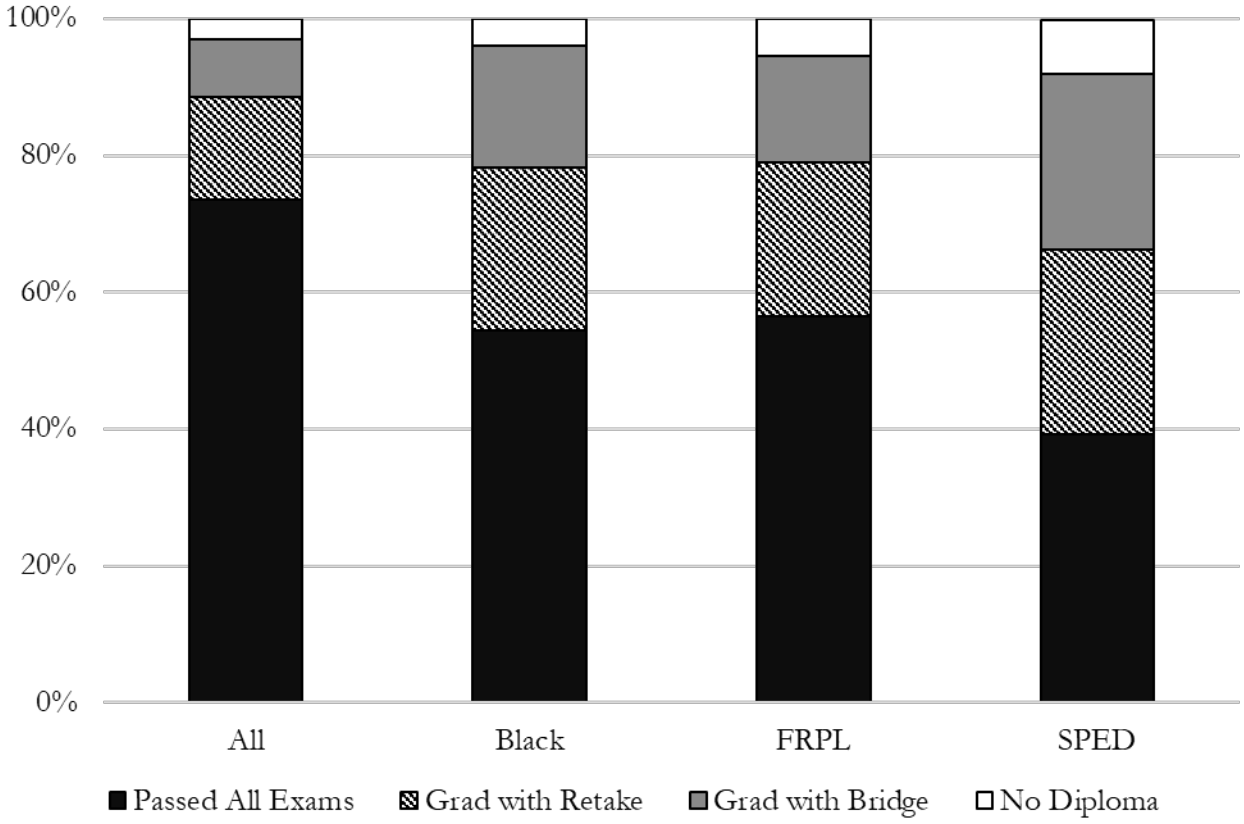
Tyler, John H., Richard J. Murnane, and John B. Willett. 2000. “Estimating the Labor Market Signaling Value of the GED.” *The Quarterly Journal of Economics* 115(2): 431–68.

Warren, John Robert, and Melanie R. Edwards. 2005. “High School Exit Examinations and High School Completion: Evidence from the Early 1990s.” *Educational Evaluation and Policy Analysis* 27(1): 53–74.

Warren, John Robert, Eric Grodsky, and Jennifer C. Lee. 2008. “State High School Exit Examinations and Postsecondary Labor Market Outcomes.” *Sociology of Education* 81(1): 77–107.

Warren, John Robert, Krista N. Jenkins, and Rachael B. Kulick. 2006. “High School Exit Examinations and State-Level Completion and GED Rates, 1975 through 2002.” *Educational Evaluation and Policy Analysis* 28(2): 131–52.

Figure 1. Pathways to On-Time Graduation for Maryland High School Seniors



Notes: Author's calculations from the Maryland Longitudinal Data Systems Center (MLDSC) Center data. Includes high school seniors from fall 2011-fall 2014 who attempted all high school exit exams. FRPL indicates if a student was ever identified as eligible for free or reduced-price lunch. SPED indicates if the student is designated as special education.

Table 1: Postsecondary Outcomes for Maryland High School Students by Pathway to High School Completion

	All	Not Eligible to Bridge	Eligible to Bridge:		
			(1) Test Passers	(2) Bridgers	(3) Non-completers
Number of Students	139,757	102,894	20,957	11,774	4,132
Percent of All Students	--	73.6%	15.0%	8.4%	3.0%
Percent of Students Eligible to Bridge	--	--	56.9%	31.9%	11.2%
Attends any college	0.692	0.786	0.536	0.369	0.059
Attends 2-year college	0.325	0.323	0.395	0.308	0.048
Attends 4-year college	0.367	0.462	0.140	0.060	0.011
Employed	0.684	0.682	0.717	0.691	0.551
Quarterly earnings if employed	$2,122	$2,070	$2,366	$2,191	$1,887
Conditioned on not attending college:					
Employed	0.673	0.677	0.705	0.687	0.545
Quarterly earnings if employed	$2,713	$2,929	$2,764	$2,356	$1,893
Conditioned on attending college:					
Employed	0.689	0.684	0.727	0.699	0.649
Quarterly earnings if employed	$1,865	$1,838	$2,031	$1,914	$1,794

Notes: Mean values for analytic sample of Maryland high school seniors who attempted all required exit exams. Students were eligible to Bridge after failing a subject exit exam twice. *Bridgers* are students who completed the Bridge program and graduated high school. *Test passers* are students who passed all exit exams on re-takes and graduated high school. *Non-completers* are students who failed to complete high school. All postsecondary outcomes are measured in the first year after on-time high school graduation. Quarterly earnings are the average of up to four quarters worked.

Table 2: Summary Statistics for Analytic Sample of Bridgers and Test Passers

	Panel A: All Students by Exam Subject			Panel B: Matched Sample by Exam Subject		
	Algebra	Biology	English	Algebra	Biology	English
Completed Bridge	0.371	0.529	0.424	0.399	0.514	0.443
	(0.483)	(0.499)	(0.494)	(0.490)	(0.500)	(0.497)
Exit exam scores (points from passing):						
Second attempt in Bridge subject	-29.859	-29.954	-25.716	-28.836	-26.030	-23.113
	(30.370)	(31.298)	(27.490)	(28.108)	(26.637)	(23.870)
First attempt - Algebra	-30.273	-24.962	-20.448	-30.564	-24.300	-21.252
	(29.879)	(35.260)	(35.447)	(29.284)	(33.931)	(34.130)
First attempt - Biology	-12.309	-27.593	-14.986	-13.401	-26.784	-15.822
	(32.730)	(29.277)	(33.013)	(32.507)	(28.509)	(32.457)
First attempt - English	-14.642	-20.426	-24.958	-14.628	-18.852	-24.218
	(29.227)	(29.700)	(26.139)	(28.895)	(28.436)	(25.178)
Number of subjects eligible to Bridge	2.077	2.373	2.184	2.107	2.357	2.229
	(0.835)	(0.728)	(0.805)	(0.831)	(0.728)	(0.788)
Demographics:						
Female	0.545	0.549	0.558	0.569	0.434	0.440
Black	0.636	0.734	0.643	0.714	0.572	0.646
Hispanic/Latino	0.120	0.086	0.114	0.082	0.122	0.094
White	0.129	0.099	0.133	0.125	0.187	0.175
Special Needs:						
Free/Reduced Lunch Eligible	0.687	0.736	0.712	0.741	0.686	0.731
Title I	0.189	0.200	0.176	0.223	0.220	0.200
English language learner	0.043	0.045	0.051	0.036	0.034	0.044
Special education	0.206	0.208	0.236	0.183	0.184	0.213
Homeless	0.033	0.035	0.032	0.034	0.035	0.033
Grade 8 Student Characteristics:						
Days absent	9.632	9.646	9.464	9.554	9.600	9.495
	(8.831)	(8.790)	(8.709)	(8.829)	(8.829)	(8.805)
Times suspended	0.326	0.360	0.371	0.323	0.355	0.374
	(0.971)	(1.035)	(1.048)	(0.965)	(1.035)	(1.059)
Math exam (z-score)	-0.094	-0.088	-0.083	-0.094	-0.087	-0.084
	(0.041)	(0.047)	(0.050)	(0.041)	(0.047)	(0.048)
Reading exam (z-score)	-0.074	-0.082	-0.086	-0.074	-0.080	-0.086
	(0.055)	(0.053)	(0.050)	(0.054)	(0.052)	(0.049)
Science exam (z-score)	-0.118	-0.135	-0.123	-0.121	-0.132	-0.125
	(0.080)	(0.076)	(0.081)	(0.080)	(0.075)	(0.079)
Number of students	22,508	16,860	20,283	16,667	12,598	15,021
Number of cells	4,583	3,890	4,391	1,640	1,428	1,629

Notes: Means (standard deviations in parentheses) of student characteristics for students in analytic sample for Bridge completers and test-passers. Students are eligible for Bridge after failing an exit exam twice. Table 2 sample includes eligible students who graduated by completing Bridge or by passing all exit exams. Panel A includes all students who are eligible to bridge in each subject. Panel B is the restricted sample of students included in cell-matched regression analysis. Cells identify students with the same school district, school, gender, race, free-lunch eligibility, and with a score bin on the second failed subject exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Cells included in Panel B must include at least one Bridge completer and one test-passer within the same cell.

Table 3: Summary Statistics for Analytic Sample of Bridgers and High School Non-Completers

	Panel A: All Students by Exam Subject			Panel B: Matched Sample by Exam Subject		
	Algebra	Biology	English	Algebra	Biology	English
Completed Bridge	0.740	0.837	0.788	0.702	0.776	0.731
	(0.439)	(0.370)	(0.409)	(0.457)	(0.417)	(0.443)
Exit exam scores (points from passing):						
Second attempt in Bridge subject	-42.153	-38.305	-35.064	-38.093	-33.974	-29.716
	(36.455)	(35.374)	(32.398)	(33.853)	(32.070)	(28.421)
First attempt - Algebra	-42.059	-37.869	-37.528	-40.616	-38.066	-37.583
	(35.839)	(37.636)	(37.803)	(34.737)	(37.414)	(36.972)
First attempt - Biology	-30.149	-35.366	-31.093	-29.940	-34.576	-30.794
	(35.243)	(33.715)	(35.500)	(34.816)	(33.575)	(35.053)
First attempt - English	-30.032	-30.881	-34.273	-28.936	-29.324	-31.649
	(32.622)	(32.421)	(31.354)	(32.423)	(32.070)	(30.031)
Number of subjects eligible to Bridge	2.611	2.698	2.664	2.599	2.683	2.675
	(0.611)	(0.519)	(0.555)	(0.617)	(0.531)	(0.545)
Demographics:						
Female	0.508	0.497	0.521	0.506	0.468	0.474
Black	0.685	0.762	0.688	0.779	0.661	0.757
Hispanic/Latino	0.129	0.105	0.122	0.099	0.128	0.111
White	0.071	0.034	0.079	0.027	0.097	0.03
Special Needs:						
Free/Reduced Lunch Eligible	0.771	0.831	0.771	0.846	0.766	0.823
Title I	0.251	0.246	0.239	0.288	0.303	0.284
English language learner	0.059	0.059	0.064	0.053	0.048	0.057
Special education	0.274	0.265	0.283	0.231	0.231	0.247
Homeless	0.041	0.042	0.042	0.043	0.046	0.042
Grade 8 Student Characteristics:						
Days absent	10.750	10.429	10.484	10.809	10.552	10.412
	(9.992)	(9.600)	(9.712)	(10.075)	(9.867)	(9.757)
Times suspended	0.405	0.408	0.418	0.390	0.397	0.403
	(1.078)	(1.085)	(1.106)	(1.054)	(1.090)	(1.119)
Math exam (z-score)	-0.109	-0.104	-0.104	-0.107	-0.104	-0.104
	(0.040)	(0.043)	(0.043)	(0.041)	(0.044)	(0.044)
Reading exam (z-score)	-0.098	-0.099	-0.102	-0.095	-0.096	-0.099
	(0.052)	(0.051)	(0.050)	(0.052)	(0.052)	(0.049)
Science exam (z-score)	-0.156	-0.159	-0.157	-0.154	-0.157	-0.157
	(0.078)	(0.076)	(0.078)	(0.078)	(0.077)	(0.077)
Number of students	12,258	11,451	11,774	8,187	6,771	7,392
Number of cells	3,363	3,181	3,328	1,084	837	976

Notes: Means (standard deviations in parentheses) of student characteristics for students in analytic sample for Bridge completers and high school non-completers. Students are eligible for Bridge after failing an exit exam twice. Table 3 sample includes eligible students who graduated by completing Bridge and those who did not complete high school. Panel A includes all students who are eligible to bridge in each subject. Panel B is the restricted sample of students included in cell-matched regression analysis. Cells identify students with the same school district, school, gender, race, free-lunch eligibility, and with a score bin on the second failed subject exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Cells included in Panel B must include at least one Bridge completer and one high school non-completer within the same cell.

Table 4: Cell-Matched Fixed Effects Regression Results - Bridgers vs. Test Passers

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college
				Panel A: Algebra			
Bridged	-0.063**	-0.032**	-0.031**	0.003	-0.117**	-0.006	-0.032
	(0.010)	(0.010)	(0.006)	(0.013)	(0.033)	(0.016)	(0.037)
Observations	16,667	16,667	16,667	9,069	6,227	7,598	5,376
R^2	0.04	0.01	0.03	0.03	0.01	0.02	0.05
Number of cells	1,640	1,640	1,640	1,545	1,398	1,431	1,297
Mean (y-variable)	0.46	0.35	0.11	0.69	7.48	0.71	7.27
Sample Bridge Rate	0.40	0.40	0.40	0.47	0.47	0.32	0.31
				Panel B: Biology			
Bridged	-0.066**	-0.032**	-0.034**	0.021	-0.025	0.023	-0.032
	(0.011)	(0.011)	(0.007)	(0.014)	(0.036)	(0.016)	(0.038)
Observations	12,598	12,598	12,598	6,997	4,969	5,601	4,087
R^2	0.04	0.02	0.04	0.03	0.02	0.02	0.01
Number of cells	1,428	1,428	1,428	1,335	1,229	1,235	1,132
Mean (y-variable)	0.45	0.35	0.10	0.71	7.49	0.73	7.31
Sample Bridge Rate	0.51	0.51	0.51	0.58	0.57	0.43	0.43
				Panel C: English			
Bridged	-0.061**	-0.041**	-0.020**	0.020	-0.007	-0.015	0.007
	(0.010)	(0.010)	(0.006)	(0.013)	(0.032)	(0.016)	(0.040)
Observations	15,021	15,021	15,021	8,780	6,159	6,241	4,460
R^2	0.03	0.01	0.02	0.03	0.02	0.02	0.01
Number of cells	1,629	1,629	1,629	1,532	1,418	1,405	1,280
Mean (y-variable)	0.42	0.33	0.08	0.70	7.57	0.72	7.34
Sample Bridge Rate	0.44	0.44	0.44	0.49	0.49	0.37	0.37

Notes: The estimated effects of Bridge on postsecondary outcomes are measured in first year after on-time high school graduation. Standard errors are in parentheses. Results based on matched OLS regression with cell fixed effects. Fixed effect is district x school x race x gender x free or reduced priced lunch eligibility x distance from passing second exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Includes students from cells with at least one Bridger and at least one test-passer. Regressions also control for second attempted exit exam scores in Bridge subject, first attempted exit exams scores in all subjects (algebra, biology, and English), number of subjects in which the student was eligible to Bridge, 8th grade student characteristics (attendance, suspensions, and exam scores in math, reading, and science), and high school cohort fixed effects. **p<0.01, *p<0.05.

Table 5: Cell-Matched Fixed Effects Regression Results - Bridgers vs. High School Non-Completers

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college
				Panel A: Algebra			
Bridged	0.072**	0.072**	0.000	0.066**	0.069	0.037	-0.042
	(0.012)	(0.011)	(0.006)	(0.015)	(0.044)	(0.028)	(0.073)
Observations	8,187	8,187	8,187	5,684	3,636	2,503	1,753
R^2	0.03	0.03	0.01	0.04	0.02	0.03	0.02
Number of cells	1,084	1,084	1,084	1,064	967	771	677
Mean (y-variable)	0.31	0.25	0.05	0.64	7.34	0.70	7.28
Sample Bridge Rate	0.70	0.70	0.70	0.68	0.70	0.76	0.76
				Panel B: Biology			
Bridged	0.088**	0.078**	0.010	0.086**	0.260**	0.067*	0.178*
	(0.014)	(0.014)	(0.007)	(0.018)	(0.052)	(0.032)	(0.087)
Observations	6,771	6,771	6,771	4,625	2,999	2,146	1,529
R^2	0.04	0.02	0.01	0.05	0.03	0.03	0.03
Number of cells	837	837	837	818	749	631	564
Mean (y-variable)	0.32	0.26	0.06	0.65	7.35	0.71	7.25
Sample Bridge Rate	0.78	0.78	0.78	0.75	0.77	0.84	0.85
				Panel C: English			
Bridged	0.059**	0.054**	0.005	0.093**	0.191**	0.004	0.084
	(0.013)	(0.012)	(0.006)	(0.016)	(0.046)	(0.028)	(0.069)
Observations	7,392	7,392	7,392	5,124	3,305	2,268	1,574
R^2	0.03	0.02	0.01	0.04	0.04	0.03	0.04
Number of cells	976	976	976	953	877	706	622
Mean (y-variable)	0.31	0.25	0.05	0.65	7.37	0.69	7.28
Sample Bridge Rate	0.73	0.73	0.73	0.71	0.74	0.77	0.77

Notes: The estimated effects of Bridge on postsecondary outcomes are measured in first year after on-time high school graduation. Standard errors are in parentheses. Results based on matched OLS regression with cell fixed effects. Fixed effect is district x school x race x gender x free or reduced priced lunch eligibility x distance from passing second exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Includes students from cells with at least one Bridger and at least one high school non-completer. Regressions also control for second attempted exit exam scores in Bridge subject, first attempted exit exams scores in all subjects (algebra, biology, and English), number of subjects in which the student was eligible to Bridge, 8th grade student characteristics (attendance, suspensions, and exam scores in math, reading, and science), and high school cohort fixed effects. **p<0.01, *p<0.05.

Table 6: Cell-Matched Fixed Effects Regression Results - Bridgers vs. Test Passers by Student Subgroups

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college	
				Panel A: Black Students				N in matched subgroup:
Algebra	-0.072**	-0.029*	-0.041**	-0.004	-0.172**	-0.008	-0.028	12,235
	(0.012)	(0.012)	(0.008)	(0.016)	(0.039)	(0.017)	(0.039)	
Biology	-0.068**	-0.018	-0.051**	0.014	-0.118**	0.025	-0.043	9,000
	(0.013)	(0.013)	(0.008)	(0.017)	(0.045)	(0.018)	(0.042)	
English	-0.076**	-0.041**	-0.035**	0.022	-0.065	-0.016	-0.021	9,705
	(0.012)	(0.012)	(0.008)	(0.017)	(0.041)	(0.018)	(0.044)	
				Panel B: Free and Reduced Lunch Eligible Students				N in matched subgroup:
Algebra	-0.059**	-0.032**	-0.026**	0.011	-0.115**	0.006	-0.040	12,260
	(0.011)	(0.011)	(0.007)	(0.015)	(0.037)	(0.018)	(0.042)	
Biology	-0.062**	-0.036**	-0.027**	0.021	-0.051	0.034	-0.064	9,335
	(0.012)	(0.012)	(0.007)	(0.016)	(0.041)	(0.019)	(0.044)	
English	-0.065**	-0.048**	-0.017**	0.025	-0.029	-0.003	-0.015	10,981
	(0.012)	(0.011)	(0.007)	(0.015)	(0.037)	(0.019)	(0.046)	
				Panel C: Special Education Students				N in matched subgroup:
Algebra	-0.078**	-0.063*	-0.015	-0.009	-0.247*	-0.033	-0.085	3,051
	(0.026)	(0.026)	(0.013)	(0.038)	(0.104)	(0.064)	(0.172)	
Biology	-0.072*	-0.049	-0.023	0.045	-0.003	-0.029	0.024	2,316
	(0.030)	(0.029)	(0.014)	(0.044)	(0.135)	(0.075)	(0.207)	
English	-0.074**	-0.063**	-0.011	-0.026	0.161	-0.032	0.157	3,206
	(0.025)	(0.024)	(0.012)	(0.035)	(0.094)	(0.064)	(0.182)	

Notes: Table 6 shows estimated effect of Bridge (standard errors in parentheses) in first year after on-time high school graduation. Students are included as Black, free or reduced priced lunch eligibility, or special education if they were ever identified in those groups in K-12 administrative data. Results based on matched OLS regression with cell fixed effects. Fixed effect is district x school x race x gender x free or reduced priced lunch eligibility x distance from passing second exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Includes students from cells with at least one Bridger and at least one test-passer. Regressions also control for: second attempted exit exam scores in algebra; first attempted exit exams scores in all subjects (algebra, biology, and English); number of subjects in which the student was eligible to Bridge; 8th grade attendance, suspensions, and exam scores in math, reading, and science; student's needs (special education in panels A and B only, Title I, homeless); and high school cohort fixed effects. **p<0.01, *p<0.05.

Table 7: Cell-Matched Fixed Effects Regression Results - Bridgers vs. High School Non-Completers by Student Subgroups

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college	N in matched subgroup:
	Panel A: Black Students							
Algebra	0.080**	0.078**	0.003	0.073**	0.023	0.029	-0.044	6,238
	(0.014)	(0.014)	(0.008)	(0.018)	(0.052)	(0.030)	(0.074)	
Biology	0.094**	0.088**	0.006	0.106**	0.195**	0.078*	0.185*	5,272
	(0.017)	(0.016)	(0.009)	(0.022)	(0.064)	(0.035)	(0.093)	
English	0.055**	0.052**	0.002	0.111**	0.134*	0.008	0.058	5,595
	(0.015)	(0.015)	(0.008)	(0.020)	(0.055)	(0.030)	(0.072)	
	Panel B: Free and Reduced Lunch Eligible Students							N in matched subgroup:
Algebra	0.073**	0.071**	0.002	0.072**	0.066	0.039	-0.030	6,802
	(0.013)	(0.012)	(0.006)	(0.016)	(0.047)	(0.031)	(0.080)	
Biology	0.090**	0.084**	0.007	0.088**	0.226**	0.065	0.121	5,727
	(0.015)	(0.015)	(0.008)	(0.019)	(0.057)	(0.036)	(0.096)	
English	0.058**	0.054**	0.003	0.099**	0.198**	0.019	0.070	6,081
	(0.014)	(0.013)	(0.007)	(0.018)	(0.051)	(0.032)	(0.080)	
	Panel C: Special Education Students							N in matched subgroup:
Algebra	0.085**	0.069*	0.017	0.106**	0.033	-0.115	0.684	1,888
	(0.029)	(0.027)	(0.013)	(0.041)	(0.138)	(0.127)	(0.373)	
Biology	0.066	0.054	0.012	0.148**	0.144	-0.097	0.630	1,564
	(0.035)	(0.033)	(0.015)	(0.047)	(0.166)	(0.127)	(0.575)	
English	0.078**	0.064*	0.011	0.090*	0.386**	0.009	0.110	1,823
	(0.029)	(0.027)	(0.013)	(0.042)	(0.133)	(0.136)	(0.503)	

Notes: Table 7 shows estimated effect of Bridge (standard errors in parentheses) in first year after on-time high school graduation. Students are included as Black, free or reduced priced lunch eligibility, or special education if they were ever identified in those groups in K-12 administrative data. Results based on matched OLS regression with cell fixed effects. Fixed effect is district x school x race x gender x free or reduced priced lunch eligibility x distance from passing second exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Includes students from cells with at least one Bridger and at least one high school Non-completer. Regressions also control for: second attempted exit exam scores in algebra; first attempted exit exams scores in all subjects (algebra, biology, and English); number of subjects in which the student was eligible to Bridge; 8th grade attendance, suspensions, and exam scores in math, reading, and science; student's needs (special education in panels A and B only, Title I, homeless); and high school cohort fixed effects. **p<0.01, *p<0.05.

Table 8: Propensity Score Matching Results - Bridgers vs. Test Passers

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college
				Panel A: Algebra			
Bridged	-0.085**	-0.048**	-0.040**	0.008	-0.062**	-0.014	-0.056**
	(0.015)	(0.015)	(0.009)	(0.019)	(0.042)	(0.021)	(0.048)
N of matched observations:							
Bridgers	8,342	8,342	8,342	5,385	3,630	2,957	2,049
Test passers	14,166	14,166	14,166	6,739	4,649	7,427	5,335
N off common support:							
Bridgers	2	2	2	3	33	0	6
Test passers	1,171	1,171	1,171	416	576	763	525
				Panel B: Biology			
Bridged	-0.075**	-0.046**	-0.029**	0.015	-0.014	-0.004	-0.027
	(0.015)	(0.015)	(0.009)	(0.019)	(0.048)	(0.021)	(0.049)
N of matched observations:							
Bridgers	8,920	8,920	8,920	5,668	3,891	3,252	2,299
Test passers	7,940	7,940	7,940	3,781	2,749	4,159	3,077
N off common support:							
Bridgers	24	24	24	20	21	35	22
Test passers	54	54	54	157	198	29	18
				Panel C: English			
Bridged	-0.076**	-0.054**	-0.022**	0.018	-0.015	0.010	0.017
	(0.015)	(0.015)	(0.008)	(0.019)	(0.047)	(0.021)	(0.049)
N of matched observations:							
Bridgers	8,593	8,593	8,593	5,690	3,900	2,903	2,020
Test passers	11,690	11,690	11,690	6,104	4,305	5,586	4,030
N off common support:							
Bridgers	6	6	6	4	24	20	18
Test passers	368	368	368	116	606	793	636

Notes: Estimated average treatment effect (ATE) of Bridge on postsecondary outcomes in first year after on-time high school graduation. Results based on matched local linear regression propensity score matching (PSM). Propensity scores are estimated as a function of student characteristics (Title I, free or reduced priced lunch eligibility, special education, homeless, English language learner); student demographics (race, gender); scores on the second failed subject exam; first attempted exit exams scores in all subjects (algebra, biology, and English); number of subjects in which the student was eligible to Bridge; 8th grade attendance, suspensions, and exam scores in math, reading, and science; and high school cohort fixed effects. Matching excludes observations that were off common support. **p<0.01, *p<0.05.

Table 9: Propensity Score Matching Results - Bridgers vs. High School Non-Completers

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college
				Panel A: Algebra			
Bridged	0.079**	0.077**	0.002	0.076**	0.119**	-0.000	-0.029
	(0.014)	(0.013)	(0.007)	(0.018)	(0.048)	(0.033)	(0.075)
N of matched observations:							
Bridgers	9,073	9,073	9,073	6,102	3,971	2,971	2,057
Non-completers	3,185	3,185	3,185	2,413	1,456	772	544
N off common support:							
Bridgers	15	15	15	16	21	3	1
Non-completers	1	1	1	0	7	4	1
				Panel B: Biology			
Bridged	0.097**	0.089**	0.008	0.093**	0.230**	0.067	0.188**
	(0.015)	(0.014)	(0.007)	(0.020)	(0.055)	(0.036)	(0.093)
N of matched observations:							
Bridgers	9,579	9,579	9,579	6,310	4,198	3,269	2,311
Non-completers	1,872	1,872	1,872	1,475	879	397	261
N off common support:							
Bridgers	1	1	1	0	1	10	5
Non-completers	1	1	1	4	4	0	1
				Panel C: English			
Bridged	0.073**	0.072**	0.000	0.106**	0.163**	0.056	0.063
	(0.014)	(0.013)	(0.007)	(0.019)	(0.050)	(0.034)	(0.087)
N of matched observations:							
Bridgers	9,276	9,276	9,276	6,358	4,220	2,918	2,030
Non-completers	2,498	2,498	2,498	1,875	1,115	623	427
N off common support:							
Bridgers	0	0	0	1	56	2	26
Non-completers	5	5	5	3	1	0	1

Notes: Estimated average treatment effect (ATE) of Bridge on postsecondary outcomes in first year after on-time high school graduation. Results based on matched local linear regression propensity score matching (PSM). Propensity scores are estimated as a function of student characteristics (Title I, free or reduced priced lunch eligibility, special education, homeless, English language learner); student demographics (race, gender); scores on the second failed subject exam; first attempted exit exams scores in all subjects (algebra, biology, and English); number of subjects in which the student was eligible to Bridge; 8th grade attendance, suspensions, and exam scores in math, reading, and science; and high school cohort fixed effects. Matching excludes observations that were off common support. **p<0.01, *p<0.05.

Appendix 1: Comparison of Means for Bridgers vs. Test Passers Among Students Eligible to Bridge

	Panel A: Algebra				Panel B: Biology				Panel C: English			
	Bridgers	Test Passers	Diff.		Bridgers	Test Passers	Diff.		Bridgers	Test Passers	Diff.	
Exit exams (distance from passing):												
Second failed exam	-46.173	-20.253	-25.920	**	-38.795	-20.021	-18.775	**	-36.409	-17.857	-18.552	**
First attempt - Algebra	-44.995	-21.604	-23.391	**	-37.278	-11.125	-26.153	**	-37.718	-7.753	-29.966	**
First attempt - Biology	-31.120	-1.232	-29.887	**	-35.264	-18.975	-16.289	**	-31.585	-2.785	-28.800	**
Fist attempt -English	-30.172	-5.496	-24.675	**	-30.247	-9.393	-20.854	**	-35.341	-17.326	-18.016	**
Number of eligible Bridge subjects	2.658	1.735	0.923	**	2.713	1.992	0.720	**	2.699	1.805	0.894	**
Demographics:												
Male	0.452	0.457	-0.004		0.446	0.437	0.009		0.517	0.603	-0.086	**
Asian	0.013	0.019	-0.006	**	0.016	0.018	-0.003		0.017	0.024	-0.007	**
Black	0.729	0.581	0.148	**	0.712	0.567	0.145	**	0.682	0.491	0.191	**
Hispanic	0.107	0.128	-0.021	**	0.107	0.122	-0.015	**	0.112	0.129	-0.016	**
Multi race	0.060	0.076	-0.016	**	0.061	0.073	-0.011	**	0.060	0.073	-0.013	**
Other race	0.024	0.030	-0.005	*	0.024	0.028	-0.005	*	0.026	0.032	-0.006	*
Special Needs:												
Free/reduced lunch eligible	0.768	0.640	0.129	**	0.763	0.655	0.109	**	0.764	0.628	0.136	**
Title I	0.268	0.143	0.125	**	0.249	0.144	0.105	**	0.251	0.121	0.129	**
English language learner	0.052	0.037	0.015	**	0.055	0.033	0.022	**	0.063	0.042	0.021	**
Special education	0.279	0.163	0.117	**	0.258	0.153	0.105	**	0.278	0.205	0.074	**
Homeless	0.037	0.030	0.007	**	0.039	0.030	0.008	**	0.038	0.028	0.009	**
8th Grade Outcomes:												
Absences	10.211	9.291	0.920	**	9.971	9.281	0.690	**	9.980	9.085	0.895	**
Suspensions	0.375	0.297	0.078	**	0.389	0.328	0.061	**	0.396	0.353	0.043	**
Math z-score	-0.113	-0.082	-0.032	**	-0.104	-0.071	-0.034	**	-0.105	-0.067	-0.038	**
Reading z-score	-0.099	-0.060	-0.039	**	-0.099	-0.064	-0.035	**	-0.105	-0.073	-0.032	**
Science z-score	-0.160	-0.094	-0.066	**	-0.161	-0.104	-0.057	**	-0.161	-0.095	-0.066	**
	8,342	14,166			9,820	7,940			8,593	11,690		

Notes: Includes students who failed a subject exam at least twice. Stars show significance of two-tailed t-test. **p<0.01, *p<0.05.

Appendix 2: Comparison of Means for Bridgers vs. High School Non-Completers Among Students Eligible to Bridge

	Panel A: Algebra				Panel B: Biology				Panel C: English			
	Bridgers	Non-Completers	Diff.		Bridgers	Non-Completers	Diff.		Bridgers	Non-Completers	Diff.	
Exit exams (distance from passing):												
Second failed exam	-46.673	-29.278	-17.395	**	-39.396	-32.722	-6.674	**	-37.109	-27.471	-9.639	**
First attempt - Algebra	-45.790	-31.431	-14.359	**	-38.154	-36.408	-1.746		-38.677	-33.263	-5.414	**
First attempt - Biology	-32.099	-24.592	-7.507	**	-36.151	-31.350	-4.801	**	-32.533	-25.746	-6.787	**
Fist attempt -English	-31.288	-26.453	-4.835	**	-31.177	-29.370	-1.807	*	-36.217	-27.056	-9.161	**
Number of eligible Bridge subjects	2.661	2.469	0.193	**	2.719	2.587	0.133	**	2.703	2.520	0.183	**
Demographics:												
Male	0.467	0.562	-0.096	**	0.459	0.582	-0.123	**	0.527	0.549	-0.021	
Asian	0.013	0.014	0.000		0.015	0.010	0.005		0.016	0.009	0.007	**
Black	0.723	0.575	0.149	**	0.709	0.583	0.126	**	0.680	0.587	0.093	**
Hispanic	0.116	0.164	-0.047	**	0.114	0.165	-0.051	**	0.119	0.161	-0.042	**
Multi race	0.065	0.095	-0.030	**	0.065	0.095	-0.029	**	0.064	0.092	-0.028	**
Other race	0.026	0.039	-0.013	**	0.025	0.037	-0.012	**	0.027	0.038	-0.011	**
Special Needs:												
Free/reduced lunch eligible	0.774	0.762	0.012		0.769	0.776	-0.006		0.770	0.752	0.018	
Title I	0.272	0.190	0.082	**	0.252	0.217	0.034	**	0.254	0.183	0.072	**
English language learner	0.056	0.065	-0.009		0.059	0.059	-0.001		0.066	0.054	0.013	*
Special education	0.284	0.243	0.042	**	0.262	0.276	-0.014		0.283	0.283	0.000	
Homeless	0.038	0.048	-0.010	*	0.040	0.050	-0.010		0.039	0.053	-0.014	**
8th Grade Outcomes:												
Absences	10.461	11.572	-1.111	**	10.189	11.655	-1.466	**	10.223	11.453	-1.230	**
Suspensions	0.380	0.474	-0.093	**	0.394	0.479	-0.085	**	0.403	0.471	-0.068	**
Math z-score	-0.114	-0.094	-0.020	**	-0.105	-0.101	-0.004	**	-0.106	-0.099	-0.007	**
Reading z-score	-0.100	-0.091	-0.009	**	-0.100	-0.093	-0.007	**	-0.106	-0.088	-0.018	**
Science z-score	-0.162	-0.138	-0.023	**	-0.163	-0.140	-0.023	**	-0.163	-0.138	-0.024	**
	9,073	3,185			9,579	1,872			9,276	2,498		

Notes: Includes students who failed a subject exam at least twice. Stars show significance of two-tailed t-test. **p<0.01, *p<0.05.

Appendix 3: Cell-Matched Fixed Effects Regression Results -
The Effect of Bridge vs. Test Passers for High-Risk Students and School Districts

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college	N in matched subgroup:
	Panel A: Students Eligible to Bridge in All Subjects							
Algebra	-0.056**	-0.015	-0.041**	-0.021	-0.152**	0.006	-0.021	6,737
	(0.015)	(0.015)	(0.008)	(0.020)	(0.054)	(0.027)	(0.068)	
Biology	-0.070**	-0.028	-0.042**	0.023	0.023	0.013	0.051	6,394
	(0.016)	(0.015)	(0.008)	(0.021)	(0.056)	(0.027)	(0.069)	
English	-0.072**	-0.036*	-0.035**	0.008	-0.002	0.003	0.075	6,781
	(0.015)	(0.014)	(0.008)	(0.020)	(0.053)	(0.025)	(0.065)	
	Panel B: School Districts with High Bridge Rates							N in matched subgroup:
Algebra	-0.055**	-0.011	-0.043**	0.001	-0.132**	0.003	-0.021	11,369
	(0.012)	(0.012)	(0.008)	(0.016)	(0.040)	(0.018)	(0.043)	
Biology	-0.073**	-0.021	-0.053**	0.026	-0.073	0.031	-0.033	8,370
	(0.013)	(0.013)	(0.008)	(0.018)	(0.046)	(0.019)	(0.045)	
English	-0.068**	-0.037**	-0.031**	0.025	-0.022	-0.011	-0.014	8,413
	(0.013)	(0.013)	(0.008)	(0.017)	(0.043)	(0.020)	(0.049)	

Notes: Table shows estimated effect of Bridge (standard errors in parentheses) in first year after on-time high school graduation. Students in Panel A failed all three subject exams at least two times. Students in Panel B are enrolled in school districts where more than 30% of students were eligible to Bridge. Results based on matched OLS regression with cell fixed effects. Fixed effect is district x school x race x gender x free or reduced priced lunch eligibility x distance from passing second exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Includes students from cells with at least one Bridger and at least one Test-Passer. Regressions also control for: second attempted exit exam scores in algebra; first attempted exit exams scores in all subjects (algebra, biology, and English); number of subjects in which the student was eligible to Bridge; 8th grade attendance, suspensions, and exam scores in math, reading, and science; student's needs (special education in panels A and B only, Title I, homeless); and high school cohort fixed effects. **p<0.01, *p<0.05.

Appendix 4: Cell-Matched Fixed Effects Regression Results -

The Effect of Bridge vs. High School Non-completers for High-Risk Students and School Districts

	(1) Any College	(2) Two-Year College	(3) Four-Year College	(4) Employed, not in college	(5) Earnings (ln), not in college	(6) Employed, in college	(7) Earnings (ln), in college	N in matched subgroup:
	Panel A: Students Eligible to Bridge in All Subjects							
Algebra	0.028	0.037*	-0.010	0.052*	-0.040	0.047	-0.040	5,481
	(0.016)	(0.015)	(0.008)	(0.021)	(0.060)	(0.036)	(0.099)	
Biology	0.053**	0.061**	-0.006	0.105**	0.263**	0.079	0.191	4,842
	(0.018)	(0.017)	(0.008)	(0.022)	(0.066)	(0.043)	(0.117)	
English	0.016	0.020	-0.004	0.095**	0.136*	0.030	0.160	5,273
	(0.016)	(0.016)	(0.008)	(0.021)	(0.062)	(0.033)	(0.087)	
	Panel B: School Districts with High Bridge Rates							N in matched subgroup:
Algebra	0.087**	0.088**	0.000	0.070**	0.049	0.042	-0.024	6,011
	(0.015)	(0.014)	(0.007)	(0.018)	(0.052)	(0.031)	(0.084)	
Biology	0.070**	0.072**	-0.002	0.093**	0.187**	0.092*	0.184	5,054
	(0.018)	(0.017)	(0.009)	(0.022)	(0.064)	(0.036)	(0.098)	
English	0.040*	0.040**	-0.000	0.102**	0.169**	0.005	0.087	5,160
	(0.016)	(0.015)	(0.008)	(0.020)	(0.057)	(0.031)	(0.077)	

Notes: Table shows estimated effect of Bridge (standard errors in parentheses) in first year after on-time high school graduation. Students in Panel A failed all three subject exams at least two times. Students in Panel B are enrolled in school districts where more than 30% of students were eligible to Bridge. Results based on matched OLS regression with cell fixed effects. Fixed effect is district x school x race x gender x free or reduced priced lunch eligibility x distance from passing second exam (1-25 points below passing, 26-50 points below passing, or >50 points from passing). Includes students from cells with at least one Bridger and at least one high school Non-completer. Regressions also control for: second attempted exit exam scores in algebra; first attempted exit exams scores in all subjects (algebra, biology, and English); number of subjects in which the student was eligible to Bridge; 8th grade attendance, suspensions, and exam scores in math, reading, and science; student's needs (special education in panels A and B only, Title I, homeless); and high school cohort fixed effects. **p<0.01, *p<0.05.

Appendix 5: Covariate Balance for Bridgers vs. Test Passers After Prospensity Score Matching

	Panel A: Algebra				Panel B: Biology				Panel C: English			
	Bridgers	Test Passers	Diff.		Bridgers	Test Passers	Diff.		Bridgers	Test Passers	Diff.	
Exit exam scores (points from passing):												
Second attempt in Bridge subject	-46.14	-44.78	-1.36	*	-38.517	-39.034	0.52		-36.33	-35.25	-1.08	*
First attempt - Algebra	-44.98	-45.97	0.99		-37.051	-37.956	0.91		-37.67	-37.21	-0.46	
First attempt - Biology	-31.10	-31.76	0.67		-35.002	-35.162	0.16		-31.50	-34.93	3.43	*
Fist attempt - English	-30.16	-31.64	1.48	*	-29.976	-29.146	-0.83		-35.26	-36.76	1.50	*
Number of subjects eligible to Bridge	2.66	2.66	0.00		2.712	2.734	-0.02	*	2.70	2.71	-0.01	
Demographics:												
Male	0.452	0.475	-0.02	*	0.446	0.475	-0.03	*	0.517	0.544	-0.03	*
Asian	0.013	0.012	0.00		0.016	0.014	0.00		0.017	0.014	0.00	
Black	0.729	0.729	0.00		0.711	0.704	0.01		0.682	0.664	0.02	*
Hispanic	0.107	0.093	0.01	*	0.107	0.103	0.00		0.113	0.104	0.01	
Multi race	0.060	0.050	0.01	*	0.062	0.058	0.00		0.060	0.054	0.01	
Other race	0.024	0.026	0.00		0.024	0.023	0.00		0.026	0.025	0.00	
Special Needs:												
Free/reduced lunch eligible	0.768	0.760	0.01		0.763	0.757	0.01		0.764	0.748	0.02	*
Title I	0.268	0.266	0.00		0.248	0.226	0.02	*	0.250	0.234	0.02	*
English language learner	0.052	0.050	0.00		0.055	0.058	0.00		0.063	0.051	0.01	*
Special education	0.279	0.301	-0.02	*	0.257	0.282	-0.03	*	0.278	0.316	-0.04	*
Homeless	0.037	0.050	-0.01	*	0.039	0.041	0.00		0.038	0.045	-0.01	*
Grade 8 Student Characteristics:												
Days absent	10.211	10.834	-0.62	*	9.956	10.242	-0.29	*	9.971	10.143	-0.17	
Times suspended	0.375	0.402	-0.03		0.387	0.465	-0.08	*	0.397	0.433	-0.04	*
Math exam (z-score)	-0.113	-0.114	0.00		-0.104	-0.105	0.00		-0.105	-0.103	0.00	
Reading exam (z-score)	-0.099	-0.098	0.00		-0.098	-0.097	0.00		-0.105	-0.104	0.00	
Science exam (z-score)	-0.160	-0.162	0.00		-0.161	-0.160	0.00		-0.161	-0.159	0.00	

Notes: Covariate means for treated (Bridgers) and untreated (Test Passers) students after prospensity score matching (PSM) using local linear matching. Includes results of t-tailed t-test of group means. * $p<0.05$.

Appendix 6: Covariate Balance for Bridgers vs. High School Non-Completers After Prospensity Score Matching

	Panel A: Algebra			Panel B: Biology			Panel C: English		
	Bridgers	Non-completers	Diff.	Bridgers	Non-completers	Diff.	Bridgers	Non-completers	Diff.
Exit exam scores (points from passing):									
Second attempt in Bridge subject	-46.47	-45.00	-1.47 *	-39.40	-40.72	1.32 *	-37.11	-37.54	0.43
First attempt - Algebra	-45.62	-46.85	1.24 *	-38.15	-39.16	1.01	-38.68	-39.15	0.48
First attempt - Biology	-32.06	-34.00	1.95 *	-36.15	-38.29	2.14 *	-32.53	-32.36	-0.17
Fist attempt - English	-31.25	-33.93	2.68 *	-31.17	-31.89	0.72	-36.22	-36.66	0.45
Number of subjects eligible to Bridge	2.66	2.67	-0.01	2.72	2.73	-0.01	2.70	2.71	0.00
Demographics:									
Male	0.467	0.458	0.01	0.459	0.483	-0.02 *	0.527	0.529	0.00
Asian	0.013	0.010	0.00	0.015	0.018	0.00	0.016	0.020	0.00
Black	0.723	0.739	-0.02 *	0.709	0.716	-0.01	0.680	0.672	0.01
Hispanic	0.117	0.118	0.00	0.114	0.122	-0.01	0.119	0.122	0.00
Multi race	0.065	0.059	0.01	0.065	0.069	0.00	0.064	0.066	0.00 *
Other race	0.026	0.027	0.00	0.025	0.024	0.00	0.027	0.036	-0.01
Special Needs:									
Free/reduced lunch eligible	0.774	0.788	-0.01 *	0.769	0.773	0.00	0.770	0.769	0.00
Title I	0.271	0.289	-0.02 *	0.252	0.260	-0.01	0.254	0.252	0.00 *
English language learner	0.056	0.064	-0.01 *	0.059	0.067	-0.01 *	0.066	0.075	-0.01
Special education	0.284	0.298	-0.01 *	0.262	0.272	-0.01	0.283	0.278	0.01
Homeless	0.038	0.047	-0.01 *	0.040	0.044	0.00	0.039	0.041	0.00
Grade 8 Student Characteristics:									
Days absent	10.464	10.699	-0.23	10.173	10.110	0.06	10.223	10.473	-0.25
Times suspended	0.380	0.403	-0.02	0.394	0.402	-0.01	0.403	0.433	-0.03
Math exam (z-score)	-0.114	-0.114	0.00	-0.105	-0.106	0.00	-0.106	-0.106	0.00
Reading exam (z-score)	-0.100	-0.101	0.00	-0.100	-0.101	0.00	-0.106	-0.105	0.00
Science exam (z-score)	-0.161	-0.164	0.00 *	-0.163	-0.163	0.00	-0.163	-0.163	0.00

Notes: Covariate means for treated (Bridgers) and untreated (Non-completers) students after prospensity score matching (PSM) using local linear matching. Includes results of t-tailed t-test of group means. * $p<0.05$.