RAND EDUCATION AND LABOR

# A One-Stop Approach to Supporting the Nonacademic Needs of Community College Students

## An Evaluation of Single Stop's Impact in North Carolina: Technical Appendix

Lindsay Daugherty, Tiffany Tsai

Sponsored by Single Stop U.S.A.

For more information on this publication, visit www.rand.org/t/RR2767

Published by the RAND Corporation, Santa Monica, Calif.

# Preface

Single Stop's College Initiative aims to address the nonacademic needs of college students, connecting them to governmental, community, and institutional resources that can help to overcome financial barriers and other life issues that lead many students to drop out before completing a credential. We examined the impact of using Single Stop on postsecondary outcomes for students enrolled between spring 2016 and fall 2016 at four community colleges in North Carolina. Specifically, the aims of the study were to

- estimate the impact of using Single Stop across four community colleges on persistence and completion within one year and credits attempted and earned over one year
- explore whether the effects of Single Stop may vary by college
- explore whether the effects of Single Stop may affect certain groups of students who might be particularly likely to benefit because of high dropout rates or greater need for nonacademic support.

This technical appendix provides supplementary information about the data and methods for the report *A One-Stop Approach to Supporting the Nonacademic Needs of Community College Students: An Evaluation of Single Stop's Impact in North Carolina* (Daugherty and Tsai, 2018).

This study was undertaken by RAND Education and Labor, a division of the RAND Corporation that conducts research on early childhood through postsecondary education programs, workforce development, and programs and policies affecting workers, entrepreneurship, financial literacy, and decisionmaking. This study was sponsored by Single Stop USA in partnership with the John M. Belk Endowment. Single Stop's mission is to build pathways out of poverty by leveraging partnerships and technology to connect people to existing resources, all through a unique one-stop shop. John M. Belk Endowment aims to transform postsecondary educational opportunities to meet North Carolina's evolving workforce needs.

More information about RAND can be found at www.rand.org. Questions about this report should be directed to Lindsay Daugherty (Lindsay_Daugherty@rand.org), and questions about RAND Education and Labor should be directed to educationandlabor@rand.org.

## Introduction

This technical appendix provides supplementary information about the data and methods for the report *A One-Stop Approach to Supporting the Nonacademic Needs of Community College Students: An Evaluation of Single Stop's Impact in North Carolina* (Daugherty and Tsai, 2018). We first provide some additional description of the data used for the report on Single Stop's College Initiative. Then we provide details about the analytic approach used to conduct the analyses. Finally, we provide additional results from the analyses that were not included in the primary report, including estimates on outcomes measured after one semester of treatment, estimates reported in effect sizes, subgroup estimates by college, estimates that are adjusted to account for students in the comparison group who later used Single Stop, and pooled estimates for the three colleges that still have operating sites (Central Piedmont Community College [CPCC], Nash Community College [NCC], and James Sprunt Community College [JSCC]).

## Data

### *Data Sources*

We relied on three primary sources of data for our analysis of credit accumulation and persistence: Single Stop program data on students' receipt of services and benefits, administrative data on students collected by the community colleges, and National Student Clearinghouse (NSC) data that tracked enrollment for students outside our study colleges. Single Stop data were provided to RAND by the Single Stop office. Administrative and NSC data were provided to RAND by the four study colleges. With the exception of one study college, RAND matched the three sources of data by using combinations of student ID, names, and birth dates. CPCC did its own matching and provided us with deidentified data. The average match rate across the four colleges was 74 percent, with some variation by college.

### *Single Stop Data*

The data from Single Stop were collected by an online form from site providers, which included three types of information: data collected at intake on client contact information and demographics, data on types of services and benefits offered, and data on the confirmed action of those services and benefits offered. The Single Stop data were structured into one data file, with multiple observations per Single Stop user, depending on the number of services and benefits offered and confirmed.

Single Stop sites consistently tracked in-office services provided in its data system and, in some cases, gathered and entered student-level data from community providers who delivered services. However, data collection from community providers varies across sites and providers.

In addition, receipt of benefits was often self-reported and not comprehensively collected for students. Because the data on confirmation of benefits and service receipt were primarily self-

reported or dependent on off-site providers, the quality and accuracy of the data varied. For example, tax assistance providers inconsistently tracked student participation; even when data were collected through sign-in sheets, these providers did not consistently deliver student-level data back to the Single Stop site for recording with the case management software.

All students who entered the Single Stop office were asked to sign into the system or had data entered by a Single Stop staff member, and this system tracked students by their names or student IDs. Although sites collected a range of identifying information on students, including name, birth date, and student ID, it appears that these data were prone to error across sites, with only 75 percent of student records matching administrative data across sites. We used names, birth dates, and student IDs and allowed for "fuzzy matches" in this process. Because use of Single Stop by noncollege students is rare, the primary explanation for not finding a match in administrative data for a Single Stop user is that there were errors in the identifying information collected by the Single Stop sites. Given these challenges, as many as 25 percent of Single Stop users who could not be matched might have been put into the comparison group despite having used Single Stop services.

### *Institutional Data*

The administrative data provided by these four study colleges included student demographics, enrollment, and prior and current academic information for students enrolled from fall 2015 to spring 2017. We collected data on a range of variables described in the report, and, for the most part, these data were consistent across institutions. A number of students were missing academic data. Only three of the four school provided high school GPA data at all, and many student records were missing that information. Overall, high school GPA data were available for 51 percent of students. Semester-by-semester snapshots of cumulative college GPA were only available at NCC, so 93 percent of students were missing prior cumulative college GPAs across the four colleges. Given that financial data are collected through Free Application for Federal Student Aid (FAFSA) records, and not all students complete the FAFSA, we were missing household income and family makeup data for a portion of students. Rates of missing data from FAFSA ranged from 2 to 62 percent, depending on the data element (see Table A.1). Missing data primarily came from those who did not file FAFSA forms. We were occasionally missing data for demographic characteristics, but outcomes were always observed.

To address missing data on these background characteristics, we created and included missing-data indicators for all control variables to identify individuals with missing data and replaced missing values with zero values. CPCC provided household income data in bins rather than providing exact values.

### *National Student Clearinghouse Data*

In addition to data from internal institutional systems, the colleges provided raw NSC data files, which documented the past enrollment of study-college students at other colleges across the

United States from fall 2015 to fall 2017. NSC data provided the most-comprehensive data on postsecondary enrollment as of fall 2017, which accounts for 97 percent of enrollments at U.S. degree-granting institutions that participate in federal financial aid programs (NSC Research Center, 2017). All four of our study schools fit in the specified category. Although there are gaps in coverage in NSC data for for-profit institutions, where students who transfer to these institutions are reported as nonpersisting students, there is no reason to suspect that Single Stop users enrolled in these colleges at rates different from non–Single Stop users. Data from NSC allowed us to more accurately capture student persistence. However, NSC data do not contain credits attempted or earned at colleges. We are therefore missing credit data for students who transferred to nonstudy colleges during the fall 2016 or spring 2017 semesters.

## Key Data Elements

### *Use of Single Stop*

Because we are interested in the overall impact of the Single Stop program, regardless of type and intensity of services received, we examined postsecondary outcomes for all students who interacted with Single Stop. For our definition of *Single Stop use*, we included all clients who were registered in Single Stop's data system within their first semester of enrollment.

For the spring 2016 cohort, we included all clients who were registered prior to June 1, 2016. For the fall 2016 cohort, we included all clients who were registered prior to December 25, 2016. This definition allowed us to examine outcomes for all students served by Single Stop and accounted for the full range of formal services and informal assistance that students had access to as part of the Single Stop program. Furthermore, this broad definition of treatment allowed us to retain the maximum number of Single Stop users, since all four study colleges opened Single Stop offices between October 2015 and May 2016. This definition also mitigated the issue of inconsistent reporting and documentation of specific services across colleges. According to Table A.1, the percentage of students interacting with Single Stop varied from 0.5 percent at Wake Technical Community College (WTCC) to 10.8 percent at JSCC.

It is important to note that the definition of *treatment students* had a drawback: Because we are following students for a full academic year, it is possible that some of the students who did not use the services during the first semester used them in the second semester. For simplicity, our analytic approach includes these students in the comparison group but accounts for them using statistical adjustments, which are described in more detail in the "Methods" section.

### *Postsecondary Outcomes*

Using data for cohorts in the spring 2016 and fall 2016 semesters, we examined three measures of postsecondary academic performance as our key outcomes: persistence, credits attempted, and credits earned. *Persistence* is defined as continued enrollment in or graduation

from a study college or any college reported in the NSC data. For the spring 2016 cohort, *one-year persistence* is defined as enrollment in any college in spring 2017 or receipt of a degree or certificate within the year. For the fall 2016 cohort, *one-year persistence* is defined as enrollment in any college in fall 2017 or receipt of a degree or certificate within the year. Students are considered to have persisted if they were enrolled at any college for at least one day in any given semester. According to Table A.1, one-year persistence rates ranged from 47.8 percent at CPCC to 69.8 percent at JSCC.

**Table A.1. Characteristics of Spring 2016 and Fall 2016 Enrollees**

| Characteristics | NCC | WTCC | JSCC | CPCC | Total | Missing |
|---|---|---|---|---|---|---|
| Enrollment (number of students) | 4,880 | 30,821 | 1,236 | 28,783 | 65,720 | 0% |
| Student demographics | | | | | | |
| Female | 57.0% | 54.8% | 66.7% | 55.1% | 55.3% | 0% |
| Average age | 26.0 | 26.4 | 23.1 | 25.7 | 26.0 | 0% |
| White | 54.0% | 51.1% | 46.6% | 43.6% | 47.9% | 1% |
| Black | 34.1% | 25.1% | 28.6% | 30.8% | 28.3% | 1% |
| Hispanic | 4.9% | 10.8% | 21.5% | 13.1% | 11.6% | 1% |
| Asian | 1.1% | 3.8% | 0.2% | 5.0% | 4.0% | 1% |
| Family makeup | | | | | | |
| Has dependent | 40.0% | 27.0% | 37.6% | 48.8% | 34.9% | 62% |
| Is dependent | 41.8% | 45.1% | 42.8% | 48.5% | 46.3% | 51% |
| Financial resources | | | | | | |
| Financial aid receipt | 99.0% | 37.0% | 97.7% | 44.8% | 45.8% | 2% |
| Annual household income | $26,913 | $27,244 | $24,627 | <$35,000 | $27,149 | 62% |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 33.1% | 31.3% | 42.5% | 30.2% | 31.1% | 0% |
| Full time | 39.5% | 24.1% | 41.0% | 30.3% | 28.2% | 0% |
| Prior academic performance | | | | | | |
| High school GPA | — | 2.69 | 2.71 | 2.59 | 2.65 | 51% |
| Cumulative baseline college GPA | 2.75 | — | — | — | 2.75 | 0% |
| Cumulative baseline credits attempted | 25.6 | 19.7 | 26.6 | 23.4 | 21.9 | 0% |
| Cumulative baseline credits earned | 19.6 | 18.5 | 20.5 | 35.2 | 25.9 | 0% |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 34.6 | 27.0 | 36.2 | 26.6 | 27.1 | 0% |
| Cumulative credits earned after 1 semester | 26.1 | 25.1 | 27.9 | 37.2 | 29.5 | 0% |
| Persistence into next semester | 64.4% | 73.4% | 80.3% | 57.6% | 71.3% | 0% |

| Characteristics | NCC | WTCC | JSCC | CPCC | Total | Missing |
|---|---|---|---|---|---|---|
| Cumulative credits attempted after 2 semesters | 47.6 | 37.0 | 47.1 | 33.4 | 37.0 | 0% |
| Cumulative credits earned after 2 semesters | 37.8 | 34.7 | 37.9 | 44.2 | 37.9 | 0% |
| Persistence into next year | 55.4% | 64.2% | 69.8% | 47.8% | 49.4% | 0% |

NOTES: This table presents summary statistics for all students in the sample: spring 2016 and fall 2016 enrollees at CPCC, NTC, and WTCC and fall 2016 enrollees at JSCC. Measures of prior academic performance are calculated at the time of first enrollment within these two semesters (i.e., at the start of fall 2016 for those not enrolled in spring 2016 and at the start of spring 2016 for all others). Percentages missing for baseline college GPA and high school GPA were calculated depending on which information was provided by the institution. — = data were unavailable.

Credits attempted and credits earned are defined using cumulative credits reported in administrative files from the study colleges for those enrolled in spring 2016 and fall 2016. Credit-earned values are limited to credits earned at the study colleges; however, in some cases, credits earned also include credits earned prior to entry, which is why we observe higher credit-earned values than credits attempted at CPCC. Table A.1 shows that the average number of credits attempted ranged from 19.7 at WTCC to 26.6 at JSCC, and the average number of credits earned ranged from 18.5 at WTCC to 35.2 at CPCC.

As described below, we had to create a separate sample of students for the credit analysis because we were missing data for transfer students. Table A.2 presents the characteristics for this sample, excluding the 14 percent of our sample that transferred to another college during the study period.

**Table A.2. Characteristics of the Revised Sample for Credit Analysis**

| Characteristics | NCC | WTCC | JSCC | CPCC | Total |
|---|---|---|---|---|---|
| Enrollment (number of students) | 4,505 | 28,797 | 1,165 | 22,142 | 56,609 |
| Student demographics | | | | | |
| Female | 58.1% | 54.4% | 66.7% | 55.0% | 55.2% |
| Average age | 26.0 | 26.4 | 23.2 | 25.9 | 26.1 |
| White | 53.5% | 51.4% | 47.1% | 42.6% | 48.0% |
| Black | 34.5% | 24.8% | 28.8% | 32.1% | 28.5% |
| Hispanic | 5.0% | 10.8% | 20.8% | 13.1% | 11.5% |
| Asian | 1.1% | 3.8% | 0.3% | 4.6% | 3.8% |
| Family makeup | | | | | |
| Has dependent | 39.9% | 26.8% | 37.4% | 49.8% | 34.4% |
| Is dependent | 42.1% | 45.5% | 43.2% | 46.4% | 45.5% |
| Financial resources | | | | | |
| Financial aid receipt | 99.0% | 37.7% | 97.8% | 46.2% | 46.8% |
| Annual household income | $26,875 | $27,529 | $24,701 | <$35,000 | $27,393 |
| Enrollment characteristics | | | | | |

| Characteristics | NCC | WTCC | JSCC | CPCC | Total |
|---|---|---|---|---|---|
| First time enrolled at college | 32.4% | 31.3% | 41.4% | 34.5% | 32.9% |
| Full time | 41.4% | 25.0% | 42.5% | 28.9% | 28.2% |
| Prior academic performance | | | | | |
| High school GPA | — | 2.70 | 2.69 | 2.55 | 2.64 |
| Cumulative college GPA | 2.73 | — | — | — | 2.73 |
| Cumulative credits attempted | 26.2 | 19.8 | 27.2 | 21.7 | 21.2 |
| Cumulative credits earned | 20.2 | 18.6 | 21.0 | 33.6 | 24.6 |
| Outcomes | | | | | |
| Cumulative credits attempted after 1 semester | 35.5 | 27.2 | 37.0 | 24.9 | 27.2 |
| Cumulative credits earned after 1 semester | 26.9 | 25.3 | 28.6 | 35.5 | 29.5 |
| Persistence into next semester | 69.7% | 78.6% | 85.2% | 62.1% | 71.6% |
| Cumulative credits attempted after 2 semesters | 47.6 | 37.0 | 47.1 | 33.4 | 37.0 |
| Cumulative credits earned after 2 semesters | 37.8 | 34.7 | 37.9 | 44.2 | 37.9 |
| Persistence into next year | 51.7% | 61.7% | 68.0% | 32.1% | 49.4% |

NOTES: This table presents summary statistics for all students in the credit analysis sample: spring 2016 and fall 2016 enrollees at CPCC, NTC, and WTCC and fall 2016 enrollees at JSCC (excluding students who transferred during the study period, since we had incomplete credit data for these students). Measures of prior academic performance are calculated at the time of first enrollment within these two semesters (i.e., at the start of fall 2016 for those not enrolled in spring 2016 and at the start of spring 2016 for all others). — = data were unavailable.

### *Other Key Variables*

The basic student demographic characteristics included are gender, age, and race. Student gender and race were coded as binary variables (indicators for female and white). As shown in Table A.1, more than 50 percent of students in the sample were female across all study colleges. The average age of students ranged from 23.1 at JSCC to 26.4 at WTCC. Across all schools, the sample was primarily made up of white students. Of the four study colleges, CPCC had the largest share of minority students.

Along with demographic characteristics, we accounted for enrollment information. Specifically, we included information about number of semesters since first enrollment at the study college and status of enrollment. We created a variable that binned students into three categories by the number of semesters since first enrollment at the study college: one semester, two semesters, or three or more semesters. As shown in Table A.1, roughly a third of all students were enrolled at the study college for the first time. For status of enrollment, we used a binary variable to indicate whether a student is full time or part time. The percentage of full-time students ranged from 24.1 percent at WTCC to 41.0 percent at JSCC.

We also included financial status and other aspects of family makeup from information collected by the study colleges. We included are financial aid receipt, household income, dependent status, and whether someone has a dependent. Financial aid receipt, dependent status, and whether someone has a dependent were created as binary variables. Household income was

reported as a continuous variable for most study colleges. However, CPCC reported household income in four categories: less than $35,000, at least $35,000 but less than $50,000, at least $50,000 but less than $75,000, and at least $75,000. It is important to note that we encountered substantial missing data for some of these variables, since students were not required to report these at registration.

Financial aid receipt varied widely, ranging from 37.0 percent at WTCC to 99.0 percent at NCC. Household income averaged $27,149 across the sample, with the highest incomes among WTCC students (but we do not know the actual average household income for CPCC). The percentage of students with dependents varied across institutions, ranging from 27.0 percent to 48.8 percent. However, the percentage of students who were dependents was more similar across the colleges, ranging from 41.8 percent at NCC to 48.5 percent at CPCC.

We also accounted for prior academic achievement. Depending on the study college, we included prior GPA as a proxy for prior academic achievement. For NCC, we used prior cumulative college GPA. For the other three study colleges, we included high school GPA. This was due to the availability of data at each study college. Across institutions, GPA was reported using a traditional four-point scale. According to Table A.1, average prior cumulative college GPA at NCC was 2.75. Average high school GPA ranged from 2.59 at CPCC to 2.71 at JSCC. We also included prior cumulative college credits attempted and earned as proxies for prior academic achievement.

## Sample and Timeline

According to the timing of the opening of Single Stop offices and availability of data, we restricted the sample to two cohorts of students: (1) those who were enrolled in spring 2016, both new and continuing students, and (2) students who were not enrolled in spring 2016 but were enrolled in fall 2016, a group that was largely first-time enrollees in that semester but also included some continuing students. We limited the fall 2016 cohort to students who were not previously enrolled in spring 2016 to avoid double-counting students. For both cohorts, we were able to follow students for one academic year after observing whether students used Single Stop within that first semester. That is, we followed those enrolled in spring 2016 through spring 2017 and those enrolled in fall 2016 through fall 2017. However, we did not follow spring 2016 enrollees from JSCC, because the Single Stop office at the campus was opened in May 2016 and was not fully serving students in the spring 2016 semester. Having two cohorts of students allowed us to retain a larger sample and examine the general impact of Single Stop services, since type of service can vary greatly by the timing of semesters.

Because we had to rely on NSC data for the postsecondary outcomes of transfer students, and because NSC data do not provide information about credits, we were not fully able to observe credit data for transfer students. Therefore, we created a separate sample for the credit accumulation analysis that excluded transfer students—meaning that these results were

generalizable only to students who remained enrolled at the study colleges. This reduced the sample by 27 Single Stop users and 9,804 comparison students (4.7 percent of the treatment sample and 13.9 percent of the unweighted comparison sample, respectively). Although tables in the main report focus on the full sample of enrollees used for the persistence analysis, we present separate tables for sample characteristics and baseline equivalence for the credit-analysis sample in this technical appendix.

## Methods

To examine the impact of the Single Stop program on postsecondary student outcomes, we cannot simply compare outcomes for Single Stop users and non–Single Stop users, because of the nonrandom selection of students into Single Stop; for example, students with financial struggles were probably more likely to seek out Single Stop services than students without financial issues. This nonrandom selection into Single Stop could lead to biased estimates if Single Stop users were different from nonusers in ways that affect postsecondary outcomes. To account for these potential biases, we used an approach that weighted students on their estimated propensity to receive the program services, which were calculated using generalized boosted models (GBMs). Separate GBM models were estimated for each cohort of students in each college.

### *Generalized-Boosted-Model Approach to Weighting*

GBM combines iterative boosting and regressions trees that partition the data set into nonoverlapping regions based on covariate values. The model is data adaptive and nonparametric. It combines many piecewise-constant linear functions of the covariates to estimate the propensity scores and automatically selects which covariates should be included. It also automatically specifies the best functional form, including interactions, to achieve the best balance between the treatment and control groups. GBM runs a number of iterations of the model, from simple to complex, and chooses an optimal iteration based on balance. It then returns the estimated propensity scores using a vector of observable baseline student-level covariates.

The vector of candidate observable baseline covariates at the student-level we included are covariates that have been found in previous research to be associated with postsecondary success and might also be related to the take-up of Single Stop services. These covariates were gender, age, race/ethnicity, semester of first enrollment, full-time enrollment status, financial aid receipt, household income, dependent status, whether the student has a dependent, high school GPA, cumulative college GPA, cumulative credits attempted, and cumulative credits earned. We implemented GBM using a Stata package called twang developed by RAND researchers (McCaffrey, Ridgeway, and Morral, 2004; Cefalu, Liu, and Martin, 2015). We estimated the propensity scores separately for each college and cohort. Based on these generated propensity

scores, we assigned inverse probability weights to the treatment and comparison groups. Treatment students were weighted by 1, and comparison students were weighted by $\frac{\hat{P}}{1-\hat{P}}$, where $\hat{P}$ is the estimated propensity score.

These weights may then be used in a regression that still includes the covariates as direct controls. Using propensity scores as weights, we controlled the influence of participants by weighting their responses based on their propensity scores (McCaffrey, Ridgeway, and Morral, 2004). Researchers have used weighted regressions to estimate causal effects from observational data (Freedman and Berk, 2008).

### *Assessing Baseline Equivalence*

We assessed the baseline equivalence of key observable characteristics across treatment and comparison groups by comparing the weighted means of the two groups to ensure that differences on all key observables were less than 0.25 standard deviations (Ho et al., 2007). In addition to comparing weighted means, we conducted statistical tests of baseline equivalence using weighted regressions, following the recent empirical work by Jenkins et al. (2016). Along with the assessing baseline equivalence across all study colleges in the main report, we examined characteristics of Single Stop users and nonusers for each individual college, since weights were constructed for each institution separately. According to Table A.3, when observing differences between Single Stop users and the weighted comparison group for NCC, we see that Single Stop users and nonusers differed significantly on a handful of key observables; however, after matching, the only key observables that were significantly different were the percentage of Asian students and the percentage of students who received financial aid.

**Table A.3. NCC: Single Stop Users Versus Weighted and Unweighted Comparison Group**

| | Unweighted Averages and Differences | | | Weighted Averages and Differences | | |
|---|---|---|---|---|---|---|
| **Characteristics** | **Single Stop Users** | **Non–Single Stop Users** | **Difference** | **Single Stop Users** | **Non–Single Stop Users** | **Difference** |
| Student demographics | | | | | | |
| Female | 77.8% | 56.6% | 0.429*** | 77.8% | 72.6% | 0.117 |
| Average age | 32.7 | 25.8 | 0.666*** | 32.7 | 31.4 | 0.119 |
| White | 26.5% | 54.6% | 0.564*** | 26.5% | 30.2% | 0.081 |
| Black | 60.2% | 33.6% | 0.563*** | 60.2% | 60.1% | 0.002 |
| Hispanic | 5.1% | 4.9% | 0.011 | 5.1% | 3.9% | 0.063 |
| Asian | 0.0% | 1.1% | 0.107 | 0.0% | 0.5% | 0.073*** |
| Family makeup | | | | | | |
| Has dependent | 55.8% | 39.4% | 0.335** | 55.8% | 53.7% | 0.042 |
| Is dependent | 17.9% | 42.8% | 0.507*** | 17.9% | 20.4% | 0.062 |

| Characteristics | Unweighted Averages and Differences | | | Weighted Averages and Differences | | |
|---|---|---|---|---|---|---|
| | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Financial resources | | | | | | |
| Financial aid receipt | 100.0% | 99.0% | 0.103 | 100.0% | 99.1% | 0.097*** |
| Annual household income | $14,346 | $27,418 | 0.458*** | $14,346 | $14,989 | 0.032 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 30.3% | 33.2% | 0.061 | 30.3% | 27.3% | 0.067 |
| Full time | 74.7% | 38.8% | 0.739*** | 74.7% | 70.2% | 0.1 |
| Prior academic performance | | | | | | |
| High school GPA | — | — | — | — | — | — |
| Cumulative college GPA | 2.34 | 2.76 | 0.361*** | 2.34 | 2.33 | 0.005 |
| Cumulative credits attempted | 28.3 | 25.5 | 0.081 | 28.3 | 26.8 | 0.052 |
| Cumulative credits earned | 20.0 | 19.6 | 0.017 | 20.0 | 19.2 | 0.039 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 40.5 | 34.5 | 0.172 | 40.5 | 38.7 | 0.062 |
| Cumulative credits earned after 1 semester | 28.1 | 26.1 | 0.075 | 28.1 | 26.7 | 0.063 |
| Persistence into next semester | 72.7% | 64.2% | 0.178 | 72.7% | 68.2% | 0.096 |
| Cumulative credits attempted after 2 semesters | 55.7 | 47.4 | 0.233 | 55.7 | 50.5 | 0.191 |
| Cumulative credits earned after 2 semesters | 40.6 | 37.7 | 0.096 | 40.6 | 37.1 | 0.148 |
| Persistence into next year | 57.6% | 55.3% | 0.045 | 57.6% | 53.2% | 0.087 |

NOTES: This table presents summary statistics for all enrollees in the spring 2016 and fall 2016 semesters, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units. — = data were unavailable. ** $p < 0.01$; *** $p < 0.001$.

For the other three colleges, Single Stop users and the weighted comparison group did not differ significantly across all key pretreatment observables (see Table A.4. through Table A.6.).

**Table A.4. WTCC: Single Stop Users Versus Weighted and Unweighted Comparison Group**

| Characteristics | Unweighted Averages and Differences | Weighted Averages and Differences |
|---|---|---|

| | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
|---|---|---|---|---|---|---|
| Student demographics | | | | | | |
| Female | 69.5% | 54.7% | 0.299*** | 69.5% | 65.9% | 0.076 |
| Average age | 29.9 | 26.3 | 0.374*** | 29.9 | 29.3 | 0.066 |
| White | 28.7% | 51.2% | 0.451*** | 28.7% | 30.5% | 0.040 |
| Black | 50.7% | 24.9% | 0.594*** | 50.7% | 48.2% | 0.050 |
| Hispanic | 9.3% | 10.8% | 0.047 | 9.3% | 10.6% | 0.042 |
| Asian | 4.0% | 3.8% | 0.01 | 4.0% | 3.6% | 0.019 |
| Family makeup | | | | | | |
| Has dependent | 36.9% | 26.9% | 0.225* | 36.9% | 37.7% | 0.018 |
| Is dependent | 24.3% | 45.3% | 0.422*** | 24.3% | 25.5% | 0.027 |
| Financial resources | | | | | | |
| Financial aid receipt | 74.4% | 36.9% | 0.777*** | 74.4% | 76.4% | 0.049 |
| Annual household income | $17,230 | $27,294 | 0.237* | $17,230 | $19,074 | 0.077 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 44.4% | 31.2% | 0.284*** | 44.4% | 50.4% | 0.120 |
| Full time | 13.9% | 24.1% | 0.239** | 13.9% | 17.3% | 0.090 |
| Prior academic performance | | | | | | |
| High school GPA | 2.39 | 2.69 | 0.465*** | 2.39 | 2.41 | 0.034 |
| Cumulative college GPA | — | — | — | — | — | — |
| Cumulative credits attempted | 11.9 | 19.7 | 0.308*** | 11.9 | 11.3 | 0.031 |
| Cumulative credits earned | 11.0 | 18.5 | 0.309*** | 11.0 | 10.3 | 0.035 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 20.1 | 27.0 | 0.262** | 20.1 | 17.5 | 0.122 |
| Cumulative credits earned after 1 semester | 18.0 | 25.1 | 0.276** | 18.0 | 15.8 | 0.111 |
| Persistence into next semester | 74.2% | 73.4% | 0.018 | 74.2% | 74.4% | 0.005 |
| Cumulative credits attempted after 2 semesters | 25.6 | 37.0 | 0.426*** | 25.6 | 26.5 | 0.039 |
| Cumulative credits earned after 2 semesters | 23.3 | 34.8 | 0.437*** | 23.3 | 24.2 | 0.042 |
| Persistence into next year | 47.7% | 64.3% | 0.346*** | 47.7% | 58.9% | 0.228** |

NOTES: This table presents summary statistics for all enrollees in the spring 2016 and fall 2016 semesters, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units. — = data were unavailable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

**Table A.5. JSCC: Single Stop Users Versus Weighted and Unweighted Comparison Group**

| | Unweighted Averages and Differences | | | Weighted Averages and Differences | | |
|---|---|---|---|---|---|---|
| **Characteristics** | **Single Stop Users** | **Non–Single Stop Users** | **Difference** | **Single Stop Users** | **Non–Single Stop Users** | **Difference** |
| Student demographics | | | | | | |
| Female | 73.7% | 65.8% | 0.167 | 73.7% | 70.5% | 0.071 |
| Average age | 27.8 | 22.6 | 0.554*** | 27.8 | 27.1 | 0.072 |
| White | 36.8% | 47.8% | 0.220* | 36.8% | 40.0% | 0.064 |
| Black | 44.4% | 26.7% | 0.395*** | 44.4% | 41.9% | 0.050 |
| Hispanic | 13.5% | 22.5% | 0.218* | 13.5% | 14.8% | 0.036 |
| Asian | 0.8% | 0.2% | 0.116 | 0.8% | 0.1% | 0.174 |
| Family makeup | | | | | | |
| Has dependent | 45.2% | 35.8% | 0.194 | 45.2% | 41.8% | 0.069 |
| Is dependent | 36.5% | 44.3% | 0.157 | 36.5% | 38.1% | 0.033 |
| Financial resources | | | | | | |
| Financial aid receipt | 95.7% | 98.1% | 0.164 | 95.7% | 96.9% | 0.071 |
| Annual household income | $22,512 | $25,131 | 0.121 | $22,512 | $22,767 | 0.011 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 43.6% | 42.3% | 0.026 | 43.6% | 41.7% | 0.039 |
| Full time | 62.4% | 38.4% | 0.492*** | 62.4% | 62.0% | 0.007 |
| Prior academic performance | | | | | | |
| High school GPA | 2.68 | 2.71 | 0.049 | 2.68 | 2.63 | 0.081 |
| Cumulative college GPA | — | — | — | — | — | — |
| Cumulative credits attempted | 33.9 | 25.7 | 0.231* | 33.9 | 31.7 | 0.058 |
| Cumulative credits earned | 23.9 | 20.1 | 0.143 | 23.9 | 23.0 | 0.030 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 46.2 | 35.0 | 0.303** | 46.2 | 43.4 | 0.072 |
| Cumulative credits earned after 1 semester | 33.2 | 27.2 | 0.216* | 33.2 | 31.5 | 0.061 |
| Persistence into next semester | 79.7% | 80.3% | 0.016 | 79.7% | 78.2% | 0.037 |
| Cumulative credits attempted after 2 semesters | 62.5 | 45.2 | 0.478*** | 62.5 | 56.5 | 0.162 |
| Cumulative credits earned after 2 semesters | 48.2 | 36.7 | 0.406*** | 48.2 | 42.6 | 0.196 |
| Persistence into next year | 66.9% | 70.2% | 0.071 | 66.9% | 59.3% | 0.155 |

| Characteristics | Unweighted Averages and Differences: Single Stop Users | Unweighted Averages and Differences: Non–Single Stop Users | Unweighted Averages and Differences: Difference | Weighted Averages and Differences: Single Stop Users | Weighted Averages and Differences: Non–Single Stop Users | Weighted Averages and Differences: Difference |
|---|---|---|---|---|---|---|
| NOTES: This table presents summary statistics for all enrollees in the fall 2016 semester, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units. — = data were unavailable. | | | | | | |
| * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. | | | | | | |

**Table A.6. CPCC: Single Stop Users Versus Weighted and Unweighted Comparison Group**

| Characteristics | Unweighted Averages and Differences: Single Stop Users | Unweighted Averages and Differences: Non–Single Stop Users | Unweighted Averages and Differences: Difference | Weighted Averages and Differences: Single Stop Users | Weighted Averages and Differences: Non–Single Stop Users | Weighted Averages and Differences: Difference |
|---|---|---|---|---|---|---|
| Student demographics | | | | | | |
| Female | 69.7% | 55.0% | 0.296*** | 69.7% | 66.8% | 0.062 |
| Average age | 29.6 | 25.7 | 0.402*** | 29.6 | 28.5 | 0.096 |
| White | 12.3% | 43.8% | 0.636*** | 12.3% | 14.7% | 0.069 |
| Black | 67.2% | 30.5% | 0.795*** | 67.2% | 66.5% | 0.014 |
| Hispanic | 10.3% | 13.1% | 0.085 | 10.3% | 10.1% | 0.005 |
| Asian | 1.5% | 5.0% | 0.158* | 1.5% | 2.4% | 0.056 |
| Family makeup | | | | | | |
| Has dependent | 50.9% | 48.8% | 0.043 | 50.9% | 51.7% | 0.016 |
| Is dependent | 27.4% | 48.7% | 0.427*** | 27.4% | 27.5% | 0.002 |
| Financial resources | | | | | | |
| Financial aid receipt | 84.1% | 44.5% | 0.798*** | 84.1% | 82.5% | 0.043 |
| Annual household income | <$35,000 | <$50,000 | 0.416*** | <$35,000 | <$35,000 | 0.053 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 44.1% | 30.1% | 0.305*** | 44.1% | 45.6% | 0.031 |
| Full time | 49.2% | 30.1% | 0.416*** | 49.2% | 47.4% | 0.037 |
| Prior academic performance | | | | | | |
| High school GPA | 2.33 | 2.59 | 0.406*** | 2.33 | 2.34 | 0.015 |
| Cumulative college GPA | — | — | — | — | — | — |
| Cumulative credits attempted | 16.0 | 23.5 | 0.31*** | 16.0 | 15.5 | 0.030 |
| Cumulative credits earned | 26.2 | 35.2 | 0.265*** | 26.2 | 23.7 | 0.096 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 20.0 | 26.6 | 0.272*** | 20.0 | 19.3 | 0.041 |
| Cumulative credits earned after 1 semester | 28.2 | 37.3 | 0.264*** | 28.2 | 25.6 | 0.098 |

| Characteristics | Unweighted Averages and Differences | | | Weighted Averages and Differences | | |
|---|---|---|---|---|---|---|
| | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Persistence into next semester | 65.1% | 57.5% | 0.154* | 65.1% | 63.0% | 0.045 |
| Cumulative credits attempted after 2 semesters | 29.7 | 33.4 | 0.161 | 29.7 | 27.4 | 0.128 |
| Cumulative credits earned after 2 semesters | 35.9 | 44.2 | 0.251** | 35.9 | 32.3 | 0.137 |
| Persistence into next year | 35.9% | 47.9% | 0.24** | 35.9% | 32.5% | 0.072 |

NOTES: This table presents summary statistics for all enrollees in the spring 2016 and fall 2016 semesters, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Tables A.7 to A.11 present the baseline equivalence tables for the sample used for the credit-outcome analysis. We start with the baseline equivalence table for the pooled sample across colleges, then show tables for each college. These tables indicated that weighting for the sample without transfer students was also successful in reducing differences in key observable characteristics.

**Table A.7. Revised Sample for Credit Analysis Across All Study Groups: Single Stop Users Versus Unweighted and Weighted Comparison Group**

| Characteristics | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Student characteristics | | | | | | |
| Female | 71.5% | 55.1% | 0.331*** | 71.5% | 67.9% | 0.077 |
| Average age | 29.8 | 26.1 | 0.381*** | 29.8 | 28.9 | 0.088 |
| White | 25.3% | 48.2% | 0.458*** | 25.3% | 27.8% | 0.055 |
| Black | 56.1% | 28.2% | 0.618*** | 56.1% | 54.5% | 0.031 |
| Hispanic | 9.7% | 11.5% | 0.057 | 9.7% | 10.3% | 0.020 |
| Asian | 1.8% | 3.8% | 0.105* | 1.8% | 2.0% | 0.013 |
| Financial resources | | | | | | |
| Financial aid receipt | 87.8% | 46.4% | 0.833*** | 87.8% | 87.5% | 0.010 |
| Annual household income | $18,305 | $27,516 | 0.224*** | $18,305 | $19,402 | 0.049 |
| Family makeup | | | | | | |
| Has dependent | 47.3% | 34.2% | 0.276*** | 47.3% | 46.2% | 0.022 |

| Characteristics | Difference Prior to Weighting: Single Stop Users | Difference Prior to Weighting: Non–Single Stop Users | Difference Prior to Weighting: Difference | Weighted Mean: Single Stop Users | Weighted Mean: Non–Single Stop Users | Weighted Mean: Difference |
|---|---|---|---|---|---|---|
| Is dependent | 27.0% | 45.8% | 0.378*** | 27.0% | 28.5% | 0.033 |
| Enrollment characteristics | | | | | | |
| First-time enrolled at college | 42.5% | 32.8% | 0.206*** | 42.5% | 43.2% | 0.013 |
| Full time | 47.5% | 28.0% | 0.434*** | 47.5% | 47.1% | 0.008 |
| Prior academic performance | | | | | | |
| Baseline cumulative college GPA | 2.34 | 2.74 | 0.350** | 2.34 | 2.32 | 0.010 |
| High school GPA | 2.42 | 2.64 | 0.337*** | 2.42 | 2.42 | 0.001 |
| Baseline cumulative credits attempted | 20.7 | 21.2 | 0.019 | 20.7 | 19.8 | 0.031 |
| Baseline cumulative credits earned | 20.0 | 24.7 | 0.159*** | 20.0 | 19.0 | 0.039 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 29.5 | 27.1 | 0.090* | 29.5 | 27.5 | 0.068 |
| Cumulative credits attempted after 1 semester | 26.4 | 29.5 | 0.104* | 26.4 | 24.4 | 0.079 |
| Persistence into next semester | 74.6% | 71.5% | 0.068 | 74.6% | 74.0% | 0.014 |
| Cumulative credits attempted after 2 semesters | 42.1 | 37.0 | 0.188*** | 42.1 | 39.3 | 0.092 |
| Cumulative credits earned after 2 semesters | 36.6 | 37.9 | 0.044 | 36.6 | 34.1 | 0.092 |
| Persistence into next year | 47.4% | 49.5% | 0.042 | 47.4% | 45.8% | 0.030 |

NOTES: This table presents summary statistics for all enrollees in the spring 2016 and fall 2016 semesters (with the exception of JSCC data, which include only fall 2016 enrollees), comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

**Table A.8. Revised Sample for Credit Analysis, NCC: Single Stop Users Versus Unweighted and Weighted Comparison Group**

| | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| Characteristics | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Student demographics | | | | | | |
| Female | 77.3% | 57.6% | 0.399*** | 77.3% | 71.4% | 0.131 |
| Average age | 32.9 | 25.9 | 0.673*** | 32.9 | 31.7 | 0.112 |
| White | 27.1% | 54.0% | 0.541*** | 27.1% | 29.8% | 0.060 |
| Black | 60.4% | 33.9% | 0.558*** | 60.4% | 60.8% | 0.007 |
| Hispanic | 4.2% | 5.0% | 0.038 | 4.2% | 3.8% | 0.019 |
| Asian | 0.0% | 1.1% | 0.105 | 0.0% | 0.5% | 0.071*** |
| Family makeup | | | | | | |
| Has dependent | 55.3% | 39.2% | 0.329** | 55.3% | 53.1% | 0.044 |
| Is dependent | 18.1% | 43.1% | 0.509*** | 18.1% | 20.4% | 0.058 |
| Financial resources | | | | | | |
| Financial aid receipt | 100.0% | 99.0% | 0.100 | 100.0% | 99.0% | 0.103*** |
| Annual household income | $14,159 | $27,402 | 0.466*** | $14,159 | $14,540 | 0.019 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 29.9% | 32.5% | 0.055 | 29.9% | 23.5% | 0.150 |
| Full time | 74.2% | 40.7% | 0.684*** | 74.2% | 69.4% | 0.104 |
| Prior academic performance | | | | | | |
| High school GPA | — | — | — | — | — | — |
| Baseline cumulative college GPA | 2.34 | 2.74 | 0.350** | 2.34 | 2.32 | 0.010 |
| Baseline cumulative credits attempted | 28.6 | 26.2 | 0.072 | 28.6 | 28.5 | 0.005 |
| Baseline cumulative credits earned | 20.3 | 20.1 | 0.004 | 20.3 | 20.5 | 0.010 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 40.8 | 35.4 | 0.155 | 40.8 | 40.4 | 0.014 |
| Cumulative credits attempted after 1 semester | 28.3 | 26.9 | 0.050 | 28.3 | 28.0 | 0.012 |
| Persistence into next semester | 74.2% | 69.6% | 0.100 | 74.2% | 70.2% | 0.087 |
| Cumulative credits attempted after 2 semesters | 55.7 | 47.4 | 0.232 | 55.7 | 52.5 | 0.113 |
| Cumulative credits earned after 2 semesters | 40.6 | 37.7 | 0.096 | 40.6 | 38.7 | 0.078 |

| | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| Characteristics | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Persistence into next year | 56.7% | 51.6% | 0.102 | 56.7% | 50.3% | 0.128 |

NOTES: This table presents summary statistics for all enrollees in the spring 2016 and fall 2016 semesters, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units. — = data were unavailable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

**Table A.9. Revised Sample for Credit Analysis, WTCC: Single Stop Users Versus Unweighted and Weighted Comparison Group**

| | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| Characteristics | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Student demographics | | | | | | |
| Female | 69.1% | 54.3% | 0.296*** | 69.1% | 65.4% | 0.078 |
| Average age | 30.0 | 26.4 | 0.381*** | 30.0 | 29.4 | 0.066 |
| White | 29.1% | 51.5% | 0.448*** | 29.1% | 30.5% | 0.030 |
| Black | 50.7% | 24.6% | 0.603*** | 50.7% | 48.7% | 0.039 |
| Hispanic | 8.8% | 10.8% | 0.066 | 8.8% | 10.1% | 0.042 |
| Asian | 4.1% | 3.8% | 0.013 | 4.1% | 3.9% | 0.009 |
| Family makeup | | | | | | |
| Has dependent | 36.3% | 26.7% | 0.215* | 36.3% | 36.6% | 0.007 |
| Is dependent | 24.5% | 45.6% | 0.423*** | 24.5% | 26.0% | 0.034 |
| Financial resources | | | | | | |
| Financial aid receipt | 75.7% | 37.6% | 0.786*** | 75.7% | 77.4% | 0.041 |
| Annual household income | $17,263 | $27,583 | 0.241* | $17,263 | $18,962 | 0.072 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 44.3% | 31.3% | 0.281** | 44.3% | 50.2% | 0.118 |
| Full time | 14.1% | 25.1% | 0.253** | 14.1% | 17.5% | 0.088 |
| Prior academic performance | | | | | | |
| High school GPA | 2.39 | 2.70 | 0.475*** | 2.39 | 2.41 | 0.031 |
| Baseline cumulative college GPA | — | — | — | — | — | — |
| Baseline cumulative credits attempted | 11.9 | 19.8 | 0.312*** | 11.9 | 11.3 | 0.027 |
| Baseline cumulative credits earned | 11.0 | 18.6 | 0.311*** | 11.0 | 10.3 | 0.033 |

| | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| Characteristics | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 20.1 | 27.2 | 0.269** | 20.1 | 17.6 | 0.118 |
| Cumulative credits attempted after 1 semester | 18.2 | 25.4 | 0.280** | 18.2 | 15.8 | 0.112 |
| Persistence into next semester | 75.4% | 78.6% | 0.078 | 75.4% | 78.9% | 0.087 |
| Cumulative credits attempted after 2 semesters | 25.6 | 37.0 | 0.426*** | 25.6 | 26.7 | 0.047 |
| Cumulative credits earned after 2 semesters | 23.3 | 34.8 | 0.436*** | 23.3 | 24.4 | 0.048 |
| Persistence into next year | 47.0% | 61.7% | 0.303*** | 47.0% | 56.1% | 0.184 |

NOTES: This table presents summary statistics for all enrollees in the spring 2016 and fall 2016 semesters, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units. — = data were unavailable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

**Table A.10. Revised Sample for Credit Analysis, JSCC: Single Stop Users Versus Unweighted and Weighted Comparison Group**

| | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| Characteristics | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Student demographics | | | | | | |
| Female | 73.6% | 65.8% | 0.165 | 73.6% | 71.3% | 0.051 |
| Average age | 27.6 | 22.7 | 0.509*** | 27.6 | 26.8 | 0.069 |
| White | 36.4% | 48.5% | 0.241* | 36.4% | 39.8% | 0.067 |
| Black | 45.0% | 26.8% | 0.402*** | 45.0% | 42.2% | 0.055 |
| Hispanic | 14.0% | 21.6% | 0.189* | 14.0% | 14.6% | 0.017 |
| Asian | 0.8% | 0.2% | 0.114 | 0.8% | 0.1% | 0.182 |
| Family makeup | | | | | | |
| Has dependent | 45.6% | 35.5% | 0.210* | 45.6% | 42.4% | 0.064 |
| Is dependent | 36.8% | 44.8% | 0.160 | 36.8% | 38.3% | 0.030 |
| Financial resources | | | | | | |
| Financial aid receipt | 95.6% | 98.3% | 0.182 | 95.6% | 97.1% | 0.083 |

| | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| **Characteristics** | **Single Stop Users** | **Non–Single Stop Users** | **Difference** | **Single Stop Users** | **Non–Single Stop Users** | **Difference** |
| Annual household income | $22,709 | $25,183 | 0.113 | $22,709 | $23,062 | 0.015 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 44.2% | 41.0% | 0.064 | 44.2% | 41.8% | 0.048 |
| Full time | 62.8% | 40.0% | 0.466*** | 62.8% | 63.2% | 0.007 |
| Prior academic performance | | | | | | |
| High school GPA | 2.68 | 2.70 | 0.026 | 2.68 | 2.63 | 0.080 |
| Baseline cumulative college GPA | — | — | — | — | — | — |
| Baseline cumulative credits attempted | 33.4 | 26.4 | 0.194* | 33.4 | 30.8 | 0.064 |
| Baseline cumulative credits earned | 23.3 | 20.7 | 0.099 | 23.3 | 22.5 | 0.028 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 45.6 | 35.9 | 0.263** | 45.6 | 42.7 | 0.075 |
| Cumulative credits attempted after 1 semester | 32.8 | 28.1 | 0.169 | 32.8 | 31.1 | 0.058 |
| Persistence into next semester | 82.2% | 85.5% | 0.094 | 82.2% | 81.5% | 0.018 |
| Cumulative credits attempted after 2 semesters | 62.5 | 45.2 | 0.478*** | 62.5 | 56.5 | 0.159 |
| Cumulative credits earned after 2 semesters | 48.2 | 36.7 | 0.406*** | 48.2 | 42.8 | 0.190 |
| Persistence into next year | 65.9% | 68.2% | 0.050 | 65.9% | 58.3% | 0.154 |

NOTES: This table presents summary statistics for all enrollees in the fall 2016 semester, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units. — = data were unavailable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

**Table A.11. Revised Sample for Credit Analysis, CPCC: Single Stop Users Versus Unweighted and Weighted Comparison Group**

| | Difference Prior to Weighting | | | Weighted Mean | | |
|---|---|---|---|---|---|---|
| Characteristics | Single Stop Users | Non–Single Stop Users | Difference | Single Stop Users | Non–Single Stop Users | Difference |
| Student demographics | | | | | | |
| Female | 68.8% | 54.9% | 0.277*** | 68.8% | 65.7% | 0.064 |
| Average age | 29.5 | 25.9 | 0.372*** | 29.5 | 28.7 | 0.077 |
| White | 13.1% | 42.8% | 0.602*** | 13.1% | 15.7% | 0.072 |
| Black | 66.5% | 31.8% | 0.744*** | 66.5% | 65.6% | 0.018 |
| Hispanic | 10.2% | 13.2% | 0.086 | 10.2% | 10.1% | 0.004 |
| Asian | 1.7% | 4.6% | 0.140 | 1.7% | 2.7% | 0.061 |
| Family makeup | | | | | | |
| Has dependent | 52.9% | 49.7% | 0.063 | 52.9% | 54.8% | 0.039 |
| Is dependent | 26.8% | 46.6% | 0.399*** | 26.8% | 26.6% | 0.004 |
| Financial resources | | | | | | |
| Financial aid receipt | 84.1% | 45.9% | 0.768*** | 84.1% | 82.5% | 0.041 |
| Annual household income | <$35,000 | <$50,000 | 0.387*** | <$35,000 | <$50,000 | 0.049 |
| Enrollment characteristics | | | | | | |
| First time enrolled at college | 46.6% | 34.4% | 0.255** | 46.6% | 47.7% | 0.022 |
| Full time | 50.0% | 28.8% | 0.468*** | 50.0% | 48.1% | 0.037 |
| Prior academic performance | | | | | | |
| High school GPA | 2.31 | 2.56 | 0.378** | 2.31 | 2.32 | 0.009 |
| Baseline cumulative college GPA | — | — | — | — | — | — |
| Baseline cumulative credits attempted | 14.5 | 21.8 | 0.308*** | 14.5 | 14.2 | 0.021 |
| Baseline cumulative credits earned | 24.9 | 33.7 | 0.259** | 24.9 | 22.4 | 0.096 |
| Outcomes | | | | | | |
| Cumulative credits attempted after 1 semester | 18.5 | 24.9 | 0.270*** | 18.5 | 18.0 | 0.031 |
| Cumulative credits attempted after 1 semester | 26.8 | 35.6 | 0.257** | 26.8 | 24.3 | 0.095 |
| Persistence into next semester | 68.8% | 62.0% | 0.139 | 68.8% | 66.1% | 0.054 |
| Cumulative credits attempted after 2 semesters | 29.7 | 33.4 | 0.161 | 29.7 | 27.5 | 0.126 |

| Characteristics | Difference Prior to Weighting: Single Stop Users | Difference Prior to Weighting: Non–Single Stop Users | Difference Prior to Weighting: Difference | Weighted Mean: Single Stop Users | Weighted Mean: Non–Single Stop Users | Weighted Mean: Difference |
|---|---|---|---|---|---|---|
| Cumulative credits earned after 2 semesters | 35.9 | 44.2 | 0.251** | 35.9 | 32.9 | 0.113 |
| Persistence into next year | 29.0% | 32.1% | 0.067 | 29.0% | 26.1% | 0.064 |

NOTES: This table presents summary statistics for all enrollees in the spring 2016 and fall 2016 semesters, comparing students who used Single Stop with students who did not use Single Stop, before and after applying weights to the comparison group. Differences are reported in standard-deviation units. — = data were unavailable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

### *Estimating Effects on Outcomes*

Once the weights were applied and the baseline equivalence was assessed, we estimated the associations between Single Stop use and postsecondary outcomes via linear regressions. As mentioned previously, we estimated the model on three outcomes. For each outcome, we estimated a weighted regression model of the following form:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + \alpha_{c(i)} + \eta_{s(i)} + \nu_{c(i)*s(i)} + e_{is}.$$

Each student $i$ enters the analysis exactly once. Here, $Y_i$ represents our outcomes of interest for student $i$ in school $s$, and $T_i$ is an indicator variable for receiving Single Stop services. The variable $X_i$ represents a vector of the same observable baseline covariates at the student level that were included in generating the propensity scores. The model also includes a vector of cohort fixed effects, $\alpha_{c(i)}$; school fixed effect, s $\eta_{s(i)}$; and the student-level error term $e_{is}$. We also included campus- and cohort-level fixed effects. Furthermore, we included campus and cohort interactions: $\nu_{c(i)*s(i)}$. The inclusion of the same weighting covariates allowed us to minimize variance and account for any remaining differences in key observable characteristics.

In addition to estimating impacts on all Single Stop users, we examined school-specific impacts. Along with school-specific impacts, we estimated associations for several different subgroups of students to see whether the program was particularly beneficial for some populations. We examined models for younger and older students (based on a cutoff at 25 years of age), students who were dependents and independents, and students who were white and nonwhite. Age and independence are not perfectly correlated, because independence can be achieved by, for example, serving in the military. The overall correlation between age and reporting as an independent is 0.56, and the correlation between being an adult learner (age 25 and older) and reporting as an independent is 0.63.

To allow for comparisons of the impact estimates from this study with a range of other educational interventions that aim to affect the same outcomes, we calculated effect sizes so that

all estimates are on a common scale of standard deviations. To calculate effect sizes, we used Hedges' g (Hedges, 2007) for all outcomes. The What Works Clearinghouse recommends Hedges' g for continuous variables and Cox Index for dichotomous variables; however, since we used linear regressions to estimate effects on all outcomes, we determined that it was appropriate to use only the statistic recommended for continuous variables (What Works Clearinghouse, 2013).

## Additional Findings and Corrections

Although the report focuses on one-year estimates and presents some of the findings in graphical representations, we provide tables with additional estimates below. First, we provide the full table of pooled estimates with effect sizes, followed by the college-specific estimates. Then we present pooled estimates for the three sites still in operation. Finally, we present pooled estimates adjusted for students in the comparison group who later used Single Stop.

### *Effect Sizes for Our Estimates*

Table A.12 presents overall pooled estimates with effect sizes. Credit outcomes appear to increase over time.

**Table A.12. Pooled Estimates and Effect Sizes for Credit and Persistence Outcomes**

| Outcome | Estimates | Effect Sizes |
|---|---|---|
| Cumulative credits attempted after 1 semester | 0.216 | 0.298 |
| Cumulative credits attempted after 1 semester | 0.259 | 0.283 |
| Persistence into next semester | 1.4% | 0.113 |
| Cumulative credits attempted after 2 semesters | 1.156** | 0.517 |
| Cumulative credits earned after 2 semesters | 1.096** | 0.384 |
| Persistence into next year | 1.4% | 0.091 |

NOTES: The numbers for persistence represent differences in persistence rates associated with use of Single Stop, while the credit estimates represent credit-hour unit differences associated with use of Single Stop.
** $p < 0.01$.

### *College-Specific Estimates*

Table A.13 presents college-specific estimates for one-semester and one-year time frames. As discussed in the report, credit estimates were statistically significant and positive for JSCC. Persistence outcomes were statistically significant and negative for WTCC. One-semester patterns looked similar to patterns for one-year findings, but the size of estimates increased over time.

**Table A.13. Pooled Estimates and Effect Sizes for Credit and Persistence Outcomes**

| | One-Semester Outcomes | | | One-Year Outcomes | | |
|---|---|---|---|---|---|---|
| College | Credits Attempted | Credits Earned | Persistence | Credits Attempted | Credits Earned | Persistence |
| Overall | 0.216 | 0.259 | 0.014 | 1.156** | 1.096** | 0.014 |
| NCC | 0.039 | 0.370 | 0.016 | 1.328 | 1.420 | 0.031 |
| WTCC | 0.275 | 0.123 | 0.013 | 0.560 | 0.325 | –0.077* |
| JSCC | 0.484 | 0.921* | 0.015 | 3.266*** | 3.793*** | 0.080 |
| CPCC | 0.156 | –0.006 | 0.018 | –0.204 | –0.631 | 0.037 |

NOTES: The numbers for persistence represent differences in persistence rates associated with use of Single Stop, while the credit estimates represent credit-hour unit differences associated with use of Single Stop.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

### *Pooled Estimates for Sites Still in Operation*

WTCC ended its relationship with Single Stop in 2017, so the funder was specifically interested in understanding the impacts of Single Stop at the three colleges continuing to receive funding. Below, we present pooled results for these three colleges (Table A.14). The results indicate that Single Stop users across CPCC, JSCC, and NCC were 5 percentage points more likely to persist and earned an additional 1.5 credits over a year.

**Table A.14. Estimates Across NCC, JSCC, and CPCC**

| Outcome | Estimates |
|---|---|
| Cumulative credits attempted after 1 semester | 0.227 |
| Cumulative credits attempted after 1 semester | 0.337 |
| Persistence into next semester | 1.5% |
| Cumulative credits attempted after 2 semesters | 1.548*** |
| Cumulative credits earned after 2 semesters | 1.592** |
| Persistence into next year | 4.7%* |

NOTES: The numbers for persistence represent differences in persistence rates associated with use of Single Stop, while the credit estimates represent credit-hour unit differences associated with use of Single Stop.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

### *Adjusting for Single Stop Use in Later Semesters*

Because we assigned our sample to cohorts and observed treatment only within the first semester of access to Single Stop, we were not able to account for the fact that some of the non–Single Stop users in that first semester might have used Single Stop in later semesters. There was a total of 330 students identified as non–Single Stop users who used Single Stop's services in the second semester of access, or 2.3 percent of the sample. To account for how participation in the intervention by these students might have affected our estimates, we adjusted our original

estimates for the full sample by dividing them by 91 (the percentage of students receiving services in later semesters), following the logic of the treatment on the treated effects that are calculated in randomized controlled trials with crossovers. The adjusted estimates, which are presented in Table A.15, have the same significance levels as the original estimates by construction. Because the crossover rates are small, the adjusted estimates are not substantially different from the original estimates.

**Table A.15. Estimates Adjusted for Crossover**

| Outcome | Original Estimates | Crossover-Adjusted Estimates |
|---|---|---|
| Credits attempted after 1 semester | 0.216 | 0.221 |
| Credits earned after 1 semester | 0.259 | 0.265 |
| 1-semester persistence | 0.014 | 0.014 |
| Credits attempted after 1 year | 1.156** | 1.184** |
| Credits earned after 1 year | 1.096** | 1.123** |
| 1-year persistence | 0.014 | 0.014 |

NOTES: The numbers for persistence represent differences in persistence rates associated with use of Single Stop, while the credit estimates represent credit-hour unit differences associated with use of Single Stop.
** $p < 0.01$.

# References


Cefalu, Matthew, Shuangshuang Liu, and Craig Martin, *Toolkit for Weighting and Analysis of Nonequivalent Groups: A Tutorial on the TWANG Commands for Stata*, Santa Monica, Calif.: RAND Corporation, TL-170-NIDA, 2015. As of October 1, 2018: https://www.rand.org/pubs/tools/TL170.html

Daugherty, Lindsay, and Tiffany Tsai, *A One-Stop Approach to Supporting the Nonacademic Needs of Community College Students: An Evaluation of Single Stop's Impact in North Carolina*, Santa Monica, Calif.: RAND Corporation, RR-2767-SSU, 2018. As of October 30, 2018: https://www.rand.org/pubs/research_reports/RR2767.html

Freedman, David A., and Richard A. Berk, "Weighting Regressions by Propensity Scores," *Evaluation Review*, Vol. 32, No. 4, 2008, pp. 392–409.

Hedges, Larry V., "Effect Sizes in Cluster-Randomized Designs," *Journal of Educational and Behavioral Statistics*, Vol. 32, No. 4, 2007, pp. 341–370.

Ho, Daniel E., Kosuke Imai, Gary King, and Elizabeth A. Stuart, "Matching as Nonparametric Preprocessing for Reducing Model Dependence in Parametric Causal Inference," *Political Analysis*, Vol. 15, No. 3, 2007, pp. 199–236.

Jenkins, Jade Marcus, George Farkas, Greg J. Duncan, Margaret Burchinal, and Deborah Lowe Vandell, "Head Start at Ages 3 and 4 Versus Head Start Followed by State Pre-K: Which Is More Effective?" *Educational Evaluation and Policy Analysis*, Vol. 38, No. 1, 2016, pp. 37–54.

McCaffrey, Daniel F., Greg Ridgeway, and Andrew R. Morral, "Propensity Score Estimation with Boosted Regression for Evaluating Causal Effects in Observational Studies," *Psychological Methods*, Vol. 9, No. 4, 2005, pp. 403–425.

National Student Clearinghouse Research Center, "Current Term Enrollment—Fall 2017," webpage, December 19, 2017. As of October 1, 2018: https://nscresearchcenter.org/current-term-enrollment-estimates-fall-2017/

NSC—*See* National Student Clearinghouse.