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The Impact of Co-locating American Job Centers on Community College Campuses in North Carolina

A CAPSEE Working Paper

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Abstract

Relationships between community colleges and the public workforce system might have an important role in promoting students' success in the labor market and in college. In particular, the co-location of American Job Centers (AJC) on community college campuses is a particularly strong form of relationship that might benefit students. Yet little is known about the impact of co-located AJCs on students. This study examines student outcomes at six community colleges in North Carolina that had co-located AJCs on their campuses. Exploiting the variation in the timing of the co-location, the study uses a difference-in-differences approach to estimate the impact of AJC co-location on students' credential completion, employment, and earnings. After three years, AJC co-location had a negative relationship with completion and employment and no relationship with earnings for the overall sample. Where five-year outcomes were available for a subset of students, there was no relationship between AJC co-location and completion, employment, or earnings. For students who completed a credential, the presence of a co-located AJC had no relationship to employment or earnings outcomes. This analysis does not support the notion that AJC co-location improves student outcomes; however, additional analyses are needed where more data are available to fully assess the effect of co-location.

Table of Contents

1. Introduction

Community colleges play an essential role in workforce development. Most offer a wide array of workforce programs to prepare people for jobs, and some have established partnerships with the public workforce system (Barnow & King, 2005). Partnerships between community colleges and the public workforce system occur in many ways, but co-location of American Job Centers (AJC) on community college campuses is the most intensive, requiring an investment in developing a tight institutional partnership (Van Noy, Heidkamp, & Manz, 2013).[1] Co-location is intended to increase access to services by providing them in a location that is convenient to the target population. The co-location of AJCs on community college campuses has the potential to bring job search, career counseling, and job placement services to community college students that they would otherwise not be able to readily access—and ultimately to help improve student outcomes, particularly employment and earnings.

Little is known about the impact of co-locating AJCs on community college campuses. National evaluations of the Workforce Investment Act of 1998 (WIA) provide some understanding of the implementation of AJCs and their effects on participants, as guided by the WIA legislation. Heinrich, Mueser, and Troske's (2008) quasi-experimental analysis found moderate positive effects of AJC services on participants' earnings nationally, with a great deal of variation across states.[2] Social Policy Research Associates' (2004) national study of WIA implementation found that community colleges have been involved with local workforce boards in a range of ways, including as operators of AJCs; however, many community colleges chose not to be involved with WIA because of the barriers to becoming an eligible training provider—particularly the reporting requirements on program participant outcomes—under the legislation. Given that the tight engagement of community colleges and AJCs is relatively rare and dependent on state and local policy, some research has examined the institutional and policy aspects of AJC co-location on community college campuses (e.g., Government Accountability Office, 2008; Visher & Fowler, 2006). However, no studies to date have directly examined the impact on students of co-locating AJCs on college campuses. To shed light on this issue, the current paper examines the effect of having an AJC located on the community college campus on students' credential completion rates and employment outcomes in North Carolina. With the passage of the Workforce Investment and Opportunity Act (WIOA) in 2014 and its emphasis on relationships between AJCs and community colleges, a better understanding of these outcomes is essential to guide workforce policy development across the nation.

[1] American Job Centers were formerly called One-Stop Career Centers; in 2012, the U.S. Department of Labor changed the name and began a strategy to create a more unified brand for these centers across the country. See Oates (2012).

[2] A random assignment evaluation of the impact of WIA is currently underway by researchers at Mathematica Policy Research. See http://www.mathematica-mpr.com/our-publications-and-findings/projects/wia-gold-standard-evaluation.

This paper proceeds as follows. The second section provides background information on the AJC system and its relationship to community colleges, focusing on the implications of co-location. The third section describes the data and methods used for this analysis. The following section presents the results from the analysis. The paper ends with a discussion of the implications of the findings for policy and practice and for future research.

2. Background

American Job Centers and Community College Co-location

AJCs have been the central point of access to services offered through the public workforce system. Mandated by the Workforce Investment Act of 1998, these centers are intended to bring together workforce and training services that respond to the needs of local employers. Over 3,000 AJCs across the country work to bring local partners together (Bradley, 2013). AJCs serve job seekers, including recently unemployed individuals who are receiving unemployment insurance and others such as youths, adults, and dislocated workers. AJCs provide a range of services, including information on the labor market and job openings; job search assistance, such as workshops on resume writing; information on job search techniques; career assessments and advising; and support for education and training (Bradley, 2013; Strong, 2012). AJC services are organized into three tiers: core services, or openly accessible resources, including job search assistance and labor market information; intensive services, or resources that involve more staff interaction, including assessments, counseling, and career planning; and training services, which include both basic skills and occupational training to help job seekers find employment. Job seekers can receive support for education training if it is clear they cannot find a job through only core and intensive services (Blank, Heald, & Fagnoni, 2011). Thus, only a subset of job seekers are connected with education and training opportunities to help prepare them for a new career or to upgrade their skills for their current career (U.S. Department of Labor, Education and Training Administration, 2013a, 2013b).

Community colleges have collaborated with AJCs in a variety of ways, including co-location of AJCs on the college campus, co-location of college staff at the AJC, representation on the leadership of either organization, and coordinated activities. Since the passage of WIA in 1998, AJCs have collaborated with local community colleges with varying degrees of closeness (Government Accountability Office, 2008); as discussed below, North Carolina's community colleges have had a uniquely high degree of involvement with the workforce system and WIA implementation. Current policy initiatives are moving to strengthen the relationship between AJCs and community colleges. The recently passed WIOA recognizes the importance of strengthening these partnerships with its shift in emphasis toward more education and training, a departure from the work-first emphasis of WIA (Hermes, 2014). Likewise, proposals to revamp the public workforce system highlight the importance of continued education and training to

increase the skill level of workers—a role that is well met by local community colleges (Strong, 2012).

Co-locating AJCs on community college campuses is a strong but relatively rare form of collaboration between the two systems. A 2008 Government Accountability Office study estimated that 34 percent of AJCs had co-located community college staff and that 11 percent of AJCs were operated by the local community college. It is not clear how many AJCs are co-located on community college campuses, but it is likely less than 11 percent. Many barriers may have prevented the formation of tighter collaborations between community colleges and AJCs (Visher & Fowler, 2006). In particular, many colleges have found WIA reporting requirements too burdensome relative to the number of WIA participants enrolled in their programs. In the years since WIA implementation, more colleges have adapted to the reporting requirements and have begun participating in WIA as eligible training providers (Blank et al., 2011). Given the barriers to basic involvement of community colleges with their local AJCs as an eligible training provider, deeper collaborations between the two systems, such as co-location, are notable when they occur. These collaborations can promote a deeper understanding among community college staff of the issues faced by unemployed job seekers and lead to better integration of college and AJC programs and services (Van Noy et al., 2013).

The critical factor in the influence of co-located AJCs is their proximity to community college students, who might otherwise not utilize their services. Efforts to build tighter linkages between the AJC system and higher education find that distance can be a barrier, and co-location might be an important strategy to promote more effective linkages (Haviland, Edwards, McKay, & Kushins, 2014). As a result of co-location, community college students have greater access to AJC services, including labor market information, career advising and counseling, and job placement assistance. The co-location of AJCs can result in more services being available to students, as the AJC programs and services complement those offered by the college (Van Noy et al., 2013); as a result, students may be more likely to access these services. Community colleges typically have very few counselors available relative to the number of students they enroll (Grubb, 2001; Scrivener & Weiss, 2009). Additionally, since the AJCs typically serve a targeted group of job seekers, the average community college student may not be aware of their services and seek them out when they are located off campus.

Co-location of AJCs on community college campuses might have an effect on multiple student outcomes. Primarily, AJCs would be expected to improve students' ability to find jobs along with their ability to find well-paying jobs. Greater access to career advising and placement assistance would be expected to help students find employment more readily and enter into jobs with higher wages, as these students would be better matched to job prospects (Heinrich et al., 2008). Through these services, AJCs may improve the employment and earnings outcomes of all students—but particularly those who complete credentials—by assisting them with their job search. In addition, AJCs may improve students' ability to complete a program. Greater access to advising, along with stronger links to the labor market, might help students make better program and course decisions, enter programs sooner, and complete programs more quickly (Jenkins &

Cho, 2012; Person & Rosenbaum, 2006). In this way, AJCs may have an effect on all enrolled students by providing information and advising that could improve degree completion.

The North Carolina Context

Co-location of AJCs on community college campuses is not a common practice nationally, but some states, such as North Carolina, do have collaborations of this nature in place (Visher & Fowler, 2006). WIA was implemented in North Carolina in 2000, but the state was involved in much earlier discussions about WIA. Unlike community college systems in many other states, the North Carolina Community College System (NCCCS) was involved in the development of WIA systems. Notably, the community colleges were highly involved in developing the Eligible Training Provider list, which in many other states served as an obstacle to community college involvement in WIA. Among those in the state involved in the early implementation of WIA, the co-location of AJCs at community colleges was a reform of interest, as North Carolina sought to fully integrate services. Whereas not all AJCs were co-located on community college campuses, this reform possibility was a priority in the discussions of early WIA implementation in many local areas in North Carolina.[3] AJCs in North Carolina were formerly called JobLink Centers and are currently called NCWorks Centers.

North Carolina has a very local community college system with 58 community colleges, such that every resident of North Carolina lives within 30 miles of a community college (North Carolina Community College System, n.d.). Thus, physically co-locating AJCs on community colleges was a strategy to increase access to workforce services within the state and extend the reach of North Carolina's 23 workforce boards. The potential benefits to community college students of having the AJC on campus include greater ease of access to services such as counseling, assessment and career planning, job search and job placement assistance, and referrals. Although the AJCs do offer services virtually, their physical presence on the college campuses likely makes their availability known to a wider group of students and may make them more convenient for students who are already on campus for their courses.

3. Method

Data

Student outcomes. The student-level dataset is composed of first-time-in-college students in credit-bearing programs who began in the NCCCS in the academic years 2001–2002 through 2009–2010. These data do not include students in non-credit-bearing or continuing education programs. They also do not include students who are in credit-bearing programs

[3] This information was gained through communications with state officials involved in these implementation efforts.

through customized training programs for a specific business or industry. The dataset includes information on individual student characteristics and full student transcript information at the institution, including credential completions. These college transcript data were merged with student-level data from the National Student Clearinghouse (NSC). The NSC tracks students when they transfer to other Title IV–eligible colleges, which more than one third of community college students do (Hossler et al., 2012). NSC data include information on awards students obtained at each institution they attended after enrolling in the NCCCS.

This combined dataset was merged with earnings data from the North Carolina Department of Commerce's Unemployment Insurance (UI) records using Social Security numbers. UI earnings data are collected quarterly from UI-covered employers and include total earnings from all jobs as well as Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) information for each job (there is no information on hours of work or occupation). Data are available for the period from the first quarter of 1996 (i.e., before any of the cohorts studied here enrolled in college) to the first quarter of 2012. All earnings have been adjusted for inflation and are expressed in 2010 dollars using the quarterly Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W).

UI data offer many advantages over other forms of data, such as survey data; they are not affected by biases due to imputation, self-reporting, and nonresponse (Bollinger & Hirsch, 2006; Schmitt & Baker, 2006). One liability of the UI data is that they do not include all workers; the data exclude independent contractors, military personnel, some federal personnel, and those working in the informal sector (e.g., casual laborers). Analysis of Bureau of Labor Statistics data suggests that approximately 10 percent of civilians are not included in the UI data, primarily because they are independent contractors (see Stevens, 2007). In most states, including North Carolina, state UI datasets do not include workers who have moved out of state. They also do not include information on occupation. Despite these limitations, 93 percent of students in the sample have at least one UI wage record during the period from 1996–2012. Individuals with no wage record between 1996 and 2012 were excluded from the analysis.

These data were used to examine the following outcomes: completion of a credential, employment in North Carolina, and quarterly earnings. To measure completion of a credential, I included any credential a student completed at an NCCCS college or any other college as identified through the NSC data. These credentials include certificates, typically completed in one year of full-time study or less, with 12–18 semester-hour credit requirements; diplomas, with credit requirements ranging from 36–48 semester-hour credits and a general education requirement; and associate degrees, with 64–76 semester-hour credits and additional general education requirements.[4] Outcomes were measured within either three or five years of student enrollment at the college, based on data availability, as discussed in more detail below.

Local economic conditions. Data on the county-level unemployment rate were collected from the Bureau of Labor Statistics for the years from 2000 to 2011 (U.S. Department of Labor,

[4]In other states, diplomas are often referred to as long-term certificates.

Bureau of Labor Statistics, 2014). These data were linked to the student-level data based on the county of the NCCCS college in which the student enrolled. Each student record was matched with the local unemployment rate for the year of the student's first enrollment in the county of his or her college. These data are important to ensure the analyses control for the variation in local-level unemployment rates over time in North Carolina, which range from as low as 2.4 percent in one county in 2000 to 17.1 percent in another county in 2011.

Timing of AJC co-location. With the assistance of the North Carolina Department of Commerce, I obtained information from workforce boards about the timing of the implementation and closure of AJCs on community college campuses. In September 2013, an e-mail was sent to the boards to gather information on the status of the co-location of their AJCs on community college campuses, including the date the AJC opened on the campus; whether an AJC was currently open on the campus; and if not, the date of the center's closure and the reason for its closure. In addition, information was obtained on whether the co-location of the AJC on the community college campus changed the way the two organizations worked together and if so, how. The board also provided information on the AJCs' hours of operation, staffing levels, and chartering status (i.e., whether they were comprehensive or non-comprehensive centers).

Institutional and Student Characteristics

Of the 22 workforce boards in the state, 19 provided information on their co-location efforts with community colleges in their local areas. Information on the co-location of an AJC is missing on eight of the state's 58 colleges in the local areas of the three boards that did not respond to the survey. Based on the information the responding boards provided, 19 community colleges had a co-located AJC at some point since WIA implementation began in the late 1990s, and 31 community colleges did not have a co-located AJC during this period. Among those colleges that had an AJC on their campus, seven always had an AJC co-located on their campus, and 12 had an AJC open or close on their campuses during the time for which data is available for the analysis. Timing of AJC co-location across the colleges is summarized in the appendix.

The implementation of AJC co-location on community college campuses occurred at various points in time. Some AJCs opened from 1996 to 1998, before the implementation of WIA, whereas some opened in the early years of WIA implementation from 2000 to 2004, and others were implemented from 2007 to 2010. Some of these AJCs also closed during the period under study—some as early as 2004 and 2005, and others from 2010 to 2013. When co-location ended, a common reason cited was lack of space on the college campus rather than lack of interest in the partnership. Overall, the timing of AJC co-location on community college campuses in North Carolina was extremely variable. The variability of this timing is crucial to the analysis, as it allows for the use of a difference-in-differences (DID) approach. The 12 AJCs that opened and closed during the period with data availability were potential candidates for inclusion in the DID analysis.

The AJCs offered a range of services through their on-site staff. In all AJCs, services were available as offered through WIA adult and dislocated worker services, along with North Carolina Employment Security Commission labor exchange services. These include job counseling and job search assistance. In addition, many AJCs offered services to specialized populations of students through other programs, including adult education and literacy services, Trade Adjustment Assistance programs, welfare-to-work programs, youth services, Perkins career and technical education programs, rehabilitation services, and programs for older workers and veterans. Most AJCs had several staff members on-site; the median number of full-time staff was five, and the median number of part-time staff was two. The number of AJC staff varied somewhat across locations. One AJC had as many as 20 full-time staff and three part-time staff, whereas another had as few as three part-time staff and no full-time staff. However, all but one of the AJCs had at least two full-time staff. The AJCs were typically open 40 hours per week

Colleges that had co-located AJCs and those that did not had similar institutional characteristics, as shown in Table 1. In terms of size and urbanicity, the two groups of colleges were similar. In addition, the conditions of their local counties on average were similar in terms of unemployment, poverty, and population.

Table 1: Characteristics of Community Colleges With and Without an AJC

Characteristic	Always Had Co-located AJC	Never Had Co-located AJC
Average fall enrollment, 2010	4,293	4,432
% urban	14%	13%
% suburban	29%	45%
% rural	57%	42%
Average poverty rate in counties served, 2010	18.3	17.9
Average unemployment rate in counties served, 2000	3.8	4.5
Average unemployment rate in counties served, 2010	10.8	11.2
Average population in counties served, 2000	90,243	87,850
Average population in counties served, 2010	106,407	105,544
n	7	31

Note. Data sources include the following: for enrollment and urbanicity, National Center on Education Statistics 2010 IPEDS data; for average poverty rate, U.S. Census Bureau, 2010 American Community Survey; for unemployment rates, U.S. Bureau of Labor Statistics; for population, the 2000 and 2010 U.S. Census.

However, these two groups of colleges did differ in terms of their student characteristics. Table 2 summarizes the characteristics and outcomes of students who enrolled in the 2002–2003 academic year in these two groups of colleges. Students in colleges with co-located AJCs were more likely to be White (70 percent versus 63 percent) and less likely to be female (58 percent versus 61 percent) than were students in colleges with no co-located AJC. They were less likely

to have graduated from high school (73 percent versus 82 percent) and to have taken developmental education (36 percent versus 43 percent). Whereas students in colleges with a co-located AJC were slightly less likely to be employed upon enrollment at the college (56 percent versus 57 percent), they were more likely to be employed five years after enrollment (89 percent versus 87 percent). The earnings of the two groups of students were no different upon enrollment or five years after enrollment.

Table 2: Descriptive Characteristics of Students at Colleges With and Without an AJC

Characteristic	Always Had a Co-located AJC	Never Had a Co-located AJC	Difference
Age upon enrollment	27	27	0
White, non-Hispanic	70%	63%	7%***
Black, non-Hispanic	23%	28%	-5%***
Hispanic	3%	3%	0%
Other race/ethnicity	4%	6%	-2%***
Female	58%	61%	-3%***
High school graduate	73%	82%	-9%***
Taking any developmental education	36%	43%	-7%***
GPA	3.05	3.01	0.04
Employed upon enrollment	56%	57%	-1%*
Average pre-enrollment earnings	$2,231	$2,091	$140
Completed within 5 years	16%	15%	2%***
Employed 5 years after enrollment	89%	87%	2%***
Average quarterly earnings 5 years after enrollment	$3,238	$3,238	$0
Observations	12,429	65,837	

*$p < .05$. **$p < .01$. ***$p < .001$.

From the perspective of some workforce boards, co-location on community college campuses led to changes in how the AJCs and colleges worked together. Co-location built stronger relationships between college and AJC staff that resulted in greater possibilities for future collaborations on other projects and initiatives. In addition, co-location increased awareness of college programs among AJC staff and helped to facilitate enrollment among AJC participants in college programs. However, other workforce boards did not perceive that co-location led to significant changes in how the two systems worked together. In several cases, these systems already had strong institutional relationships before co-location. The perspectives of the workforce boards provide some insight into how co-location may have had an impact on the way the two systems worked together. However, they do not provide insight into colleges' perspectives on how co-location has affected their student population—which is a different

group from the AJC population, and might be expected to be most directly affected by the physical presence of an AJC on campus.

Analysis

To examine the impact of the co-location of AJCs on the community college campuses, a DID analysis was conducted. The analysis compared the cohort-by-cohort change in outcomes at schools that co-located an AJC on their campus with the change in outcomes at schools that did not co-locate a center during the same time frame. This approach offers a means to effectively "difference out" the pre-intervention student characteristics. Anytime-invariant individual characteristics were removed when I determined the difference between post- and pre-intervention outcomes.

Design. The implementation of AJC co-location on community college campuses occurred at many different times. This variation in the timing of AJC implementation provides an opportunity to conduct a DID analysis to estimate the effect of the co-located AJCs on student outcomes, but it also presents certain analytic challenges. The timing of implementation across colleges needs to be staggered across colleges and must occur during periods in which data are available to allow for the DID analysis.

To ensure that colleges in the analysis were similar in their orientation toward workforce programs and toward the co-location of AJCs in particular, the analysis focused only on colleges that had an AJC co-located on their campus at any point in time. Colleges that had never had a co-located AJC are likely to be different as a group, in that they were unwilling or unable to co-locate an AJC on their campus. This unwillingness or inability might indicate a different approach to workforce preparation that would prevent these colleges from serving as appropriate comparisons for colleges with a co-located AJC. That is, the act of co-locating an AJC may be endogenous with other institutional factors at the college that might be similarly related to their promotion of students' workforce success. The colleges that did co-locate an AJC likely had a general receptivity in their organization to promoting workforce development and partnerships with the workforce system that allowed for the co-location to occur. Because of these differences in colleges, rather than comparing colleges with co-located AJCs with all community colleges in North Carolina, my analysis compares the colleges with co-located AJCs across periods when they did and did not have AJCs on their campuses. This approach exploits the variation in timing of AJC implementation to remove the potential concern about endogeneity, an approach that is typically used in the policy literature (Besley & Case, 2000). Even though the timing of AJC co-location varied for a number of reasons, including funding and space availability, these colleges demonstrate comparability with each other because of their actions in co-locating an AJC.

Furthermore, in developing a DID approach, the timing of AJC implementation combined with the timing of the availability of data for the analysis had to be considered. Among colleges that had a co-located AJC, those that continuously had AJCs on campus (seven of the 19 colleges with a co-located AJC) during the time when data were available (2002 to 2012) did not

offer any variation in the timing of the AJC relative to the period with available data and thus were not included in the analysis. The analysis focused on colleges where the AJC either opened or closed during the period in which data were available. Among the 12 colleges that met these criteria, six had AJCs that either opened or closed at a point in the period with adequate data available before and after AJC implementation or closure. To conduct a DID analysis, it was essential to have at least two years of data on students at the college before and after the AJC implementation or closure. See Table 3 for the timing of AJC co-location at these six colleges.

Table 3: Timing of AJC Opening and Closure on Community College Campuses

						Time Period With Data Available										
College	**97**	**98**	**99**	**00**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
Treatment 1								O	O	O	O	O	O	O	O	O
Comparison 1a														O	O	O
Comparison 1b														O	O	O
Treatment 2											O	O	O	O	O	O
Comparison 2a	O	O	O	O	O	O	O	C								
Comparison 2b						O	O	C								

Note. C = closed. O = open.

Among the six colleges that met the criteria for this analysis, two were selected as treatment and four as comparison groups based on how the timing of implementation provided an opportunity for a DID approach. At the treatment colleges, AJC co-location was implemented in the midst of the period that is the focus of the analysis. At the comparison colleges, the AJC co-location occurred either well before or well after the co-location at the corresponding treatment college. In Treatment College 1, the AJC co-location was implemented in 2004; the two colleges used for comparison had AJC co-location occur in 2010 (these are referred to as Comparison 1a and 1b). For Treatment College 1, the pre-co-location period is defined as the 2003–2004 school year, and the post-co-location period is defined as the 2005–2006 school year. In Treatment College 2, the AJC co-location occurred in 2007; at the two comparison colleges, AJC co-location occurred much earlier and ended in 2004 (these are referred to as Comparison 2a and 2b). These AJCs closed primarily because of space constraints on the college campuses. By 2007, the former co-located AJCs should no longer have been an influence in students' experience at these colleges because the AJCs no longer existed physically on campus. For Treatment College 2, the pre-co-location period is defined as the 2006–2007 school year, and the post-co-location period is defined as the 2008–2009 school year.

The number of staff members at the AJCs is a potential indicator of the level of services to the campus. The two treatment colleges included several staff members on-site—eight full-

time and six part-time staff members at one and six full-time and three part-time staff members at the other. The comparison colleges had a range of staffing levels—including AJCs with 20 full-time and three part-time staff members, four full-time and five part-time staff members, five full-time and no part-time staff members, and no full-time and three part-time staff members. The staffing levels of the treatment AJCs are substantial relative to the range among North Carolina's co-located AJCs. These levels of staffing suggest that these AJCs had the capacity to provide relatively high levels of service, such as more than the average number of job search workshops or greater availability of counseling and career-planning services.

The DID approach is commonly used in the policy literature to examine the effects of changes in policy or practice over time. A foundational study that exploited this variation in policy over time is Card and Krueger's (1994) study of minimum wage laws in New Jersey and Pennsylvania. Using the increase in minimum wage in New Jersey, this study examined the effect on employment growth at stores before and after the policy change in these two states. Dynarski (2000) examined the impact of Georgia's HOPE scholarship program on college attendance by comparing the change over time in Georgia compared with change over time in a set of neighboring states. In addition to examining state-level policy, the DID approach has been used with college-level practices, such as the Integrated Basic Education and Skills Training (I-BEST) model in Washington State. This model for providing basic skills instruction was adopted at 14 colleges at different times, and this variation in timing provided an opportunity to assess the impact of I-BEST on students at those colleges (see Zeidenberg, Cho, & Jenkins, 2010). These DID studies all focused on a change in policy or practice that occurred institutionally (whether at the state level or at the college level) and that had an impact on individuals involved in those institutions (whether individual stores or individual students). The ultimate goal of these analyses is to examine the impact of an institutional policy or practice on the individual unit that the policy or practice is intended to affect. Therefore, the individuals (stores or students) serve as the unit of analysis.

These studies varied in terms of the number of institutions where the change in policy or practice occurred. DID studies sometimes involve only two institutions where there is a policy change, as in Card and Krueger's (1994) study. Alternatively, they may involve more institutions, such as the study by Zeidenberg et al. (2010), in which 14 colleges were included in the analysis. Given this prior work using the DID approach, the current study's examination of co-located AJCs, which includes six colleges with a change in policy or practice, is typical within the literature. The analysis examined the impact of the AJC on students at those six colleges, whose characteristics are described in the next section.

Sample. The analysis focused on two potential target populations of AJC services among community college students: enrollees and completers. Enrollees might be expected to benefit from the AJC services during their attendance in college through assistance in making career choices and securing employment while in school and upon completion. At the same time, it is possible that community college students who have completed a credential and are seeking employment in the area of that credential would be the most likely group of students to use AJC

services. These students would be expected to benefit the most from the additional job search and placement support that co-located AJCs provide, and these services would be most relevant to these students as they transition into the career they prepared for in college. At the same time, students who complete a program are likely more motivated than the overall student body (and are potentially likely to have sought out AJC services before completion). Ultimately, it is not clear which sample—enrollees or completers—is the most appropriate because it is not clear when students use AJC services during the course of their enrollment or after their completion of a program. Given this lack of clarity, models were run on both enrollees and completers.

Several examinations of enrollees were conducted. The analysis focused on different subsamples of students to examine differences across these groups and to allow for an examination of longer term outcomes where data were available. First, to examine all students in both treatment and comparison colleges, the analysis was restricted to fall semester enrollees to examine outcomes over three full calendar years. Because wage records data were only available through the first quarter of 2012, the sample was restricted to ensure that outcomes for all students could be measured over three years. For Treatment College 2 and its comparison colleges, there were not three full years of wage data for the students who enrolled in the spring and summer of 2009.

To examine outcomes over a longer period, a subanalysis was conducted on Treatment College 1 and its comparison colleges. Because the pre-co-location year was 2003–2004 in these colleges, for the students enrolled early enough, it was possible to examine five-year outcomes through 2009. For these students, it was possible to examine five-year outcomes regardless of the initial semester of enrollment, so the analysis included those who enrolled in fall, spring, and summer in each year.

The characteristics of the students who enrolled in these colleges in each cohort provide a measure of their comparability, particularly on crucial attributes that would make them more or less likely to use and benefit from a co-located AJC. Table 4 summarizes the characteristics of students in treatment and comparison cohorts. Employment status and earnings are important indicators of students' similarity in terms of the role that the AJCs would play in their achieving successful outcomes; unemployment is an indicator of students who are likely to use AJC services, as people who file for unemployment insurance receive information on AJC services. Students in treatment and comparison colleges before AJC co-location differed in their employment status upon enrollment (59 percent versus 54 percent), although the difference in their earnings is not statistically significant ($1,358 versus $1,185). The treatment and comparison group students also differed on other notable characteristics potentially related to their outcomes, including race/ethnicity, whether they had completed high school, and whether they had taken any developmental education. Treatment group students were more likely to be White (86 percent versus 73 percent), less likely to be high school graduates (60 percent versus 71 percent), and less likely to have taken any developmental education (33 percent versus 44 percent). These differences are statistically significant based on two-tailed *t*-tests. The differences between the treatment and comparison groups raise some concerns for the baseline

comparability of these two groups; therefore, these variables are included as controls in the DID models.

Table 4: Descriptive Characteristics Enrolled Students

Characteristic	Treatment Cohorts, 1 Year Prior	Comparison Cohorts, 1 Year Prior	Difference	Treatment Cohorts, 1 Year After	Comparison Cohorts, 1 Year After	Difference
Age upon enrollment	23.2	25.1	-2.0***	22.2	23.4	-1.2***
White, non-Hispanic	86%	73%	12%***	86%	76%	10%***
Black, non-Hispanic	7%	22%	-15%***	5%	17%	-13%***
Hispanic	2%	1%	0%	3%	3%	0%
Other race/ethnicity	6%	3%	3%***	7%	3%	3%***
Female	51%	60%	-9%***	51%	55%	-4%*
High school graduate	60%	71%	-11%***	52%	63%	-11%***
Taking any developmental education	33%	44%	-11%***	30%	43%	-13%***
GPA	2.87	2.92	-0.04	2.80	2.72	0.08*
Employed upon enrollment	59%	54%	5%**	53%	49%	4%*
Average pre-enrollment earnings	$1,359	$1,185	$173	$946	$862	$84
Observations	2,877	1,172	-2.0	2,879	1,364	-1.2

*$p < .05$. **$p < .01$. ***$p < .001$.

An additional analysis examined the cohorts of student completers during the years prior to and after the implementation of AJC co-location. Employment and earnings outcomes were calculated for student completers in the first year after they completed their first college credential. Specifically, I measured the percentage of student completers with any employment and the average earnings of student completers in the year following their completion in order to capture the potential impact of the AJCs on students transitioning from college to a career.

The characteristics of student completers are described in Table 5. As was the case with enrollees, completers in the treatment cohorts were more likely to be White (91 percent versus 76 percent) and less likely to have taken developmental education (38 percent versus 52 percent) than were completers in the comparison cohorts.

Table 5: Descriptive Characteristics of Completers

Characteristic	Treatment Cohorts, 1 Year Prior	Comparison Cohorts, 1 Year Prior	Difference	Treatment Cohorts, 1 Year After	Comparison Cohorts, 1 Year After	Difference
Age upon enrollment	29.7	28.3	1.4	28.0	29.0	-1.1
White, non-Hispanic	91%	76%	15%***	91%	78%	13%***
Black, non-Hispanic	5%	20%	-15%***	4%	19%	-15%***
Hispanic	1%	3%	-2%**	1%	1%	-1%
Other race/ethnicity	4%	2%	2%	5%	2%	2%*
Female	57%	64%	-7%	58%	63%	-5%
High school graduate	91%	90%	1%	85%	88%	-4%
Taking any developmental education	38%	52%	-14%***	45%	56%	-11%***
GPA	3.35	3.30	0.05	3.28	3.26	0.02
Employed upon enrollment	55%	52%	3%	53%	46%	7%*
Average pre-enrollment earnings	$3,247	$2,065	$1,182***	$2,516	$2,111	$404*
Completed associate degree	64%	69%	-5%	77%	60%	17%
Completed diploma	14%	15%	-1%	11%	17%	-6%
Completed certificate	22%	16%	6%	12%	23%	-11%
Observations	536	798		256	421	

*$p < .05$. **$p < .01$. ***$p < .001$.

Methodology. The empirical strategy for this analysis relies on a DID approach. This analysis exploits the differences in the timing of AJC implementation across college campuses to examine the impact of the AJC co-location on student outcomes. The analysis examines the changes over time in student outcomes—including program completion, short-term and long-term employment, and short-term and long-term earnings—among the student populations in the colleges where AJC co-location had been implemented. As a comparison, the analysis uses other colleges that did not have AJCs during the same period but had AJCs co-located on their campuses at some point in time. These colleges provide a robust comparison group because they made a similar commitment to collaborating with the public workforce system, in contrast with colleges that had never had a co-located AJC.

The impact of AJC co-location on student outcomes is identified by differences between the colleges with AJCs on their campuses during the time in which data are available ("treatment" colleges) and the colleges that had AJCs on their campuses at other points in time

("comparison" colleges). The analysis uses DID estimation to compare student completion, employment, and earnings outcomes before and after the co-location of AJCs at the treatment colleges and the comparison colleges. This calculation is made using an ordinary least squares equation, as follows:

$$y = \alpha + \beta_1(AJC\ College * AJC\ Cohort) + \beta_2 AJC\ College + \beta_3 AJC\ Cohort + X_1\beta_{4+} v \quad (1)$$

The dependent variable of student outcomes is either a binary measure of completion or employment or a continuous measure of earnings. *AJC College* is a binary variable that is set to 1 if a student was enrolled at a treatment college, and *AJC Cohort* is a binary variable that is set to 1 if a student was enrolled in a cohort at a treatment college. This specification controls for the time trends in student outcomes (β_3) and for the average impact on student outcomes of being enrolled at a treatment college (β_2). A series of control variables for student characteristics, institutional characteristics, and labor market conditions are included in the model (X_1). Student characteristics controlled for in the model include age, race/ethnicity, gender, high school diploma attainment, developmental education course-taking, pre-enrollment employment status, and pre-employment average earnings. College-level dummy variables control for institutional characteristics using fixed effects, and the yearly unemployment rate in the local county controls for labor market conditions. The impact of AJC co-location is identified by β_1. It is assumed that any change in student outcomes can be attributed to the co-location of the AJC on the community college campus.

All estimates presented below were generated using ordinary least squares. Logit results yielded similar results. The regressions are modeled after similar DID approaches that sought to compare outcomes before and after the implementation of a program reform, such as those in Dynarski's (2000) HOPE study and Zeidenberg et al.'s (2010) I-BEST study.

4. Results

The analysis examined the outcomes of two groups of students: the cohorts of students who enrolled in a given year and the cohorts of students who completed a credential in a given year. The broader group of students enrolled in a given year might have benefited from the AJC services over the course of their enrollment as well as at the time of their completion, when they would have been seeking employment. In contrast, the completers might have been more likely to benefit from the AJC services as they sought well-paying jobs upon completing a credential. This section provides results from analyses on these two samples of students. For each group, descriptive results (i.e., non-regression results) from the DID models are reported first. Then, I report results from regression-adjusted DID models that control for a range of covariates. This section discusses the influence of AJC co-location, first on enrollees and then on completers.

Enrollment Cohorts

Descriptive DID three-year outcomes. At the outset of the analysis, descriptive statistics on three-year outcomes for students in the different cohorts were calculated. Table 6 summarizes these findings. All three outcomes—completion, employment, and earnings—were higher for treatment group students than for comparison group students, both before and after AJC co-location. In addition, all three outcomes declined over time by similar amounts for students in both treatment and comparison colleges. That is, the differences in completion, employment, and earnings after three years were very similar across the treatment and comparison groups. In particular, employment rates declined by 5 percentage points for both treatment and comparison college students, and earnings declined by $545 and $496 for treatment and comparison college students, respectively. The descriptive finding that the outcomes declined over time at similar rates is counter to the hypothesis that the AJCs would positively influence student outcomes, and it raises the question of whether the AJC co-location had any impact on this trend. However, several factors could explain this downward trend. In particular, the Great Recession could explain a decline in outcomes over time in the later cohorts that comprise the second group of treatment and comparison colleges. Because these are merely descriptive findings and do not control for baseline differences between the student groups and other difference in the cohorts, the next step of the analysis was to conduct an ordinary least squares (OLS) analysis to more rigorously control for these differences.

Table 6: Descriptive Three-Year Outcomes for Fall Cohorts of Enrolled Students

Outcome	Cohort Enrolled 2 Years Prior to Co-location	Cohort Enrolled in Year Prior to Co-location	Cohort Enrolled in Year After Co-location	Difference Between Year Before and Year After
Completion				
Treatment college students	9%	8%	6%	-2%***
Comparison college students	10%	10%	9%	-1%
Employment				
Treatment college students	89%	88%	83%	-5%***
Comparison college students	87%	83%	78%	-5%***
Earnings				
Treatment college students	$2,513	$2,326	$1,781	-$545***
Comparison college students	$2,137	$2,046	$1,550	-$496***
Sample Size				
Treatment college students	2,805	2,877	2,879	
Comparison college students	1,258	1,172	1,364	

*$p < .05$. **$p < .01$. ***$p < .001$.

Regression-adjusted DID three-year outcomes. Several models using OLS regressions were used to generate regression-adjusted DID estimates that control for differences in baseline characteristics between the student groups. These estimates were generated for all students pooled across the two sets of treatment colleges. The models were run separately for each of the three outcomes: completion, employment, and earnings. The findings on three-year outcomes are summarized in Table 7. The coefficients highlighted in bold in each table are those that pertain to the DID findings regarding the impact of AJC co-location.

For all students, the OLS regression-adjusted models revealed the same results as the descriptive analysis did. This analysis yielded a negative relationship between completion (-.028) and employment (-.022) and the co-location of an AJC on a community college campus; the coefficients for these outcomes were significant at the 5-percent level or better. The relationship between AJC co-location and earnings was also negative but is not significant, indicating that for all students, the co-location of the AJC does not have an effect on earnings within three years.

The negative relationship between the co-location and the outcomes was unexpected and might be explained by a few factors. Although the OLS models control for the local unemployment rate in each year, the effects of the Great Recession are difficult to fully control for. It is possible that the negative relationship reflects the Great Recession and the general difficulty it caused in the labor market for workers seeking employment at a good wage. It is also possible that the negative relationship is a result of students' finding good jobs through the AJC before completing their programs, or entering longer programs of study and thus not having enough time to complete those programs and find jobs within a three-year time frame. Students may have entered long programs of study because of the advice they received at the AJC or because the relative tradeoff of entering longer programs of study versus working was diminished during the Great Recession. Based on students' self-reported intent, however, the treatment and comparison groups had similar rates of intention to complete an associate degree, so it is not clear to what extent the AJCs prompted students to enter longer term programs. Additional analyses were conducted to examine these findings for subgroups of students—breaking out the findings for the first and second group of treatment and comparison colleges separately.

Table 7: OLS Three-Year Outcomes for Fall Cohorts of Enrolled Students

Characteristic	Completion	Employment	Earnings
In AJC college	-0.027***	0.011	-80.336
	[0.007]	[0.008]	[50.751]
In AJC cohort	0.019***	-0.008	-177.946***
	[0.007]	[0.007]	[48.304]
In AJC college * In AJC cohort	**-0.028*** **	**-0.022** **	**-43.689**
	[0.008]	**[0.009]**	**[60.585]**
Unemployment rate upon enrollment	-0.014***	-0.020***	-113.791***
	[0.003]	[0.003]	[20.925]
Age upon enrollment	0.000	-0.005***	-36.845***
	[0.000]	[0.000]	[2.399]
Female	-0.001	0.036***	-131.082***
	[0.005]	[0.006]	[36.444]
Black, non-Hispanic	-0.027***	-0.006	-28.482
	[0.009]	[0.010]	[62.393]
Hispanic	-0.005	-0.066***	215.601
	[0.018]	[0.021]	[132.390]
Other race/ethnicity	0.006	-0.070***	-60.974
	[0.011]	[0.013]	[82.934]
High school graduate	0.109***	0.018***	560.933***
	[0.006]	[0.007]	[43.673]
Taking any developmental education	-0.039***	0.031***	-325.299***
	[0.005]	[0.006]	[39.553]
Employed pre-enrollment	-0.027***	0.302***	1,620.447***
	[0.005]	[0.006]	[37.755]
Average pre-enrollment earnings	0.000***	0.000***	0.657***
	[0.000]	[0.000]	[0.009]
Observations	12,341	12,341	12,341
R-squared	0.054	0.235	0.501

Note. Standard errors in brackets.

*$p < .05$. **$p < .01$. ***$p < .001$.

Regression-adjusted DID three-year outcomes by subgroup. The effect of the co-location of AJCs on student outcomes might vary by subgroups of students—particularly between the two sets of treatment and comparison colleges. One major difference between these sets of colleges is the timing of the Great Recession. For the first set of treatment and comparison colleges, the Great Recession occurred after AJC implementation and during the time when the analysis examined student outcomes. Thus, it would be expected that in the first set of colleges, the student cohorts after AJC implementation would face greater difficulties in finding employment than did prior cohorts. For the second set of colleges, the Great Recession occurred at the time when the AJC was implemented on the college campus. This timing could affect the types of students that decided to enroll in college and the types of programs that students selected.

Separate models on subgroups of students from the two sets of treatment and comparison colleges were estimated. The results from these models are summarized in Table 8. For the second set of treatment and comparison colleges, all students had lower completion rates when at a college with the co-located AJC. Given the timing of the Great Recession, it is possible that these students entered into longer programs than did students who did not have the additional advising from the co-located AJC. However, these findings are based on outcomes three years after enrollment; an examination of longer term outcomes may be necessary to fully understand the relationship between AJC co-location and student outcomes. This analysis reveals that some of the findings for the overall group of students may be driven by particular subgroups and raises question for further analysis.

Table 8: OLS Three-Year Outcomes for Fall Cohorts of Enrolled Students by Subgroup

Subgroup	Completion	Employment	Earnings
All treatment and comparison colleges	-0.028***	-0.022**	-43.689
First set of treatment and comparison colleges	-0.022	-0.018	-94.878
Second set of treatment and comparison colleges	-0.045**	0.012	-118.432

*$p < .05$. **$p < .01$. ***$p < .001$.

Regression-adjusted DID five-year outcomes. An examination of longer term outcomes is possible for students enrolled in the first set of treatment and comparison colleges. To explore longer term outcomes, OLS regressions were run on these students using a five-year time frame after enrollment, rather than a three-year time frame. Because data were available, this analysis includes students who enrolled at all times during the year—fall, spring, and summer. Table 9 reports the results from this analysis. In contrast with the analysis of three-year outcomes, this analysis indicates that the co-location of the AJCs on community college campuses does not have a relationship with student outcomes. Five-year completion rates, employment rates, and average earnings of students who had an AJC co-located on their campus were not significantly different from those of students who did not have an AJC on their campus.

Table 9: Five-Year Outcomes for Enrolled Students in All Semester Cohorts in First Set of Treatment and Comparison Colleges

Characteristic	Completion	Employment	Earnings
In AJC college	-0.108***	0.069***	375.230**
	[0.025]	[0.020]	[172.093]
In AJC cohort	-0.010	0.022	18.969
	[0.019]	[0.014]	[126.315]
In AJC college * In AJC cohort	**0.013**	**-0.018**	**-20.707**
	[0.017]	**[0.014]**	**[117.870]**
Unemployment rate upon enrollment	-0.034***	0.027***	207.253***
	[0.011]	[0.009]	[76.478]
Age upon enrollment	-0.001**	-0.006***	-45.288***
	[0.000]	[0.000]	[2.745]
Female	0.026***	0.038***	-170.557***
	[0.006]	[0.005]	[43.738]
Black, non-Hispanic	-0.052***	-0.022***	-169.884**
	[0.011]	[0.008]	[71.450]
Hispanic	-0.041	-0.068***	36.895
	[0.026]	[0.020]	[176.043]
Other race/ethnicity	-0.014	-0.069***	-175.300
	[0.016]	[0.012]	[106.730]
High school graduate	0.113***	-0.018***	590.682***
	[0.008]	[0.006]	[53.264]
Taking any developmental education	0.015**	0.035***	-300.170***
	[0.007]	[0.005]	[47.349]
Employed pre-enrollment	-0.037***	0.226***	1,723.923***
	[0.007]	[0.005]	[45.255]
Average pre-enrollment earnings	0.000***	0.000***	0.678***
	[0.000]	[0.000]	[0.009]
Observations	12,052	12,052	12,052
R-squared	0.039	0.206	0.468

Note. Standard errors in brackets.

*$p < .05$. **$p < .01$. ***$p < .001$.

Completion Cohorts

Descriptive DID one-year outcomes. Students who completed programs would be in most need of finding a job at a good wage and thus would be expected to benefit the most from having a co-located AJC on campus and the resultant availability of job search workshops, career counseling, and job placement services. To understand the outcomes for this cohort of students, descriptive outcomes related to employment and earnings were calculated (see Table 10). The cohorts of completers in the comparison colleges had greater declines in their employment rates (7 percent versus 1 percent) after AJC co-location than did the cohorts of completers in treatment colleges. The cohorts of completers in treatment and control colleges both had declines in their earnings outcomes after AJC co-location. Again, it is possible that other factors, particularly the Great Recession, influenced the downward trend in earnings. OLS models that control for other possible differences between the groups were used to further examine the role of AJC co-location for the completion cohorts.

Table 10: Descriptive One-Year Outcomes for Completers

Outcome	Cohort Enrolled 2 Years Prior to Co-location	Cohort Enrolled in Year Prior to Co-location	Cohort Enrolled in Year After Co-location	Difference Between Year Before and Year After
Employment				
Treatment colleges	71%	72%	71%	-1%
Comparison colleges	68%	69%	62%	-7%*
Earnings				
Treatment colleges	$2,615	$2,563	$2,009	-$554***
Comparison colleges	$1,477	$2,012	$1,522	-$490**
Sample size				
Treatment colleges	386	536	798	
Comparison colleges	179	256	421	

*$p < .05$. **$p < .01$. ***$p < .001$.

Regression-adjusted DID one-year outcomes. OLS regressions were used to generate DID estimates that control for differences in baseline characteristics among completers. These estimates were generated for all completers pooled across the two sets of treatment colleges. The models were run separately for each of the two outcomes: employment and earnings. The findings are summarized in Table 11. OLS regressions provide no indication of a relationship between AJC co-location and employment or earnings for completers. The coefficients are positive but insignificant for both employment (.027) and earnings (63.7). Together with the findings for enrollees, these findings suggest that AJC co-location does not have a significant relationship with these outcomes for the broad student population at these colleges.

Table 11: OLS One-Year Outcomes for Completers

	Employment	Earnings
In AJC college	-0.018 [0.018]	-3.160 [113.199]
In AJC cohort	-0.014 [0.018]	-271.056** [113.185]
In AJC college * In AJC cohort	**0.027** **[0.020]**	**63.669** **[130.543]**
Unemployment rate upon enrollment	-0.016** [0.007]	-97.343** [46.079]
Age upon enrollment	-0.006*** [0.001]	-16.983*** [4.944]
Female	0.041*** [0.014]	-268.325*** [87.732]
Black, non-Hispanic	-0.033 [0.023]	-28.265 [150.769]
Hispanic	-0.054 [0.061]	-4.901 [396.675]
Other race/ethnicity	0.003 [0.036]	169.145 [233.276]
High school graduate	-0.009 [0.021]	355.926*** [135.524]
Taking any developmental education	-0.062*** [0.014]	-335.320*** [87.226]
Employed pre-enrollment	0.616*** [0.013]	3,133.321*** [86.654]
Average pre-enrollment earnings	0.000*** [0.000]	0.318*** [0.016]
Attained diploma	0.004 [0.023]	-711.542*** [148.850]
Attained associate degree	-0.027 [0.018]	-602.442*** [113.548]
Observations	2,576	2,576
R-squared	0.517	0.476

Note. Standard errors in brackets.

*$p < .05$. **$p < .01$. ***$p < .001$.

5. Discussion and Conclusion

These results provide a mixed picture of the influence of AJC co-location on community college student outcomes. For students enrolling in community colleges, the presence of an AJC on the college campus appears to have little effect on completion, employment, and earnings, and may even have a negative effect on some outcomes in the early years after enrollment. However, given the longer time to completion for most students, the cohorts of enrolled students might not reach the point at which they could most benefit from AJC services until after the three-year or five-year window for examining outcomes that was possible with the available data for this study.[5] For students who completed college credentials, AJC co-location had no effect on employment or earnings outcomes.

While the findings provide some initial guidance for policy, additional research should be conducted to expand and further validate these findings. The availability of data in some cases limited the ability to examine outcomes over a time frame long enough to allow for a significant number of enrollees to complete programs. Further analyses should examine the outcomes of these same cohorts over a longer period than was possible with the wage data that were available for this analysis. Additional analyses might also examine how growth trajectories in earnings vary over time across different credentials (Jaggars & Xu, 2015).

In addition, to better understand these findings, it would be important to understand the types of AJC services students received and when students received those services. These data would provide insights into the patterns of use that might explain the findings on student outcomes. Students who received more intensive AJC services would be expected to have better outcomes. Additional data would be needed to identify specific services students received and examine the possible link between those services and student outcomes.

Finally, these analyses focus only on students in credit-bearing programs at North Carolina's community colleges. However, non-credit students compose a large proportion of North Carolina's community college enrollees (North Carolina Community College System, 2008). Because non-credit students tend to pursue workforce training with the goal of obtaining a job, they would also be more likely to benefit from AJC services co-located on campus. Future analyses should examine the relationship between the co-location of AJCs and outcomes for non-credit students.

[5] Nearly 18 percent of community college students are still enrolled six years after their initial enrollment (Juszkiewicz, 2015).

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Appendix

Table A.1: Timing of One-Stop Opening and Closure on Community College Campuses

							Time Period With Data Available											
College	**96**	**97**	**98**	**99**	**00**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**
Treatment 1									O	O	O	O	O	O	O	O	O	C
Comparison 1a															O	O	O	O
Comparison 1b															O	O	O	O
Treatment 2												O	O	O	O	O	O	O
Comparison 2a		O	O	O	O	O	O	O	C									
Comparison 2b							O	O	C									
Other 1	O	O	O	O	O	O	O	O	O	C								
Other 2								O	O	O	O	O	O	O	O	O	O	O
Other 3			O	O	O	O	O	O	O	O	O	O	C					
Other 4							O	O	O	O	O	O	O	O	C			
Other 5		O	O	O	O	O	O	O	O	O	O	O	O	O	C			
Other 6					O	O	O	O	O	O	O	O	O	O	C			
Other 7							O	O	O	O	O	O	O	O	O	O	O	O
Other 8							O	O	O	O	O	O	O	O	O	O	O	O
Other 9						O	O	O	O	O	O	O	O	O	O	O	O	O
Other 10		O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Other 11					O	O	O	O	O	O	O	O	O	O	O	O	O	O
Other 12	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Other 13					O	O	O	O	O	O	O	O	O	O	O	O	O	O

Note. C = closed. O = open.