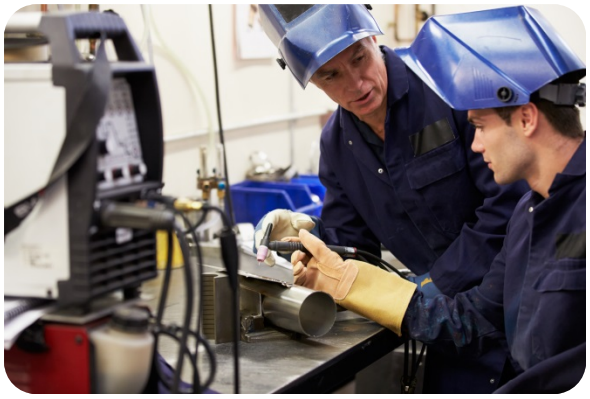

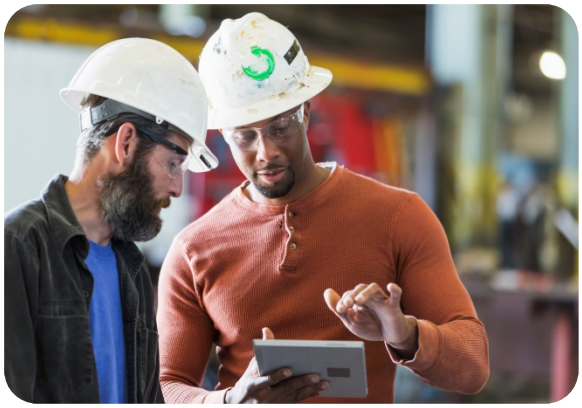

Des Moines Area Community College Workforce Training Academy Connect Program: Implementation and Early Impact Report

Appendices

Pathways for Advancing Careers and Education

OPRE Report No. 2018-82

October 2018

PACE
Pathways for Advancing Careers and Education

Des Moines Area Community College Workforce Training Academy Connect Program: Implementation and Early Impact Report Appendices

Pathways for Advancing Careers and Education (PACE)

OPRE Report No. 2018-82

October 2018

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Submitted to:
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Office of Planning, Research, and Evaluation
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Four appendices provide additional detail on the data and methods in this report. Appendix A describes the WTA assessment score requirements for program eligibility. Appendix B describes data collected at baseline, gives further detail on baseline characteristics of treatment and control group members, and explains procedures for using these data to adjust for imbalances arising by chance during random assignment. Appendix C provides detail on survey-based outcome measures, adjustments for item non-response, and analyses of survey non-response. Finally, Appendix D documents the research team's approach to outliers, or extreme values, in the analysis.

Appendix A: WTA Connect Assessment Score Requirements

The table below provides a full description of assessment score requirements for WTA Connect eligibility at various points in the study enrollment period (2012-2014).

Date	Description	Eligibility Criteria
April 2012	Random assignment begins. WTA Connect begins PACE enrollment using CASAS® tests.	Eligible if both scores are within range, or one score is within range and one is above: 206-224 CASAS Math 219-234 CASAS Reading
March 2013	CASAS eligibility score range expanded by raising the "ceiling" for applicants who lack a GED®.	For applicants without GED or high school diploma: 206-235 CASAS Math 219-245 CASAS Reading For applicants with GED or high school diploma (stays the same as before): 206-224 CASAS Math 219-234 CASAS Reading
August 2013	Workforce Training Academy (including WTA Connect) switches from CASAS to ACT WorkKeys®. Some applicants may still have CASAS scores if they are enrolled in the GED program; those scores may be used.	WorkKeys® score range: 66-74 Math 70-74 Reading CASAS score range, for those without GED (stays the same as before): 206-235 CASAS Math 219-245 CASAS Reading
December 2013	WTA Connect decides to allow ACT Compass® scores for eligibility, for applicants who had previously enrolled in for-credit coursework. (This was used for eligibility determination very infrequently.) Part of outreach/recruitment to DMACC's students in its diploma and degree programs.	Compass score range: 42-56 Math 73-79 Reading WorkKeys® score range (stays the same as before): 66-74 Math 70-74 Reading CASAS score range, for those without GED (stays the same as before): 206-235 CASAS Math 219-245 CASAS Reading

Appendix B: Baseline Characteristics and Adjustments

This appendix describes specifications for baseline covariates—including the approach to missing values in Section B.1. It then compares distributions for treatment and control group members on these measures (B.2). Finally, Section B.3 explains how the analyses control for these covariates in estimating impacts.

B.1. Details on Baseline Covariates

Exhibit B-1 details the specifications and data sources for baseline covariates. Item nonresponse rates on these covariates were generally low. Across all nine PACE sites, item nonresponse rates were under four percent except for parental college attendance (6.0 percent), typical high school grades (7.2 percent), family income (9.5 percent), and expected near-term future work hours (6.0 percent).

In order to simplify modeling tasks, the team imputed values for missing covariates using SUDAAN/IMPUTE, a weighted hot-deck imputation procedure (Research Triangle Institute, 2012) which worked as follows. This imputation step entailed a single computer run on the combined sample from all nine PACE sites. With this process, each missing value was replaced with an observed response from a similar case. Within specified strata, cases with missing values were randomly matched to cases with reported values; the reported value was then copied over to the case where the value was missing. The strata represented a cross-classification of: treatment-control status, site, National Student Clearinghouse (NSC)-reported enrollment status (some or none),[1] NSC-reported credential award (some or none), and number of months of NSC-reported enrollment. Cross-classifying on these five variables assures that each matched pair will agree perfectly on the complete set of variables.[2]

[1] The National Student Clearinghouse (NSC) has information on monthly enrollment and many credentials for 96% of college students. https://nscresearchcenter.org/workingwithourdata/

[2] In instances where this level of matching was too restrictive because no matched case with a reported value was found, then the procedure was re-run matching only on treatment status and NSC-reported enrollment status.

Exhibit B-1. Operationalization of Baseline Measures Used as Covariates in Regression-Adjusted Impact Estimates

Variable Description	Operationalization Details	Data Source(s) Instrument & Item Number
Age	Categorical measure: Under 21 21-24 25-34 35+*	BIF: B2_dob RABIT: R_RA_Date_Assigned
Female	Binary variable 1 if female 0 if male	BIF: B7
Race-ethnicity	Categorical measure: Any race, Hispanic Black, non-Hispanic White, non-Hispanic* Other, non-Hispanic	BIF: B9
Family structure	Categorical measure: Spouse/partner, with children Spouse/partner, without children Single, with children* Single, without children (Only biological and adopted children of randomized participant considered here. Step children, grandchildren, younger siblings, and other children not considered.)	BIF: B13
Living with own parents	Binary variable 1 if living with own parent(s) 0 otherwise (Presence of parents of spouse not considered.)	BIF: B13
Parent attended college	Binary variable: 1 if either parent attended college 0 otherwise	BIF: B21
Usual high school grades	Categorical measure: Mostly A's Mostly B's Mostly C's or below*	BIF: B23
Highest level of education completed	Categorical measure: No college* Under 1 year's college credit 1 year+ of college credit Associate's degree or above	BIF: B17
Index (average of items)	Proportion of responses to seven questions about career orientation and knowledge to which respondent answered, "strongly agree." Missing if four or more of seven responses blank.	SAQ: S13

Variable Description	Operationalization Details	Data Source(s) Instrument & Item Number
Academic discipline[3]	Average of ten items (scale ranging 1-6) after reversing responses to negatively-phrased items. Missing if seven or more of ten responses blank.	SAQ: S11a
Training commitment[4]	Average of ten items (scale ranging 1-6) after reversing responses to negatively-phrased items. Missing if seven or more of ten responses blank.	SAQ: S11b
Academic confidence[5]	Average of twelve items (scale ranging 1-6) after reversing responses to negatively-phrased items. Missing if nine or more of twelve responses blank.	SAQ: S11d
Emotional stability[6]	Average of twelve items (scale ranging 1-6) after reversing responses to negatively-phrased items. Missing if nine or more of twelve responses blank.	SAQ: S11e
Family income in past 12 months	Categorical measure: Less than $15,000 $15,000-29,999 $30,000+*	BIF: B27
Received food assistance (WIC/SNAP) in past 12 months	Binary variable: 1 if yes 0 if no	BIF: B26b
Received public assistance or welfare in past 12 months	Binary variable: 1 if yes 0 if no	BIF: B26c
Financial hardship in past 12 months	Binary variable: 1 if yes if ever missed rent/mortgage payment in prior 12 months or reported generally not having enough money left at the end of the month to make ends meet over the last 12 months, 0 otherwise	SAQ: S8, S9
Current work hours	Categorical measure: 0-19* 20-34 35+	BIF: B24
Expected work hours in next few months	Categorical measure for covariate: 0-19* 20-34 35+	SAQ: S2
Expecting to attend school part-time if accepted	Binary variable: 1 if yes 0 if no	SAQ: S1

[3] Modified version of the Academic Discipline scale in the Student Readiness Index (SRI), a proprietary product of ACT, Inc., Le, et al. (2005). Further validation in Peterson, et al., (2006).

[4] Modified version of Commitment to College scale in the Student Readiness Index (SRI), a proprietary product of ACT, Inc., Le, et al. (2005). Further validation in Peterson, et al., (2006).

[5] Modified version of the Academic Self-Confidence scale in the Student Readiness Index (SRI), a proprietary product of ACT, Inc., Le, et al. (2005). Further validation in Peterson, et al., (2006).

[6] Modified version of the Emotional Control scale in the Student Readiness Index (SRI), a proprietary product of ACT, Inc., Le, et al. (2005). Further validation in Peterson, et al., (2006).

Variable Description	Operationalization Details	Data Source(s) Instrument & Item Number
Frequency of situations interfering with school, work, job search or family responsibilities	Average of six items of frequency of problems (scale ranging 1-5). Missing if four or more of six responses blank.	SAQ: S15
Stress[7]	Average of four items (scale ranging 1-5) after reversing responses to negatively-phrased items. Missing if three or more of four responses blank.	SAQ: S14

Data source abbreviations: RABIT (Random Assignment and Baseline Information Tool), BIF (Basic Information Form), SAQ (Self-Administered Questionnaire). * = category omitted in creating binary (dummy) variables for regression-adjustment models.

B.2. Comparing Treatment and Control Groups at Baseline

Exhibit B-2 shows tests for similarity in characteristics of treatment and control group members at baseline. If the means in the two columns are congruent, then it is said that "baseline balance" was achieved. The list expands on the characteristics in Chapter 2, Exhibit 2-2.

The last column contains p-values for tests of hypotheses of no systematic differences between the treatment and control groups. On average, one would expect that out of 28 tests three will fall outside a 90-percent confidence interval due to chance. In this case, there were six statistically significant differences (in red font), one of which (academic discipline index) was highly significant. The team has no evidence that there were any problems with random assignment. It is likely that these are simply random results. Furthermore, as described in the next section, regression adjustment helps to control for any effects chance differences might have on the impact estimates.

[7] Cohen, et al. (1983).

Exhibit B-2. Baseline Balance for WTA Connect

Characteristic	All Participants	Treatment Group	Control Group	p-Value
Age (%)				.236
20 or under	14.3	14.7	14.0	
21 to 24	16.4	17.2	15.6	
25 to 34	27.7	24.7	30.7	
35 or older	41.6	43.4	39.8	
Female (%)	62.6	65.0	60.3	.130
Race/Ethnicity (%)				.414
Any race, Hispanic	15.3	13.9	16.7	
Black, Non-Hispanic	47.4	50.2	44.7	
White, Non-Hispanic	33.8	33.3	34.3	
Other, Non-Hispanic	7.1	6.3	7.8	
Family Structure (%)				.019
Not Living with Spouse/Partner and not Living with Children	49.5	48.6	50.4	
Not Living with Spouse/Partner but Living with Children	20.1	24.1	16.2	
Living with Spouse/Partner and not Living with Children	19.9	18.3	21.5	
Living with Spouse/Partner and Children	10.5	9.1	11.8	
Living with Parents (%)	16.9	16.8	17.1	.907
At Least One Parent Has at Least some College (%)	30.2	30.6	29.8	.812
High School Grades (%)				.814
Mostly Got A's	8.3	8.5	8.1	
Mostly Got B's	36.9	35.8	38.0	
Mostly got C's or Below	54.8	55.7	53.9	
Current Education (%)				.054
Less Than a High School Degree	40.1	39.1	41.1	
High School or Equivalent	36.8	35.7	37.9	
Less Than 1 Year of College	10.8	13.1	8.4	
1 or More Years of College	8.2	9.0	7.3	
Associates Degree or Higher	4.2	3.0	5.4	
Received Vocational or Technical Certificate or Diploma (%)	20.9	20.7	21.0	.896
Career Knowledge Index (mean)	0.36	0.37	0.35	.312
Psycho-Social Indices (means)	4.92	4.95	4.89	.259
Academic Discipline Index	5.34	5.40	5.28	.007
Training Commitment Index	4.32	4.35	4.29	.218
Academic Self-Confidence Index	4.85	4.87	4.82	.341
Emotional Stability Index	3.09	3.12	3.06	.030
Social Support Index	2.58	2.56	2.60	.397
Stress Index	1.82	1.81	1.84	.431
Depression Index	4.92	4.95	4.89	.259
Family Income (%)				.571
Less than $15,000	56.0	56.8	55.1	
$15,000-$29,999	26.1	26.6	25.5	
$30,000 or More	18.0	16.6	19.4	
Family Income (mean)	$16,364	$15,783	$16,966	.289

Characteristic	All Participants	Treatment Group	Control Group	p-Value
Public Assistance/Hardship Past 12 Months				
Received WIC or SNAP (%)	65.8	68.8	62.8	.057
Received Public Assistance or Welfare (%)	14.4	14.6	14.2	.878
Reported Financial Hardship (%)	62.7	62.4	62.9	.825
Current Work Hours (%)				.674
0	62.2	61.7	62.7	
1 to 19	5.1	6.0	4.2	
20 to 34	13.3	12.8	13.8	
35 or more	19.5	19.6	19.3	
Expected Work Hours in Next Few Months (%)				.394
0	22.4	20.1	24.6	
1 to 19	4.7	5.3	4.1	
20 to 34	27.9	29.0	27.0	
35 or more	45.1	45.7	44.4	
Life Challenges Index (mean)	1.77	1.79	1.75	.355
Owns a Car (%)	59.2	62.0	56.3	.084
Has both Computer and Internet at Home (%)	50.6	49.6	51.5	.545
Ever arrested (%)	41.1	41.3	40.9	.870

SOURCE: Abt Associates calculations based on data from PACE Basic Information Form (BIF) and Self-Administered Questionnaire (SAQ).
NOTES: Tests for statistically significant imbalance were based on SAS/FREQ procedure for categorical outcomes and on the SAS/TTEST procedure for other outcomes.

B.3. Regression Adjustment

In this section, the team describes the regression adjustment approach used to improve precision and minimize effects of sampling error on impact point estimates.

Equation B.1 below shows the conventional regression-adjustment model:

$$Y_i = X_i\beta + \delta T_i + e_i, \quad \text{(B.1)}$$

where Y_i is the outcome, T_i is a 0/1 dummy variable indicating treatment group membership, X_i is a row vector of baseline covariates, β is the vector of parameters indicating the influence of each covariate on the outcome, δ is the effect of treatment, and e_i is an error term. This method is known as ordinary least squares (OLS) and has excellent properties when the sample size is many times larger than the number of covariates (Lin, 2013) even when the outcomes are not normally distributed (Judkins and Porter, 2016). Estimates of the treatment effect are "asymptotically unbiased" and for adequately large sample sizes, under most conditions, $\text{var}\left(\hat{\delta}\right) \approx \left(1-R^2\right)\text{var}(\bar{y}_T - \bar{y}_C)$, where R^2 is proportion of the variance in Y_i that can be explained by X_i, in equation B.2 below.

The team's analyses showed that the method can perform poorly when the number of baseline covariates, *p*, is relatively large compared to the number of observations, *n*. Specifically, when the ratio *n/p* is not very large, it can happen that $\text{var}\left(\hat{\delta}\right) > \text{var}(\bar{y}_T - \bar{y}_C)$, meaning that the

variance on the estimated treatment effect using the regression adjustment in equation B.1 is actually larger than the variance of the simpler randomization-based estimate of the treatment effect, formed by simply contrasting the mean outcomes in the two groups. Unpublished simulations show that the variance penalty increases as the ratio of non-significant to significant covariates grows.[8] There is a lack of good research on how large the ratio of cases to variables needs to be in order to guarantee that $\text{var}\left(\hat{\delta}\right) < \text{var}(\bar{y}_T - \bar{y}_C)$, but it appears that values of *n/p* less than 30 may be problematic. Eight of nine of the PACE sites have values of *n/p* in this potentially problematic range even after trimming the number of baseline predictors to 34 through the examination of their ability to explain measures derived from the NSC about educational participation, persistence, and attainment (Fein, 2016).

Based on this research, the team applied a slightly different approach to estimation for this report. The approach involved first estimating the influences of the baseline characteristics on the outcome under the control condition (equation B.2 below). The next step was to calculate how different each program and control group member's outcome was from what would have been expected under control conditions, as in equation B.3. These differences between actual and predicted outcomes are called "residuals." The team then calculated the difference between average residual in the program group and the average residual in the control group, as in equation B.4. Equation B.5 gives the formula used to estimate standard errors on these impact estimates.

$$Y_i = X_i\beta + e_i, \tag{B.2}$$

$$\hat{r}_i = Y_i - X_i\hat{\beta}, \tag{B.3}$$

$$\hat{\delta} = \hat{\mu}_T - \hat{\mu}_C = \frac{\sum_i T_i\hat{r}_i}{\sum_i T_i} - \frac{\sum_i (1-T_i)\hat{r}_i}{\sum_i (1-T_i)}, \tag{B.4}$$

$$se(\hat{\delta}) = \sqrt{\frac{\sum_i T_i(\hat{r}_i - \hat{\mu}_T)^2}{\sum_i T_i - 1} + \frac{\sum_i (1-T_i)(\hat{r}_i - \hat{\mu}_C)^2}{\sum_i (1-T_i) - 1}}, \tag{B.5}$$

For survey-based outcomes subject to nonresponse, the team used a weighted version of this estimator (see Equation B.6).

[8] For example, with a sample size of 1000, when there are three covariates that explain 57 percent of the variation of the outcome and 97 covariates that are not relevant to prediction of the outcome, the standard error of the effect of treatment is 11 percent higher with OLS than with Koch's method. (Austin Nichols, Abt Associates, unpublished simulations, 2016).

$$\hat{\delta} = \frac{\sum_i w_i T_i \hat{r}_i}{\sum_i w_i T_i} - \frac{\sum_i w_i (1-T_i) \hat{r}_i}{\sum_i w_i (1-T_i)}, \quad \text{(B.6)}$$

where w_i is the nonresponse-adjustment weight for survey-reported outcomes.

This method is similar to the method developed by Koch, et al. (1998), who referred to it as nonparametric ANCOVB. Since then, most authors have referred to it as Koch's estimator. The difference between Koch's estimator and the method applied in this report is that Koch and co-authors fit equation B.2 on the entire sample rather than just the control sample. The main advantage of fitting B.2 just on the control sample is that the parameters are more easily interpretable when the null hypothesis is rejected.[9] A secondary advantage is that, as Lesaffre and Senn (2003) demonstrated, Koch's estimator can produce overly-liberal significance tests, meaning that the null hypothesis of no program effect is rejected too often. This occurs because the estimated standard errors on the estimated treatment effect using Koch's method are too small. When the estimated standard errors are too small, random differences between the treatment and control groups are mistakenly classified as statistically significant evidence of program effects. Fitting B.2 on just the control sample will increase the estimated standard errors obtained in equation B.5 compared to what would be obtained by Koch's estimator, but still smaller than what would be achieved with a pure randomization-based estimator.

Analysis confirmed that use of the modified Koch's estimator slightly increased precision relative to both pure randomization and OLS (eq. B.1). The variance on the estimate of the impact of the program on the confirmatory outcome (receipt of a credential from any source) was 7.5 percent smaller with the modified Koch's estimator than it would have been with the OLS approach, and across a collection of confirmatory and secondary outcomes, the average variance reduction due to using the modified Koch's estimator instead of the OLS estimator was 5 percent.

Exhibit B-3 shows the regression coefficients from equation B.2 for the confirmatory outcome, credential receipt from any source. These covariates were selected based on a pooled analysis across all nine PACE sites of factors that predict various measures of success reported to the NSC. Note that of the 34 baseline covariates allowed into the model, four of these are predictive of future receipt of a credential from any source by members of the control group sample. Specifically, being 21 to 24 years old, having one or more years of prior college education at baseline, and having higher academic discipline are all positively associated with future credential receipt, while living with one's parents is negatively associated with future credential receipt.

[9] If there is a treatment effect, there is also the possibility of interactions. If there are interactions, then the coefficients for main effects in model run without those interactions on the pooled sample will be biased, meaning that they will not be good estimates of the influence of the baseline predictor under either treatment or control conditions.

Exhibit B-3. Coefficients for Baseline Characteristics as Predictors of Credential Receipt from Any Source: WTA Connect Control Group Members

Baseline Covariate	Estimate	Standard Error	p-Value
Intercept	0.228	0.258	.379
Age			
20 or under	0.069	0.060	.255
21 to 24	0.165	0.073	.025
25 to 34	0.059	0.051	.249
35 or older	0	NA	NA
Sex			
Female	0.031	0.042	.449
Male	0	NA	NA
Race/Ethnicity			
Any race, Hispanic	-0.043	0.048	.378
Black, Non-Hispanic	0.051	0.043	.238
White, Non-Hispanic	0	NA	NA
Other, Non-Hispanic	0.022	0.083	.791
Family Structure			
Not Living with Spouse/Partner and not Living with Children	-0.097	0.070	.166
Not Living with Spouse/Partner but Living with Children	0.037	0.073	.615
Living with Spouse/Partner and not Living with Children	0	NA	NA
Living with Spouse/Partner and Children	0.017	0.062	.787
Living with Parents	-0.107	0.061	.082
At Least One Parent Has at Least some College	-0.051	0.040	.203
High School Grades			
Mostly Got A's	0.120	0.088	.173
Mostly Got B's	-0.054	0.041	.189
Mostly got C's or Below	0	NA	NA
Current Education			
High School Degree or Less	0	NA	NA
Less Than 1 Year of College	0.060	0.078	.438
1 or More Years of College	0.151	0.085	.076
Associates Degree or Higher	-0.055	0.058	.347
Career Knowledge Index	-0.028	0.056	.622
Family Income			
Less than $15,000	-0.032	0.050	.527
$15,000-$29,999	0.055	0.056	.331
$30,000 or More	0	NA	NA
Psycho-Social Indices			
Academic Discipline Index	-0.070	0.039	.071
Training Commitment Index	0.019	0.042	.650
Academic Self-Confidence Index	0.013	0.034	.697
Emotional Stability Index	0.029	0.030	.323
Stress Index	-0.027	0.029	.353
Life Challenges Index	-0.041	0.038	.287

Baseline Covariate	Estimate	Standard Error	p-Value
Public Assistance/Hardship Past 12 Months			
Received WIC or SNAP	0.041	0.041	.320
Received Public Assistance or Welfare	-0.012	0.056	.831
Reported Financial Hardship	0.025	0.042	.553
Current Work Hours			
0 to 19	0	NA	NA
20 to 34	-0.030	0.061	.625
35 or more	0.066	0.059	0.268
Expected Work Hours in Next Few Months			
0 to 19	0	NA	NA
20 to 34	0.013	0.052	.800
35 or more	-0.050	0.045	.266
Plan to attend school only part-time if admitted to WTA Connect	0.124	0.124	.124

SOURCE: Abt Associates calculations based on data from on data from the PACE Basic Information Form (BIF), and the PACE Self-Administered Questionnaire (SAQ).
NOTES: Model estimated with SAS/SURVEYREG procedure. Sample size=316.

The team considered the alternative of OLS with a winnowed set of effectual covariates for each outcome at each PACE site but rejected doing so in favor of the greater transparency and convenience of using a common set of covariates for every outcome across the overall project.

Exhibit B-4 shows impacts on selected confirmatory and secondary outcomes before and after regression adjustment without weights.[10] The adjusted estimates are usually smaller than the unadjusted estimates—sometimes much smaller. This suggests there must be some important imbalance among survey respondents. Referring back to Exhibit B-2, the imbalance on some but less than a year of college experience (13 percent in the treatment group versus just 8 percent in the control group) may be issue that makes the estimates sensitive to the use or nonuse of regression adjustment.

[10] See Exhibit C.3 in Appendix C for the impact of nonresponse-adjustment weights on these estimates.

Exhibit B-4. Comparison of Selected Impact Estimates With and Without Adjustment for Baseline Imbalances

Outcome	Survey Respondents without Weights	
	Unadjusted Est (StdErr)	Adjusted Est (StdErr)
Primary Outcome (Survey)		
Received a credential from any source (proportion)	0.0598**(0.0278)	0.0427*(0.0277)
Secondary Education Outcomes (Survey)		
Total Hours of Occupational Training at (average)		
A College	17.0*(11.6)	11.7(11.6)
Another Place	4.58(6.63)	2.10(6.61)
Any Place	21.8*(13.3)	13.7(13.3)
Received a Credential from: (proportion)		
A College	0.0282*(0.0187)	0.0187(0.0187)
Another Education/Training Institution	-0.0209(0.0134)	-0.0305(0.0134)
A Licensing/Certification Body	0.0618***(0.0250)	0.0474**(0.0249)
Other Secondary Outcomes (Survey)		
Indices of Self-Assessed Career Progress (average)		
Perceived Career Progress[a]	0.0783(0.0624)	0.0720(0.0604)
Confidence in Career Knowledge[b]	0.0211(0.0496)	-0.0122(0.0453)
Access to Career Supports[c]	0.0219(0.0225)	0.0004(0.0218)
Indicators of Career Pathways Employment (proportion)		
Working in a Job Paying $12/Hour or More[d]	0.0074(0.0313)	0.0029(0.0295)
Working in a Job Requiring at Least Mid-Level Skills	0.0258(0.0208)	0.0080(0.0209)
Sample Sizes	368	375

SOURCE: Abt Associates calculations based on data from PACE short-term follow-up survey.

NOTES: Standard errors on estimated impacts are shown in parentheses. Adjusted impact estimates and associated standard errors were prepared with the modified Koch's estimator, as defined equations (B.4) and (B.5). Statistical significance levels, based on one-tailed t-tests tests of differences between research groups, are summarized as follows: *** statistically significant at the one percent level; ** at the five percent level; * at the ten percent level.

[a] Three-item scale tapping self-assessed career progress; response categories range from 1=strongly disagree to 4=strongly agree.

[b] Seven-item scale tapping self-assessed career knowledge; response categories range from 1=strongly disagree to 4=strongly agree.

[c] Six-item scale tapping self-assessed access to career supports; response categories range from 1=no to 2=yes.

[d] Assessed wage distributions for employed control members to establish this cut-point at approximately the 60th percentile of wages.

Appendix C: Survey Data Recoding and Adjustments

This appendix documents key technical detail for impact estimates for outcomes based on 18-month follow-up survey data. Section C.1 documents coding for scales based on follow-up survey data. Section C.2 describes the imputation process for some missing survey data elements. Section C.3 analyzes survey nonresponse and documents the decision not to apply nonresponse weights in the impact analysis.

C.1. Measures Based on Follow-up Survey Data

Exhibit C-1 provides details on specifications for the process outcomes analyzed in the Implementation Analysis of Chapter 4. Chapter 5, Exhibit 5-1 provided descriptions of outcomes in the impact analysis of WTA Connect. Exhibit C-2 provides details on the operationalization of each measure and the underlying survey questions.

Exhibit C-1. Details on Specifications for Survey-Based Outcomes in Chapter 4

Outcome	Details on Derivation of Outcome	Follow-Up Survey Question(s)
Receipt of Education or Training		
Entire Study Sample		
Received education or training since random assignment		
In any subject/field	Two question format with slightly different wordings to try to get all training spells reported	A1, A1a
In a healthcare occupation	Open-ended responses about name of target occupation and understanding of future duties were coded by staff from the U.S. Census Bureau into Standard Occupation Classification (SOC) codes. Those in programs designed to train them for jobs as health care practitioners/technicians (SOC 29-xxxx) or health care support workers (SOC 31-xxxx) were counted for this outcome. This does not include office workers in the health care industry or personal care aides in nursing homes.	A19a, A20, A21, A27a, A27c, A27d
Since random assignment, ever attended	The team looked up place names reported in A4 in IPEDS and used the IPEDS classification to edit self-reports in A5. Private for-profit colleges were not counted as proprietary schools. Only places not classified as degree-granting in IPEDS and that are privately run for profit were classified as proprietary schools.	A4, A5
Two-year college	Community or technical college (2 year college)	
Four-year college	4 year college/university	
Proprietary school	Private school/company that provides training	
Adult high school/education	Adult education / adult high school / community school / night school.	
Community/non-profit organization		
Other	State unemployment/employment office, One-stop career center, your place of employment, or somewhere else.	

Outcome	Details on Derivation of Outcome	Follow-Up Survey Question(s)
Of Those Who Attended Any Education or Training		
Time spent at school and work at first place attended	Question was asked about each place attended since randomization, but only information on first place was analyzed. Enrollment dates were used to determine first place attended since randomization.	A7
Full-time school and full-time work		
Full-time school with no or part-time work		
Part-time school and full-time work		
Part-time school with no or part-time work		
Views of classes at first place attended	Questions about career relevance and learning methods were only asked about first place attended. This was done to reduce respondent burden. First place was chosen rather than last place because PACE programs put particularly emphasis on innovative teaching methods for basic education classes, which would typically be the first classes taken.	
Strongly agrees relevant to life/career[a]	Strongly agrees that, "These classes were relevant to my career interests," or strongly disagrees that, "These classes did not relate to much of anything else in my life."	A46c, A46d
Used active learning methods most/all of the time	Responses to three positively worded items from 6-item battery were reverse scaled (1=none of the time, 4=all the time) and then averaged. Three negatively worded items were not used because they did not exhibit the expected negative correlations with the positively worded items. Anyone with an average of 2.5 or larger was counted.	A47b-A47d
Perceived strong emphasis on community	People who responded "a great deal" were counted.	A37
Basic Skills Instruction and Tests		
Received basic skills instruction since random assignment		
Academic skills		A10b
English as a Second Language		A10a
Took college placement exam		
English		A57
Math		A58
Passed college placement exam		
English		A57a
Math		A58a
Life Skills Instruction		
Received life skills instruction since random assignment		A10e

Outcome	Details on Derivation of Outcome	Follow-Up Survey Question(s)
Receipt of Various Supports		
Received assistance from any organization since random assignment (%)	This was asked of everyone, even those with no training since randomization.	A62
Career counseling		
Help arranging supports for school/work/family		
Job search or placement		
Cited financial support as challenge in enrollment or persistence [b]	Reported money troubles as reason for not continuing studies, not currently studying, or never starting studies; or reported that it was very or somewhat difficult to obtain adequate financial support to continue their studies	A11a, A14a, A23a, A26a, A35, A59, A60
Received supports at first place of instruction attended (%)	Question was asked about first and second places attended since randomization, but only information on first place was analyzed. Enrollment dates were used to determine first place attended since randomization.	
Career counseling		A36d
Ever		
Three or more times		
Academic advising		A36a
Ever		
Three or more times		
Financial advising		A36b
Ever		
Three or more times		
Tutoring		A36d
Ever		
Three or more times		
Help arranging supports for school or work		A36f
Ever		
Three or more times		
Job search/placement assistance		A36e
Ever		
Three or more times		
Received financial assistance at first place of instruction (%)[a]	Question was asked about each place attended since randomization, but only information on first place was analyzed. Enrollment dates were used to determine first place attended since randomization.	
Grants/scholarship	A Pell grant or other government grant or scholarship—not counting loans you have to pay back, Must indicate in A31 that funds were used with for tuition, other school related expense, or living expenses.	A30g, A31
Loan	Loans in your own name or loans in your parents' names. Must indicate in A31 that funds were used with for tuition, other school related expense, or living expenses.	A30e, A30f

Outcome	Details on Derivation of Outcome	Follow-Up Survey Question(s)
Offered opportunities for related work experience as part of training at first place of instruction (%)	Question was asked about each place attended since randomization, but only information on first place was analyzed. Enrollment dates were used to determine first place attended since randomization.	
Clinical internship		A38b
Visits to local employer		A38c
Work-study job		A38a
Apprenticeship		A38e
Any related work experience (including other)		A38f

Exhibit C-2. Details on Specifications for Survey-Based Outcomes in Chapter 5

Outcome	Details on Derivation of Outcome	Follow-Up Survey Question(s)
	Primary and Secondary	
Education		
Hours of occupational training at colleges	1) Students receiving noncredit occupational training were asked for duration of training (e.g., weeks) and intensity (e.g., hours per week). These were multiplied together to obtain hours of occupational training. 2) If students reported earning regular college credits at colleges, the evaluation team translated credits for hours using a rule of 15 hours of training time per credit. (Typical 3-credit college classes at most U.S. colleges and universities meet three hours per week for 15 weeks, so each credit represents 15 hours of class time.) 3) If a student reported receiving both noncredit and credit training at a college, the team summed the hours from both.	A24, A28, A29
Hours of occupational training at places other than colleges	Same as at colleges	A24, A28, A29
Hours of occupational training at any place	Sum of prior two outcomes	A24, A28, A29
Credential receipt from colleges[a]	The survey had separate questions about credentials awarded for regular for-credit classes and for noncredit occupational classes. It the respondent indicated receiving either type of credential, then this variable was coded as 1 (for yes); otherwise, it was coded as 0 (for no). The survey did not ask for credentials awarded as a result of ESL, ABE, or life-skills classes.	A22, A23, A27e, A27f
Credential receipt from another type of education-training institution	Same as at colleges.	A22, A23, A27e, A27f
Credential receipt from a licensing/certification body	The survey asked about the highest level of occupation training completed. One of the possible answers was “a professional, state or industry certification, license or credential.” If the respondent picked this level, then there was a follow-up question about the year of award. If the year of award was the same as the year of randomization or later, then the person was coded as having earned such a credential.	A56

Outcome	Details on Derivation of Outcome	Follow-Up Survey Question(s)
Received a credential from any source	See cells above for receipt of credentials from colleges, for other education training institutions, and from licensing/certification bodies. If a student had obtained any of these, he or she was classified as having received a credential	A22, A23, A27e, A27f, A56
Career Progress		
Employment and earning $12 or per hour	Analyzed response to survey question for control group. Selected the threshold because it was close to the 60th percentile of hourly wages among employed control group members. This percentile was picked as being a reasonable goal for programs like WTA Connect.	E2
Employment in job requiring mid-level skills	Three open-ended questions about the kind of work done, the usual activities completed, and the job title were coded into one of the Department of Labor Standard Occupational Classification (SOC) codes. The team then looked up the Job Zone[11] for each SOC code in the BLS O*NET system.[12] There are five Job Zones. A Job Zone is a group of occupations that are similar in education needed to do the work, related experience needed to do the work, and amount of on-the-job training needed to do the work. Job Zone of 3--occupations that need medium preparation—seemed a reasonable goal for graduates of WTA Connect. This Job Zone is described in the O*NET system documentation as, "Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations."	E3, E4, E5
Working in a healthcare occupation	Three open-ended questions about the kind of work, usual activities, and job title were coded into one of the SOC codes. If the first two digits of the SOC were 29 (Healthcare Practitioners and Technical Occupations) or 31 (Healthcare Support Occupations), then the respondent was considered working in a healthcare occupation. Note, being employed in a healthcare occupation is usually associated with employment in the healthcare industry, but this is not always true. The survey did not ask about industry of employer.	E3, E4, E5
Perceived career progress	This was a new scale created for PACE. It is a 3-item scale of self-assessed career progress; response categories range from 1='strongly disagree' to 4='strongly agree'. It was designed specifically to measure an individual's sense of progress a career pathways program as described in Fein (2012).	C5, C6
Confidence in career knowledge	This seven-item scale was based on a review of six survey instruments, as well as literature. The first two scale items (a-b) were adapted from the Career Decision Self-Efficacy-Short Form (Betz and Taylor, 2001). Items d-f were adapted from Career Exploration Survey. Two items (c and g) were new and written specifically for the PACE BIF. Response categories ranged from 1='strongly disagree' to 4='strongly agree'.	C3
Access to career supports	This was a new scale created for PACE. It is a 6-item scale, counting number of types of career-supportive relationships in workforce and education settings. Response categories ranged from 1=no to 2=yes. The motivation for creating this scale was the theory richer social networks are one of the benefits of higher education (e.g., Goldrick-Rab and Sorenson, 2010).	C2

[11] https://www.onetonline.org/help/online/zones [last accessed September 12, 2016]

[12] https://www.onetonline.org/ [last accessed September 12, 2016]

Outcome	Details on Derivation of Outcome	Follow-Up Survey Question(s)
Tertiary		
Psycho-Social Skills		
Grit	Existing scale from Duckworth, et al. (2007). The 8-item scale captures persistence and determination. Response categories ranged from 1 (strongly disagree) to 4 (strongly agree).	B3
Academic self-confidence	Existing scale from Le, et al. (2005). This scale was used for a second time in the follow-up survey. It was used initially in in the BIF. The 12- -item scale includes response categories that range from 1='strongly disagree' to 6='strongly agree'.	B4
Core self-evaluation	Existing scale from Judge (2009). The 12- item scale response categories ranged from 1='strongly disagree' to 4='strongly agree'.	B6
Social belonging in school	Shorter version of an existing scale by Walton and Cohen (2007 and 2011). The 5-item scale captured sense of belonging; response categories ranged from 1='strongly disagree' to 4='strongly agree'.	B7
Life Stressors		
Financial hardship	This was a new scale created for PACE. This scale was used for a second time in the follow-up survey. It was used initially in in the BIF. The two-item scale asked about financial hardship, reported as either an inability to pay rent/mortgage or not enough money to make ends meet. Response categories were 0='no' or 1='yes'.	D1, D2
Life challenges	This was a new scale created for PACE. It was adapted from a longer instrument by Kessler, et al. (1998). This scale was used for a second time in the follow-up survey. It was used initially in in the BIF. The 7- item scale captured life challenges that interfered with school, work, or family responsibilities. The response categories ranged from 1='never' to 5='very often'.	D3
Perceived stress	Existing scale from Cohen et al. (1983). This scale was used for a second time in the follow-up survey. It was used initially in in the BIF. The 4-item scale captured perceived stress. The response categories ranged from 1='never' to 4='very often'.	D4

C.2. Imputation of Item Nonresponse for Some Items in the Follow-up Survey

This section documents the research team's response to two sources of missing data affecting survey outcomes. First, initial data quality assessment revealed that a small fraction of respondents who initially indicated receiving some education and training did not answer subsequent questions on the nature of these experiences. Second, all outcomes were affected by at least some missing data where respondents either declined to answer a question or gave an answer of "don't know."

Concerning the first issue, checks against an independent data source—the NSC—confirmed education and training receipt and suggested that respondent misunderstanding of survey questions was a likely source of the missing data. The discrepancy affected fewer than 10 percent of respondents and occurred at similar rates for treatment (11 percent) and control (seven percent) group members. Specifically, the missing data involved responses to a filter question (A10) ascertaining participation in each of a set of types of education and training activities (ESL, adult basic education, classes for college credit, noncredit occupational training, life skills classes).

To adjust for these missing data, the team imputed new responses for A10 using a nearest neighbor "hot deck" procedure (Andridge & Little, 2010).[13] The hot deck involves "binning" and sorting. Within a bin, the procedure matches each case that is missing an outcome to the nearest complete case with respect to the sort. This hot deck imputation procedure matched spells with consistent responses to A10 (*consistent spells*) to spells with inconsistent responses to A10 (*inconsistent spells*). The team used site and treatment status to define the bins and the modeled propensity of a spell being consistent to define the sorting variable. To model the propensity that a spell would be consistent, the team searched a large potential set of predictor variables from baseline variables and from sections of the follow-up survey for which A10 was not a filter question. The team included interactions as well as main effects. The team conducted this search and fit the final model on a pooled dataset including observations from WTA Connect, as well as five other PACE sites where data collection ended at about the same time. The final imputation model used 12 variables and interactions from the survey.

In the course of imputing A10, the team kept track of the ID of the consistent spell that was matched to each inconsistent spell. After imputation of A10 was complete, the team then filled in responses to the detailed questions (A11-A29) filtered by A10 by copying the responses for the consistent spell that had been matched to the inconsistent spell.

In response to the section issue—the common problem of small fractions missing on most questions due to refusals and don't knows—the team for the most part simply omitted people with such responses from the relevant analyses. This was done separately for each outcome, meaning that the maximum number of usable responses was used for estimating the impact of each outcome. However, for training hours the team imputed responses for each type of

[13] If A10e was answered "no" or was not answered, then items A49-A51 were skipped. The team decided not to impute values for these items in the cases where A10e was imputed to have a value of "yes", as A49-A51 do not provide important outcomes for PACE impact analyses.

classes at each school the respondent attended. This imputation allowed the team to sum training hours across schools and types of classes without having high missing data rates on the sums because of scattered item missingness. To carry out this imputation, the team used SUDAAN/IMPUTE, as discussed in Section A.1, for missingness of baseline covariates. This random matching was constrained to occur within strata defined by treatment status, site, type of training, and self-reported completion status of the spell.

C.3. Survey Nonresponse Analysis

Across the PACE study sample, the 18-month follow-up survey obtained a markedly higher response rate in the treatment group (86 percent) than in the control group (79 percent). In this section, the team assesses the implications of non-response for the study's impact findings.

Exhibit C-3 compares distributions on baseline characteristics for all sample members and survey respondents. There were six significant imbalances (using a threshold of 0.10 for statistical significance) on the full sample and four on the unweighted respondent sample.

The upper panel of Exhibit C-4 compares regression-adjusted impacts on college outcomes from NSC records for the full and respondent samples.[14] If no weights are used, estimated impacts on three of the four NSC variables are larger.[15] More worrisome, the level of statistical significance changes for two of the NSC variables.

In response, the team developed and applied weights to adjust for nonresponse, based on statistical models of the association between baseline characteristics and response probabilities within each of the two randomly assigned groups. Covariates also included several measures of college enrollment and credential receipt over the follow-up period. These methods are common in survey research.

The main steps in constructing weights included:

1. Winnow the list of potential covariates that are statistically significant in a logistic regression model for response status.[16] Do this separately for treatment and control cases. This approach identified family structure and NSC-reported full-time college enrollment as significant predictors of response status in the treatment sample. The set of significant predictors in the control sample consisted of age, commitment to training, welfare receipt, stress, and NSC-reported full-time college enrollment.

[14] The NSC outcomes in this table are not formal outcomes for the evaluation of WTA Connect. The PACE team decided not to use them for the formal evaluation because at the sites where students have access to training vouchers, many of students use their vouchers at schools that do not report to the NSC. (At DMACC, students did not have access to vouchers.) Nonetheless, the NSC outcomes are observed for the full sample and thus are useful for assessing the contribution of the weights to inference.

[15] The weighted estimates are discussed after the procedure for nonresponse adjustment is discussed.

[16] The team used the stepwise search option in SAS/LOGISTIC for this purpose with a p-value to enter the model of 0.20 and a p-value to stay in the model of 0.10.

2. Using the winnowed list of potential covariates, estimate the response propensity for each member of the treatment and control sample—both for respondents and nonrespondents.
3. Sort the sample in each study arm by the estimated response propensity, and then divide the sample into five equal-size groups (quintiles).
4. Within each arm and quintile, calculate the empirical response rate. Invert it to calculate the nonresponse-adjusted weight.

The last column in Exhibit C-3 shows that the weighting does very little to change baseline imbalances.[17] With or without nonresponse adjustment weights, there are four significant imbalances. The last column in the upper panel of Exhibit C-4 shows that the use of weights brought three of the four NSC-reported outcomes closer to those estimated from the full sample although the star pattern remained distorted.[18] For example, using the full sample, the estimated impact of WTA Connect on the number of NSC-reported months of any enrollment is an increase of 0.23 months. When only the survey respondents are used, the estimated impact climbs to 0.34 months and becomes statistically significant. If weights are used, the estimated impact is an increase of 0.28 months, closer to the full sample estimate, but is still (unfortunately) statistically significant. Given these improvements, the team decided to use the nonresponse-adjusted weights in analyses of survey-based outcomes in this report.

The lower portion of Exhibit C-4 also shows estimates of the impact of WTA Connect on the survey-based outcomes. The team produced these to allow readers to assess the sensitivity of the report findings to the decision to use nonresponse-adjusted weights. Generally, the two sets of estimates are very similar. The same set of impacts would have been flagged as statistically significant with or without the nonresponse-adjusted weights. This suggests that the regression adjustment is adequate by itself to remove bias for the survey reported outcomes even though the combination of regression adjustment and nonresponse adjustment is beneficial for the impacts on the measured NSC outcomes.

[17] Not shown in this table, the adjustment was effective in making the weighted respondent sample resemble the full sample more closely in each treatment group. However, given that the paramount focus of this study is on treatment/control differences, the team did not think that this improvement should be an important consideration in whether to use nonresponse adjustment weights.

[18] NSC-reported enrollment and credentials were not used as outcomes in the evaluation of WTA Connect because of concerns that many students in the treatment group were given vouchers to attend for-profit colleges that do not cooperate with the NSC. Nonetheless, the NSC is the only source of current information on survey nonrespondents that was available to the team.

Exhibit C-3. Baseline Balance on Full Sample, Unweighted Respondent Sample, and Weighted Respondent Sample

WTA Connect Baseline Characteristics									
	All Participants			Survey Respondents, Unweighted			Survey Respondents, Weighted		
	Treatment	Control	p-value	Treatment	Control	p-value	Treatment	Control	p-value
Age (%)			.236			.164			.243
20 or under	14.7	14.0		14.4	13.6		14.5	14.5	
21 to 24	17.2	15.6		17.1	14.7		16.7	14.9	
25 to 34	24.7	30.7		23.6	30.9		24.0	30.5	
35 or older	43.4	39.8		44.8	40.8		44.9	40.1	
Sex (%)			.130			.177			.154
Female	65.0	60.3		67.4	62.7		65.6	60.4	
Male	35.0	39.8		32.6	37.3		34.4	39.6	
Race/Ethnicity			.414			.514			.450
Hispanic	13.9	16.7		13.9	17.7		13.9	17.4	
Black NonHispanic	50.2	44.7		50.6	44.9		52.2	45.5	
White NonHispanic	33.3	34.3		32.4	34.2		31.3	34.2	
Other NonHispanic	6.3	7.8		6.9	6.6		6.6	6.4	
Family Structure (%)			.019			.018			.011
Not Living with Spouse/Partner and not Living with Children	48.6	50.4		47.6	48.8		48.1	49.7	
Not Living with Spouse/Partner but Living with Children	24.1	16.2		24.2	15.8		24.4	15.3	
Living with Spouse/Partner and not Living with Children	18.3	21.5		19.4	22.7		19.1	22.8	
Living with Spouse/Partner and Children	9.1	11.8		8.7	12.7		8.5	12.2	
Living with Parents (%)	16.8	17.1	.907	16.6	15.8	.751	15.7	16.0	.903
At Least One Parent Has at Least some College (%)	30.6	29.8	.812	33.7	29.9	.317	33.7	30.0	.347
High School Grades (%)			.814			.628			.933
Mostly Got A's	8.5	8.1		9.3	8.8		8.9	9.1	
Mostly Got B's	35.8	38.0		33.2	36.9		35.1	36.4	
Mostly got C's or Below	55.7	53.9		57.5	54.3		56.0	54.5	

WTA Connect Baseline Characteristics									
	All Participants			Survey Respondents, Unweighted			Survey Respondents, Weighted		
	Treatment	Control	p-value	Treatment	Control	p-value	Treatment	Control	p-value
Current Education (%)			.054			.073			.103
Less Than a High School Degree	39.1	41.1		36.6	38.2		37.5	38.8	
High School or Equivalent	35.7	37.9		36.4	39.0		36.3	39.3	
Less Than 1 Year of College	13.1	8.4		14.3	8.7		14.1	8.8	
1 or More Years of College	9.0	7.3		9.4	8.2		9.0	7.6	
Associates Degree or Higher	3.0	5.4		3.3	6.0		3.2	5.5	
Received Vocational or Technical Certificate or Diploma (%)	20.7	21.0	.896	20.5	22.9	.452	20.5	22.1	.615
Career Knowledge Index (average of items)	0.37	0.35	.312	0.38	0.35	.298	0.39	0.35	.239
Psycho-Social Indices	4.95	4.89	.259	4.95	4.89	.255	4.94	4.88	.261
Academic Discipline Index	5.40	5.28	.007	5.41	5.27	.007	5.41	5.26	.005
Training Commitment Index	4.35	4.29	.218	4.31	4.26	.439	4.31	4.26	.426
Academic Self-Confidence Index	4.87	4.82	.341	4.88	4.80	.211	4.88	4.78	.121
Emotional Stability Index	3.12	3.06	.030	3.13	3.05	.015	3.12	3.05	.024
Social Support Index	2.56	2.60	.397	2.55	2.63	.174	2.56	2.62	.261
Stress Index	1.81	1.84	.431	1.81	1.83	.590	1.81	1.84	.512
Depression Index	4.95	4.89	.259	4.95	4.89	.255	4.94	4.88	.261
Income (%)			.571			.589			.388
Less than $15,000	56.8	55.1		53.9	51.7		56.7	53.1	
$15,000-$29,999	26.6	25.5		27.6	26.5		26.8	26.2	
$30,000 or More	16.6	19.4		18.5	21.8		16.6	20.7	
Mean	15,783	16,966	.289	16,750	18,056	.316	15,694	17,584	.135
Public Assistance/Hardship Past 12 Months (%)									
Received WIC or SNAP	68.8	62.8	.057	67.2	62.9	.231	68.7	63.8	.176
Received Public Assistance or Welfare	14.6	14.2	.878	13.6	14.2	.801	14.1	14.6	.869
Reported Financial Hardship	62.4	63.1	.825	59.3	62.5	.381	63.0	63.2	.959
Current Work Hours (%)			.674			.535			.452
0	61.7	62.7		58.9	62.5		60.1	63.9	
1 to 19	6.0	4.2		6.2	4.2		6.1	4.2	
20 to 34	12.8	13.8		12.7	13.2		12.3	13.3	
35 or more	19.6	19.3		22.3	20.0		21.5	18.6	

WTA Connect Baseline Characteristics									
	All Participants			Survey Respondents, Unweighted			Survey Respondents, Weighted		
	Treatment	Control	p-value	Treatment	Control	p-value	Treatment	Control	p-value
Expected Work Hours in Next Few Months (%)			.394			.257			.388
0	20.1	24.6		20.4	26.6		20.8	26.6	
1 to 19	5.3	4.1		5.2	4.2		4.9	4.3	
20 to 34	29.0	26.8		27.4	23.6		26.8	25.1	
35 or more	45.7	44.5		47.1	45.6		47.5	44.0	
Life Challenges Index (averages in original units 1-5)	1.79	1.75	.355	1.74	1.70	.314	1.77	1.75	.690
Owns a Car (%)	62.0	56.4	.084	64.8	60.9	.267	63.6	56.6	.055
Has both Computer and Internet at Home (%)	49.6	51.6	.545	54.3	53.4	.825	49.4	52.3	.447
Ever arrested (%)	41.3	40.8	.870	38.7	37.3	.705	40.4	38.7	.648

SOURCE: Abt Associates calculations based on data from the PACE Basic Information Form (BIF), the PACE Self-Administered Questionnaire (SAQ), and response status to the PACE short-term follow-up survey.

NOTES: SAS/SURVEYFREQ used to test for significant imbalances for categorical variables. SAS/TTEST was used to significant imbalances for other variables.

Exhibit C-4. Comparison of Selected Impact Estimates for the Unweighted and Weighted Survey Samples

Outcome	Full Sample	Survey Respondents	
		Unweighted Est (StdErr)	Weighted Est (StdErr)
NSC-Reported Educational Progress through 15 months			
Number of months with any enrollment	0.227(0.186)	0.339*(0.214)	0.284*(0.211)
Number of months of full-time enrollment	-0.040(0.108)	-0.009(0.120)	-0.042(0.122)
Any enrollment	0.0558**(0.0251)	0.0756***(0.0282)	0.0756***(0.0280)
Any credentials	0.00426*(0.00301)	0.00543*(0.00384)	0.00445*(0.00314)
Confirmatory Outcome (Survey)			
Received a Credential (proportion)		0.0427*(0.0277)	0.0430*(0.0276)
Secondary Education Outcomes (Survey)			
Total Hours of Occupational Training at (average)			
A College		11.7(11.6)	8.8(11.2)
Another Place		2.10(6.61)	3.35(7.01)
Any Place		13.7(13.3)	12.0(13.2)
Received a Credential from: (proportion)			
A College		0.0187(0.0187)	0.0171(0.0182)
Another Education/Training Institution		-0.0305(0.0134)	-0.0278(0.0135)
A Licensing/Certification Body		0.0474**(0.0249)	0.0487**(0.0250)
Other Secondary Outcomes (Survey)			
Indices of Self-Assessed Career Progress (average)			
Perceived Career Progress[a]		0.0720(0.0604)	0.0592(0.0612)
Confidence in Career Knowledge[b]		-0.0122(0.0453)	-0.0086(0.0453)
Access to Career Supports[c]		0.0004(0.0218)	0.0006(0.0223)
Indicators of Career Pathways Employment (proportion)			
Working in a Job Paying $12/Hour or More[d]			
Working in a Job Requiring at Least Mid-Level Skills		0.0029(0.0295)	0.0012(0.0295)
Sample Sizes		*743*	*743*

SOURCE: Abt Associates calculations based on data from NSC and the PACE short-term follow-up survey.

NOTES: Standard errors on estimated impacts are shown in parentheses. Adjusted impact estimates and associated standard errors were prepared with the modified Koch's estimator, as defined equations (A.4) and (A.5). Statistical significance levels, based on one-tailed t-tests tests of differences between research groups, are summarized as follows: *** statistically significant at the one percent level; ** at the five percent level; * at the ten percent level.

[a] Three-item scale tapping self-assessed career progress; response categories range from 1=strongly disagree to 4=strongly agree.

[b] Seven-item scale tapping self-assessed career knowledge; response categories range from 1=strongly disagree to 4=strongly agree.

[c] Seven-item scale tapping self-assessed access to career supports; response categories range from 1=no to 2=yes.

[d] Assessed wage distributions for employed control members to establish this cut-point at approximately the 60th percentile of wages.

Appendix D: Treatment of Outliers

The team took a conservative approach to outliers, retaining extreme values except where they were clearly impossible. This approach is based on the general difficulty of discriminating between errors and legitimate large values and the fact that remedies require assumptions about true values that may not be correct.

Trimming observations could easily introduce non-ignorable nonresponse by making nonresponse a function of Y, the outcome in question. (Trimming by definition creates item nonresponse since the provided response is discarded. If trimming is a function of observed Y, as is standard, and if there is some relationship between observed Y and true Y, then item nonresponse becomes a function of true Y, which is known as "non-ignorable nonresponse." Since there is no known way to remove bias due to non-ignorable nonresponse, trimming is likely to create uncorrectable biases in estimated treatment effects.)

Winsorizing observations (also known as top-coding, where values above a threshold are set equal to the threshold) could introduce bias if there is a treatment impact but the same threshold is used for treatment and control group members (and there is no reasonable basis for setting different thresholds for the two groups).

Furthermore, evidence suggests that results are generally robust to extreme values. In particular, research by Judkins and Porter (1996) and Lumley et al. (2002) indicate that, for the sample sizes available in this evaluation, OLS (ordinary least squares) inference on the reported data should be robust to outliers.

Outcomes assessed for extreme values included instructional hours (by type of instruction) and credits. The research team found no values that were clearly impossible and thus retained all reported values in the analysis.