ANNENBERG
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EdWorkingPaper No. 22-565

The Power of "Free" College: Reducing Racial and Socioeconomic Inequalities in College Expectations

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Promoting equality in college enrollment and completion must start early in students' college-going journeys, including with their expectations to first earn a college degree. With a nationally representative sample of high school students, I evaluate the ability of a recent collection of college access policies (place-based "promise" scholarships or "free" college programs) to increase students' college expectations and test the heterogeneity of these impacts across students' race and family income. Evidence from a difference-in-differences design and lagged-dependent-variable regressions suggest the introduction of promise programs increased the likelihood a student expected to attain an associate degree or higher by 8.5 to 15.0 percentage points by the end of high school, with larger effects for low-income and racially minoritized students. This study is the first to test the power of "free" college in shaping pre-college students' educational plans, and, in doing so, not only addresses an existing gap in the literature but also identifies a key mechanism through which many of the positive college-going impacts observed across promise programs in the current literature may in fact originate. Given the rapid proliferation of promise programs across the nation, this study provides policymakers with a fuller view of the potential impacts of these programs, particularly concerning how they influence students' outcomes along dimensions of race and income.

VERSION: April 2022

Suggested citation: Odle, Taylor. (2022). The Power of "Free" College: Reducing Racial and Socioeconomic Inequalities in College Expectations. (EdWorkingPaper: 22-565). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/0wkw-wd50

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Abstract
Promoting equality in college enrollment and completion must start early in students' college-going journeys, including with their expectations to first earn a college degree. With a nationally representative sample of high school students, I evaluate the ability of a recent collection of college access policies (place-based "promise" scholarships or "free" college programs) to increase students' college expectations and test the heterogeneity of these impacts across students' race and family income. Evidence from a difference-in-differences design and lagged-dependent-variable regressions suggest the introduction of promise programs increased the likelihood a student expected to attain an associate degree or higher by 8.5 to 15.0 percentage points by the end of high school, with larger effects for low-income and racially minoritized students. This study is the first to test the power of "free" college in shaping pre-college students' educational plans, and, in doing so, not only addresses an existing gap in the literature but also identifies a key mechanism through which many of the positive college-going impacts observed across promise programs in the current literature may in fact originate. Given the rapid proliferation of promise programs across the nation, this study provides policymakers with a fuller view of the potential impacts of these programs, particularly concerning how they influence students' outcomes along dimensions of race and income.

JEL Codes: I22, I24, I28
Keywords: College access; difference-in-differences; educational expectations; free college; High School Longitudinal Study of 2009; lagged dependent variables; promise programs

Acknowledgements
I thank Laura Perna, Brooks Bowden, Lauren Russell, Michael Gottfried, and Manuel González Canché for helpful comments on earlier versions of this work, as well as session participants at the 2022 meeting of the Association for Education Finance and Policy. This research was supported in part through funding from the Institute of Education Sciences, U.S. Department of Education, under Grant R305B200035 to the University of Pennsylvania. Any views or opinions expressed are those of the author alone and do not represent the views or opinions of the Institute or the U.S. Department of Education.

Introduction

Higher education in the United States is characterized by inequality across many dimensions, including by race and income. Students from low-income backgrounds and students of color are substantially less likely to apply to college, enroll, and earn a degree than their White and higher-income counterparts (Baker et al., 2018; Deming & Dynarski, 2009). While prior works have identified many determinants of these unequal college enrollment and completion outcomes (see Page and Scott-Clayton, 2016 for a review), few studies have considered inequalities in students’ pre-college educational expectations as a source of these longstanding gaps. Given that college outcomes are influenced by students’ belief in their ability to ultimately enroll and complete a credential (Klasik, 2012; Schneider & Saw, 2016; Somers et al., 2002), identifying and evaluating mechanisms to increase pre-college students’ college expectations has salient implications for understanding and improving subsequent college-going outcomes. Furthermore, reducing racial and socioeconomic disparities in students’ expectations may be an important step toward achieving equity along all points of the postsecondary access and completion pipeline.

In this study, I pair multiple federal and private datasets with complementary causal inference techniques to evaluate the ability of a recent collection of college access policies—place-based “promise” scholarships or “free” college programs (hereafter, promise programs)—to increase students’ college expectations across their high school years and test the heterogeneity of these impacts along racial and socioeconomic dimensions. Promise programs afford students within defined regions with a financial award beyond existing federal and state aid to offset the costs of college and, in doing so, explicitly seek to increase higher education attainment (Perna & Leigh, 2018). Given these features, promise advocates and researchers

consistently reference the power of "free college" rhetoric in signaling postsecondary opportunities—particularly to low-income, underrepresented racial minority (URM), rural, and first-generation students (e.g., Bell, 2020; Gándara & Li, 2020; Gurantz, 2019; Kanter, 2019)—yet none have tested whether this signal increases pre-college students' expectations to ultimately enroll and attain a postsecondary credential.[1]

Conceptually, key features of these promise programs, including the transmission of information (Dynarski et al., 2021; Long & Riley, 2007), the provision of early commitment financial aid (Heller, 2006; Liu et al., 2011), and the promotion of a "college-going culture" within communities (Miller-Adams, 2015, p. 10), may provide important mechanisms to increase students' expectations to enroll in college and complete a degree while also effecting "systemic" change across the contexts within which students develop initial college plans (Iriti et al., 2018, p. 140; Perna, 2006). Indeed, prior works have documented how other interventions seeking to increase college access—like affirmative action policies, college savings accounts, and college advising practices—can have meaningful impacts on pre-college students' educational aspirations and expectations, particularly for low-income and racially minoritized groups (Elliott, 2009; Lloyd et al., 2008; Ryu et al, 2021).[2] Promise programs are likely to do the same.

Drawing from prior work on college-going intentions and related work on promise programs, this study is the first to estimate causal impact of promise programs on students' college expectations. In doing so, it not only addresses an existing gap in literature but also

[1] URM students in higher education include students identified as American Indian/Alaska Native, Black/African-American, Hispanic, More than one race, or Native Hawaiian/Pacific Islander (Bensimon, 2017; Mukherji et al., 2017).

[2] It is important to distinguish between educational aspirations (i.e., goals, desires, or hopes) and educational expectations (i.e., beliefs or plans that reflect true contexts or opportunities). This study focuses on students' *expectations* to enroll in and attain a college credential, driven in party by data limitations that only observe expectations (not aspirations). However, prior works have shown that expectations are better predictors of subsequent educational performance than aspirations because they allow students to account for real and perceived barriers toward realizing those first-order aspirations (see Elliott, 2009 and Lloyd et al., 2008).

interrogates a key mechanism by which promise programs may subsequently impact students’ college enrollment and completion outcomes. Indeed, many positive enrollment and attainment effects observed from promise programs in the current literature may flow (at least in part) from this increase in students’ college attainment expectations. This study is the first to test this mechanism and assess the power of “free” college in altering students’ educational expectations. Furthermore, given the rapid growth in the adoption of promise programs across communities and states (Perna & Leigh, 2018), providing policymakers with a fuller view of the potential impacts of these programs is of great importance, particularly concerning how they may impact students’ outcomes along dimensions of race and income.

By exploiting exogenous variation in the adoption of promise programs across regions and over students’ high school years in a difference-in-differences framework and through lagged-dependent-variable adjustment that controls for students’ own prior expectation levels (Angrist & Pischke, 2009; Ding & Li, 2019), I find the adoption of a local promise program increased the likelihood an 11th-grade student expected to ultimately attain an associate degree or higher by between 8.5 and 15.0 percentage points. These impacts are driven predominantly by low-income (12.7-16.5 points), URM (12.7-26.2 points), and low-income-URM (21.3-30.1 points) students and functionally eliminated prior gaps in expectations between students in promise regions and their peers in other areas. While this is the first study to estimate impacts of promise programs on students’ college expectations, these findings strongly mirror prior works establishing connections between changes in students’ college-going plans and the adoption of other college access policies, including the introduction of affirmative action policies (Lloyd et al., 2008), college counseling programs (Ryu et al., 2021), college savings accounts (Elliott,

2009), and merit-based financial aid (DesJardins et al., 2019), as well as changes in students’ neighborhood characteristics (Parker et al., 2016; Stewart et al., 2007).

The results of this study shed light on the impacts of promise programs on altering high school students’ postsecondary attainment plans and show how this rapidly growing policy may also reduce inequalities in educational expectations across dimensions of race and family income. Given this evidence, many of the widely documented positive impacts of promise programs on students’ college-going and degree-attainment outcomes may indeed begin with this increase in students’ first-order expectations to enroll and complete a credential. With this documented power of “free” college, researchers and policymakers alike should carefully consider the design, introduction, and evaluation of promise programs and other policies that simultaneously deliver information and early-commitment financial aid while promoting a college-going culture across the multiple contexts within which students develop initial college plans. The increasingly diversified design of these programs (e.g., merit-based aid versus need-base aid) suggests not all may be able to effectively achieve the same goal—particularly given the disparate impact such policy designs have shown under past evaluations (e.g., Domina, 2014; Gurantz & Odle, 2021). Future studies that estimate heterogeneity in these impacts across such policy designs will provide important insights for future research and policy.

The remainder of the manuscript is organized as follows. First, I review the national context on students’ college expectations and review prior literature on investigations into high school students’ college-going plans alongside existing works on promise programs. Next, I present a conceptual framework for considering the mechanisms by which the adoption of promise programs may influence students’ college-going and degree-attainment plans. I then describe the study’s data sources and identification strategies and present results that are robust

to altered specifications and counterfactual groups. Finally, I conclude with a discussion of these findings, their contributions to extant literature, and their implications for policy.

Background and Literature Review

Approximately 77.3% of 9th-grade students in the High School Longitudinal Study of 2009 (HSLS:09) reported expecting to ultimately attain an associate degree or higher, with observed gaps in these expectations by race and income (Schneider & Saw, 2016). While 86.7% of Asian and 80.8% of White students "expected to achieve" an associate degree or higher, only 74.6% of Black and African American, 68.6% of Hispanic, and 60.8% of American Indian and Alaska Native students reported the same.[3] Similarly, 91.6% of students from families earning over $115,000 annually expected to attain an associate degree or higher compared to only 83.0% of students from families earning between $35,000 and $115,000 and only 67.2% of students from families earning less than $35,000. These realities suggest that, even in their first year of high school, racially minoritized students and those from low-income backgrounds report expecting to attain a postsecondary credential at rates up to 20.0 percentage points lower than their White counterparts and 24.4 points lower than their higher-income peers. Given that students' college-going outcomes are influenced in part by these plans to ultimately enroll and complete a credential (Klasik, 2012; Somers et al., 2002), such inequalities in expectations represent one potential source of the widespread disparities in college access by race and income observed today (Baker et al., 2018; Deming & Dynarski, 2009). However, the negative impacts of such unequal college-going plans and subsequent enrollments do not reside with students alone or fade after high school graduation.

[3] Author's calculations of HSLS:09 student responses with NCES Data Lab public-use files.

Earning a college credential has salient implications across the individual lifespan, including by providing higher average labor market wages and greater social mobility (Chetty et al., 2017; Ma et al., 2019), and yields a host of meaningful benefits for states and local communities. The average associate degree holder earns approximately $12,000 (or 18.6%) more annually than those with a high school diploma (Winters, 2020), contributing a disproportionately higher share toward state and local tax revenues (Abel & Deitz, 2014). In addition to these economic advantages, higher education provides considerable nonmonetary benefits for society, including improvements in public health, civic engagement, and charitable giving, as well as reduced incarceration rates (Ma et al., 2019; McMahon & Delaney, 2021). Given these individual and collective benefits, the identification of mechanisms to increase college-going expectations and reduce inequalities therein is of great importance to educational equity advocates and state and local policymakers alike—particularly if such improvements reduce inequalities in subsequent college-going and completion outcomes.

Increasing College Expectations

While few studies have considered mechanisms to effectively increase pre-college students’ educational expectations, extant works in this area have explored the relationship between students’ college-going and college-attainment plans and a collection of public policies (e.g., affirmative action, college savings accounts, and financial aid), educational practices (e.g., college counselors), and changes in students’ contexts (e.g., proximity to college and neighborhood features). Following the introduction of the Texas Top 10% Plan, which guarantees admission to any state public college or university for seniors graduating in the top decile of their high school class, Lloyd et al. (2008) found that high school students with “some” or “a lot” of *knowledge* of the program were more than 2.3 times more likely to aspire to earn a

credential, nearly 2.2 times more likely to expect to enroll in college following graduation, and were over 2.2 times more likely to report applying to college than their peers with "little" or "no" knowledge of the program, even after controlling for students' decile rank, demographic characteristics, academic performance, and K-12 school and family contexts. The authors found these impacts were primarily driven by increases in aspirations, expectations, and college application submissions among Black and Hispanic students.

On the financial front, a collection of prior works have also examined the potential for financial aid to impact students' college-going expectations. Considering participation in the Indiana Twenty-first Century Scholars (TFCS) program, a state need-based aid scholarship that provides recipients with support services throughout high school and a last-dollar scholarship to cover public college tuition and fees for up to four years, DesJardins et al. (2019) found that, by 11th grade, TFCS students had 17.8% higher odds of aspiring to earn a two-year degree—and 32.3% higher odds of aspiring to earn a four-year degree—than their non-TFCS peers, even after controlling for students' academic ability, family characteristics, demographics, and school contexts. Next, both Pharris-Ciurej et al. (2012) and St. John and Hu (2006, 2007) evaluated outcomes associated with the adoption of the Washington State Achiever (WSA) program, a highly selective program with need- and merit-based eligibility criteria where 7th and 8th grade students apply to receive supports in high school and access to college scholarships.[4] Leveraging pre- and post-program participation surveys, St. John and Hu (2006, 2007) found scholarship recipients had higher educational ambitions than non-recipients after controlling for individual demographic and socioeconomic factors, and Pharris-Ciurej et al. (2012) found that students in WSA had 24-42% higher odds of reporting plans to attend a four-year college than non-WSA

[4] WSA began in 2001 with funding from the Bill & Melinda Gates Foundation but concluded in 2012.

peers and 26-29% higher odds of engaging in pre-college activities, like taking the SAT/ACT. Finally, Elliott (2009) evaluated impacts of the availability of college savings accounts (CSAs) on students’ college-going aspirations and expectations and found that students with a CSA, conditional on parent, child, academic, psychological, and economic factors, were nearly twice as likely to expect to attend college than those without a CSA.

In addition to these studies, prior works have also found that high school educational practices and changes in students’ contextual environments can also meaningfully influence students’ educational plans. Relying on HSLS:09, Ryu et al. (2021) found that access to college counselors in high school, including those who could provide guidance on college financial aid, was associated with increased college aspiration and enrollment rates of Latina/o students. Furthermore, findings from Stewart et al. (2007) suggest that an African American student who moves from a high-disadvantage to a low-disadvantage neighborhood is predicted to experience a 31% increase in college-going plans. Similarly, Parker et al. (2016) found that students living in closer proximity to universities were 12% more likely to expect to attain a college credential than students living further away, with a higher impact (14%) for low-income students.

In all, this small but diverse body of work suggests that pre-college students’ educational expectations and college-going plans can be relatively sensitive to and positively influenced by changes in students’ pre-college contexts and by public policies or financial programs aimed at increasing college access—particularly among students from low-income and racially minoritized backgrounds. Promise programs may be one viable yet underexplored mechanism to similarly increase college expectations.

Promise Programs

Over 300 promise programs operate across state, regional, and institutional levels, with 23 states already offering a statewide program and 13 more in active implementation (College Promise Campaign, 2019). While these programs vary widely in their design, eligibility, and financial awards, they generally consist of a place-based scholarship aimed at increasing access to college (Perna & Leigh, 2018). Given their growing political popularity, the proliferation of promise programs has rapidly outpaced evaluations of their effects across all possible levels and contexts (Page et al., 2019), yet a diverse body of research has documented their impact on students’ college enrollment, persistence, completion, and debt outcomes, as well as on outcomes across K-12, college, and community levels, like increased high school graduation rates, greater spending on support services, and improvements to local workforce outcomes (Carruthers & Fox, 2016; Miller-Adams, 2015; Odle et al., 2021; Odle & Monday, 2021; Swanson et al., 2020). An important subset of these works has documented how promise program impacts are particularly pronounced for students from traditionally underserved groups, including those from low-income families, those who are the first in their family to attend college, and those from communities of color (Bell, 2020; Gándara & Li, 2020; Gurantz, 2019; Kanter, 2019). However, none have considered causal impacts of “free” college on students’ educational expectations. To frame this investigation, I draw from two prior qualitative studies that provide suggestive evidence of this potential link between the introduction of a local promise program and changes in students’ college-going plans.

In Michigan, high school teachers reported that the introduction of the Kalamazoo Promise “quickly changed the equation for local youth in multiple ways, informing the culture within which educational, career, and life goals are formulated” (Miron et al., 2012, p. 20).

Across 41 interviews, high school educators and guidance counselors reported positive changes in students' college expectations, noting "the sense of hope increase[d]" and that students "have this feeling that it's not *just* [emphasis added] about getting out of high school" (p. 17). In later interviews with these students, when asked if the Kalamazoo Promise changed the way they thought about college, one interviewee responded: "I do have a chance to actually go to college because some people didn't actually think they were going to go to college… I'm going to try" (p. 16). Another noted: "…the Promise has opened more doors for [my friends] that they didn't know would be available" (p. 16). Miron et al. (2012) concluded the Kalamazoo Promise altered students' perceptions of college through the availability of increased opportunity and led students to adjust their college-going plans accordingly.

In Pittsburgh, Gonzalez et al. (2011) observed similar outcomes among high school students following the introduction of the Pittsburgh Promise. Across focus groups at nine schools with 35 middle and high school students, the authors reported over three-quarters of students agreed that "Promise had made it more likely that [they] will go to college or other school after graduation," regardless of Promise-eligibility or grade level (p. 68). Additionally, 94% of respondents reported they would work harder to become or remain Promise-eligible, with one noting that "pressure from family members to meet Promise eligibility requirements got them to go to school when they would rather stay home" (p. 66). In all, Gonzalez et al. (2011) concluded the Pittsburgh Promise clearly increased students' intentions to pursue a postsecondary education, particularly among those from low-income backgrounds.

Building upon these rich qualitative works, I seek to expand the knowledge base on the student-level impacts of promise programs by causally interrogating this key mechanism which may help explain many of the positive effects observed on students' subsequent college

enrollment and completion outcomes. To consider these impacts, it is first helpful to conceptually identify the levers by which promise programs can influence students’ educational expectations and the contexts within which these programs operate.

Conceptual Framework

Accompanied by an explicit goal to promote a “college-going culture” among potential students within each promise region, two foundational features of all promise programs include the transmission of college-going information and the provision of financial aid (Miller-Adams, 2015, p. 10). Through these complementary levers, promise programs not only signal postsecondary opportunities to pre-college students but also combine these signals with a financial commitment to cover all or part of students’ future tuition and fee expenses. Taken separately, either of these mechanisms could influence pre-college students’ expectations to enroll in and complete college by increasing their exposure to and knowledge of college options or by directly reducing their costs to enroll. Indeed, a host of prior works have shown that (a) providing students with information on college, steps to prepare for enrollment, and the availability of financial aid (Bettinger et al., 2012; Castleman & Page, 2015; Oreopoulos & Dunn, 2013; Ross et al., 2013) and (b) providing students with actual financial aid awards (Dynarski, 2003; Heller, 2006; Hoxby & Turner, 2013; Liu et al., 2011) are linked to increased college-going outcomes, particularly for students from low-income families and students of color (Andrews, Ranchhod, & Sathy, 2010; Dynarski & Scott-Clayton, 2013; Page & Scott-Clayton, 2016). Together, these levers have shown to be particularly powerful for low-income and racially minoritized students, like in promise programs where information and financial aid are combined (Andrews, DesJardins, & Ranchhod, 2010; Dynarski et al., 2021; Lunda De La Rosa, 2006).

Students’ educational expectations, college plans, and decisions about if, where, and when to enroll are influenced by a host of individual, family, school, and community factors (Hoxby, 2004; Kiyama, 2010; Nelson, 1972; Stewart et al., 2007). That is, students develop and alter their plans across many contexts, including, through individual reflection but also at home with family, communally with peers, and at school with counselors and teachers (i.e., Cooper’s [2002, p. 607] family involvement, culturally enriched teaching, counseling, mentoring, and peer “bridges” to college and Perna’s [2006] individual, school and community, higher education, and social and economic layers influencing the college choice process). Conceptually, promise programs may shape each of these contexts, particularly given these programs’ goals to increase the “college-going culture” (Miller-Adams, 2015, p. 10) across each community by delivering a “system-level solution” (Iriti et al., 2018, p. 139) that not only targets students and families but also focuses on K-12, community, and workforce outcomes and stakeholders. In this light, the introduction of a promise program not only impacts individual student and family discussions, plans, and resources around college-going by way of providing information and financial aid but also directly (and indirectly) influences students’ expectations by altering their peers’ plans and behaviors, their school’s culture and college-going supports, and their community’s educational attainment orientation (e.g., Gonzalez et al., 2011; Miron et al., 2012).

Research Questions

Promise programs hold the potential to leverage multiple mechanisms across many contexts to increase students’ educational expectations. In doing so, these programs may influence students’ ultimate college enrollment and attainment outcomes (at least in part) through this increase in high school students’ first-order plans to ultimately enroll and complete a degree. This study is the first to test this mechanism and assess the power of “free” college in increasing

college expectations and, importantly, in reducing inequalities in college-going plans across groups. To fulfill these aims, I am guided by the following research questions:

1. Did the adoption of a local promise program increase pre-college students' plans to ultimately earn a college degree?
2. If so, did this effect vary across dimensions of students' race or family income?

Answers to these questions provide policymakers and researchers alike with a fuller view into the impacts of promise programs on students' educational outcomes, including differences across dimensions of race and income. Furthermore, this investigation centers pre-college students' educational expectations as an additional and underexplored mechanism by which promise programs may influence students' subsequent college-going outcomes.

Data

One way to estimate the impacts of a promise program on students' college plans is to observe (a) students who were and were not exposed to a promise program (e.g., treatment and control students) alongside (b) students' educational expectations over time (e.g., before and after such exposure). To achieve this, I assemble a unique, student-level data set from multiple public and private sources. For students' college plans over time, I leverage HSLS:09, which surveyed a nationally representative panel of over 23,000 students from 944 high schools in 9th grade and followed them until four years after high school. Among the host of academic, demographic, financial, and social questions included in the HSLS:09 surveys, students were asked about their ultimate educational expectations with an "Attainment Expectations" indicator that read: "As things stand now, how far in school do you think you will actually get?" Here, students selected from 10 discrete attainment levels ranging from "Less than high school" to "Complete Ph.D./M.D./Law/other prof degree," including the option to indicate starting but not

completing a credential at any level (e.g., "*Start* a Bachelor's degree" versus "*Complete* a Bachelor's degree," emphasis added). This indicator, and its peer in the National Education Longitudinal Study of 1988, have been used by prior works to capture students' educational plans (e.g., Ryu et al., 2021; Schneider & Saw, 2016; Somers et al., 2002). Students' self-reported expectation levels are observable in 9th grade (fall 2009) and two and a half years later in 11th grade (spring 2012), allowing me to observe changes in college expectations from a student's first semester in high school through the final semester of their junior year.

Next, to identify if and when students were exposed to a promise program, I leverage students' high school location as a proxy for their residence by linking HSLS:09 school identification numbers to those in the U.S. Department of Education's public and private school directories available via the Common Core of Data (CCD).[5] With the best approximation of a student's home address, I then leverage Perna and Leigh's (2016) Promise Program Database to identify whether or not the student attends a high school covered by a place-based promise program or lives in a region served by one. The Promise Program Database (PPD) covers over 425 college promise programs across the nation, including the 43 programs that are specifically identified as "place-based" programs—those that target aid and services to students within a designated location—allowing me to observe which states, counties, regional zones, school districts, and/or high schools are within a promise zone, as well as the year the promise program began. Thus, pairing HSLS:09 files with CCD's public and private directories and the PPD allows me to observe students' educational expectations over time, including the presence and timing of exposure to any promise program.

[5] This is a reasonable strategy given that Voulgaris et al. (2019) found most high school students travel 5-10 minutes from home to school. HSLS:09 does not provide information on students' actual home address.

Given that HSLS:09 surveyed students in fall 2009 and again in spring 2012, these data allow me to identify which students were treated by the introduction of a place-based promise program across their high school years. That is, I can observe students who (a) reported their college attainment plans at the start of 9th grade; (b) subsequently experienced the introduction of a local promise program in 2010, 2011, or 2012; and then (c) reported educational expectations again at the end of 11th grade. Of the 43 place-based promise programs across the United States, 11 began in 2010, 2011, or 2012. These programs span six states and include some of the most widely known promise programs (i.e., Detroit Promise, Say Yes Buffalo).[6] These data allow me to observe changes in educational expectations across students' high school years for those in areas impacted by the introduction of a place-based scholarship and those in areas that never experienced such an introduction.

Finally, given that students' educational expectations are also influenced by a host of individual, parent, and school factors, I also collect a set of controls from HSLS:09, including students' GPA, race, gender, and ACT/SAT participation (Blackhurst & Auger, 2008; Klasik, 2012; Rodriguez & Arellano, 2016; Schneider & Saw, 2016); parents' educational attainment, income, and employment (Berzin, 2010; Luna De La Rosa, 2006; Sewell & Shah, 1986); and each high school's type, locale, college-advising services, socioeconomic demographics, and prior college-going rates (Alwin & Otto, 1977; DesJardins et al., 2019; Horng et al., 2013; Nelson, 1972; Tieken, 2016). Furthermore, given that students' regional and community contexts can also shape educational plans and college-going behaviors (Stewart et al., 2007), I also match

[6] These 11 programs include the Arkadelphia Promise (located in Arkansas; began in 2010), Beacon of Hope (Virginia; 2011), Benton Harbor Promise (Michigan; 2011), Degree Project (Wisconsin; 2011), Detroit Promise (Michigan; 2011), Hazel Park Promise (Michigan; 2011), Holland-Zeeland Promise (Michigan; 2010), La Crosse Promise (Wisconsin; 2012), New Haven Promise (Connecticut; 2010), Pontiac Promise Zone (Michigan; 2011), and Say Yes Buffalo (New York; 2011).

several empirically guided, community-level indicators from the U.S. Census Bureau’s American Community Survey (ACS) to the dataset as controls, including zip-code median household income, unemployment rates, and educational attainment (Gil-Flores et al., 2011; Napolitano et al., 2014; Taylor & Rampino, 2014).

After merging HSLS:09, CCD, and local ACS records with PPD information on the location and timing of the introduction of local promise programs, I transform students’ educational expectations in 9th and 11th grade from the 10 ordinal categories to a single binary indicator capturing whether the student reported expecting to attain an associate degree or higher, the lowest possible postsecondary credential captured by the survey. Most promise programs focus on increasing student access to two-year institutions or community colleges, where associate degrees are the most common award (Perna & Leigh, 2018). Students with missing data on an outcome of interest (i.e., 9th or 11th-grade expectations), those located in states or regions with a local promise program that began prior to 2010 (i.e., students who are “already treated” by a free college program), and those who transferred high schools between 2009 and 2012 (i.e., who arguably experienced another form of treatment [i.e., moving during high school] that could influence college-going plans; Sutton et al., 2013) were dropped from the sample. Among the remaining 12,796 students, any missing covariate values were mean imputed in accordance with What Works Clearinghouse standards and a corresponding dummy/missing indicator was generated for each observation (Institute of Education Sciences, 2020; Jackson & Makarin, 2018). Finally, all financial predictors were indexed to the Consumer Price Index for 2012, the last data year.

Table 1 reports descriptive statistics for the final analytic sample overall and for three primary groups: (a) students exposed to a promise program during high school (i.e., the treatment

group), (b) students never exposed to a promise program but located within one of the same six states as treated students (i.e., a control group), and (c) students never exposed to a promise program but located within a border state to treated students (i.e., another control group). Comparing outcomes for treated students to in-state/non-treated and border-state peers seeks to minimize observable and unobservable demographic, educational, political, social, and other differences between the treatment and control groups that could be introduced by comparing students, alternatively, across the nation. This is a common strategy when assessing impacts of promise programs and other college access policies (Dynarski, 2000; Nguyen, 2020; Odle et al., 2021). These descriptive statistics show relatively stable levels of educational expectations across students’ high school years, consistent with prior works (Schneider & Saw, 2016): 79.9% of 9th graders reported planning to attain an associate degree or higher; 79.3% did so in 11th grade. However, for students treated by the introduction of a promise program, there are large descriptive gains in the proportion who reported expecting to attain an associate degree or higher, rising from 68.8% in 9th grade to 83.3% in 11th grade, a 14.5 percentage point jump that suggests promise programs may in fact have meaningful impacts on students’ college plans.

Descriptive changes in students’ educational expectations are also plotted in Figure 1 for students in promise regions; non-promise, in-state peers; and non-promise peers in border states. Figure 2 also plots these same outcomes for specific subgroups of interest, including URM students (defined as those who self-identified as American Indian/Alaska Native, Black/African-American, Hispanic, More than one race, or Native Hawaiian/Pacific Islander; guided by Bensimon [2017] and Mukherji et al. [2017]), low-income students (defined as those whose parental income was in the bottom tercile of the income distribution during the first survey wave in 2009), and URM-low-income students (defined as those meeting both prior criteria). As

hypothesized, these descriptives suggest that, if promise programs increased students’ educational expectations, those gains were likely greatest among racially minoritized and low-income students, where mean expectations to ultimately attain an associate degree or higher rose by 25.1 and 17.7 percentage points, respectively, compared to an overall increase of 14.5 percentage points for all students in promise regions.

Empirical Strategy

To estimate causal impacts of the adoption of a local promise program on students’ educational expectations, I employ two complementary identification strategies: a difference-in-differences (DID) design and a model that incorporates students’ own prior expectation levels via a lagged-dependent-variable (LDV) regression. Taken together, these strategies have been shown to possess a “bracketing” relationship that bounds the causal effect of interest (Ding & Li, 2019, p. 605). On one hand, a DID estimator with two-way unit and time fixed effects assumes there are no unobserved time-varying confounders. This assumption has been shown to upwardly bias estimates of the treatment effect and violate DID’s fundamental parallel-trends assumption if such confounders exist and have time-varying impacts on the outcome of interest (Angrist & Pischke, 2009). On the other hand, estimates from a LDV regression, which rest on an assumption of ignorability (i.e., that treatment and control unit outcomes would have the same distribution conditional on the LDV), may be downwardly biased if such conditional independence is violated (Ashenfelter, 1978). In practice, however, both models can be estimated separately to robustly identify estimates of the upper and lower bound of the true effect and will together provide stronger evidence than either would alone (Ding & Li, 2019; O’Neill et al.,

2016).[7] In this setting, findings from a DID estimator and LDV regression will provide a range of the impacts of promise programs on students' educational expectations.

Difference-in-Differences

First, I leverage a DID design to exploit exogenous variation in the adoption of promise programs across regions. This design allows me to estimate impacts on college plans for the same cohort of students as they progress from 9th grade (fall 2009) to 11th grade (spring 2012) by comparing changes in expectations among students in promise regions (i.e., treatment) to those in non-promise regions (i.e., controls) before and after the programs began (Imbens & Wooldridge, 2009). Formally, I estimate the following linear probability model:

$$(1) \qquad y_{ist} = \delta \text{Promise}_{it} + \mathbf{X}'_{it}\beta + \alpha_i + \gamma_s + \phi_t + \varepsilon_{ist} \mid w_i \, .$$

Here, y is the expectation outcome of student i in year t, which is a binary indicator for whether the student planned to ultimately earn an associate degree or higher. Promise is a binary treatment indicator, which takes the value of 1 for students in promise regions in all years when a promise program is present (i.e., treated students in 2011) and 0 otherwise. δ is thus the average treatment effect on the treated and my parameter of interest, where δ isolates the mean shift in educational expectations for students exposed to the adoption of these promise programs (relative to students in non-promise regions), net of the prior level differences in expectations observed between the two groups. $\mathbf{X}_{it}$ represents a vector of the student, parent, school, and community controls described above to account for other factors related to college plans. I also include traditional two-way student (α_i) and year fixed effects (ϕ_t) to absorb other individual-specific, time-invariant factors; capitalize upon within-student variation over time in the outcome

[7] Angrist and Pischke (2009) discuss how the conditions for consistently estimating treatment effects under a model with both fixed effects and a LDV can be extremely demanding and, thus, recommend separating each strategy.

of interest; and control for any within-year features that could impact all students' expectations.[8] Furthermore, I include state fixed effects (γ_s) to restrict all comparisons to students within a given state and hold constant other demographic, educational, political, social, or other factors of states that could influence college plans (e.g., state financial aid, higher education opportunities). In all models, I estimate robust standard errors clustered at the school level and weight each estimate by the HSLS:09 unit sampling weights, w_i (Bertrand et al., 2004).

As noted, a primary assumption of a DID estimator is that of parallel trends; that treatment and control groups would follow similar outcome trajectories in the absence of an intervention (Angrist & Pischke, 2009). This untestable assumption is commonly supported by establishing that treatment and control groups followed similar outcome paths *before* an intervention. Given that HSLS:09 only observed students' expectations one year before a promise program began (i.e., in 2009 or 9th grade) and one year after a promise program (i.e., in 2012 or 11th grade), I have a canonical DID design with two time periods (i.e., before and after), so such pre-treatment parallel-trend plots are impossible given only one year of data on either side of the treatment boundary. However, to ensure findings are not driven by the selection of a counterfactual group that may or may not follow these outcome paths, as noted in the Data section, I alter the DID counterfactual group to compare changes in expectations among students exposed to a promise program to two separate peer groups: (a) in-state peers and (b) out-of-state peers (St. Clair & Cook, 2015). If parallel trends would not hold for either of these groups, simulations by O'Neill et al. (2016) show that regression adjustment with a LDV can instead produce the most efficient and least biased estimate of the treatment effect.

[8] This specification varies the inclusion of time-invariant individual and parent controls (e.g., gender, race, educational attainment) with unit fixed effects which absorb these factors. Results for regression models with both full covariate controls and those will full fixed effects (student, state, and year) are each presented.

Lagged Dependent Variable

In addition to the primary DID strategy, I leverage a complementary LDV regression technique. This design incorporates students' own prior expectation levels when estimating treatment effects. Here, I specify the following linear probability model

$$(2) \qquad y_{i,t=2012} = \pi_0 + \pi_1 \text{Promise}_i + \theta y_{i,t=2009} + \mathbf{X}_i'\beta + \varepsilon_i \mid w_i \,,$$

where the primary outcome is now $y_{i,t=2012}$, or student i's binary expectation outcome at time $t = 2012$ (i.e., 11th grade). Promise is a binary indicator identifying students in promise regions, and π_1 thus estimates the mean difference in expectations between students in promise and non-promise regions. Importantly, this estimation now accounts for those same students' prior expectation levels, $y_{i,t=2009}$. Here, this LDV functionally matches students at the same dichotomous expectation level in 9th grade, thus allowing π_1 to estimate the difference in 11th grade expectations for those similar students across promise and non-promise regions. Given observed level differences in pre-treatment expectations between students in promise and non-promise regions, the LDV's ability to functionally correct for these differences allows it to provide a robust estimate of the average treatment effect on the treated (Wilkins, 2017). This LDV strategy has also been shown to reduce concerns of endogeneity (Bellmare et al., 2017), though there is no evidence that students and families could anticipate *would-be* promise regions and would sort themselves into these areas prior to students' 9th grade year, supporting the LDV strategy's conditional ignorability assumption (Ding & Li, 2019; Keele & Kelly, 2006). In this setup, $\mathbf{X}_i$ are still time-invariant controls for the same year, and I again alternate the model's comparison group from in-state (non-promise) peers to border state peers, estimate robust standard errors clustered at the school level, and use HSLS:09 unit sampling weights.

In all, these complementary DID and LDV strategies will allow me to estimate impacts of promise programs on students’ educational expectations and “bound” this effect within the range of their estimates (Angrist & Pishke, 2009). Furthermore, each can also facilitate a study of heterogeneous impacts across dimensions of students’ income and race by separately interacting indicators for low-income status, URM status, and low-income-URM status with the treatment indicators in each respective model (Hainmueller et al., 2019).

Results

Estimates from the DID and LDV regression models are presented in Table 2 by estimation strategy and specification (column) and counterfactual group (row). The first two columns show results from the DID strategy and vary the inclusion of time-variant and invariant controls with individual, state, and year fixed effects. The final column shows results from the LDV strategy with covariate controls. The first row of estimates shows impacts comparing students treated by a promise program to in-state, non-promise peers; the second shows estimates comparing students to border-state peers. As expected, estimates from the DID models remain unchanged to these varied specifications and altered counterfactual groups. Across each specification-group combination, results suggest the introduction of a local promise program increased students’ expectations to ultimately attain an associate degree or higher by 13.7-15.0 percentage points. Given a 9th grade expectation level of 68.8% for students in promise regions, this increase is a roughly 19.9-21.8% increase in expectations. As noted, these estimates may represent an upper bound of the true causal effect under an assumption of parallel trends, where estimates from a LDV regression can provide associated lower bounds by controlling for students’ own prior expectation levels. Estimates from these specifications are lower than the fixed effects estimates and remain unchanged to variation in the counterfactual group. As shown

by the final column of Table 2, results from the LDV models suggest the introduction of a local promise program increased students' educational expectations by 8.5 percentage points (or 12.4% given baseline means). In all, these results provide robust evidence that the introduction of a local promise program increased high school students' expectations to attain an associate degree or higher by 8.5-15.0 percentage points.

Heterogeneity by Race and Family Income

Estimates from a heterogeneity analysis exploring whether these impacts on students' educational expectations vary across dimensions of race and/or family income are presented in Table 3. The table is formatted in the same manner as Table 2, but each set of columns is now additionally collected by subgroup (e.g., URM, low-income, and URM-low-income). Estimates from DID models will full fixed effects and regressions with a LDV are presented (by column) and remain robust to altered counterfactual groups (by row). As hypothesized, these estimates suggest that the impacts of promise programs on students' educational expectations were greatest among racially minoritized students and those from low-income families.

For URM students, LDV regression and DID estimates suggest that the introduction of a promise program increased college plans by between roughly 12.7-26.2 percentage points compared to in-state peers and by 11.8-25.8 percentage points when compared to border-state peers. For students from families in the lowest income tercile, estimates suggest promise programs raised educational expectations by between 12.7-16.5 percentage points (12.6-17.7 percentage points for border-state comparisons). These estimates were even more pronounced for students who identified as URM *and* were additionally from families classified as low-income. Here, estimates suggest that promise programs raised the educational expectations among URM-low-income students by 21.3-30.1 percentage points when compared to in-state peers and by

20.9-31.0 percentage points compared to border-state peers. In all, the results of this heterogeneity analysis suggest that the positive impacts of promise programs on students’ educational expectations meaningfully vary across dimensions (and intersections) of student race and family income, where these impacts may reach levels up to twice that of these students’ more economically advantaged and racial-majority peers.

Discussion

Access to postsecondary education and a college credential yields a host of positive benefits for individuals and society (Chetty et al., 2017; Ma et al., 2019), yet wide gaps in college access and completion persist across dimensions of race and income, where students from low-income backgrounds and students of color are substantially less likely to apply to college, enroll, and earn a degree than their White and higher-income counterparts (Baker et al., 2018; Deming & Dynarski, 2009). These inequalities begin early in students’ college-going journeys with their expectations to pursue and ultimately complete a credential. Even in 9th grade, racially minoritized students and those from low-income backgrounds in HSLS:09 reported expecting to attain an associate degree or higher credential at rates up to 20.0 percentage points lower than their White counterparts and 24.4 points lower than their higher-income peers. Given that students’ college-going outcomes are influenced in part by these early college-going plans (Klasik, 2012; Somers et al., 2002), identifying and evaluating mechanisms to increase pre-college students’ educational expectations has salient implications for understanding and improving subsequent college-going outcomes. Furthermore, reducing racial and socioeconomic disparities in students’ expectations may be an important step toward achieving equity along all points of the postsecondary access and completion pipeline.

Drawing from prior works that have conceptualized the college expectation and choice process, I hypothesized that a recent collection of college access policies, place-based "promise" scholarships or "free" college programs, may not only combine key levers correlated with increased college-going outcomes—including by transmitting information, providing early-commitment financial aid, and promoting a "college-going culture" (Dynarski et al., 2021; Heller, 2006; Liu et al., 2011; Long & Riley, 2007; Miller-Adams, 2015, p. 10)—but that promise programs may also exercise these levers across many of the contexts within which students' develop initial college plans, including across individual, family, school, and community environments (Hoxby, 2004; Iriti et al., 2018; Kiyama, 2010; Nelson, 1972; Perna, 2006; Stewart et al., 2007). Taken together, these hypotheses suggest that promise programs may be a viable mechanism to increase students' educational expectations. Yet while prior works have qualitatively examined a link between promise programs and students' college-going attitudes and beliefs (Gonzalez et al., 2011; Miron et al., 2012), no research to date has quantitatively considered impacts of the adoption of promise programs on students' reported expectations to ultimately enroll and complete a degree.

Across complementary identification strategies, I found robust evidence to suggest that the adoption of a promise program had meaningful impacts on local high school students' expectations to ultimately attain an associate degree or higher. Overall, estimates suggest promise programs increased students' educational expectations by between 8.5 and 15.0 percentage points by 11th grade, an approximately 12.4-21.8% increase over 9th grade levels. These impacts were largest among URM, low-income, and URM-low-income students, where impact ranges grew up to 12.7-26.2, 12.7-16.5, and 21.3-30.1 percentage points, respectively (compared to in-state, non-promise peers). Thus, it is clear that promise programs represent a

viable policy option to increase students’ college expectations by harnessing the hypothesized power of “free” college, particularly for URM students, students from low-income backgrounds, and students at the intersection of URM and low-income status. Indeed, even descriptively (as shown in Figures 1 and 2), the advent of a promise program effectively equalized educational expectations between students in promise regions and their non-promise peers and eliminated gaps between low-income, URM, and low-income-URM students and their White and higher-income counterparts.

While this study identified relatively large impacts of the introduction of promise programs on students’ educational expectations compared to other interventions seeking to increase other college-access-related outcomes (e.g., the average increase in the likelihood of enrollment given $1,000 of need-based aid is approximately of 4 percentage points; Deming & Dynarski, 2010), it is important to remember that (a) the outcome of interest is a relatively pliable indicator (i.e., a student self-reporting whether they expect to attain a specific level of education) and (b) prior interventions have achieved similar levels of impact on students’ aspirations and expectations, such as the introduction of a competitive merit-aid program that raised four-year college aspirations by 32.3% (DesJardins et al., 2019) or an affirmative action policy that more than doubled students’ expectations to enroll in college following high school graduation (Lloyd et al., 2008). Indeed, a small but diverse body of work has shown that students’ educational expectations can be relatively sensitive to and positively influenced by changes in students’ pre-college contexts and by public policies or financial programs aimed at increasing college access—particularly among students from low-income and racially minoritized backgrounds. This work extends this body of work and identifies “free” college

promise programs as a viable yet underexplored mechanism to similarly increase college expectations and reduce inequalities in these college plans across groups.

Limitations

While this study makes important contributions to existing literature and identifies an underexplored mechanism that may explain (at least in part) many of the positive outcomes associated with promise programs, there are notable limitations to this work. First, both the DID design and LDV regression techniques are primarily limited by the design of the HSLS:09 survey in that students' educational expectations are only observable at two points; once before the introduction of a promise program and once after. While I altered the specifications' counterfactual comparison group (and found robust results), a plausible assessment of parallel trends is impossible.[9] Future studies seeking to replicate these findings among other samples would be strengthened by a longer panel of observations or an identification strategy that does not explicitly rely upon panel data, such as instrumental variables. Second, while the study is adequately powered to detect impacts overall and across the three subgroups explored here, the present study cannot examine heterogeneous impacts across (a) promise program types (e.g., merit-aid versus need-based aid given that only one of the 11 programs determines eligibility on a means-tested basis) or (b) dimensions of student place (e.g., urban versus rural given that none of the 11 programs are in rural areas).[10] Prior works suggest that the design and delivery of

[9] I attempted to link HSLS:09 records to records from the Educational Longitudinal Study of 2002 (ELS:2002) to establish parallel trends between students in these areas in an additional pre-treatment period, but the ELS:2002 sample did not provide coverage of the same HSLS:09 high schools.

[10] While there are fewer than 100 students in the treatment group and only one pre ($b = 1$) and post ($k = 1$) observation period ($T = 2$), the study is still adequately powered given each population's outcome distribution and the correlation between the repeated measures ($\rho = .34$). Following Hu and Hoover's (2018) power analysis design for DID estimators, only 42 treated students are needed here to achieve 80% power at the 0.05 significance level, less than half of the current sample. This is given by $n = \frac{T(1-\rho)}{bk\delta^2}\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 = \frac{2(1-.34)}{1*1*.50^2}(1.96 + 0.84)^2 = 42$, where δ is an effect size of 0.50 and z scores follow the standard normal distribution.

college access and financial aid programs, including “free” college promise programs, matters for program efficacy (Domina, 2014; Perna et al., 2020). Future works should seek to overcome this limitation and examine whether program design—and students’ subsequent beliefs about scholarship eligibility given such criterion—moderate the impacts of program adoption on educational expectations. Furthermore, given that wide gaps in college-going plans and enrollment persist by students’ geographic location (Chetty & Hendren, 2018a, 2018b; Hillman, 2016), promise programs may similarly be able to reduce inequalities in students’ educational expectations across dimension of place, though the present study cannot observe such students.

Conclusion

In all, this study assesses the ability of place-based promise programs to increase high school students’ ultimate educational expectations and to reduce inequalities in college plans across dimensions of race and family income. Answers to these questions not only fill an existing gap in the literature and provide the first causal link between promise programs and educational expectations but also provide policymakers and researchers alike with a fuller view into the impacts of promise programs. Furthermore, this investigation centered pre-college students’ educational expectations as an additional and underexplored mechanism by which promise programs may influence students’ subsequent college-going outcomes. Given this foundation, future work should seek to disentangle the impacts of these key levers—information, financial aid, and the advent of a college-going culture—on students’ college enrollment and completion outcomes and seek to identify the unique contribution such an increase in educational expectations has on students’ ultimate college completion outcomes, particularly given existing gaps between students’ college plans and their final attainment outcomes (McCarron & Inkelas, 2006).

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Table 1. *Descriptive statistics.*

	Overall	Promise Program (Treatment)	Non-Promise, In-State (Control)	Border State (Control)
Outcome				
Ed. Expectation AA+ (9th Grade)	0.799	0.688	0.808	0.814
	0.401	0.463	0.394	0.389
Ed. Expectation AA+ (11th Grade)	0.793	0.833	0.803	0.809
	0.405	0.373	0.398	0.393
Student				
GPA	2.777	2.736	2.837	2.853
	0.831	0.819	0.865	0.815
Race (URM)	0.429	0.698	0.219	0.270
	0.495	0.459	0.414	0.444
Gender (Female)	0.503	0.571	0.481	0.494
	0.500	0.495	0.500	0.500
SAT/ACT Testing	0.589	0.423	0.556	0.558
	0.787	0.536	0.703	0.739
Parent				
Ed. Attainment (AA+)	0.590	0.449	0.655	0.640
	0.447	0.445	0.436	0.436
Income	90,656.04	74,233.76	92,418.78	95,637.38
	115,382.41	34,426.34	102,123.96	112,903.97
Unemployed	0.256	0.465	0.206	0.228
	0.398	0.459	0.369	0.381
School				
Type (Private)	0.061	0.005	0.070	0.078
	0.240	0.067	0.256	0.268
Locale (Rural/Town)	0.356	0.000	0.389	0.358
	0.479	0.000	0.488	0.479
College Adviser	0.584	0.095	0.569	0.534
	0.466	0.293	0.465	0.466
Percent FRPL	37.573	62.920	28.978	31.838
	23.135	13.407	17.063	21.539
Historic CGR	77.822	94.120	81.070	79.792
	15.799	12.340	11.603	13.652
Community				
Median Income	56,351.37	28,019.41	58,722.73	58,311.06
	22,747.19	8,940.18	21,424.06	21,143.84
Unemployment Rate	0.095	0.217	0.091	0.088
	0.046	0.055	0.039	0.038
Ed. Attainment (AA+)	0.346	0.179	0.345	0.365
	0.159	0.078	0.138	0.154
N	12,796	94	1,298	4,504

Sources: HSLS:09, Public and Private School Directories, American Community Survey, Promise Program Database.

Notes: Table shows means (first row) and standard deviations (second row) at baseline (2009, 9th-grade, unless otherwise noted), weighted by HSLS:09 unit sampling weight. URM: Student identified as American Indian/Alaska Native, Black/African-American, Hispanic, More than one race, or Native Hawaiian/Pacific Islander. SAT/ACT Testing is number of exams student took. School Historic College-Going Rate (CGR) is percent of prior senior cohort who enrolled in a college or university after graduation.

Table 2. *Differences-in-differences and lagged dependent variable estimated impacts of promise program adoption on students' educational expectations (associate degree or higher).*

In-State Student Comparisons

	Difference-in-Differences		Lagged Dependent
	Controls	Fixed Effects	Variable
PROMISE PROGRAM ADOPTION	0.1371** (0.0499)	0.1497** (0.0473)	0.0850* (0.0404)
Baseline	0.808	0.808	0.808
N	1,392	1,392	1,392
Adj. R^2	0.1269	0.3722	0.1731

Border-State Student Comparisons

	Difference-in-Differences		Lagged Dependent
	Controls	Fixed Effects	Variable
PROMISE PROGRAM ADOPTION	0.1367** (0.0464)	0.1501*** (0.0447)	0.0847** (0.0323)
Baseline	0.814	0.814	0.814
N	4,598	4,598	4,598
Adj. R^2	0.1097	0.3444	0.1636

Sources: HSLS:09, Public and Private School Directories, American Community Survey, Promise Program Database.

Notes: + p < .10, * p < .05, ** p < .01, *** p < .001. Table reports coefficients and robust standard errors clustered at the high-school level (in parentheses). Outcome is student's 11th-grade expectation (associate degree or higher), modeled under a linear probability specification. Models with controls only include student (GPA, race, gender, ACT/SAT participation), parent (educational attainment, income, employment), school (control, urbanicity, presence of a college adviser, FRPL proportion, prior college-going rate), and community (median income, unemployment, educational attainment) covariates. Models with controls also include an indicator for missing/imputed values of any covariate control. Models with fixed effects only include student, state, and year fixed effects. Lagged dependent variable is student's 9th-grade educational expectation. Lagged dependent variable models also include controls. Baseline expectation levels are for 9th grade students in non-promise regions.

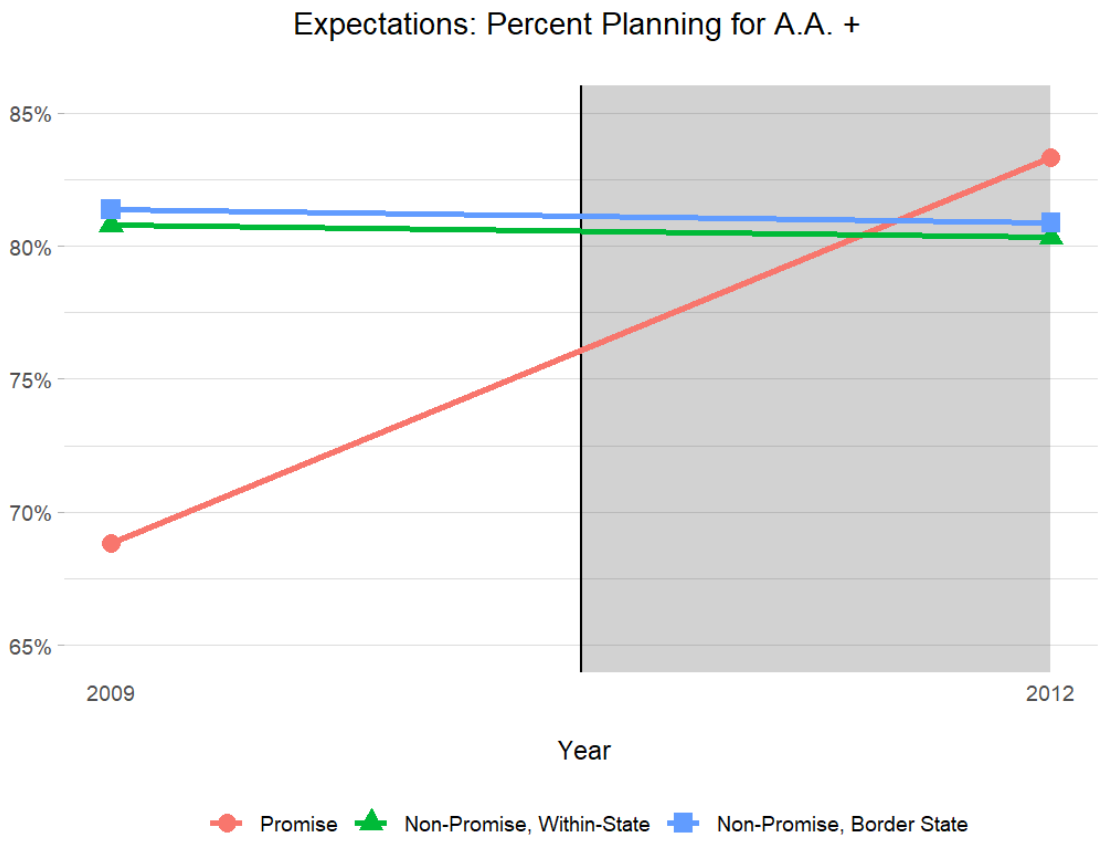
Table 3. *Differences-in-differences and lagged dependent variable estimated impacts: Heterogeneity by race and income.*

In-State Student Comparisons	**Race (URM)**		**Income (Low-Income)**		**Race (URM) x Income (Low-Income)**	
	Diff-in-Diff with Fixed Effects	Lagged Dependent Variable	Diff-in-Diff with Fixed Effects	Lagged Dependent Variable	Diff-in-Diff with Fixed Effects	Lagged Dependent Variable
PROMISE PROGRAM ADOPTION	0.2623*** (0.0514)	0.1274*** (0.0325)	0.1649** (0.0560)	0.1269* (0.0581)	0.3007*** (0.0637)	0.2125*** (0.0493)
Baseline	0.7730	0.7730	0.7823	0.7823	0.7351	0.7351
N	1,392	1,392	1,392	1,392	1,392	1,392
Adj. R^2	0.3872	0.1428	0.3675	0.1386	0.3763	0.1465
Border-State Student Comparisons	**Race (URM)**		**Income (Low-Income)**		**Race (URM) x Income (Low-Income)**	
	Diff-in-Diff with Fixed Effects	Lagged Dependent Variable	Diff-in-Diff with Fixed Effects	Lagged Dependent Variable	Diff-in-Diff with Fixed Effects	Lagged Dependent Variable
PROMISE PROGRAM ADOPTION	0.2578*** (0.0461)	0.1177*** (0.0265)	0.1768** (0.0658)	0.1256* (0.0583)	0.3102*** (0.0689)	0.2090*** (0.0493)
Baseline	0.7646	0.7646	0.7930	0.7930	0.7365	0.7365
N	4,598	4,598	4,598	4,598	4,598	4,598
Adj. R^2	0.3495	0.1205	0.3426	0.1193	0.3457	0.1219

Sources: HSLS:09, Public and Private School Directories, American Community Survey, Promise Program Database.

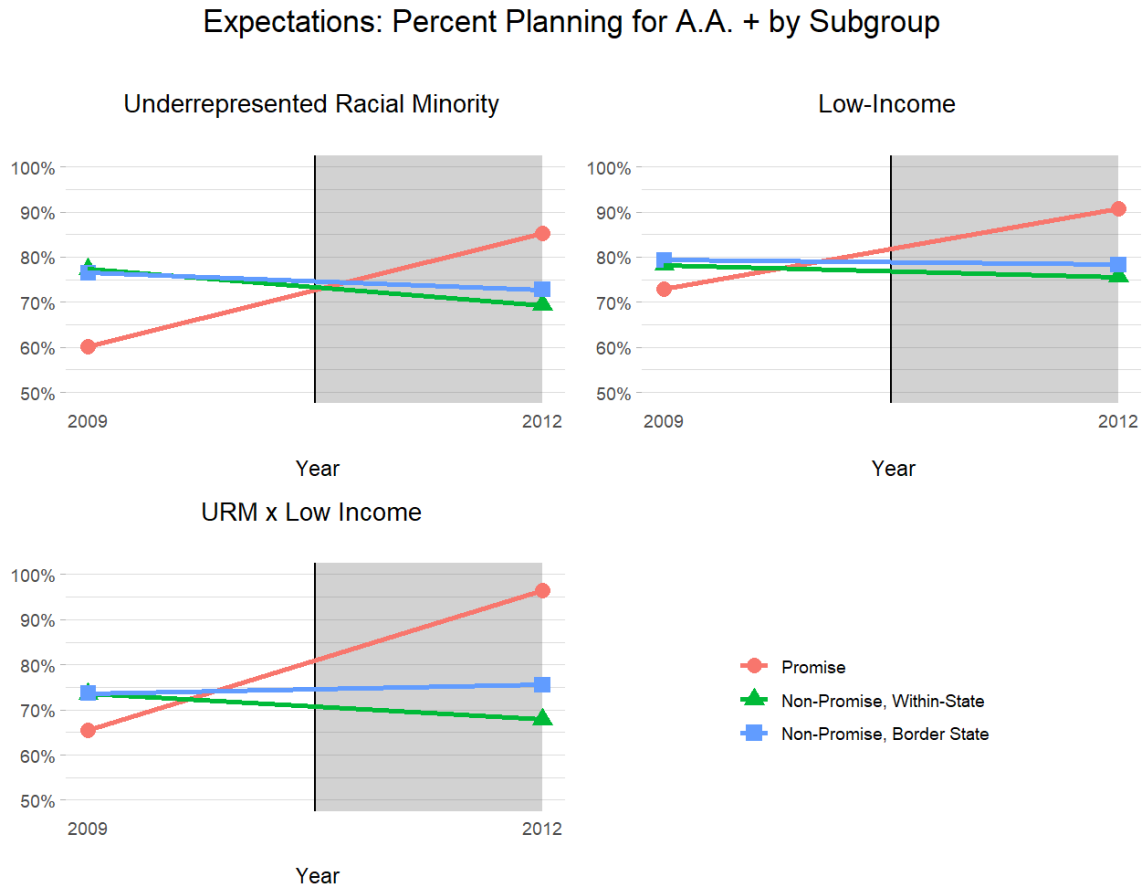
Notes: + p < .10, * p < .05, ** p < .01, *** p < .001. Table reports coefficients and robust standard errors clustered at the high-school level (in parentheses). Outcome is student's 11th-grade expectation (associate degree or higher), modeled under a linear probability specification. Models with fixed effects only include student, state, and year fixed effects. Lagged dependent variable is student's 9th-grade educational expectation. URM: Student identified as American Indian/Alaska Native, Black/African-American, Hispanic, More than one race, or Native Hawaiian/Pacific Islander. Any missing values for race were categorized as Non-URM. Parental income based on first wave (2009) value and broken into terciles. Low-income is defined as bottom tercile. Baseline expectation levels are for 9th grade students in non-promise regions.

Figure 1. *Mean differences in educational expectations over time and across groups.*



Sources: HSLS:09, Promise Program Database.
Notes: Plot shows the mean A.A.+ expectation level for the treatment group (Promise, *n*=94) and two control groups: Non-Promise, In-State students (*n*=1,298) and Border-State students (n=4,504). 9th grade (fall 2009) expectations are pre-treatment; 11th grade (spring 2012) are post-treatment (i.e., shaded). Treatment is defined as the introduction of any promise program in 2010, 2011, or 2012.

Figure 2. *Mean differences in educational expectations over time and across groups: Heterogeneity by race and income.*



Sources: HSLS:09, Promise Program Database.
Notes: Plot shows the mean A.A.+ expectation level for the treatment group (Promise) and two control groups: Non-Promise, In-State and Border-State. 9th grade (fall 2009) expectations are pre-treatment; 11th grade (spring 2012) are post-treatment (i.e. shaded). Treatment is defined as the introduction of any promise program in 2010, 2011, or 2012. URM: Student identified as American Indian/Alaska Native, Black/African-American, Hispanic, More than one race, or Native Hawaiian/Pacific Islander. Any missing values for race were categorized as Non-URM. Parental income based on first wave (2009) value and broken into terciles. Low-income is defined as bottom tercile.