RESEARCH REPORT

Rethinking Consumer Information in Higher Education

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Executive Summary

Providing better information on college quality to potential students and their families is a major focus of bipartisan higher education policy efforts. These efforts have focused on labor market outcomes, such as employment rates and average earnings, as indicators of college quality. Several state governments have published data on labor market outcomes by program of study (e.g., engineering) at different institutions within the state. The first successful federal effort to publish average earnings data for colleges nationwide was the Obama administration's College Scorecard, which is likely to continue under the new administration.[1]

But there is little evidence on how these new outcome-based data are likely to affect student decisionmaking and the broader market for higher education. Policymakers hope that students will use this information to shop for colleges and, in doing so, push colleges to compete on both quality and price. But students may not know this information exists or may struggle to incorporate it into their decisionmaking. Additionally, new information is unlikely to inform decisionmaking or spur competition in areas where most students can only access one institution (such as the local community college).

This report summarizes the results of a three-year effort aimed at assessing the demand for and impact of program-level information on labor market outcomes. We developed an informational tool that displays academic major-level earnings and other key data points (including the average price charged, customized based on the user's family income), piloted the tool at a set of Virginia high schools, and collected data to assess the tool's impact on high school students' college-going behavior.

To test the impact of providing earnings information (and semipersonalized net price), we created a "treatment" version with program-level labor market outcomes and a "control" version that only contained basic information about colleges that is readily available elsewhere. We randomly assigned participating schools to receive access to one of the two sites so that we could measure whether the inclusion of labor market information made students more likely to use the tool and to enroll in institutions and fields with higher average earnings.

We did not find evidence of significant demand for a new resource that provides data on labor market outcomes. Only 25 high schools in Virginia agreed to participate in the study, despite intensive outreach efforts to more than 300 schools. Usage of the informational tool was low, and potential users at schools randomly assigned to receive the treatment version of the intervention did not visit the website more frequently than those at schools that received the control version without data on labor market outcomes.

We do not find any evidence that receiving access to the treatment site had a detectable impact on students' behavior, based on the colleges and majors they chose immediately after graduating from high school. Students from schools randomly assigned to receive the treatment version of the intervention did not choose institutions and majors with higher average wages, higher graduation rates, or lower net prices than students from schools in the control group.

The absence of an observed impact on student outcomes could be because the result of the low usage of the tool, the design of the tool, or the context in which it was deployed (among high school seniors in Virginia). A tool deployed to a different population of potential college students, such as high school sophomores or older individuals seeking to improve their prospects in the labor market, might have yielded different results.

Based on these findings and lessons from existing research, we recommend the following:

- Efforts to bring labor market information to students might be more successful if they are integrated into online college advising platforms that students already use rather than standalone platforms that must compete with established players (such as Big Future, Cappex, and Naviance).
- The failure of pilot efforts to change behavior should not deter state and federal efforts to publish data on labor market outcomes, as high-quality data are necessary to support continued experimentation and other goals, such as accountability for institutions.
- State and federal policymakers are in a strong position to make data available but not necessarily to communicate it directly to students. The next generation of policy efforts should focus on making data easily available (such as through APIs and downloadable data files) to support the data diffusion efforts of nongovernmental organizations, including nonprofits and the private sector.
- The design and communication of college-quality measures should be carefully market tested with different types of potential students. How to help prospective college students incorporate new types of information into their decisionmaking likely varies by location, policy context, and intended audience (e.g., traditional-age versus older potential students).

Providing more information, on its own, is unlikely to solve any of the shortcomings in the US higher education system. But the creation of such information is a necessary first step to support a range of possible uses, including consumer choice, market-based accountability, and government regulation.

Rethinking Consumer Information in Higher Education

The US higher education system gives students a great deal of choice of where to go to college and what academic majors to pursue, but without providing much in the way of high-quality, actionable information on college or program quality on which to base those choices. As a result, colleges may compete for status with the input measures that factor into popular rankings, such as the average SAT scores of students attending the school and student-faculty ratios, rather than on outcomes, such as graduation rates, the labor market success of graduates, and the price charged.

Policymakers at both the federal and state levels have undertaken a set of efforts aimed at addressing the lack of information in higher education. In late 2015, the Obama administration augmented its College Scorecard to include earnings information for most colleges in the country. A number of states, including Virginia, Colorado, and Texas, have used their own data to publish information on labor market outcomes of former students, such as average earnings and typical employment rates, for their public institutions.[2] The resulting data often drill below the college level to the program level (e.g., engineering majors at a particular college).

These policy efforts are built on the assumption that, with the right information, potential students will be able to make better-informed choices. There is limited research that directly tests this hypothesis, and there are at least three reasons for skepticism. First, many potential students may not know about the availability of college outcomes information. Early analysis of the College Scorecard indicated that the website's users seemed to be those who were searching for highly selective schools and were likely already comparing multiple colleges.[3]

Second, potential college students and their families who are able to access information on labor market outcomes may struggle to incorporate it into their college decisionmaking. Of course, better outcomes are to be preferred, all else equal, but it is not obvious how to weigh a higher average salary against a lower graduation rate, a higher tuition price, or a less attractive campus.

Finally, the decisions that can be informed by this information may be limited. For example, a recent Urban Institute study found that nearly two-thirds of Virginia students are not likely to use information on post-graduate earnings to decide among colleges because many students attend college near their homes and may be academically ineligible for nearby selective colleges (Blagg and Chingos 2016). For

students who lack choice among institutions, more information may help them decide whether to go to college (and what to major in), but not where to go to college.

In this report, we summarize the results of a three-year effort in which we developed an informational tool that displays academic major–level earnings information and other key data points to high school seniors. We piloted the tool at a set of Virginia high schools and collected data that enable us to assess the tool's impact on traditional-age students' college-going behavior. This is one of the first studies to look at the direct impact of providing program-level earnings information on high school students' decisions about college enrollment and choice of major.

Previous Literature

Researchers have recently been able to investigate the role of institution-specific outcomes, such as detailed data provided by the US Department of Education's College Scorecard and from state- and federally sponsored longitudinal data systems, in college decisionmaking. The present study focuses on the potential of informational interventions to affect students' college decisions and on the impact of the design and function of the interventions.

STUDENT USE OF LABOR MARKET OUTCOMES FOR DECISIONMAKING

Researchers have demonstrated that some high school students "under-match" to individual colleges; students from low-income or minority backgrounds often do not apply to or attend the most challenging school they could attend, or do not attend college at all (Bowen, Chingos and McPherson 2009; Hoxby and Avery 2013). To remedy undermatching in college enrollment, researchers have assessed a variety of informational "nudges" aimed at encouraging better college decisions. The results from these interventions have been mixed.

Experimental studies have shown the power of data to change hypothetical higher education decisions. For example, one study found that parents who were informed of a public college's graduation rate, in addition to information on demographics, selectivity, and cost of attendance, were more likely to select the institution with a higher graduation rate than parents who did not have graduation information (Kelly and Schneider 2011). When college students are provided information on earnings or employability for a given category of majors (e.g., liberals arts or science), they update their perceptions of and preferences for those majors (Baker et al. 2017; Wiswall and Zafar 2014).

There is strong evidence that providing information to high-achieving low-income students on their college opportunities increases the rates at which they take advantage of those opportunities (Hoxby and Turner 2013). However, information alone does not solve the problem. Hoxby and Turner (2013, table 6) report that receiving an informational intervention that included guidance on completing applications, semicustomized information about the net price of attending different colleges, and fee waivers on submitting applications increased the share of students with high SAT scores who attended an institution appropriate for their qualifications 13 percentage points, on a base of 29 percent. This is a large effect, but it still leaves the majority of high-achieving students (58 percent) attending colleges of lower quality than they were eligible for. And evidence on the impact of this type of information on students outside the top 10 percent of ACT/SAT takers with a high GPA is far more limited.[4]

The impact of financial aid and earnings outcomes information on college-going behavior is more muted. An information-only intervention that described tax credits available for prospective college students in Texas did not have a significant effect on college application enrollment or reenrollment (Bergman, Denning, and Manoli 2016). Providing student financial aid information to low-income individuals does not increase college attendance or persistence on its own, though it resulted in an increase in these outcomes when it was paired with assistance on completing and filing the Free Application for Federal Student Aid (FAFSA) (Bettinger et al. 2012). The introduction of earnings information in the Department of Education's College Scorecard resulted in a change in the number of SAT score "sends" (an indication of intent to apply) to colleges with higher median earnings, but this effect was driven largely by private high school students (Hurwitz and Smith 2016).

Informational interventions providing college earnings estimates to students outside the United States have also produced heterogeneous results. Providing earnings and cost information to Chilean students from low-income backgrounds did not change the likelihood of enrollment in college, though those who did enroll were more likely to select degrees with higher earnings relative to cost (Hastings, Neilson, and Zimmerman 2015). Finnish high school students who were provided with post-graduation earnings data broken down by program of study did not, on average, change their higher education application or enrollment patterns. However, a small subset of students who had the least prior knowledge of earnings outcomes tended to apply to programs with relatively higher earnings (Pekkala Kerr et al. 2015). When Colombian high school students received informational presentations from local college graduates, they were more likely to enroll in a selective school or higher education program, but this effect was largely concentrated among students from higher socioeconomic backgrounds (Bonilla, Bottan, and Ham 2016).

DESIGN OF INFORMATION INTERVENTIONS

Researchers have begun to focus on the effect that the design of the informational intervention has on parents and students. Similar to what's commonly understood in the context of marketing consumer goods and services, researchers who are examining effects of information on college choices are beginning to consider the possibility that the presentation of data, as well as the selection of data presented, may have substantial impact on the effectiveness of an intervention.

Based on data gathered from focus groups, researchers have concluded that an effective intervention should provide standardized, clear, and relevant data on colleges. A four-year graduation rate may be more relevant and clear to prospective students than a six-year graduation rate, and student loan measures should avoid complex language that is unfamiliar to applicants (Morgan and Dechter 2012). Others argue that informational interventions should provide individualized information directly to applicants based on location, debt amounts, and major selection (Hershbein and Hollenbeck 2014, Whitehurst and Chingos 2015). Delivery of information can also be personalized, so that students and families receive data in staged increments, getting relevant data as they narrow down their choices (Castleman 2015). Providing text messages that prompt specific planning steps (such as identifying a time when they can complete the FAFSA) increased college enrollment 1.7 percentage points for first-generation college students (1.1 percentage points overall) (Bird et al. 2017).

Methodology

We conducted a quantitative and qualitative study of the effect of providing high school seniors with website-based information on program-level earnings, as well as information on net price and institutional success indicators, such as graduation rates and time to degree. We selected Virginia for the study because of the availability of longitudinal data on the earnings of graduates and other outcomes of interest from colleges and universities within the state.

In the 2014–15 school year, we designed a website intervention, GradpathVA, for high school seniors and invited all Virginia high schools participate in a randomized experiment to test the efficacy of the intervention. Out of more than 300 high schools, 25 agreed to participate, which entailed promoting the website to their students during the 2015–16 school year. We describe the school recruitment process in detail in appendix C.

The 25 schools that agreed to participate in our study are statistically similar to all schools in Virginia on several characteristics, including the percentage of students served by the school who are

economically disadvantaged, homeless, or migrant and students' mean SAT score. But the schools differ on other characteristics. Students from participating schools are more likely to be white (71 percent are white compared with 56 percent of students from nonparticipating schools), and less likely to be black (18 percent versus 25 percent) or Asian (3 percent versus 7 percent). Students were also less likely to be English language learners (1 percent versus 2 percent).[5]

We created two versions of the website. Both contained information on the availability of programs of study at each public and private nonprofit postsecondary institution in Virginia, as well as basic descriptive information about the campuses and outcome data, such as admission and reenrollment rates, average in-state tuition, and the percentage of students receiving financial aid. Twelve high schools received access to the control version of the site, which only included this information, and 13 received access to the treatment version, which added information on program-level average earnings after graduation as well as the institution's graduation rate, average price of degree, and average years to degree. We provide additional detail on the two versions of the site in appendix A.

We worked closely with contacts in both our treatment and control schools to make 12th-grade students and their families aware of the website, providing posters, flyers, branded "swag" to be distributed during college-centered events, and templates for e-mails, text messages, and school announcements.

In our assessment of the intervention's effects, we examine three different types of outcomes. First, we review data on website usage, assessing the number of visitors from each high school and how long users stayed on the website. Second, we analyze information collected from focus groups with students and parents at the end of the 2015–16 school year, including their perceptions of the treatment and control websites and their college decisionmaking process. Finally, we examine college enrollment data on students from the participating high schools using student-level information from the Virginia Department of Education and enrollment data from the National Student Clearinghouse.

Preintervention Focus Groups

Concurrent with the development of the informational intervention tool, we conducted focus groups to understand how and when students and their families made decisions regarding postsecondary education. Students and their parents participated in separate focus groups at three schools, for a total of six focus groups.

Students varied in the amount of support they reported receiving from their parents, family, friends, and school staff in the college decisionmaking process. Across the three schools, students agreed that friend networks provided important connections for schools. Students and parents generally credited guidance counselors as important resources in the college search process.

Students and parents identified online resources as the most important means for learning about colleges during their senior year search, with parents especially interested in financial information. Students were especially interested in assessing the "fit" of different campuses, with issues of cost, distance from home, and amenities also listed as important elements to consider. Factors of concern to parents included likelihood of success, comfort, and safety.

When asked about the provision of new information, students unanimously felt that an online tool would be the best way to reach them. That was the strategy we pursued when developing our information intervention. Further feedback from our focus groups is available in appendix D.

Intervention Development

We partnered with SalterMitchell, a marketing and communications firm, to develop the website intervention, "GradpathVA". It was designed to be browser- and mobile-friendly, and a version of it is publicly available at gradpathva.com through the end of September 2017.

As discussed above, we created treatment and control versions of the website. Participating students, parents, and schools were not informed if they were given access to the treatment or control website.

DATA

The data presented on the GradpathVA treatment site came from the Integrated Postsecondary Education Data System (IPEDS) and the State Council of Higher Education for Virginia (SCHEV). IPEDS data are publicly available through the National Center for Education Statistics, and parts are incorporated in the Department of Education's College Scorecard.[6] IPEDS provides institution-level data on colleges and universities. The GradpathVA tool sources the following information from the 2013 IPEDS survey:

- Institution address and web address
- Average annual net price of school attendance, by family income grouping

- Percentage of applicants admitted
- 25th and 75th percentiles of students' SAT scores
- Percentage of students who receive financial aid
- Percentage of students who reenroll

The SCHEV data are publicly available at the council's Economic Opportunity Metrics website.[7] The GradpathVA tool sources graduate earnings by institution and program from the SCHEV data, as well as the graduation rates (within 150 percent of normal program length) of students who matriculated directly from a Virginia high school and enrolled full time in college.[8] We use graduation rates to calculate an estimate of average time to degree among graduates (e.g., using four-, five-, and six-year graduation rates at four-year colleges).[9]

The primary earnings measure used in this study is the average earnings of graduates, by program of study, 18 months after graduation. The Virginia earnings data are only reported for programs with at least 10 graduates that appear in the wage data with earnings of at least $13,195 a year (corresponding to 52 weeks of employment at 35 hours a week at $7.25 an hour). Thus, part-time workers and those who do not appear at all in the earnings data (including graduates who left the state of Virginia) are excluded from the reported average earnings.[10] The earnings data we use are averaged across students who graduated between 2006 and 2010.[11]

DESIGN OF THE GRADPATHVA WEBSITE

When prospective students first visit the treatment site, they see a landing page with three filter prompts (see appendix A):

- **I want to major in:** Students can type into the field or select from a drop-down menu of the 27 program categories. If selecting a category, students will see all majors that apply to that category. If typing in a selection, students will only see majors that have the typed text as part of the title of the major.
- **My family's average income**: Students can select one of the five income categories for which IPEDS reports average net price: $0–$30,000, $30,001–$48,000, $48,001–$75,000, $75,001–$110,000, and $110,001+. We also include a "not sure" option, and display net prices for the middle-income group for students who choose this option or who do not select any option.

- **My zip code**: Students may enter their home zip code. If students select this option, institutions are presented with "as the crow flies" distance, in miles, to the campus. If students do not select this option, institutions are presented without the distance information.

If the student does not answer any questions, they receive a full list of programs and institutions available in Virginia. Virginia institutions offer a total of 2,754 programs. Information on earnings is available for 756 programs across 62 of the state's 73 public and private nonprofit colleges and universities. Seventy-three percent of students who graduated in 2015 and subsequently enrolled in a Virginia college were enrolled in a major that provided earnings information. The site lists all programs, regardless of whether wage data are available, but those with wage data are listed first.

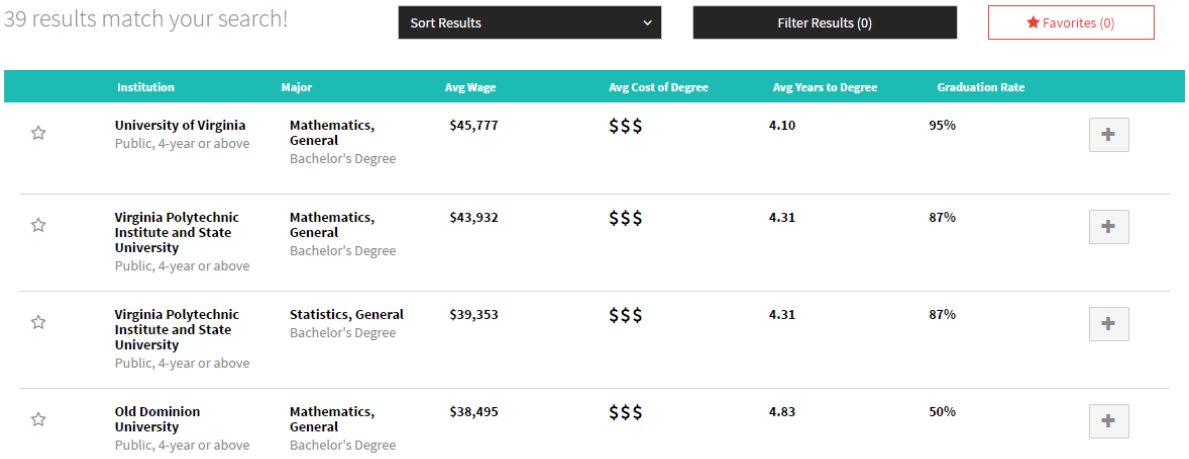
By default, programs on the treatment version of the website are sorted and displayed by average wage, with the program with the highest average wage displayed first (figure 1). The website allows users to sort the results by average price of college degree, which is the calculated annual net price multiplied by the average time to degree for graduates and is indicated in the ranking as a set of dollar signs from one to four.[12] Users can also sort the results by average years to degree, graduation rate, and distance from home. In addition, students can filter results based on whether the institution is a two-year or four-year school, and on whether the SAT or similar test is required for admission.

Students who visited the control version of the GradpathVA website (see appendix A) did not receive earnings information or the net price information for their family income (students were not asked for an estimate of family average income on the landing page). The control website provided top-line information on the institution address and the majors available at Virginia institutions, sorted by distance from home. Students may access additional institution-level information, such as SAT scores, graduation rate, and in-state tuition, by clicking the selection button.

FIGURE 1

Presentation of Programs on Treatment Site

Sample results for a search for programs under the "math" category on GradpathVA



Promotion of Intervention

Each of the 25 participating high schools identified a school contact, typically a principal, assistant principal, or guidance counselor. The research team reached out to this contact monthly via e-mail to provide ideas and resources for promoting the GradpathVA tool, gather information about effective strategies that the school had used and answer any questions from the school staff. The firm that developed the website and promotional materials also sent monthly e-mails that highlighted the online tool. If contacts were unresponsive to e-mails, our research team followed up with phone calls to ensure that the school contacts were still promoting GradpathVA.

Packages of promotional materials were sent to each school, including postcards, posters, pens, sunglasses, backpacks, and water bottles branded with the GradpathVA URL and logo (appendix A). School contacts were asked to put GradpathVA posters in high-trafficked school corridors and distributed the branded swag during college-centered events. The research team also provided the school contacts with templates for e-mails, text messages, and school announcements. It was up to the school contacts to decide how and when to distribute the materials. Schools were also provided with a GradpathVA "widget," an image-based link to the GradpathVA website that could be placed on the school's web page and a sample lesson plan that teachers could use the present the GradpathVA website to their students.

To encourage schools to participate in the study, we designed the study to limit the burden on school staff. The research team gave schools a high level of autonomy to decide how to provide information to students and parents about how to access and use the GradpathVA tool. Participating schools agreed to distribute materials at least six times throughout the year. The research team provided school contacts with swag, templates for messaging, code for a widget on the school's website, and additional resources to facilitate distribution, but the school contacts decided how to distribute information to students and parents.

School contacts appeared to be more likely to use the outreach methods that could be combined with their regular job duties. Many of the school contacts were guidance counselors who distributed swag and discussed the tool with students and parents during meetings about college options. Many also mentioned bringing materials to prescheduled events, such as parent-teacher conferences and senior night. Methods that did not fit into their typical work, such as installing the widget on the school's website or implementing a lesson plan, were less likely to be used.[13]

We tracked usage of the website by school, so the research team could continue to provide insights to school contacts regarding methods of promoting the online tool that proved effective at other schools. Over the course of the school year, each school contact received approximately 20 communications from the research team or the website developer, via e-mail, phone calls, or mailings. Eighteen of the 25 school contacts provided frequent updates on their distribution of GradpathVA materials.

Quantitative Data Collection and Methodology

Because the treatment version of GradpathVA provides users with multiple measures of the benefits associated with individual institutions and academic majors, our quantitative analysis examines several outcome measures for students who were provided access to either the treatment or control version of the GradpathVA website. These outcomes include the potential earnings that students could expect from their academic majors upon enrollment as well as the graduation rate and net price of the first institution they attend.

DATA

We use individual-level data from the senior classes from 2014–15 and 2015–16. We limit our sample to students who were expected to graduate in 2015 or 2016, who did not exit the public school system before the start of their senior year, and who were listed as attending one of our 25 participating high

schools. The senior class of 2015–16 was potentially exposed to our intervention and forms the basis for our analysis of its impacts. We use 2014–15 data to compare treatment and comparison high schools before the intervention, which provides a baseline for the results based on 2015–16 data.[14]

The individual-level data come from the Virginia Department of Education, through the Virginia Longitudinal Data System (VLDS). We use deidentified student-level data, including demographic information, highest recorded score on a college admissions test (SAT or ACT), and the academic major in which the student indicated interest on their most recent Preliminary Scholastic Aptitude Test and National Merit Scholarship Qualifying Test (PSAT).[15]

We also obtained, through the VLDS, National Student Clearinghouse (NSC) data on whether students enrolled in postsecondary education following their high school graduation, the specific institutions in which students enrolled, and their enrollment major, when available. To avoid including students who were dual-enrolled in college during their senior year of high school, we select the first NSC record for the student in the fall period after their senior year (i.e., those who started after June of their graduation year and did not have an end date of earlier than September of their graduation year).[16]

We segment each student's enrollment major, as well as major preference declared on the PSAT, into one of 46 categories (appendix B, table B.1). Class-of-2015 students from the study high schools listed 165 different potential majors on the PSAT and enrolled in 239 different majors, as measured by the CIP (Classification of Instructional Programs) code. Students from the class of 2016 listed 153 different PSAT majors and enrolled in 236 different programs.[17]

Sixty-four percent of students in our 2015 sample and 62 percent of students in our 2016 sample were enrolled in at least one postsecondary institution, as recorded by the NSC following graduation. Of the students who enrolled, 85 percent of 2015 students and 84 percent of 2016 students had an enrollment major recorded for their first institution. We are able to categorize about three-quarters of enrollment major data into one of the 46 categories. Uncategorized majors generally had CIP code beginning with 24, which indicates Liberal Arts and Sciences, General Studies and Humanities, and were most commonly labelled "undeclared," "arts & sciences undeclared," and "undecided."[18]

EXPECTED VALUE OF DEGREE

Our first outcome measures examine the enrollment major of each student. Using data from SCHEV for our GradpathVA tool, we generate an unweighted average wage of the majors within each field , by institution.[19] For example, if a college offers two majors, statistics and mathematics, both of which we

include in our math field, we calculate the average wage for that college in the math field as the average of the two majors. We match each average wage to students by field and institution. Because we only provide information for institutions in Virginia, we exclude from this measure any student who attended college out of state, as well as any student who does not have a recorded enrollment major.

Using this measure of the expected value of a degree, we estimate two impacts of GradpathVA. First, whether students in the treatment group are more likely to select institutions and fields of study that have average wage information available. Second, whether students from treatment schools chose institutions and fields that would be expected to generate higher earnings, on average, than students from control schools.

SHIFT IN MAJOR CHOICE

Our second outcome measure assesses whether the availability of the treatment website induced students to choose higher-earning fields, relative to the preferred field that they listed when they took the PSAT. To conduct this analysis, we generate an unweighted average wage for all fields in each of the 46 categories used in the GradpathVA tool. For example, the GradpathVA treatment website lists 16 institutions that offer majors in political science for which average wage information is available. The average earnings from these programs range across institutions from $23,793 to $37,553, with a mean average of $30,577. A full listing of fields and their unweighted mean average wages is available in appendix B, table B.1.

Using these values, we assess whether students exposed to the treatment GradpathVA website selected higher-earning fields upon enrollment in college, relative to the field they selected when taking the PSAT. We are only able to calculate this measure for students who have both a PSAT and enrollment field of study listed in the data. Thirty-three percent of students in the 2015–16 cohort at participating schools had both a PSAT preferred field and an institution-reported enrollment field available. Of those who enrolled in college, 54 percent of students had both data fields.

INSTITUTIONAL GRADUATION RATE AND NET PRICE

Our third outcome measure focuses on the selection of an institution based on graduation rate and average net price (the out-of-pocket cost of a degree after grants and scholarships). Because we present these data at the institution level in the GradpathVA tool, we assess this outcome based on the first institution the student enrolled in after their senior year. Students in the control group were not provided with a net price based on family income; they were only provided a link to a net price calculator hosted at the listed institution's website. Although students in the control group were

provided with graduation rates, they were unable to sort programs by institution graduation rate and were not provided with information on average years to degree.

To assess the impact of this information, we use the graduation rate that was reported on the GradpathVA tool, as well as the average annual net price for families in the median income range. Because the GradpathVA tool only reports these data for Virginia colleges and universities, we compute this number only for students who enrolled in a postsecondary institution in Virginia. Eighty-four percent of students in our 2016 sample who enrolled in a postsecondary institution enrolled in a Virginia college.

ANALYSIS METHODOLGY

We randomized our 25 participating schools into treatment and control groups by sorting them by total enrollment (i.e., the number of students in the 2014 graduating class), grouping them into pairs (and one triplet), and then randomly assigning one school in each pair (and two schools in the triplet) to the treatment group. This method assigned 13 schools to the treatment group and 12 to the control group. Below we report the average baseline characteristics of the two groups of schools.

We compare outcomes between students in the control and treatment schools by estimating the following basic model:

$$Y_i = Treat_i + X_i + \varepsilon,$$

where *Y* is the outcome of interest for student *i* and *Treat* is an indicator variable for attending a treatment high school in the student's senior year; *X* is a set of the following individual-level controls: gender, race, economically disadvantaged status, status as a homeless or migrant student, English-language learner status, and SAT score. We cluster standard errors on schools, and also report wild-bootstrap p-values clustered on schools.

As Blagg and Chingos (2016) note, the utility of wage information in Virginia varies widely by school location and students' academic preparation. Because many students enroll close to home, the utility of earnings data may vary between our treatment and control schools depending on each high school's proximity to colleges, especially given the limited number of participating schools.

To correct for this possibility, we use a difference-in-difference methodology, comparing the enrollment decisions of students in treatment and control schools to the previous untreated cohort of seniors from their school. By using this method, we control for school geography by comparing each school to its own pretreatment baseline. We estimate the following model:

$$Y_i = Treat\_TreatYear_i + TreatYear_i + X_i + Z_i + \varepsilon,$$

where *Treat_TreatYear* is the variable of interest, an indicator for being exposed to the treatment in the 2015–16 treatment year. *TreatYear* is an indicator for being a senior in the 2015–16 treatment year, and *Z* is a set of school-level fixed effects. The school-level fixed effects variables control for any variables that are school specific and were fixed over the pretreatment and treatment years, such as school location, course or program offerings, and school facilities. We use standard errors clustered at the school level. As a check on our results, we also report wild-bootstrap *p*-values clustered on schools.

We report the results of both our basic and difference-in-difference models in the results section. The difference-in-difference methodology is our preferred specification because it corrects for school-specific factors that do not change over time, which may vary between our relatively small sample of treatment and control schools.

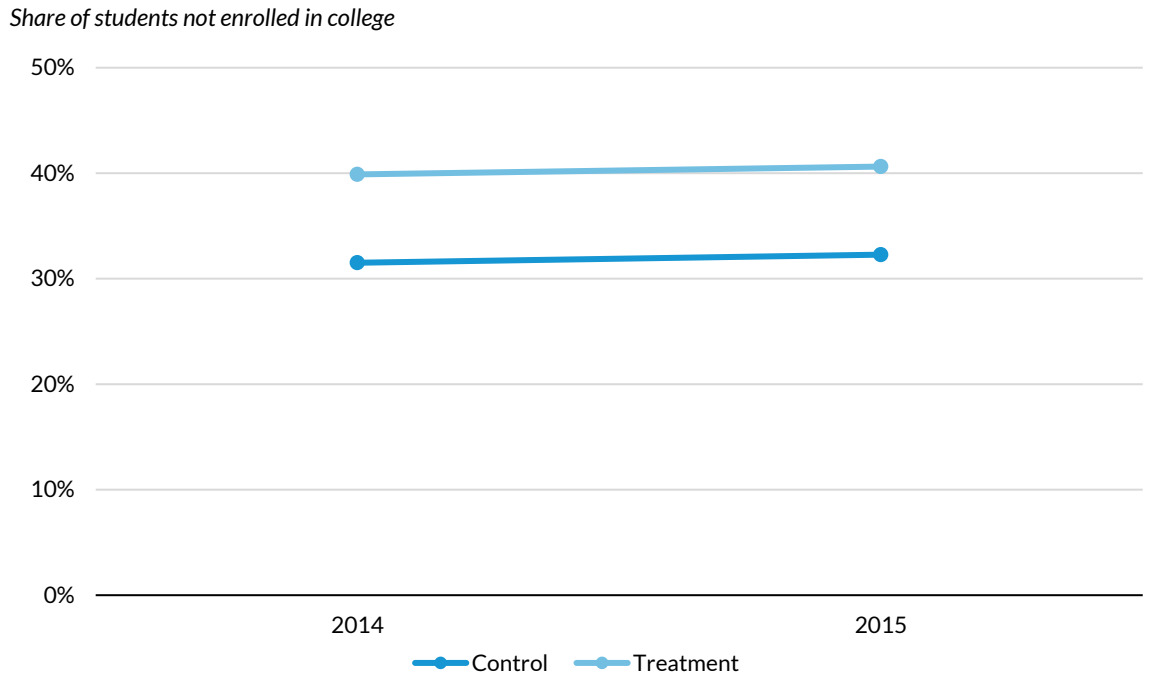
The key assumption of a difference-in-difference model is that the control group provides a valid counterfactual for what would have occurred in the treatment group in the absence of treatment. A common test of this assumption is to examine whether the treatment and control groups have similar trends in the pretreatment period.

Data from the graduating classes of 2014 and 2015 indicate that our college enrollment outcome variables generally exhibited similar trends, on average, at treatment and control schools. For example, figure 2 shows that, even though the percentage of students who did not enroll in college was different between the treatment and control groups at baseline, the pretreatment trend in this variable was not substantially different. We observe similar trends for enrollment in different types of schools and for our five outcome variables.

FIGURE 2

Trends in College Enrollment

2013–14 and 2014–15



Source: Urban Institute analysis of Virginia Department of Education data.

Descriptive Statistics of Treatment and Control Schools

To assess whether the randomization of schools produced treatment and control groups with similar average characteristics, we examine the distribution of student demographics within the 2015–16 treatment year and the distribution of enrollment and higher education outcome data from the 2014–15 pretreatment year. We find that the seniors within the treatment and control schools have similar demographics. However, we find that the enrollment outcomes for students from the 2014–15 pretreatment year vary significantly, which motivates the difference-in-differences specification described above.

STUDY-YEAR SCHOOL DEMOGRAPHICS

Seniors who attended the treatment schools were generally demographically similar to students who attended control schools in our study, as we would expect given the random assignment of participating schools (table 1). Schools in the treatment group were more likely to have students who were classified

as homeless or migrant (0.6 percent in control group, 1.2 percent in treatment group). However, this difference is only significant at the 10 percent level and may be the result of testing multiple comparisons.

TABLE 1

Baseline Demographic Characteristics of Seniors in Treatment and Control Schools

2015–16

	Treatment	Control	Treatment v. control	Standard error	*P*-value, clustered by school	*P*-value, wild-bootstrap	*n*
Female	0.490	0.498	-0.0076	(0.0171)	0.662	0.630	5,740
White	0.724	0.702	0.0218	(0.0759)	0.776	0.742	5,517
Black	0.195	0.164	0.0313	(0.0602)	0.607	0.654	5,517
Hispanic	0.055	0.093	-0.0380	(0.0387)	0.336	0.462	5,517
Asian	0.019	0.040	-0.0205	(0.0158)	0.207	0.276	5,517
Disadvantaged	0.306	0.260	0.0462	(0.0678)	0.502	0.526	5,740
Homeless/migrant	0.012	0.006	0.0065*	(0.0036)	0.083	0.068	5,740
English language learner	0.004	0.008	-0.00357	(0.0054)	0.514	0.788	5,740
Took SAT/ACT	0.464	0.532	-0.0676	(0.0619)	0.286	0.322	5,740
SAT score	1,002	1,057	-55.53	(35.02)	0.126	0.166	2,856

Source: Urban Institute analysis of Virginia Department of Education data

Notes: SAT score is highest score on either the SAT or ACT (converted to SAT scores using a concordance table).

* indicates a statistically significant difference at the $p < 0.10$ level.

PRIOR-YEAR COLLEGE OUTCOMES

We next assess whether students from treatment and control schools are likely to make similar college decisions (table 2). First, we categorize students' enrollment decisions, assessing whether and where they first enrolled in college. We find that students in the treatment schools in the pretreatment year (2015) were less likely to go to a four-year college ($p < 0.01$) and less likely to enroll in any college ($p < 0.05$) than their peers from control group schools. These differences largely hold even when controlling for student demographics and SAT scores (appendix B, table B.2).

We theorize that some of this difference may emerge from the geographic distribution of the sample and treatment schools (Chau 2004; Franklin 2013). In addition to assessing differences in types of school enrollment, we run our five key outcome variables on the prior-year data. This sample is restricted to students who enrolled in a postsecondary institution after graduation in 2015, as these outcome measures cannot be computed for students who did not enroll in college.

TABLE 2

Average College Enrollment Outcomes of Seniors from Treatment and Control Schools

Pretreatment year, 2014–15

	Treatment	Control	Treatment v. control	*P*-value, clustered by school	*P*-value, wild-bootstrap	*n*
No college	41%	32%	8%**	0.038	0.046	5,803
Two-year public	26%	25%	1%	0.725	0.730	5,803
Four-year public	26%	30%	-4%	0.418	0.466	5,803
Four-year private	7%	12%	-5%***	0.001	0.018	5,803

Source: Urban Institute analysis of Virginia Department of Education data

** indicates a statistically significant difference at the $p < 0.05$ level, *** indicates a statistically significant difference at the $p < 0.01$ level

We find no significant differences in the likelihood of choosing a particular field at a particular institution with available wage data, the expected average wage for a given institution and field, or the difference in expected wage from PSAT field to enrollment field (table 3). In addition, we find that there is no significant difference between the treatment and control group in the graduation rate at the students' selected institution, nor is there a difference in institutional annual net price at median income.

TABLE 3

Average Program Characteristics of Seniors from Treatment and Control Schools

Pretreatment year, 2014–15

	Treatment	Control	Treatment v. control	*P*-value, clustered by school	*P*-value, wild-bootstrap	*n*
Enrollment in institution/field with wage	43%	41%	2%	0.578	0.602	3,126
Average wage in institution/field	$33,865	$34,231	-$366	0.785	0.822	1,313
Average wage in enrollment field - PSAT field	-$1,499	-$1,312	-$186	0.640	0.672	1,472
Institution graduation rate	44%	49%	-5%	0.110	0.176	3,082
Institution annual net price at median income	$12,796	$13,744	-$949	0.285	0.288	3,090

Source: Urban Institute analysis of Virginia Department of Education data.

We find no significant pretreatment differences in our outcomes of interest, but these outcomes are only measured for students who enrolled in college. Because we observe differences between treatment and control group schools in college enrollment (particularly on the decision to enroll versus not enroll in college), we use a difference-in-difference approach, which differences out the effect of geography in our estimate.

Use of the GradpathVA Information Tool

Throughout the treatment 2015–16 school year, students and their families were made aware of the availability of the GradpathVA tool through interactions with their school counselors and other school staff. Researchers provided school contacts with a variety of GradpathVA promotional materials to share, including a GradpathVA widget to include on the school's website, posters, flyers, stickers, pens, water bottles, backpacks, and sunglasses. The research team also provided the school contacts with templates for e-mails, text messages, and school announcements. Based on the study design, it was up to the school contacts to decide how and when to distribute the materials.

Our ongoing communications with school contacts suggests that the ways schools chose to promote the tool varied widely. In some schools, students were given specific opportunities to access the tool while at school. Despite the extensive outreach efforts, usage of the GradpathVA site was low at most of our high schools. We examine website data, as well as insights from focus groups, to understand students' and parents' exposure to and perception of the tool.

Website Usage

The two versions of the GradpathVA website (treatment and control) were opened to students and families beginning in September 2015 and remained active through June 2016. Each of the study schools had a school-specific web address to access GradpathVA. This allowed us to track usage by school, as well as ensure that only users from the schools would be able to access the website. We use these data to compare the total visitors to the two versions of the GradpathVA online tool between September 2015 and June 2016

Usage of the GradpathVA tool was generally low. During the 2015–16 academic year, there were a total of 1,287 visitors to the two versions of the website across the 25 participating high schools. To meet the requirements of the study design and preserve the privacy of users, the GradpathVA website

did not retain the IP addresses of individuals who accessed the online tool. As a result, it is not possible to determine if a user is a repeat visitor to the site. For example, a school counselor using the tool during demonstrations with multiple students may be counted as a single user, even though their use of the tool exposed several students to the website. Most users (72 percent) accessed the site during the school day (between 7:00 a.m. and 4:00 p.m., Monday through Friday), indicating that many users were likely using the site with assistance or supervision of school staff.[20]

The number of visitors to the site varied widely among the participating schools. Control group schools registered an average of 85 visitors to the GradpathVA site, and the treatment schools averaged 21 website visitors per school over the course of the year. However, this difference is not statistically significant, and the average use in the control group skews high as a result of 639 visitors from a single outlier high school. When this outlier is removed, the average number of visitors in the control group is reduced to 35 (and the difference between treatment and control schools continues to be not statically significant).

Looking at the number of clicks on the website, we find that the control version of the website had an average of 701 total clicks per school and the treatment version had an average of 117 total clicks per school (difference significant at the $p < 0.10$ level). When the heavy-use outlier school is removed, the average number of clicks for control schools drops to 373 (still significant at the $p < 0.10$ level).

Looking at patterns by visitor, we observe that those using the treatment version of the website spent significantly less time on the website than users of the control version. The average user of the control website spent 27 minutes on the site, and the average treatment user spent 10 minutes on the website (statistically significant at the $p < 0.01$ level using robust standard errors clustered at the school level). However, when we remove use from the outlier school, the average time spent on the control site drops to 15 minutes, and the difference is no longer statistically significant.

We find that the amount of time that the user spends on the site varies widely. Twenty-eight percent of users did not interact with the site (did not click more than once), and 7 percent of users spent an hour or more on the site, which would be consistent with the use of the tool in a classroom or presentation setting. When looking at usage over time, we observe that the treatment site registered more users in December and November and the control site registered the most users in February, followed by October and March (appendix B, figure B.1).

Focus Group Insights

At the end of the experiment year, the research team conducted a second set of focus groups with parents and students at four schools, two in the treatment group (high school V and W), and two in the control group (high school X and Y).[21] In addition, the research team conducted interviews with the school contacts at these schools and one additional treatment school (high school Z). These school contacts were responsible for disseminating materials to students and families about the GradpathVA online tool during the 2015–16 school year. The focus groups and interviews focused on obtaining details about the strategies that the school contacts used to promote the GradpathVA online tool and participants' perceptions of the usefulness of the tool for providing information about colleges to students and families.

USAGE OF THE GRADPATHVA SITE

Our school contacts provided helpful feedback on the student usage of the GradpathVA website. High schools Y and Z posted the highest site usage among the control and treatment groups, respectively. In addition to regularly disseminating the flyers and other promotional materials that we provided throughout the school year, school contacts at these two schools used time during the school day for hands-on demonstrations to students of how to use the GradpathVA website. Specifically, in school Y, the school contact attended each 12th-grade class and led students through a 90-minute session about how to use the website. The school contact followed up with students during the senior college admissions planning night and financial aid workshops. At another high-usage school, the school contact held a session to walk through the website with senior class officers and then had the students present the GradpathVA website to their peers during a senior student meeting. This school contact followed up with Monday-morning announcements about using GradpathVA.

Students from the treatment schools had some knowledge of the GradpathVA tool, but they did not tend to use the website outside of school-led sessions. Students from high school V recalled receiving materials on the website and hearing about GradpathVA from their school counselor, but none used the tool extensively. In contrast, parents from high school V were much more enthusiastic about the tool. At least one parent in the focus group had used the tool with her child as a part of their college search process. She liked the simple layout of the tool (such as the dollar signs to represent cost) and appreciated the salary information reported on individual majors. This information, which she reported was not readily available from other resources, helped their family consider the long-term impact on the student and their success. The parents who had not used the tool asked if they could still access it.

At treatment high school W, students remembered receiving promotional items, seeing posters around the school building, and being introduced to the website in a college resource lesson with their counselors. The focus group parents also remembered the tool being introduced to them at a college night event. On both occasions, the counselor introduced more than one resource but also discussed unique offerings of the GradpathVA website relative to the other tools. Most students could not recall having used the program outside the lesson with their counselor. A student who used GradpathVA outside the lesson said she found it useful while she was doing initial data collection, but as she needed more detailed information she began to lean more heavily on other online college search tools.

Students at the control high schools X and Y varied in their knowledge and use of GradpathVA. At school X, students and parents did not have any recollection of the tool. However, when pressed about what they would want in a tool, their responses echoed features that would have been available on the GradpathVA site, such as net price and distance from home. All of the students in the focus group at control school Y, our highest-usage school, had used the GradpathVA tool, and had heard about it throughout the school year through their counselors and advertisements in the school. Students were familiar with the tool, but they admitted that it did not factor into their school choice decisions. They stated that they did not factor information from the website into their college decisions because it did not have information on colleges outside of Virginia.

Students at control high school X appreciated that the GradpathVA tool could be tailored to their individual needs and interests, but they found it too similar to other online college information tools they were already more familiar with. These students tended to use a national college search tool that allows students to use a combination of filters to determine what schools might be a good fit for them. Filters on this site are test scores and selectivity, type of school, location, campus and housing, majors and learning environment, sports and activities, academic credit, paying, support services, and diversity.

Regarding the influence of factors other than the intervention, students and parents in both the treatment and control focus groups largely echoed the views of students and parents from our pretreatment focus groups. Although students varied widely in terms of their preferences for schools, students from all four focus groups prioritized “fit” with their college, as well as proximity to home, as key drivers of their decision. Financial considerations and availability of a given major or program also played a role but were frequently secondary factors relative to issues of fit and distance. More detailed information on the posttreatment focus groups is available in appendix D.

Results of Intervention

Overall, we find that the GradpathVA treatment intervention had no significant impact on student enrollment in college or on the selection of institutions and majors. This pattern of results may not be unexpected given the low usage of the GradpathVA site, as well as the focus group feedback from students and parents. However, we have no way of knowing if higher usage rates would have produced detectable impacts on student outcomes.

Where Students Enroll in College

Within our treatment year cohort, we found no statistically significant differences between the treatment and control groups in rates of enrollment in two-year public colleges, four-year public colleges, and four-year private colleges (table 4). There was a difference in rates of nonenrollment: 43 percent of students in the treatment group and 33 percent of students in the control group were recorded in the NSC as not enrolled in any postsecondary institution after their high school graduation year. The difference, about 9 percentage points, is statistically significant at the $p < 0.10$ level, but diminishes when controlling for student demographic characteristics, and becomes insignificant when controlling for student SAT score (though the size of our sample also decreases substantially).

As discussed above, our preferred specification is a difference-in-differences model that compares changes in outcomes between the pretreatment and treatment years in the treatment and control groups. Using this specification, we find no statistically significant differences in any enrollment category. When controlling for school geography, demographics, and SAT scores, we find that the GradpathVA treatment had no effect on the type of school in which students enrolled (table 5). These results are also less sensitive to the controls included in the model than the simple treatment versus control differences reported above.

TABLE 4

Treatment Impact Estimates, College Enrollment Outcomes, Single-Year Specification

2015–16

	Treatment	Control	Treatment v. control	Standard error	*P*-value, clustered by School	*P*-value, wild-bootstrap	Demographic controls	SAT score control	*n*
No college	0.433	0.338							
Model 1			0.0950*	(0.0495)	0.067	0.082			5,740
Model 2			0.0802*	(0.0402)	0.058	0.110	x		5,517
Model 3			0.0098	(0.0171)	0.571	0.586	x	x	2,739
Two-year public	0.227	0.234							
Model 1			-0.0064	(0.0305)	0.837	0.834			5,740
Model 2			-0.0091	(0.0312)	0.773	0.798	x		5,517
Model 3			-0.0148	(0.0231)	0.527	0.544	x	x	2,739
Four-year public	0.263	0.310							
Model 1			-0.0472	(0.0562)	0.409	0.416			5,740
Model 2			-0.0315	(0.0455)	0.496	0.542	x		5,517
Model 3			0.0460	(0.0478)	0.345	0.378	x	x	2,739
Four-year private	0.075	0.116							
Model 1			-0.0404	(0.0243)	0.110	0.208			5,740
Model 2			-0.0387	(0.0255)	0.142	0.210	x		5,517
Model 3			-0.0418	(0.0298)	0.173	0.192	x	x	2,739

Source: Urban Institute analysis of Virginia Department of Education data.

* indicates a statistically significant difference at the $p < 0.1$ level

TABLE 5

Treatment Impact Estimates, College Enrollment Outcomes, Difference-in-Differences Specification

2015–16 compared with 2014–15

	Treatment v. control	Standard error	*P*-value, clustered by school	*P*-value, wild-bootstrap	Demographic controls	SAT score control	*n*
No college							
Model 1	0.0145	(0.0248)	0.565	0.598			11,543
Model 2	0.0126	(0.0256)	0.629	0.622	x		11,095
Model 3	0.0101	(0.0188)	0.596	0.612	x	x	5,796
Two-year public							
Model 1	-0.0138	(0.0199)	0.494	0.496			11,543
Model 2	-0.0156	(0.0214)	0.472	0.502	x		11,095
Model 3	-0.0266	(0.0234)	0.268	0.244	x	x	5,796
Four-year public							
Model 1	-0.0087	(0.0170)	0.615	0.708			11,543
Model 2	-0.0068	(0.0170)	0.694	0.704	x		11,095
Model 3	-0.0072	(0.0287)	0.806	0.814	x	x	5,796
Four-year private							
Model 1	0.0101	(0.0168)	0.553	0.568			11,543
Model 2	0.0123	(0.0159)	0.447	0.494	x		11,095
Model 3	0.0254	(0.0258)	0.334	0.362	x	x	5,796

Source: Urban Institute analysis of Virginia Department of Education data.

Notes: Difference-in-difference model estimated between pretreatment and treatment year cohorts.

How Students Respond to Data on Earnings, Graduation, and Net Price

We find no impact of the GradpathVA intervention on measures of college and major characteristics, including graduation rates and average earnings. In both the single-year group mean comparison and the preferred difference-in-differences model, we find that exposure to additional earnings information did not significantly change the likelihood of enrolling in an institution and field that provided earnings information, nor did it increase a student's projected earnings based on enrollment in a given institution and field (tables 6 and 7).

TABLE 6

Treatment Impact Estimates, College Major Characteristics, Single Year Specification

2014–15

	Treatment	Control	Treatment v. control	Standard error	*P*-value, clustered by school	*P*-value, wild-bootstrap	Demographic controls	SAT score control	*n*
Enrollment in institution/field with wage									
Model 1	44%	43%	0.0027	(0.0389)	0.946	0.934			3,028
Model 2			0.0008	(0.0421)	0.986	1.000	x		2,914
Model 3			-0.0069	(0.0311)	0.826	0.848	x	x	1,975
Average wage in institution/field									
Model 1	$34,226	$34,710	-484.1	(1,577)	0.762	0.844			1,319
Model 2			183.4	(1,171)	0.877	0.924	x		1,267
Model 3			538.7	(734.2)	0.471	0.544	x	x	838
Average wage in enrollment field-PSAT field									
Model 1	-$1,451	-$1,137	-313.5	(383.1)	0.422	0.428			1,161
Model 2			-316.7	(415.9)	0.454	0.478	x		1,111
Model 3			-348.3	(536.4)	0.523	0.554	x	x	867
Institution graduation rate									
Model 1	46%	50%	-0.0432	(0.0312)	0.179	0.186			2,936
Model 2			-0.0368	(0.0268)	0.182	0.256	x		2,828
Model 3			-0.0098	(0.0153)	0.527	0.530	x	x	1,944
Institution annual net price at median income									
Model 1	$13,253	$13,783	-530.1	(942.4)	0.579	0.598			2,946
Model 2			-370.2	(837.1)	0.662	0.704	x		2,838
Model 3			-275.4	(489.7)	0.579	0.580	x	x	1,952

Source: Urban Institute analysis of Virginia Department of Education data.

TABLE 7

Treatment Impact Estimates, College Major Characteristics, Difference-in-Differences Specification
2015–16 compared with 2014–15

	Treatment v. control	Standard error	*P*-value, clustered by school	*P*-value, wild-bootstrap	Demographic controls	SAT score control	*n*
Enrollment in institution/field with wage							
Model 1	-0.0113	(0.0301)	0.711	0.714			6,154
Model 2	-0.0120	(0.0293)	0.686	0.668	x		5,927
Model 3	-0.0150	(0.0285)	0.604	0.63	x	x	4,244
Average wage in institution/field							
Model 1	29.01	(589.2)	0.961	0.992			2,632
Model 2	137.9	(561.7)	0.808	0.756	x		2,535
Model 3	748.2	(658.3)	0.267	0.306	x	x	1,746
Average wage in enrollment field-PSAT field							
Model 1	-338.5	(567.7)	0.557	0.558			2,633
Model 2	-496.2	(610.6)	0.424	0.452	x		2,520
Model 3	-746.5	(649.4)	0.262	0.288	x	x	2,051
Institution graduation rate							
Model 1	0.00701	(0.0130)	0.596	0.614			6,018
Model 2	0.00689	(0.0135)	0.615	0.622	x		5,801
Model 3	0.00583	(0.0145)	0.691	0.714	x	x	4,206
Institution annual net price at median income							
Model 1	373.2	(320.6)	0.256	0.248			6,036
Model 2	391.8	(333.4)	0.251	0.238	x		5,819
Model 3	395.7	(320.4)	0.229	0.282	x	x	4,221

Source: Urban Institute analysis of Virginia Department of Education data.
Notes: Difference-in-difference model estimated between pretreatment and treatment year cohorts.

We find that, on average, students from the treatment group do not switch to higher-earning enrollment fields relative to the field they selected on their PSAT at a rate statistically different from their control group peers. This holds true in both our single-year group mean comparison and in our difference-in-differences models.

Finally, we find no significant differences in the average institutional graduation rate or net price between the institutions that students in the treatment group select and students in the control group select.

We are unlikely to detect small to modest effects in light of the relatively small number of high schools that participated in the study. For example, the difference-in-difference model without controls produces a treatment impact estimate on average field wages of $29, which is statistically indistinguishable from zero but is also not significantly different (at the 95 percent level) from a positive

effect of $1,155 (or a negative effect of $1,126). We are unable to rule out such effects, and emphasize that our finding of "no significant difference" should not be misinterpreted as "no difference.

Conclusions and Recommendations

The informational intervention we designed to focus users' attention on labor market outcomes did not have any observable impact on students' behavior, measured based on the colleges and majors they chose immediately after graduating from high school. This may be because of the low usage of the tool, as measured using web analytics, as it is hard to imagine how a tool that students did not widely use could be expected to have a significant impact on their behavior.

But the low usage of the tool, as well as the fact we were only able to recruit 25 high schools to participate out of more than 300 statewide, are also important findings in their own right. Successfully placing new information in the hands of high school students requires obtaining buy-in from schools, students, and families. We suspect that the challenges we faced were not unique to our study, and that other efforts to inject more information into the market for higher education are likely to face similar changes.

This suspicion, at least as applied to the tool we developed for this study, is supported by web analytics covering the academic year following the experimental study (2016–17), during which the treatment version of the GradpathVA website became publicly available (at gradpathva.com). We contacted the school principal and guidance counselor at nearly every high school in Virginia about the site and encouraged them to make it available to their students.

Web analytics data indicate that usage rates remained low. Between August 2016 and April 2017, there were 150 sessions (127 first-time users) from visitors with Virginia IP addresses, which translates to much less than one session per high school contacted. The average session time was under three minutes, and only 72 users statewide conducted at least one home page search.

The findings of this study indicate that simply publishing earnings data on an easy-to-use website is unlikely to change the higher education decisionmaking of prospective college students. There did not appear to be significant pent-up demand for this information in our Virginia pilot, despite its intuitive appeal to policymakers and researchers.

We emphasize that our findings should not be extrapolated to different interventions or different contexts, which we did not examine. A variety of study design decisions may have affected the outcome.

First, the use of a web-based stand-alone tool meant competing for students' attention with existing sources of information they typically use. Our focus group results indicate that many high schools already have well-developed procedures to help their students navigate the college selection process. These schools provide access to information sources and tools such as Big Future, Cappex, and Naviance, which are full-service platforms that do much more than simply provide information. Efforts to increase the use of labor market data may have more success working through these platforms rather than creating stand-alone products.

Second, the design of the tool, such as its look and functionality, may have contributed to lackluster interest among students and parents. Market testing different versions of similar tools is fertile ground for future research.

Third, different populations of potential college students may vary in their use of such informational tools. For example, in our study we targeted students in their senior year of high school, some of whom may have already formed views about whether and where to apply to college. Piloting similar interventions with younger students and over a longer period are natural activities for follow-on research.

Likewise, our study only included students considering colleges to attend immediately after graduating from high school. A substantial portion of college students are older, and some have families of their own. Their needs in the college search process likely differ in important ways, and they may be more interested in data on the economic return of different programs of study. Older students, however, may be harder to reach through outreach efforts given that they are not concentrated in a single set of institutions (high schools).

Finally, our study was focused on a particular use of information on labor market outcomes: comparing different institutions that offer the same program of study. This use is limited for many students by geography (the location of different colleges relative to the student's home) and the academic credentials required for admission at different colleges (Blagg and Chingos 2016). A student only considering a single postsecondary option, such as his local community college, may not find a tool like GradpathVA very useful, even though he could benefit from similar data for deciding whether to go to college at all and what major to pursue.

Based on these findings, we make the following recommendations:

- Proponents of infusing labor market information into higher education decisionmaking may increase their chances of success by integrating their efforts into online college advising

platforms that students already use. These online platforms represent potential opportunities to test the impact of different methods of providing this information to students. These methods could examine take-up of the information and student behavior. Developers could experiment with targeting different kinds of information to students based on the ways in which they are most likely to use it (e.g., a student eligible for admission to selective colleges would receive different kinds of information than a student who did not take the SAT and is likely only looking at nearby options).

- State and federal efforts to publish data on labor market outcomes should continue even when pilots like ours produce disappointing results, as the existence of high-quality data is necessary to support continued experimentation. Policymakers should not expect this information to immediately affect student behavior, but they can support the data diffusion efforts of nongovernmental organizations, including nonprofits and private-sector organizations, by making the data easily available (such as through APIs and downloadable data files).
- Future work on consumer information in higher education should pay careful attention to the design of college-quality measures and how they are communicated. For example, average postgraduation earnings has intuitive appeal, but it may be difficult for prospective college students to include this information into their decisionmaking without additional context. How to provide that context in an effective way will require significant market testing, and the right answer may vary across audiences (e.g., traditional-age and older potential students).

The bottom line is that policymakers should not assume that providing more information, on its own, is likely to solve any of the shortcomings in the US higher education system. Instead, federal and state policymakers should view the creation of such information as a necessary first step to support consumer choice, market-based accountability, and government regulation.

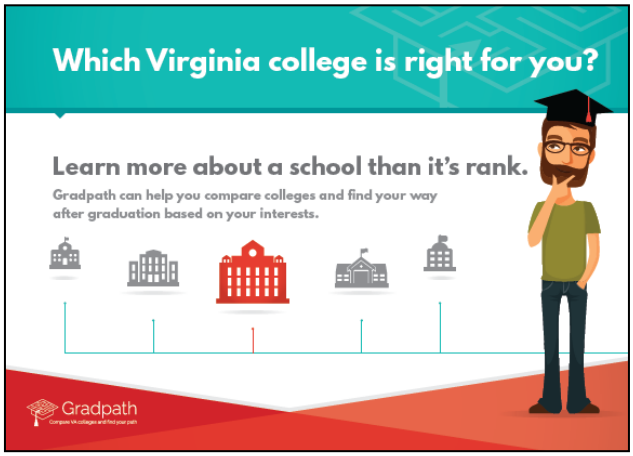
Appendix A. Intervention

Intervention Advertisements

Students received items from their school's advertising of the GradpathVA website. Examples of these items, as well as school-distributed posters and flyers, are displayed below. The school-specific URL is blacked out to preserve the anonymity of participant schools.

FIGURE A.1

School Advertisements and Promotional Gear



Intervention Website

Based on their high school URL, students were directed to either a treatment or control website providing information on Virginia colleges. We present screenshots of the GradpathVA intervention in this appendix.

FIGURE A.2

Control Website Landing Page

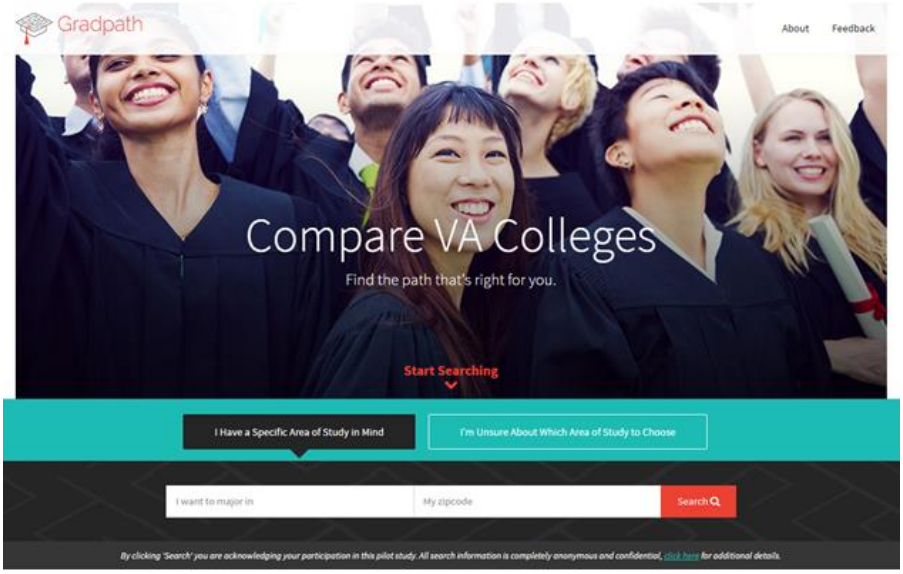


FIGURE A.3

Treatment Website Landing Page

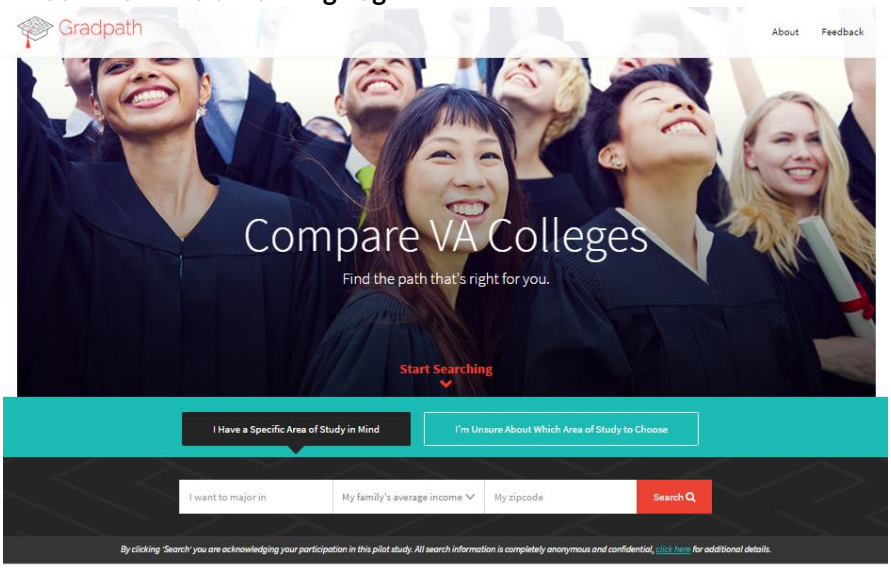


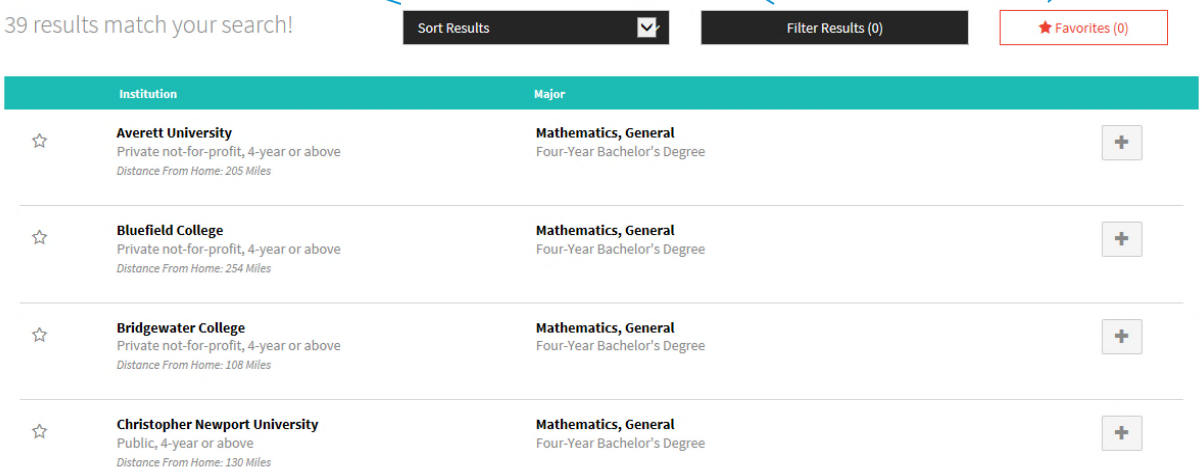
FIGURE A.4

Control Website Search Results

Sort results based on institution or distance from home

Filter results to see only schools which have an SAT requirement, or only two- or four-year schools.

Select favorites by clicking the star. These schools are stored in the favorites tab during the browsing



Institutions are displayed along with their primary degree type. An institution may show up more than once if it has more than one major that fits the selected category.

Degree offered is shown with the type of the degree (e.g., certificate, associate's, bachelor's).

Clicking the plus sign allows students to see more information about the college: Location, admission and reenrollment rates, average in-state tuition, percent receiving financial aid, graduation rate, 25th and 75th SAT reading and math score (if required), links to college website, and net price calculator.

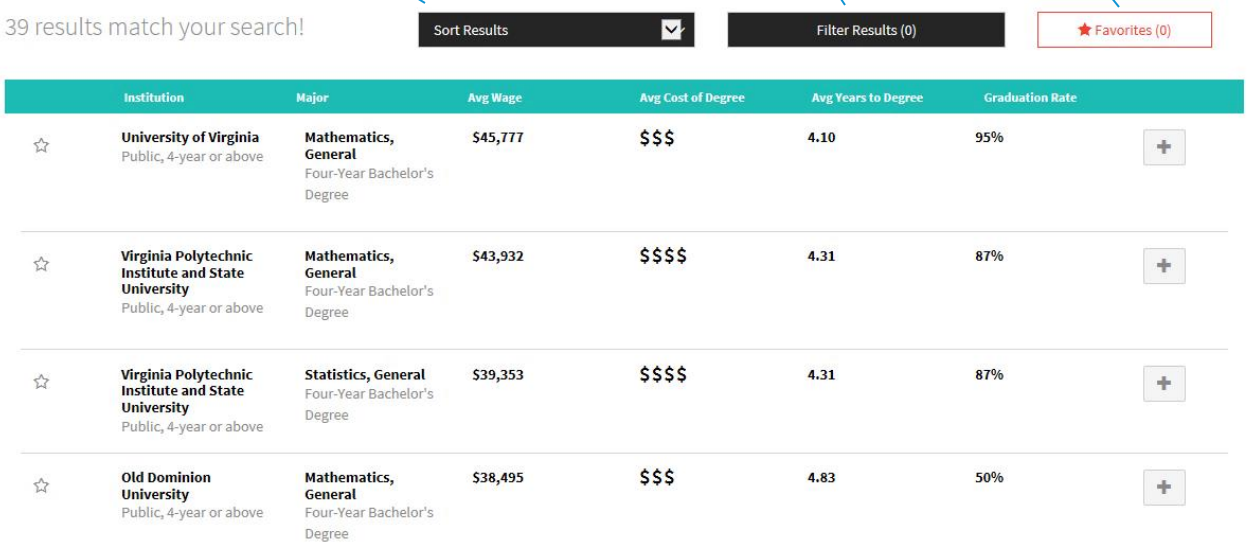
FIGURE A.5

Treatment Website Search Results

Sort results based on average wage after graduation (default), average cost of degree, average years to degree, or graduation rate.

Filter results to see only schools that have an SAT requirement or are only two- or four-year schools.

Select favorites by clicking the star. These schools are stored in the favorites tab during the browsing session.



Institutions are displayed along with their primary degree type. An institution may show up more than once if it has more than one major that fits the selected category.

Degree offered is shown with the type of the degree (e.g., certificate, associate's, bachelor's).

Dollar signs indicate the cost of the degree, based on household income if the student provides it.

Clicking the plus sign allows students to see more information about the college: Location, average wage, average cost of degree for household income, average years to degree, admission and reenrollment rates, average in-state tuition, percent receiving financial aid, graduation rate, 25th and 75th SAT reading and math score (if required), links to college website, and net price calculator.

Appendix B. Supplementary Data

TABLE B.1

Field Categories PSAT and Enrollment Majors with Summary Wage Data

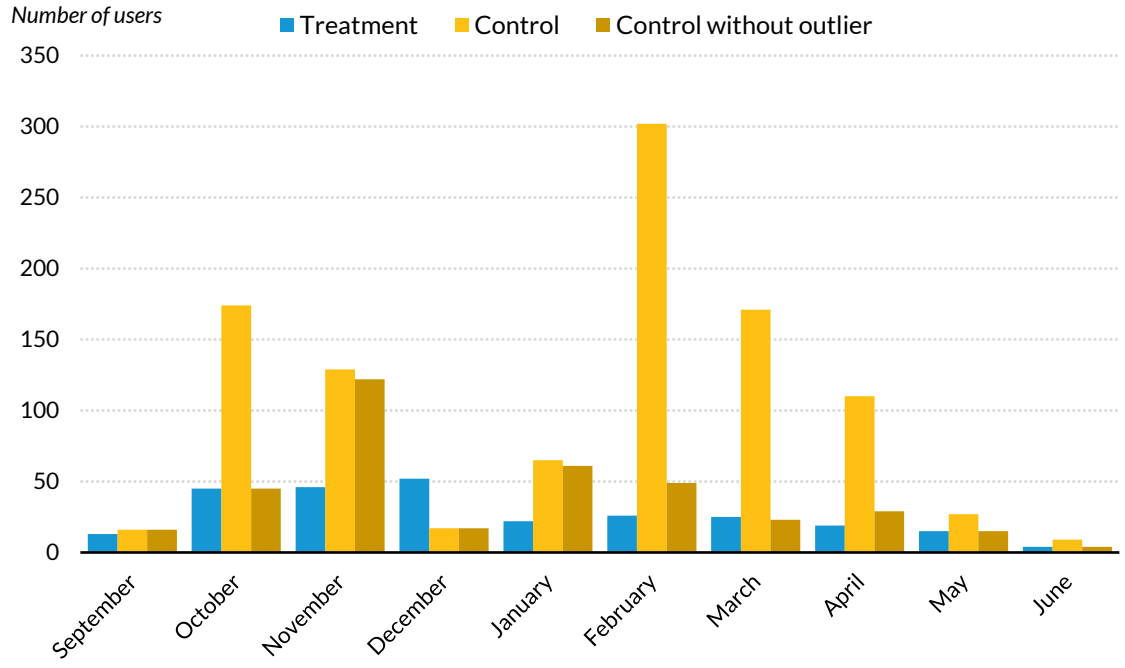
Field	Mean average Wage	Minimum average wage	Maximum average wage
Emergency medical technician	$52,484	$36,044	$68,907
Engineering	$46,682	$25,141	$60,300
Industrial technology/metallurgy	$44,855	$21,599	$60,986
Nursing /physician assistants /pre-med	$43,628	$26,768	$67,223
Dental assistant/hygienist	$43,342	$25,505	$59,394
Computer/information sciences	$43,078	$25,117	$82,622
Healthcare therapy	$39,837	$29,665	$47,826
Electrician/electronics programs	$38,207	$30,981	$51,045
Math	$37,772	$28,723	$45,777
Physics	$37,362	$24,488	$50,236
Economics	$37,240	$29,532	$42,895
Healthcare technicians	$37,110	$26,618	$47,257
Business/management	$36,815	$24,456	$69,104
Architecture	$36,619	$35,329	$39,828
Accounting/finance	$36,307	$21,624	$52,362
Marketing/merchandising	$33,945	$27,995	$40,019
Liberal arts/General studies	$33,570	$20,013	$61,737
Technical/trade programs	$33,452	$24,546	$45,142
Public policy and administration	$32,662	$27,771	$40,550
Healthcare administration	$32,483	$22,353	$44,524
Design	$32,471	$27,600	$42,063
Foreign languages	$32,289	$29,913	$35,879
Other social sciences	$31,775	$24,354	$52,004
Chemistry	$31,768	$27,882	$34,839
Legal assistant/paralegal	$31,367	$23,092	$41,617
Physical and environmental science	$31,240	$24,294	$41,833
Music	$30,676	$27,384	$34,277
Political science	$30,577	$23,793	$37,553
Criminal justice/law enforcement	$30,542	$23,909	$48,001
Agriculture	$30,109	$26,320	$32,313
Sociology	$29,211	$21,499	$35,007
Communications/journalism	$29,053	$23,516	$42,392
History	$28,917	$24,115	$32,478

Field	Mean average Wage	Minimum average wage	Maximum average wage
English literature	$28,761	$23,962	$34,792
Psychology	$28,352	$21,858	$36,935
Biology	$28,180	$23,690	$38,848
Fitness/health/physical education	$27,951	$22,964	$42,732
Teaching	$27,849	$17,957	$38,297
Drama and theatre arts	$27,516	$22,648	$34,501
African American/black studies or other	$27,004	$25,128	$28,879
Fine arts	$26,000	$20,612	$32,310
Dance	$25,939	$25,939	$25,939
Anthropology	$25,786	$22,255	$31,554
Classic languages	$25,759	$25,759	$25,759
Philosophy/religion	$25,544	$20,949	$29,404
Business operations support	$22,185	$19,138	$26,306

FIGURE B.1

GradpathVA Use over Time

2015–16



Source: Urban Institute analysis of website analytics data.

TABLE B.2

Pretreatment College Enrollment Outcomes for Seniors in Treatment and Control Schools

2014–15

	Treatment	Control	Treatment v. control	Standard error	*P*-value, clustered by school	*P*-value, wild-bootstrap	Demographic controls	SAT score control	*n*
No college									
Model 1	0.406	0.323	0.0835**	(0.0381)	0.038	0.046			5,803
Model 2			0.0692**	(0.0295)	0.028	0.042	x		5,578
Model 3			0.00992	(0.0175)	0.576	0.598	x	x	3,057
Two-year public									
Model 1	0.262	0.252	0.00931	(0.0261)	0.725	0.730			5,803
Model 2			0.00853	(0.0260)	0.745	0.734	x		5,578
Model 3			0.0161	(0.0243)	0.514	0.514	x	x	3,057
Four-year public									
Model 1	0.256	0.298	-0.0418	(0.0507)	0.418	0.466			5,803
Model 2			-0.0276	(0.0407)	0.505	0.518	x		5,578
Model 3			0.0457	(0.0374)	0.233	0.224	x	x	3,057
Four-year private									
Model 1	0.072	0.124	-0.0519***	(0.0141)	0.001	0.018			5,803
Model 2			-0.0512***	(0.0141)	0.001	0.016	x		5,578
Model 3			-0.0738***	(0.0183)	0.000	0.004	x	x	3,057

Source: Urban Institute analysis of Virginia Department of Education data

** indicates a statistically significant difference at the $p < 0.05$ level, *** indicates a statistically significant difference at the $p < 0.01$ level.

TABLE B.3

Comparison of Pretreatment College/Major Characteristics for Seniors in Treatment and Control Schools

2014–15

	Treatment	Control	Treatment v. control	Standard error	*P*-value, clustered by school	*P*-value, wild-bootstrap	Demographic controls	SAT score control	*n*
Enrollment in institution/field with wage									
Model 1	0.430	0.411	0.0195	(0.0346)	0.578	0.602			3,126
Model 2			0.0145	(0.0362)	0.692	0.692	x		3,013
Model 3			0.0130	(0.0308)	0.677	0.680	x	x	2,269
Average wage in institution/field									
Model 1	$33,865	$34,231	-365.8	(1,324)	0.785	0.822			1,313
Model 2			102.3	(1,049)	0.923	0.930	x		1,268
Model 3			-180.8	(717.3)	0.803	0.870	x	x	908
Average wage in enrollment field - PSAT field									
Model 1	-$1,499	-$1,312	-186.2	(393.6)	0.640	0.672			1,472
Model 2			-10.80	(391.7)	0.978	0.996	x		1,409
Model 3			105.3	(393.5)	0.791	0.812	x	x	1,184
Institution graduation rate									
Model 1	0.444	0.495	-0.0511	(0.0308)	0.110	0.176			3,082
Model 2			-0.0442	(0.0268)	0.113	0.146	x		2,973
Model 3			-0.0220	(0.0192)	0.264	0.360	x	x	2,262
Institution annual net price at median income									
Model 1	$12,796	$13,744	-948.7	(868.2)	0.285	0.288			3,090
Model 2			-796.7	(752.8)	0.300	0.374	x		2,981
Model 3			-764.0	(487.2)	0.130	0.184	x	x	2,269

Source: Urban Institute analysis of Virginia Department of Education data.

Appendix C. School Recruitment

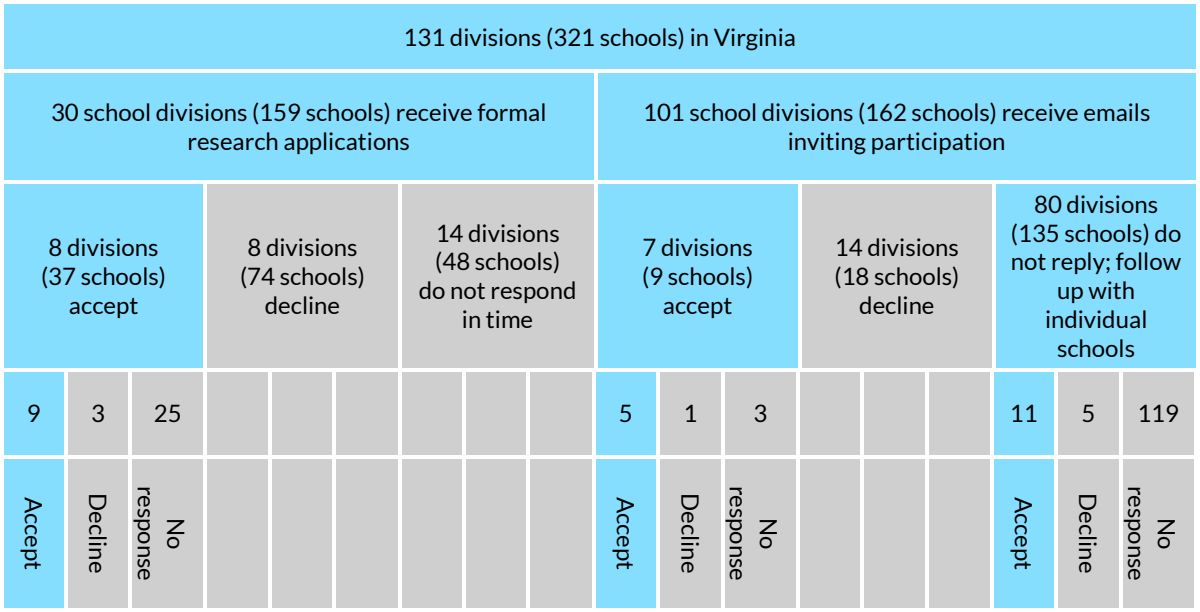
School Recruitment and Study Sample

All public high schools in Virginia were eligible to participate in the study. To participate, schools had to agree to do two things: (1) identify a staff member to be the point person at the school and manage the distribution of materials regarding the informational tool, and (2) distribute information to seniors and their families regarding the study's informational website a minimum of six times during the 2015–16 school year. In exchange for taking on these responsibilities, the school gained access to the informational tool for its students and received $500 through gift cards to a large online retailer.

We used a staged process to recruit Virginia public high schools to participate in our study (figure C.1). In Virginia, school divisions (akin to a school district) manage applications for research. In March 2015, we e-mailed all 131 Virginia school divisions, covering 321 high schools, and requested any available information on their formal research application process.

FIGURE C.1

Recruitment Procedure for High Schools



RESPONSE OF VIRGINIA DIVISIONS AND SCHOOLS TO RECRUITMENT FOR GRADPATHVA INTERVENTION

We identified 30 divisions, covering 159 high schools, that had a formal research application process in place. Throughout March 2015, we submitted applications to each of these school divisions for review. We also submitted a follow-up memo of support for the study from the Virginia Department of Education in April 2015. For the divisions that did not have formal research application processes, we requested permission to contact high schools about the study.

Once our research team received formal permission to contact high schools or did not receive a response from districts that had an informal process, we pursued a multipronged outreach strategy to recruit high schools. At every stage, if a high school declined to participate, the school was removed from the next round of contacts. The first step was an e-mail to the school principal with a simple description of the study that included details about the informational tool that would be available to students and families, the time requirements for participating schools, a link to "frequently asked questions" about the study, and a request to complete a "join the study" agreement.

The second contact with high schools was a hard-copy mailing with a cover letter, a "frequently asked questions" document, a school agreement form, return envelope, and a $5 Starbucks gift card with the note, "Have a cup of coffee on us while you think it over." Six days after the packets went out, we followed up with an e-mail to the high schools informing them of the mailing.

Third, we hosted a booth at the Virginia Middle and High School Principals Conference and Exposition in June 2015. Before the conference, we sent an e-mail to nonresponsive high schools letting them know that the study would be hosting a booth and invited them to stop by to find out more about the study. At the conference, we distributed study materials and conducted a raffle for any high school principal who discussed the study with booth staff and left their business card. We followed up with personalized thank you cards for attendees who left their contact information.

The fourth step was to call nonresponsive high schools. At two points over the summer, we called high schools directly, asking to speak to either the principal or a guidance counselor about the study. As school was starting in early September 2015, we also e-mailed a link to the control version of the informational tool, allowing undecided principals and counselors the opportunity to test-drive the site. By the start of the study, our research team had contacted nonresponsive high schools a minimum of 6 times, and, in some cases, had up to 10 contacts with high school staff.

At the start of our study in September 2015, 8 divisions had accepted our research application, which permitted us to contact high schools to request their participation. The 8 divisions included 37

high schools, 9 of which signed onto the study. Of the 101 divisions that did not have formal research application processes, 7 gave permission to contact high schools, resulting in 5 schools joining the study. Ninety-four divisions did not respond to multiple e-mails. We reached out directly to the 153 high schools with nonresponsive divisions and recruited an additional 11 high schools, bringing our total to 25 participating high schools.

Appendix D. Focus Groups

Preintervention Focus Groups

All 25 schools participating in the study were offered the opportunity to host focus groups and we selected three schools from six that agreed. The study's contact at the school, typically a guidance counselor, selected the focus group participants. We asked the school contact at each of the three schools to invite a group of students, as well as their families, who had just graduated and who were varied in their postsecondary plans. In total, 20 students and 20 parents participated in focus groups that lasted one hour. Separate focus groups for students and parents at each school were led by researchers from Basis Policy Research and the protocols included questions related to the role of family and peers, school staff, existing college information resources, school characteristics in college decisionmaking , and the potential value of an online informational tool and strategies for informing students about the online tool.

Role of Family and Peers

Students varied widely in the amount of support they reported receiving from their parents and family in the college decisionmaking process. At one school (high school A), students said that their parents were very supportive and pushed them to go to college, although they also said that family members were very likely to be concerned with costs. High school B participants who were first-generation students reported that they felt their parents did not have good advice about the college search and selection process. One student noted that their parents were focused on safety, stating that "mom wanted me to go somewhere where she felt safe for me." Other students mentioned that having a family connection to a school was important, and two of the seven students at high school B planned to attend a college where a family member is a student or alumnus. At high school C, most students indicated that family did not play a large role in their decision. Students who wanted to work in the same field as family members consulted them for advice.

In separate focus groups, parents centered their concerns on college costs and proximity to home. At high school A, parents stressed the importance of accounting for college costs, but they also resisted pushing their children too hard in a given direction. One parent from high school A reported, "I think it's

one of the hardest things you do as a parent, to steer your child on a path where they'll be happy and make enough money to live on." Parents from high school C echoed this concern, indicating that they tried to shape their students' college choices, even if their children did not realize it. "I have to make him think it's his idea," said one parent of guiding their child's college selection process. At high school B, parents also mentioned their own peer network, reporting that they learned from other adults who already had students in college.

At all three schools, students reported that, in their view, their friends did not affect their college choices. However, they did report that friend networks provided important connections for schools. At high school A, students stated that their older friends gave information about schools and hosted them for visits. Some high school A students wanted to go to a school where they would already know other students or could be close to a boyfriend or girlfriend. At high school B, some parents brought their child's friends with them on campus visits so that students could see more schools. Parents at high school C noted that, though students did not feel they had to go to the same school as their friends, friends who were already in college provided helpful advice.

Role of School Staff

When asked to consider the role of school staff in their college decisionmaking, students in high schools A and B were quick to point to their guidance counselor as a source of information and advice. Students at high school A said that the school counselor was highly influential in their decisionmaking. Students at high school B were unanimous in citing their guidance counselor as the most influential person in their college decision process. One student said that their school guidance counselor, as well as the school principal, "really pushed us to explore getting into college." At high school B, the guidance counselor provided students with online resources like CappEx, helped with SAT prep, and explained the college application and enrollment process to students. At high school C, one student reported that he met with adults who worked in his desired field to get advice about colleges and course work. However, the other students at high school C did not identify other adults or school staff who had helped them.

Parents of students at all three schools credited school guidance counselors, teachers, and school staff with influencing their child's college decisionmaking. Parents at high school A cited the guidance counselor, and noted that coaches and teachers who have strong relationships with some students would suggest schools. Parents at high school B agreed that the school's guidance counselor provided a lot of information, but some parents felt that the information that was shared was not shared equally

with all parents. Parents and students at school B also mentioned the district's superintendent, who connected students to faculty and staff at his alma mater. Though students at high school C did not feel they received substantial help from adults at school, parents reported that the guidance counselor and some of their student's teachers acted as an influence by providing resources and recommending schools that might be a good fit.

Role of Informational Resources

Students at all three schools identified online resources as the most important means for learning about colleges during their senior year search. Students at high school A reported that visiting individual school websites was particularly helpful. Students at high school B also cited individual college websites, as well as a CappEx, which offers individualized college and scholarship searches. Using data the user provides, this website calculates a student's "fit" for a school based on the student's stated preferences regarding factors like size, cost, and majors. The tool also has a "What are my chances?" calculator that predicts students' likelihood of admission to various colleges. The site provides Yelp-style reviews for schools from students and alumni.

High school C students said that they received the most information from individual college and university websites. They reported that they had used the Virginia Education Wizard, a free online tool provided by the state of Virginia, to estimate college costs in one of their classes, but no student had used it outside of class. Students also highlighted campus visits, as well as connections with current students and alumni through college visits and college fairs, as a key source of college information.

Parents also cited the importance of online resources, particularly for financial information. Parents at high school A stated that school websites and scholarship search sites, such as FastWeb, were important resources for helping their students with the college search. However, most parents felt that it was hard to find good information about colleges. One parent noted that it can be very difficult to navigate the college-decision process, saying "he's my third one and it hasn't gotten better any time." Parents at high school B echoed this concern, particularly when obtaining information about cost. Parents noted that it is easy to find almost all information about colleges (such as majors and programs offered), but that understanding the cost was difficult. One family thought they had a full ride for their student but found out that the scholarship was not all-inclusive. Other parents indicated that they were confused by the information about different types of student loans. Parents at high school C spoke highly of online resources but also cited a presentation from a nearby community college, which

presented the college's cost and graduation and transfer rates relative to other two- and four-year schools in Virginia. Parents indicated that this was an effective recruitment tactic.

Role of College Characteristics

When considering factors in their college decision, students from all three high schools cited campus "fit" as an important concern. Issues of cost, distance from home, and amenities were also listed as important elements to consider. Students at high school A cited cost, along with school atmosphere, as the two most important factors when selecting a college. Many students from high school A planned to live at home for their first two years of college to save money. At high school B, students made many references to campus atmosphere, feeling comfortable, and knowing a school was the "right fit." Most students indicated that they made college decisions after touring campuses and getting a sense of the food, dorms, and campus life. One student said, "sometimes when you walk on a campus you can tell right away, you're going to like it or you're not."

Other considerations for students were financial (tuition, scholarships) and sports programs (for student athletes). Students from high school C said that their college decision was primarily based on where they fit in and felt at home. One student said that campus visits "changed a lot" about how he felt about schools. The second most-mentioned decision factor from students at high school C was whether the college or university had a program in their desired field of study. High school C students also identified factors such as cost, distance from home, religious affiliation, whether the school has a desired program, and amenities such as dorms and the ability to bring a car. One student said that "cost was incredibly important" and "I was trying to look for places where I wouldn't be in debt for the rest of my life," generating agreement from the group. Most students wanted to stay close to home and intended to begin at a community college and transfer. For these students, the cost of attending a four-year college was identified as a key deterrent. One student said that "money problems… led me to choose something close to home and then transfer."

Parents tended to take a pragmatic approach to their child's choice of school. Parents at high schools A and C mentioned considering the likelihood of transfer to a four-year school for students who are starting at a community college. Parents were also concerned about student comfort and safety. At high school A, parents identified proximity to home as a primary factor, and parents at high school C considered a school's distance from home, job prospects, and the extent to which they felt their student was ready to be away from home and doing college coursework. Parents at high school B also indicated that they considered factors such as safety and finances. However, parents at high school B also stated

that students' comfort level and feeling of belonging was most critical in choosing a college. One parent said, "you can be at the best college in the world, but if your child doesn't want to be there, they're not going to succeed."

Information Tool Design and Outreach

Students who participated in the three preintervention focus groups had several ideas for how to build and market a new information tool to high schoolers. Students unanimously felt that an online tool would be the best way to reach them. Students also indicated that social media, such as information posted on a guidance office's Facebook feed, would be an effective way to reach them. Students reported mixed views on e-mail. Students at high school B indicated that they check e-mail regularly, but that they often delete e-mails or regard them as spam. Students at high school C reported that, aside from social media, e-mail would be a good way to reach them with information about an online tool. Parents from all three schools indicated that they were more likely to open information and review a website such as an online tool if it came from their high school rather than from a third party. Parents also stated that they were likely to open physical mail, such as letters home from the high school.

POSTTREATMENT FOCUS GROUPS

Students from treatment high school V reported that they picked their college based on whether they felt at home on the campus and whether they could get a full college experience at the institution. Students wanted to make sure they could "see themselves" within a school's student body. They wanted to feel at home, be able to identify with the average student on campus, and get involved with academic and social organizations, such as the Greek system and Reserve Officers' Training Corps. For some students, this also meant attending a historically black college or university or seeking out schools with greater diversity than their high school. The school's distance from home factored into their decisionmaking; most students wanted a minimum of two hours driving time between them and their families. Students discussed the role of finances in selecting a college in passing, but they actively tried to avoid allowing money to drive their choices. At the same time, multiple students cited their long-term job opportunities, earnings, and career experience as other reasons they decided on their colleges.

Students from treatment high school W reported that their choices were driven by the institution's reputation and the quality of programming each school could offer, such as special opportunities (e.g., guaranteed internships) and involvement in campus life. Students wanted to feel like they could find a place for themselves within the larger campus community. Students mentioned financial feasibility as a

factor in their decisionmaking, but they reported it as a secondary factor. Most students from high school W wanted to make sure they were far enough away from home to feel independent but still within a few hours' drive of their family. Although parents and students did weigh the cost of a school, they also expressed an interest in the long-term payoff of the degree students would earn. Students wanted to know what their long-term earning potential might look like at one school versus another.

Students from control high school X reported that campus visits had a significant impact on how they viewed a campus. Students also considered campus environment while making their final choices. School location was an important factor for all the students in the high school X focus group. Though they did not express preferences for urban versus rural schools, each student had strong feelings about the proximity of their campuses to home. Many wanted to put some space between them and their families. Students agreed that two to three hours was enough distance that they could feel independent while still living within the same state.

Another important factor in the college selection process was the availability of certain majors/programs of study. Each student in the high school X focus group had a clear idea of what they wanted to study and narrowed the field of schools considerably based on whether the college offered their major. Finances also played a role in making their final choices. Most students applied to several schools and may have preferred some over others until it came time to reconcile the cost to attend. Despite scholarships and financial aid, some schools had to be ruled out because of their cost.

At control high school Y, focus group participants emphasized the role of finances. Although students did not pick a school solely for its affordability, the amount of financial aid or scholarships offered served as a deciding factor in making final selections for two of the three students. Students also stressed the importance of the "college experience" when picking their schools. Each student had a slightly different idea of what their ideal experience looked like, but each wanted to make sure that the location, majors, school type, school culture, and student body aligned with their college wish list. Students also mentioned that they considered their parents' opinions when making final selections, but they did not weigh heavily on their final choices.

Notes

1. Andrew Kreighbaum, "Transparency with Staying Power," *Inside Higher Ed*, June 14, 2017, https://www.insidehighered.com/news/2017/06/14/education-department-track-update-college-scorecard.
2. Data from the Virginia system includes private and public institutions.
3. "Report and Suggestions from College Scorecard Technical Review Panel 1: Consumer Information," accessed June 19, 2017, https://edsurveys.rti.org/IPEDS_TRP_DOCS/prod/documents/CS1_Summary.pdf.
4. Hoxby and Turner's target group consists of students in the top 10 percent on the ACT or SAT, who have a high school grade point average of A- or higher. About 4 percent of US high school students are in this high-achieving category.
5. In Virginia, a student is categorized as "disadvantaged" if, at any point during the school year, she is eligible for free or reduced-price lunch, receives Temporary Assistance for Needy Families, is eligible for Medicaid, or is identified as experiencing homelessness.
6. Though an earnings data measure is available in the College Scorecard, we do not incorporate the College Scorecard earnings measure in GradpathVA.
7. "EOM Scorecard," SCHEV, accessed June 15, 2017, http://research.schev.edu/eom/scorecard.asp.
8. The SCHEV graduation rate data are for the most recent year available between 2005–06 and 2009–10 (in practice, most observations are from 2009–10).
9. SCHEV did not report five-year graduation rates, so we imputed them as the average of the four- and six-year rates.
10. Exclusions also include any individual working in a position not subject to reporting to the Virginia Employment Commission, such as consultants and independent contractors. "Post-Completions Wages of Graduates (FAQ)," SCHEV, accessed June 15, 2017, http://research.schev.edu/apps/info/Frequently%20Asked%20Questions.Post-Completions-Wages-of-Graduates-FAQ.ashx.
11. For programs where a five-year average ending in 2010 was not available, we use the most recent five-year average if it ended in 2007 or later (i.e., we drop programs for which only older data are available).
12. The dollar signs correspond to the quartile of net price, for each family income level (e.g., one dollar sign indicates the institution cost is in the lowest quartile of net price for the student's family income level).
13. Schools distributed information in a variety of ways, including distributing GradpathVA-branded swag (eight treatment schools reported doing so, and seven control schools reported doing so), discussing with students individually (one treatment, one control), discussing with students in a group (six treatment, three control), discussing with parents individually (one treatment, three control), discussing with parents in a group (three treatment, three control), installing a widget on the school site (one treatment, three control), posting posters in the school (two treatment, three control), sending letters to parents (two treatment, three control), sending letters to parents (two treatment, four control), implementing a provided lesson plan (zero treatment, one control), and informing teachers of the website (two treatment, one control). These numbers are based on information given to us by the school contacts throughout the year but may underestimate efforts if a contact took a promotional action but did not report it to the research team.
14. We also briefly examine 2013–14 data when we discuss pretreatment trends in our difference-in-differences analysis.

15. We keep the highest total SAT or ACT score. We use a SAT-ACT concordance table to convert all ACT scores to SAT scores, building a crosswalk between the ACT composite score and the SAT Critical Reading and Mathematics scores (College Board 2009).
16. Our results are not substantially different when we include individuals who enrolled in a program (such as a short-term certificate program) in the summer following graduation.
17. We categorize all PSAT majors into one of the 46 categories. We have PSAT scores for 65 percent of students in our sample high schools for the class of 2015. Eighty-one percent of students who took the PSAT listed a preferred (not "other") major (53 percent of students overall had a major recorded). In 2016, 54 percent of students in our sample high schools have PSAT scores recorded. Of students who took the exam, 80 percent listed a preferred major (43 percent of the overall sample). There were no significant differences in PSAT-taking or recording a preferred major between our treatment and control groups in the treatment year.
18. There were no significant differences in the likelihood of having a listed enrollment major amongst the treatment and control group in the pretreatment (2015) year. However, students in the 2015 treatment group were more likely to have a classifiable major, relative to the control group (79 percent vs. 73 percent, $p < 0.05$). We discuss these issues further in our methodology section.
19. We use unweighted average wages because we assume that a student may have an equal likelihood of considering majors that are similar to each other, such as statistics and math. We also present our major-level earnings data on GradpathVA without an indication of the size of the program.
20. An average of 74 percent of users in the control schools accessed the website during school hours, and 69 percent of users in the treatment group used the website during school hours. This difference is not statistically significant.
21. Two of the focus group schools were included in the pretreatment sample (school W is school B in the pre-treatment sample, school X is school C).

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