A Study of the Effect of the Talent Search Program On Secondary and Postsecondary Outcomes in Florida, Indiana, and Texas

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ABSTRACT

Low-income students and students whose parents have not attended college typically are less likely than middle- and upper-income students to complete high school and attend college, and are thus less likely to reap the benefits of attending college. By providing information on the types of high school courses students should take to prepare for college and on the financial aid available to pay for college, the Talent Search program seeks to address substantial informational hurdles. Using a large amount of administrative data compiled in Florida, Indiana, and Texas for one complete cohort of students, we were able to use complex propensity score matching models to identify nonparticipating students who were most similar to Talent Search participants. We find that Talent Search participants were more likely than comparison students to apply for federal financial aid and enroll in public postsecondary institutions in all three states. These findings suggest that assisting low-income students who have college aspirations to overcome information barriers—an important objective of the Talent Search program—may be effective in helping these students achieve their aspirations.

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INTRODUCTION

The importance for success in the labor market of completing high school and earning a postsecondary degree is well documented. The difference in earnings between high school and college graduates is great, even among young workers. For full-time workers ages 25 to 34, median earnings are 65 to 70 percent higher for workers with a bachelor's degree than for workers with a high school diploma only. Workers who do not complete high school fare much worse, earning only 75 percent of what high school graduates earn and less than half of what workers with a bachelor's degree earn (U.S. Department of Education 2004). These differences increase with workers' ages, as earnings also rise more rapidly among college-educated workers with experience (Murphy and Welch 1992). In addition to the economic benefits of a college education, evidence suggests positive externalities are generated by individuals who complete college, such as having a greater civic orientation, being more likely to vote, and assuming leadership roles in their communities (Astin 1993; Bowen and Bok 1998).

Low-income students are less likely than middle- and upper-income ones to complete high school and attend college (and thus less likely to reap the benefits of attending college) for several reasons. First, the barriers low-income students face are due, in part, to the socioeconomic status of their families—it is more difficult for low-income families to allocate time and money toward schooling and away from other necessities. Second, the environment outside the household compounds these issues. Recent studies of high school dropout rates across the country indicate that not only do low-income students have higher dropout rates than other students, but middle-income students at high-poverty high schools have higher dropout rates than middle-income students at other high schools. Attending a high-poverty high school is particularly deleterious for high school completion among African Americans (Swanson 2004; Balfanz and Legters 2004). Third, most low-income students do not have a parent who has a

college degree, which presents both financial and informational barriers for students accessing financial aid and navigating the college admissions process. In 1999, 82 percent of students with parents with a bachelor's degree enrolled in college immediately after high school, compared to 54 percent of students with parents with high school diplomas only. Differences in high school curricula, parents' education, and test scores can partly explain the gap in enrollment rates between low- and high-income students (U.S. Department of Education 2001; Jacobson et al. 2001; McPherson and Schapiro 1998). However, evidence indicates that, even though financial aid programs such as Pell Grants, college tuition tax credits, and student loan programs are available, differences in financial resources also play an important role (Kane 1999).

Additionally, low-income students are not taking full advantage of financial aid programs. A study by the American Council on Education showed that 20 to 30 percent of college-going students with family incomes below $40,000 (and thus likely to be eligible for federal financial aid) did not file a Free Application for Federal Student Aid (FAFSA) in 2000. This includes approximately 850,000 students who may have been eligible for a Pell Grant (King 2004). Other studies have also shown that while low-income students may have high educational aspirations, they find the college admissions test-taking, financial aid application, and college application process difficult to navigate (St. John et al. 2002; Avery and Kane 2004).

Program Description

One of the original federal TRIO programs, Talent Search was designed to help low-income, potentially first-generation college students prepare for and gain access to college. The program helps students achieve these goals by:

- Providing information on the types of high school courses students should take to prepare for college
- Providing information on financial aid available to pay for college

- Helping students access financial aid through applications for grants, loans, and scholarships
- Orienting students to different types of colleges and the college application process

Talent Search has consistently been the largest of the TRIO programs in the number of students served. Talent Search funding in fiscal year (FY) 2004 was approximately $144 million and it served 382,500 students in 470 projects across the country. Talent Search, which spent approximately $313 per student in FY 2000 (the period relevant to this analysis), is a relatively low-intensity program.[1] Talent Search projects are mainly hosted by two- and four-year institutions, but also community-based institutions. It targets students who have academic potential for college but who may need extra information and help in navigating the financial aid and college application process. The low-intensity structure of Talent Search is reflected in the limited number of services participants received. According to a survey of project directors in 2000, while almost three of ten Talent Search participants received 20 or more hours per year of services, nearly half received 10 hours per year of services or fewer.[2]

Talent Search helps students overcome the informational barriers that stem from attending high-poverty high schools and being the first generation in their families to attend college. The services and goals of the Talent Search program are specifically intended to address some of the barriers described above. Talent Search projects reported providing a wide range of services in 1999–2000, but the services most commonly provided fall into three categories: (1) academic support (test taking, study skills, academic advising, and course selection), (2) career development (college orientation activities, visits to college campuses, referrals, and counseling), and (3) financial aid (individual financial aid counseling, financial aid workshop, assistance with

[1] For example, in FY 2001, the average cost per student served by Upward Bound was $4,800 per year.

[2] For details on the program as it was operating in the late 1990s, see Cahalan et al. 2004.

pencil-and-paper FAFSA, and scholarship searches).[3] In addition, project directors listed financial aid services and visiting college campuses as the top two services that contributed to achieving the projects' objectives.

This paper examines the effect of participation in Talent Search on secondary and postsecondary outcomes in selected states, relying on administrative records gathered from several sources and quasi-experimental statistical techniques, which allow us to identify students who did not participate in the program but who were similar to Talent Search participants.[4] In the following sections, we describe the data compiled for the analyses, the methodology for identifying drawing comparison groups of students, and the characteristics and Talent Search participants and similar nonparticipants. We follow with the results and implications.

DATA AND METHODS

Our goal in assessing the effect of Talent Search on participants was to determine what would have happened to Talent Search students if the program had not been available to them. A randomized study would have provided the most valid framework for such an analysis, splitting students who wished to participate in Talent Search into groups of those assigned to participate and those not assigned to participate. In the absence of a randomized study, we used a matched comparison group based on propensity score design, adhering to the criteria developed by Rosenbaum and Rubin in a series of articles (Rosenbaum and Rubin 1983 and 1985; Rubin 2001) for replicating a randomized design as well as possible.

Within the quasi-experimental framework, we sought to identify a comparison group that was as similar as possible to the participant group, particularly in observable characteristics

[3] The services listed include only those that more than 90 percent of the projects provided.

[4] Mathematica Policy Research conducted this study under contract to the U.S. Department of Education.

correlated with educational outcomes. The data files compiled in Florida, Indiana, and Texas contained a wealth of information on students in Talent Search, including important demographic information such as age, race, and gender; the school the student was enrolled in for ninth grade; and postsecondary outcomes, such as first-time application for financial aid and postsecondary enrollment.

Because we compiled a large amount of data in each state, both in terms of the number of data elements available and the size of the student samples, we were able to use complex propensity score matching models to identify nonparticipating students who were most similar to Talent Search participants. We report findings only for matched comparison groups with a distribution of characteristics similar to those of Talent Search participants, and we test the sensitivity of our findings to alternative comparison groups that also meet these criteria.

Propensity Score Matching

For each Talent Search project, we estimated propensity scores on which the samples of participants and nonparticipants were to be matched. An unweighted logit model was estimated to distinguish between members of the two samples; the dependent variable (participation in Talent Search) was coded as 1 for participants and 0 for nonparticipants. The explanatory variables varied by state; in each state, however, they included demographic, socioeconomic, and some academic characteristics. We used the model to estimate the log odds (the output of the propensity score model) of participating in Talent Search, conditional on the explanatory variables, for each participant and nonparticipant in the sample.[5]

[5] The log odds of being in the participant sample equals the natural log of $P(1) / P(0)$, where $P(1)$ equals the probability of being in the participant sample, and $P(0)$ equals the probability of being in the comparison sample. We predicted these probabilities using the estimated coefficients from the logit model.

Within each Talent Search project or group of projects, we matched participants to similar nonparticipating comparison students. Two students were deemed comparable when their log odds were sufficiently close. We matched each participant to all comparison students deemed comparable within a specified distance, or caliper range. Comparison students could be matched to multiple participants, a technique known as matching with replacement. Talent Search participants for whom we could not find a similar comparison student were excluded from the study because no comparison student could provide credible information about the outcomes we would have observed without the student's participation in Talent Search. In each state, however, we were able to match 95 percent or more of Talent Search participants to at least one comparison student. All comparison students who were matched to one or more participant sample members were included in the matched comparison group.

Another component of the algorithm for matching participant and comparison students was to select the appropriate caliper range that defines how close the log odds of a participant and a comparison student must be to be deemed a suitable match. Narrow caliper ranges can leave many participants unmatched when similar students might be found in the comparison sample; wide caliper ranges generate matches between students who may be less similar. We tested several caliper ranges in matching participants to the comparison students, based on fixed fractions of the standard deviation of the log odds within the matching group. Each caliper range generated different matched participant and comparison samples; therefore, selecting a caliper range was equivalent to selecting a pair of matched participant and comparison samples. Ultimately, we selected a narrow caliper range which led to matched participant and comparison samples with a smaller number of significant differences in variables that describe baseline

characteristics and academic achievement, while still finding matches for a high percentage of participants.[6]

As part of the matching procedure, students in the comparison sample who matched to participants were assigned weights based on their matches. For all comparison group members who were within the caliper range for a participant, each comparison group member received an equal share of the participant's weight. Specifically, for each comparison student, *c*, who was matched to a single participant, *p*, we assigned a weight of $w_c = 1/n_p$, where n_p equals the number of comparison students who were matched to the participant. Furthermore, because matching is done with replacement, a comparison group member could fall within the caliper range of several participants. Therefore, each matched comparison student was assigned a weight equal to the sum of the weight contributions from each participant to whom he or she was matched:

$$w_c = \sum_{p \in M_c} 1/n_p$$

where M_c is the set of participants who were matched to the comparison student.

Within each state, we were able to draw comparison students from nonparticipants with the target high schools which yielded samples of students most similar to Talent Search participants based on the characteristics available in the data. One limitation of this approach is that students in target high schools who chose to participate when it was offered may be fundamentally different in important and unmeasured characteristics from those who chose not to participate. To control for potential bias caused by self-selection of students into Talent Search, we also

[6] We used a caliper range of 1/20th of the standard deviation of the log odds from the propensity score model, a small caliper to ensure that we matched only those who had propensity scores very close to the participant being matched. Due to the large size of the nonparticipant population in the administrative data available, we were able to obtain well-matched comparison groups using even smaller calipers. However, smaller calipers led to more participants dropping out of the analysis because we could find no suitable comparison students.

attempted to draw comparison students from other high schools not served by a Talent Search project. Although this approach may be appropriate for reducing self-selection bias among participants, the resultant samples of participants and nonparticipants remained significantly different in several key observable characteristics. While we present our findings using the comparison groups drawn from students within the same target high schools as Talent Search participants, we analyzed differences between participants and comparison students using both types of comparison groups and our findings in each state were robust to the specification of comparison group.[7]

Data

We restricted our analysis to the cohort of students who were in ninth grade in 1995–96 to allow us to collect information on high school completion and postsecondary enrollment. Students from this cohort who graduated from high school "on time" in spring 1999 were first-time applicants for federal aid and enrolled in college in 1999, though our data collection window extended through 2002. Overall, we compiled data on secondary and postsecondary outcomes for more than 600,000 students in Texas, Indiana, and Florida, who attended thousands of different institutions. In Florida and Texas, the sample was a complete census of ninth-grade students in 1995-96; in Indiana, it was nearly 80 percent of the cohort. Except for the baseline information in Indiana, the data are based on administrative information which is more likely to be accurate than self-reported information, particularly retrospective self-reported information.[8]

In Texas, we received data on 4,177 Talent Search participants in 10 out of 16 Talent Search projects who were in ninth grade in the fall of 1995, along with nonparticipants throughout the

[7] For more details on the strategies used to identify potential comparison students, see Constantine et al. 2006.

[8] For more details on the data collected in each state, see Constantine et al. 2006.

state. The data we obtained included secondary school records on the entire 1995–96 ninth-grade cohort from the Texas Education Agency, postsecondary school records on students in the cohort who had enrolled in public postsecondary institutions in Texas from the Texas Higher Education Coordinating Board, Talent Search project records, and federal financial aid application records from the Office of Postsecondary Education in the U.S. Department of Education. Altogether, these data sources yielded records on 335,563 students who were in ninth grade in a Texas public school in fall 1995.

In Indiana, we received data on 1,166 Talent Search participants in 7 out of 8 Talent Search projects throughout the state. This project data was combined with data on secondary school experiences and educational and career expectations from a survey administered by the Indiana Career and Postsecondary Advancement Center (ICPAC), data on postsecondary enrollment information and financial aid records obtained from the Indiana Commission for Higher Education and the State Student Assistance Commission of Indiana, and federal financial aid application records from the Office of Postsecondary Education in the U.S. Department of Education. The compilation of the data sources yielded 65,979 records on students who completed an ICPAC survey when they were in ninth grade in fall 1995.

In Florida, we received data on 908 Talent Search participants in 5 out of 7 Talent Search projects from across the state. We were able to combine this data with secondary and postsecondary school records from the Florida Department of Education's K-20 Data Warehouse and federal financial aid application records from the Office of Postsecondary Education in the U.S. Department of Education. Compilation of these data sources yielded records on 233,188 students who were in ninth grade in Florida public schools during the 1995–96 school year.

Not all data on student characteristics and on secondary or postsecondary outcomes of interest were available in any one state, and the type of information that was missing differed

across states. For example, while age, race, and gender were commonly available, measures of academic characteristics varied across states, ranging from at-risk, gifted, and disability indicators to test scores in a number of subject areas. Furthermore, some states were able to provide additional detail, such as measures of family income, persistence through high school, and educational aspirations, that provided more information to use in achieving quality matches. However, the variations in the data, as well as our strategies for drawing comparison students in each state, provided a good test of the sensitivity of the findings to using different data sources and comparison students. Findings that were consistent across all three states suggest greater robustness.

Samples

Using students from the same high schools as Talent Search participants provided a pool of potential comparison students who were in the same educational environment and had backgrounds more similar to participants than those from other schools in the district or other districts across the state. Even within the same schools, the characteristics of Talent Search participants differed significantly from those of nonparticipants. The tables below illustrate that in each state, even though the unmatched participant and comparison samples differed from each other, the matched samples resembled each other closely. Overall, the characteristics of Talent Search students presented in the tables indicate that the program is serving the students the program was intended to reach: disadvantaged, potentially first-generation college students, with good academic performance in high school and with college aspirations.

Texas

The first set of columns in Table 1, titled "Full Sample," provides mean values for the baseline characteristics of the participants and all potential comparison students, along with an

indicator of the level at which the difference in means is statistically significant. These show that in Texas, Talent Search students were more likely than all other students in the target high schools to be black and taking a vocational or technical course, characteristics associated with lower rates of high school completion and college enrollment. On the other hand, they also had characteristics associated with *higher* rates of high school completion and college enrollment: they were more likely than nonparticipants to be female, to be the traditional age for entering ninth grade, and to be participating in a gifted and talented program. They also had markedly higher eighth-grade test scores.

While all students were in ninth grade in 1995, the time at which students first participated in Talent Search varied widely, with some entering the program for the first time early in high school and some much later. Students who persisted longer in high school may have been fundamentally different than students who did not. To the extent that these differences are also associated with education outcomes and are not captured by the data we have available, this could limit our ability to generate valid estimates of the relationship between participation in Talent Search and postsecondary outcomes. Therefore, to deal with issues related to persistence through high school, we divided the sample of students based on their first year of participation, usually into two time periods per project. For example, if Talent Search participants entered the program for the first time fairly evenly over the high school years, this led to the creation of one early cohort (1996 and 1997) and one late cohort (1998 and later) of participants. The early group required potential comparison group members still to have been in school in 1996; the later group of participants required potential comparison group members to still be enrolled in Texas schools in 1998.

The second set of columns in Table 1, titled "Matched Sample," provides mean values for the baseline characteristics of the participant and comparison students matched using the propensity score model, also followed by an indicator of the level of statistical significance for

TABLE 1

BASELINE CHARACTERISTICS OF TALENT SEARCH PARTICIPANTS AND NONPARTICIPANTS IN TEXAS, UNMATCHED AND MATCHED SAMPLES (PERCENTS)

	Full Samples			Matched Samples	
	Participants	Nonparticipants		Participants	Nonparticipants
Demographic Characteristics					
Male	38.2	54.0	***	38.7	38.6
White	27.1	30.2	***	27.4	27.3
Black	25.4	17.8	***	25.1	24.3
Hispanic	46.8	51.0	***	46.9	46.9
Home language is Spanish	14.2	15.9	***	14.2	14.1
Economically disadvantaged	50.9	50.2		50.6	50.6
Age in ninth grade (mean years)	14.8	15.0	***	14.8	14.8
Overage in ninth grade	15.3	28.3	***	15.4	15.3
Academic Characteristics					
Enrolled in a gifted and talented program	11.1	6.3	***	10.6	10.3
At risk for dropping out of school	46.6	54.4	***	46.9	46.9
Limited English proficiency	6.3	11.2	***	6.3	6.2
Special education services	5.5	13.3	***	5.6	5.5
Enrolled in a voc or tech course	45.0	39.1	***	45.0	45.4
Enrolled in a voc or tech education program	8.1	9.5	***	8.1	7.8
Eighth-Grade Test Scores					
Raw math score (# of questions correct)	36.7	30.5	***	36.6	36.6
Scored in top quartile in state for math	24.2	16.8	***	23.9	23.7
Scored in bottom quartile in state for math	26.9	42.8	***	27.1	26.9
Raw reading score (# of questions correct)	33.8	28.0	***	33.7	33.7
Scored in top quartile in state for reading	24.9	17.4	***	24.6	24.6
Scored in bottom quartile in state for reading	25.5	42.4	***	25.6	25.4
Score on essay test (mean)	2.4	1.9	***	2.3	2.4
Missing test scores	7.0	15.7	***	7.0	6.9
Number of Students	**4,112**	**46,810**		**4,027**	**30,842**

Note: We matched nonparticipant comparison students to Talent Search students using a propensity score model as described in the text. The participants' means for the matched sample differed slightly from the means for the full sample, as some participants had no suitable comparison students; these unmatched participants were dropped from the participant sample. The number of nonparticipants in the matched sample were those who matched to a participant; the sample was then weighted to equal the number of participants in the analysis.

*/**/***: Difference is statistically significant at the 10 percent, 5 percent, or 1 percent level.

the difference. The means for the full samples and matched participant sample are unweighted, whereas the matched comparison sample means are weighted to account for the results from matching. Though the unmatched participant and comparison samples differed significantly from each other on nearly every observable characteristic, the matched samples were very similar, with no statistically significant differences in the means of any of the baseline characteristics.

Indiana

The first set of columns in Table 2 shows that across target high schools in Indiana, Talent Search participants were more likely than other students to be black, have a parent without a bachelor's degree, and live with only one parent. Participants were also more likely to be female, expect to attend a two-year college, and have participated in Indiana's 21st Century Scholar program (a program focused on low-income eighth-graders, designed to increase their commitment to taking the steps to prepare for college). While most of the demographic characteristics of participants are associated with lower average educational outcomes, the academic and educational expectations characteristics are correlated with higher educational outcomes. Given the goals of the Talent Search program, it is notable that Talent Search participants were slightly more likely than nonparticipants to believe they could not afford college and to have no one to advise them about their future.

The Indiana data are based on experiences and expectations in the ninth grade only and there is no information that allows us to control for persistence in high school. However, the data include a much richer set of background characteristics on educational aspirations, which may capture some of the underlying differences associated with high school persistence and postsecondary outcomes.

TABLE 2

BASELINE CHARACTERISTICS OF TALENT SEARCH PARTICIPANTS AND NONPARTICIPANTS IN INDIANA, UNMATCHED AND MATCHED SAMPLES (PERCENTS)

	Full Sample			Matched Samples		
	Participants	Nonparticipants		Participants	Nonparticipants	
Demographic Characteristics						
Male	42.6	47.5	***	42.5	42.0	
White	51.6	56.7	***	52.4	51.8	
Black	21.6	17.1	***	20.7	21.1	
All other races	14.6	16.6	*	14.7	15.5	
Race is missing	12.2	9.6	***	12.3	11.6	
Parents' education: Bachelor's degree	22.2	28.3	***	22.5	22.3	
Parents' education: No bachelor's degree	48.6	43.9	***	48.2	47.7	
Student lives with mother and father	39.3	50.3	***	39.8	39.5	
Student lives with one parent	30.9	23.2	***	30.5	30.8	
Age in ninth grade (mean years)	14.8	14.8		14.8	14.8	
Overage in ninth grade	17.1	15.8		17.1	17.2	
Academic Characteristics						
Educational expectations						
Will not complete high school	0.1	0.7	***	0.1	0.6	***
Complete high school	6.4	8.2	***	6.3	6.5	
Complete some college	5.8	5.7		5.8	6.3	
Complete two years of college	11.1	9.1	***	11.0	10.7	
Complete four years of college	60.8	59.1		60.7	60.5	
Grades in school[a]						
Mostly As	6.3	8.8	***	6.4	6.0	
Mostly As and Bs	33.1	28.6	***	33.0	32.6	
Mostly Bs	7.4	8.0		7.4	7.8	
Mostly Bs and Cs	27.1	29.0		27.3	27.2	
Mostly Cs and below	21.1	20.4		20.9	21.2	
Grades are missing	5.0	5.2		5.1	5.2	
Academic programs of interest						
21st Century Scholar Program	23.1	12.2	***	22.4	22.6	
Indiana Core 40 Program	27.1	22.6	***	26.8	27.0	
Barriers to obtaining postsecondary education						
Not sure I can afford it	36.1	31.6	***	35.9	36.0	
No one to advise about future	5.4	3.9	***	5.1	5.3	
No barriers	19.6	23.5	***	20.0	19.7	
Number of Students	**1,102**	**10,700**		**1,083**	**9,844**	

Note: We matched nonparticipant comparison students to Talent Search students using a propensity score model as described in the text. The participants' means for the matched sample differed slightly from the means for the full sample, as some participants had no suitable comparison students; these unmatched participants were dropped from the participant sample. The number of nonparticipants in the matched sample were those who matched to a participant; the sample was then weighted to equal the number of participants in the analysis.

[a] Categories of grades reflects the language on the ICPAC survey, and students' self-reporting of grades.

*/**/***: Difference is statistically significant at the 10 percent, 5 percent, or 1 percent level.

In Indiana, there were instances in which different Talent Search projects served target high schools in the same district, so we could not isolate potential comparison students by project. Therefore, we created three project groupings based on the geographic location of the projects and the extent to which the projects served either the same target schools or different target schools within the same districts. The second set of columns in Table 2 displays the aggregate results of drawing the comparison students from within target high schools by group of projects, showing that, while the unmatched participant and comparison samples differ considerably, the matched participant and comparison samples had no remaining significant differences.

Florida

The first set of columns in Table 3 illustrate that within the target high schools in Florida, Talent Search participants differed from other students on several characteristics, many of which are correlated with high school completion and college enrollment. Compared with all other students in target high schools, Talent Search students were more likely to be black and economically disadvantaged (as measured by eligibility for free or reduced-price lunches) than other students. However, they were also more likely than other students to be female and the traditional age when entering ninth grade, less likely to have participated in a dropout prevention program, and less likely to be classified as physically or learning disabled.

Because the Florida data included information on persistence through high school, we used a strategy for identifying comparison students to Talent Search participants similar to the one we used in Texas. We drew comparison students by Talent Search project and controlled for persistence through high school by dividing the participant sample into students first served early or later in their high school careers, requiring potential comparison group members to still have

TABLE 3

ASSESSING BALANCE BETWEEN TALENT SEARCH PARTICIPANTS AND NONPARTICIPANTS IN FLORIDA (PERCENTS)

	Full Samples			Matched Samples		
	Participants	Nonparticipants		Participants	Nonparticipants	
Demographic Characteristics						
Male	33.9	52.3	***	34.2	34.0	
White	44.6	60.3	***	45.0	44.2	
Black	45.6	24.8	***	45.3	45.6	
Hispanic	4.5	11.1	***	4.3	5.1	
All other races	5.3	3.9	*	5.3	5.2	
Home language is English	96.9	91.9	***	97.0	96.2	
Home language is Spanish	1.9	5.9	***	1.8	1.9	
Home language is Other	1.2	2.2	***	1.2	1.9	*
United States citizen	94.7	88.2	***	94.8	94.7	
Economically disadvantaged	63.1	36.3	***	62.9	63.6	
Age in ninth grade (mean years)	14.6	14.8	***	14.6	14.6	
Overage in ninth grade	9.7	19.1	***	9.8	10.7	
Academic Characteristics						
Gifted	4.1	4.5		3.7	4.2	
Any dropout prevention program	17.2	23.7	***	17.2	19.7	*
Dropout prevention for disruptive students	2.5	4.2	***	2.6	2.8	
Dropout prevention for alternative education	13.1	15.1		13.1	13.3	
Dropout prevention for Department of Juvenile Justice	5.0	8.2	***	5.0	6.1	
Emotionally or physically disabled	5.8	8.3	***	5.8	5.8	
Learning disabled	3.6	8.8	***	3.7	4.2	
Number of Students	**908**	**67,049**		**900**	**42,514**	

Note: We matched nonparticipant comparison students to Talent Search students using a propensity score model as described in the text. The participants' means for the matched sample differed slightly from the means for the full sample, as some participants had no suitable comparison students; these unmatched participants were dropped from the participants sample. The number of nonparticipants in the matched sample were those who matched to a participant; the sample was then weighted to equal the number of participants in the analysis.

*/**/***: Difference is statistically significant at the 10 percent, 5 percent, or 1 percent level.

been in the same schools as Talent Search participants when the participants first participated in Talent Search.[9] Drawing comparison students from nonparticipants within target high schools yielded a sample of students most similar to Talent Search participants based on the characteristics available in the data. The second set of columns in Table 3 show that the samples were statistically equivalent on all characteristics, except for very small differences in native language spoken at home and participation in any dropout prevention program.

EMPIRICAL SPECIFICATION

We used a regression-adjusted approach to estimate the effect of participation in Talent Search on first-time application for federal financial aid and college enrollment. To compute the average effect of participation in Talent Search, we estimate a statistical model that predicts the outcome of interest as a function of participation status and background characteristics (for example, sex, race, ethnicity, and academic-risk status). This approach allowed us to (1) adjust for the small remaining differences in observable characteristics between Talent Search participants and the matched comparison group and (2) increase the precision of our estimates. The basic form of the model is:

$$y_i = \beta_0 + \beta_1 P_i + \beta_2 X_i + \varepsilon_i ,$$

where y_i is the outcome of interest; P_i equals 1 if the student participated in Talent Search and 0 otherwise; X_i is a vector that includes the student's characteristics; ε_i is a random error term that captures the effects of unobserved factors that influence the outcome; and β_0, β_1, and β_2 are

[9] When sample sizes permitted, we broke the sample into two time periods per project. However, as the Talent Search projects in Florida did not serve as many students from this cohort as those in Texas, we could not divide the sample of participants at two of the projects.

parameters or vectors of parameters to be estimated. The parameter of greatest interest is β_1, which shows the impact of participating in Talent Search on student outcomes.

We estimate the parameters in the above equation using ordinary least squares; all regression models are weighted to account for matching and allow for potential heteroskedasticity of standard errors due to clustering at the project level. By using a caliper range to determine potential comparison students who are similar to any given participating student, rather than a one-to-one match, we increase the size of our matched comparison student sample. The weighting algorithm accounts for the number of matches per treatment student, and the standard error calculations from the outcomes equation estimation account for the variance in the weights.

RESULTS

Talent Search participants were much more likely than comparison students to be first-time applicants for financial aid in the 1999–2000 school year. This finding was significant in all states and virtually every project. The gap in financial aid application for Talent Search participants and comparison students was 28, 14, and 17 percentage points, respectively, for Texas, Indiana, and Florida. The difference was smallest in Indiana, where we had the strongest measures of educational aspirations; however, even in Indiana, the gap represents application levels for financial aid that are one-third higher for Talent Search participants.

The next step, after the financial hurdle, is for the student to enroll in college. Here again, we found that Talent Search participants were more likely than comparison students to enroll in a public college or university in their state by the 1999–2000 school year. Additionally, the finding was positive and significant at most, but not all, projects. Initial enrollment in a postsecondary institution was higher by 18, 6, and 14 percentage points, respectively, for Texas,

Indiana, and Florida. The gaps are smaller than for financial aid, but they follow the same pattern in magnitude across the states.

While we find differences in enrollment rates for both two- and four-year institutions, the differences are larger and more statistically robust for two-year enrollment. The four-year result was not significant in Indiana. Our analyses also show some evidence that enrollment by type of institution was linked to type of institution hosting the Talent Search project. In general, projects did not increase enrollment in both types of institutions. The findings presented by state in the following section suggest that Talent Search projects may increase enrollment by exposure to their type of institution, either specifically or in general.

Texas

There were large differences in first-time application for financial aid between Talent Search participants and comparison students, seen in Table 4. Nearly twice as many participants (59 percent) as comparison students (31 percent) applied for aid in the 1999–2000 school year. Talent Search participants were more likely than comparison students to enroll in a public postsecondary institution in Texas, with enrollment in a public postsecondary institution in 1999–2000 18 percentage points higher for participants (51 percent) than comparison students (33 percent). The higher rates of overall postsecondary enrollment were the result of higher rates of enrollment at both two- and four-year institutions: 30 percent of Talent Search participants enrolled in two-year institutions compared to 18 percent of comparison students and 21 percent of Talent Search students enrolled in four-year institutions compared to 14 percent of comparison students.

Statistically significant differences in enrollment across projects were more varied than differences in first-time application for financial aid, with very small or no differences at 4 of the

TABLE 4

APPLICATION FOR FEDERAL FINANCIAL AID AND ENROLLMENT IN PUBLIC POSTSECONDARY INSTITUTIONS, TALENT SEARCH PARTICIPANTS AND NONPARTICIPANTS, 1999–2000
(Percents)

	Participants	Nonparticipants	Difference	Significance
Application for Federal Financial Aid				
Texas	59	31	28	***
Indiana	56	42	14	***
Florida	42	25	17	***
Postsecondary Enrollment Overall				
Texas	51	33	18	***
Indiana	51	45	6	***
Florida	51	37	14	***
Postsecondary Enrollment Two-Year				
Texas	30	18	12	***
Indiana	16	13	3	***
Florida	39	29	10	***
Postsecondary Enrollment Four-Year				
Texas	21	14	7	***
Indiana	35	32	3	
Florida	14	9	5	***

*/**/***: Difference is statistically significant at the 10 percent, 5 percent, or 1 percent level.

10 projects. Notably, some differences in enrollment depended on the type of institution that served as the Talent Search host. For enrollment at four-year institutions, the projects with statistically significant differences were primarily those hosted by four-year institutions; for two-year institutions, the projects with statistically significant enrollment differences across the various years of entry into Talent Search were a mixture of two-year and community-based projects.[10]

Indiana

As Table 4 shows, 56 percent of Talent Search participants in Indiana were first-time applicants for federal financial aid in the 1999–2000 school year, compared to 42 percent of the comparison students. We find a difference of 6 percentage points for enrollment rates at public colleges or universities in Indiana in 1999–2000, 51 percent of Talent Search participants enrolled versus 45 percent of comparison students. Although Talent Search participants were more likely than comparison students to enroll in college, the most robust difference between the groups was in two-year college enrollment: the difference in enrollment rates at both two- and four-year institutions is three percentage points, although only the difference for two-year institutions is statistically significant.

To further explore differences in enrollment in two- and four-year institutions, we examined the differences in application for aid and postsecondary enrollment by project group. The only projects with a statistically significant difference in overall postsecondary enrollment were those hosted by four-year institutions. The difference in enrollment in two-year institutions, however, is driven entirely by the group containing the only Talent Search project hosted by a two-year institution, and the difference in four-year enrollment by the Talent Search projects hosted by

[10] For detailed findings across projects, see Constantine et al. 2006.

four-year institutions. There is no difference in postsecondary enrollment between Talent Search participants and comparison students in the project not hosted by a postsecondary institution.

Florida

Talent Search participants were more likely than comparison group students to apply for financial aid in Florida, 42 percent for participants compared to 25 percent of comparison students, a difference of 19 percentage points. We found that 1999–2000 enrollment in public postsecondary institutions in Florida was 14 percentage points higher for participants (51 percent) than comparison students (37 percent) overall, as well as at both two-year (39 versus 29 percent) and four-year (14 versus 9 percent) institutions. When we expanded the enrollment window to 2003, the differences in enrollment rates were larger for both types of institutions. Expanding the window of enrollment to 2003 markedly increased enrollment at two-year institutions for participants and comparison students, suggesting that initial enrollment in two-year institutions occurs well after completion of high school.

There was substantial variation in overall enrollment and in two- and four-year enrollment by project. Although the magnitude of the differences in overall enrollment varied, there were positive and statistically significant differences at four of the five projects. There were also differences in two- and four-year enrollment that appear to be related to the type of host institution. At projects hosted by two-year institutions, Talent Search participants were significantly more likely than comparison students to attend a two-year institution in 1999–2000, immediately after high school, with no significant difference at four-year institutions. Expanding the window for enrollment to 2003 reveals that Talent Search participants at these projects were more likely to eventually attend a four-year institution. Students from these two projects may have been more likely to attend a two-year school initially and transfer to a four-year school a

few years later. On the other hand, at projects hosted by four-year institutions, Talent Search participants were more likely than comparison students to enroll in a four-year college immediately following high school.

IMPLICATIONS

We assembled information on the characteristics and outcomes of the cohort of students in Texas, Florida, and Indiana who were in ninth grade during the 1995–96 school year, along with participation by any of the cohort members in Talent Search. These data files contained a wealth of information on students before participation in Talent Search, including important demographic information such as age, race, and gender; the school the student was enrolled in for ninth grade; and postsecondary outcomes, such as first-time application for financial aid and postsecondary enrollment. Because we compiled a large amount of data in each state, both in terms of the number of data elements available and the size of the student samples, we were able to use complex propensity score matching models to identify nonparticipating students who were most similar to Talent Search participants.

Comprehensive data on student characteristics before participation in Talent Search and on secondary or postsecondary outcomes of interest were not available in all states, with the type of information missing differing across states. However, the variations in the data, as well as our strategies for drawing comparison students in each state, enabled us to test the sensitivity of the findings to using different data sources and comparison students. While we have reservations about attributing participation in Talent Search to improved outcomes in any one state, we are more confident of findings that are consistent across all three states.

The study was not a randomized experiment and we cannot attribute differences in outcomes solely to participation in Talent Search. However, despite the limitations in the data and the

design, we are confident that some of the differences in first-time application for financial aid and initial postsecondary enrollment can be attributed to participation in Talent Search. The higher rates of application for financial aid and postsecondary enrollment were consistent across all three states (although the differences were smallest in Indiana, where the two groups had similar educational aspirations) and the majority of projects. The differences in first-time application for financial aid and initial postsecondary enrollment were similar magnitude conditioning on high school completion.

The findings are also consistent with the program's objectives and services it delivers. Talent Search projects report directly targeting services toward activities to increase application for financial aid and postsecondary enrollment. Previous research found that help with application for financial aid is "hands on"—it involves sitting with students to complete their paper-and-pencil applications or at a computer to complete the Web-based Free Application for Federal Student Aid (FAFSA)). Talent Search project staff also reported providing college orientation activities, such as help completing college applications, visits to college campuses, and arranging for participants to shadow students—often Talent Search alumni—at the project's host institution.[11] Looking at the findings across projects, the potential relationship between enrollment in a two- or four-year institution and the type of institution hosting the Talent Search project suggests that orientation to the host institution itself may increase postsecondary enrollment for participants.

Overall, the findings suggest that assisting low-income students who have college aspirations to overcome information barriers—an important objective of the Talent Search program—may be effective in helping these students achieve their aspirations. Practical

[11] Cahalan et al 2004.

information—direct guidance on how to complete applications for financial aid and admission to college and what a college campus looks and feels like—may have been one of the key services that Talent Search projects delivered.

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