Health Insurance and Human Capital: Evidence from the Affordable Care Act's Dependent Coverage Mandate

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Abstract Prior to 2010, young adults between the ages of 18 and 34 had the highest rates of uninsurance in America. The "Dependent Care Provision" of the Affordable Care Act sought to increase insurance rates among young adults by allowing them to stay on their parents' policy until age 26. We examine the human capital decisions young adults make once they have an option for health insurance outside of employer-sponsored health insurance. Using the American Community Survey from 2001 to 2016 and a difference-in-differences research design, we found that the implementation of the mandate was associated with a 3–5 percent increase in college enrollment among women 23–25 years of age. This result is robust to a variety of specifications. We did not find a consistent effect among men. Our results suggest that increased flexibility in health insurance markets has implications for human capital investment.

Keywords Affordable Care Act, health insurance, dependent coverage, human capital, education

Prior to enactment of the Affordable Care Act (ACA) in March 2010, young adults between the ages of 18 and 34 had the highest rates of uninsurance in America (DeNavas-Walt, Proctor, and Smith 2011; Levy 2007). The "Dependent Care Provision" of the ACA was one of the earliest implemented provisions of the ACA, and it sought to increase insurance rates among young adults by requiring insurers to offer dependent coverage policies that allowed parents to enroll their children until their 26th birthday (P.L. 111-48, §2714). Following its implementation, the uninsured rate among those 19–25 years of age dropped from 31.4 percent in 2009 to 27.7 percent in 2011 (DeNavas-Walt, Proctor, and Smith 2011, 2012).

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Studies have since examined the extent to which this relationship is causal and whether this mandate has affected other aspects of the lives of young adults, including their health care use, their physical and mental well-being, their financial security, and their labor supply.

Our study builds on this literature to examine the human capital decisions young adults make once they have an option for high-quality, low-cost health insurance in addition to the traditional employer-sponsored health insurance option. Using a panel of data from the American Community Survey (ACS) from 2001 to 2016, we found robust evidence that the ACA increased college enrollment among women 23–25 years of age by 3–5 percent. We did not observe a robust effect for men.

We conclude that the impact of the ACA's dependent coverage mandate may extend beyond the realm of health insurance coverage and include increases in human capital investment, and these findings have several implications for policy makers. The first is that publicly provided health insurance can lead to human capital gains for women, a benefit currently not counted when debating the ACA. Second, in addition to the short-run benefits of health insurance coverage to an individual's finances, mental health, and physical well-being, additional investments in human capital have lifelong returns for both economic well-being and intergenerational mobility.

Background and Context

The ACA Dependent Coverage Mandate

Prior to 2010, uninsured Americans were disproportionately between the ages of 18 and 34. In 2009, the uninsured rate was 31.4 percent for those between 19 and 25 years old, compared to 21.0 percent for those 35–44 (DeNavas-Walt, Proctor, and Smith 2011). This high level of uninsurance stemmed largely from the fact that young adults at these ages are often just beginning to transition into the labor force (Levy 2007). The jobs available to them may be entry level or part-time jobs, and their employer may be a small business. Thus, employer-sponsored health insurance may not be offered to new entrants to the labor force. The categorical exclusion of young adults from public health insurance plans compounds this problem, as many children covered under Medicaid and the Children's Health Insurance Program lose access at age 19 (Anderson, Dobkin, and Gross 2012, 2014; Levine, McKnight, and Heep 2011). Furthermore, young adults became ineligible for dependent coverage on parental health insurance plans when they turned 19, or age 24 if they were full-time students (Anderson, Dobkin, and Gross 2012, 2014).

Beginning in the mid-1990s, several states began experimenting with dependent coverage mandates to address the high uninsurance rate without requiring a large increase in public spending. By 2010, over thirty states had implemented some form of the dependent coverage mandate (Akosa Antwi, Moriya, and Simon 2013; Dillender 2014; Monheit et al. 2011; Levine, McKnight, and Heep 2011; National Conference of State Legislatures 2016). However, these mandates suffered from several limitations. First, they often imposed restrictions based on age or status, including whether one was married, a full-time student, or formerly uninsured or maintained state residency (National Conference of State Legislatures 2016). Second, Internal Revenue Service regulations required that individuals report insurance provided to older dependents as taxable income, removing the favorable tax treatment of health insurance contributions for these policies (IRS 2010a, 2010b). Third, the Employee Retirement Income and Security Act of 1974 exempts self-insured plans from state mandates (29 U.S.C. 1001, 1144(a)). With approximately 57 percent of private-sector beneficiaries enrolled in self-insured plans in 2010, this effectively limited the mandated coverage to less than half of the potential beneficiaries (Akosa Antwi, Moriya, and Simon 2013).

Passed in March 2010, the ACA expanded these state mandates and made them universally available. The ACA requires that insurers offering dependent coverage policies allow older children to remain enrolled until their 26th birthday, effective on the next plan renewal date after September 22, 2010 (P.L. 111-48, §2714). The ACA mandate overcomes several of the prior limitations. First, the mandate applies regardless of marital or student status or whether individuals reside with parents, are considered dependent for tax purposes, or have children of their own. Second, the ACA excludes the value of insurance coverage for older dependent children from the employee's income, providing tax benefits through the end of the taxable year in which they turn 26. Finally, the expanded benefit applies to a broad set of health insurance plans, including retiree and self-insured health plans.

In addition to these policy advantages, there are additional reasons to predict a large and early insurance enrollment response to the ACA's dependent coverage mandate. While the law allowed insurers to wait until the start of the next plan year to begin covering this new group of young adults, many insurers agreed to implement the requirement between May and September 2010. This would avoid the administrative costs associated with disenrolling young adults at the end of the academic year and reenrolling them in September (Center for Consumer Information and Insurance Oversight 2013). The law did require insurers to send beneficiaries written notification of a special open enrollment period during which newly eligible children could be added to their policies (Akosa Antwi, Moriya, and Simon 2013). News coverage also aided the policy's visibility, in addition to public documentation on various federal websites. Lastly, for parents already covered by full-family health insurance policies, the marginal cost of adding an older child is often close to zero (Akosa Antwi, Moriya, and Simon 2013). However, the mandate was not immediately universal in 2010, as the law allowed certain grandfathered plans to refuse coverage until 2014.[1]

Previous Work

Our study is one of several examining the effects of dependent coverage mandates on the lives of young adults. One set of studies examined the primary policy outcome of the mandate: health insurance coverage. Researchers have consistently found increases in the number of young adults with any health insurance, private health insurance, or dependent coverage, as well as reductions in the uninsured rate and increased rates of coverage for those seeking emergency care or care at hospitals (Levine, McKnight, and Heep 2011; Monheit et al. 2011; Sommers and Kronick 2012; Cantor et al. 2012; Mulcahy et al. 2013; Akosa Antwi, Moriya, and Simon 2013, 2015; Sommers et al. 2013; O'Hara and Brault 2013; Barbaresco, Courtemanche, and Qi 2015).

Another set of studies examined secondary impacts of the mandate: health care utilization and health-related outcomes of young adults. These studies have shown an increased probability of having a primary care doctor, excellent self-assessed health, and decreased body mass index (Barbaresco, Courtemanche, and Qi 2015), as well as increased inpatient hospitalizations, particularly those related to mental illness (Akosa Antwi, Moriya, and Simon 2015), and increases in excellent self-reported health and mental health (Chua and Sommers 2014).

A third set of studies examined a broader set of outcomes, the category in which our study falls. So far, these studies have focused on both financial and labor supply effects of the dependent coverage mandates. They have

1. Even though approximately 56 percent of workers were covered by grandfathered plans (Claxton et al. 2012), Akosa Antwi, Moriya, and Simon (2013) found that insurance updates increased by 30 percent following the mandate.

found a reduction in out-of-pocket medical expenses (Chua and Sommers 2014) but conflicting evidence of changes in labor supply. Some studies have found reductions in the probability of working full-time or number of hours worked (Depew 2015; Akosa Antwi, Moriya, and Simon 2013), while others found no meaningful changes in labor market outcomes (Heim, Lurie, and Simon 2015; Leung and Mas, forthcoming) and no evidence of increased job mobility (Bailey and Chorniy 2016), changes in self-employment (Bailey 2013), or an effect of the ACA on retirement (Levy, Buchmueller, and Nikpay, forthcoming).

Our study builds on Dillender 2014, which examined the effect of state-level mandates on educational attainment, educational timing, and wages. Using data from the Census and ACS, Dillender employed a difference-in-differences strategy, comparing the change in outcomes for young adult cohorts affected by the reforms to nonaffected cohorts, in states that implemented the mandates relative versus those that did not. He found evidence that extending health insurance to young adults through dependent coverage mandates raised their wages and that this effect varied by gender. Young women experienced persistent wage increases of about 3.1 percent, while young men experienced a persistent wage increase of about 1.6 percent. Dillender (2014) attributed the increase for men almost entirely to the average increase of education of about 0.17 years. However, small and statistically insignificant increases in education for women did not explain much of the wage increase.

In contrast to Dillender 2014, this study evaluates the implementation of a national mandate rather than the individual state mandates enacted at different times. As stated previously, this national mandate affects all young adults 26 and under regardless of status, benefits from favorable tax treatment of health insurance contributions, and covers a greater number of health insurance policies. Further, our panel of data extends to 2016, a period six years after the ACA national mandate. In contrast, the Dillender 2014 panel stops in 2011, when our postperiod begins. We view this study as building on and extending the current literature to examine how expanding the health insurance options available to young adults affects human capital investment decisions.

Health Insurance and Human Capital Investment

Following insights from Becker 1993, we assumed that human capital investments are rational responses to expected costs and benefits. Therefore, we predicted that increased flexibility in the health insurance market caused by the ACA dependent coverage mandate may in turn affect young adults' human capital investment decisions through two main pathways: a price effect and an income effect.

First, we expected that extending dependent coverage to young adults may increase their flexibility to invest in human capital by providing an additional channel to gain health insurance. Prior to the ACA mandate, attending school at a later age often meant forgoing employer-sponsored health insurance. Because such insurance is usually of higher quality and lower cost than the insurance options available on the individual market (Currie and Madrian 1999), the opportunity cost of attending school is higher than simply forgone wages. Additionally, many colleges require students to maintain health insurance while enrolled, which raises the cost of college for young adults (Dillender 2014). By giving young adults another pathway to relatively cheap, high-quality health insurance, the ACA dependent coverage mandate effectively reduces both the real price and opportunity cost for attending school. This lower cost induces young adults at the margin to increase their human capital investment by enrolling in school.

Second, we expected that extending dependent coverage to young adults may improve the financial resources of young adults and their households through an income effect. For those without insurance, employer-sponsored health insurance is often cheaper than the plans available for purchase on the individual market, and for those who have parents with insurance, being added as a dependent on a parent's employer-sponsored plan is usually cheaper than purchasing coverage through the dependent's employer or the individual market. If parents are already covering a dependent through their employer-sponsored health insurance, such as a spouse or another child, the marginal cost associated with adding another child as a dependent is often zero (Akosa Antwi, Moriya, and Simon 2013). Additionally, as mentioned above, employer-sponsored health insurance is often of higher quality compared to plans on the individual market. By offering fuller, more complete insurance coverage, these plans may be better at sheltering individuals from the financial risk associated with unexpected health shocks (Gross and Notowidigdo 2011; Dave et al. 2015; Finkelstein et al. 2012). Therefore, whether it is through reduced cost or better coverage, the ACA dependent coverage mandate may put young adults and their households in better financial positions. Through this income effect, the ACA mandate may make young adults wealthier, increasing their willingness to give up work to invest in their education (Dahl and Lochner 2012; Lovenheim 2011; Michelmore 2013). This effect will be particularly large for young adults who, in the absence of the ACA mandate, would be uninsured but may still be present for those who now switch from their own insurance to dependent coverage.

We also predicted that the effect of the ACA dependent coverage mandate on human capital investment may differ by gender. Prior to the ACA, insurance companies could charge women higher health insurance premiums than men of the same age, because they often require health care services that men do not, such as regular gynecological visits and maternity care. The ACA eliminated this practice in 2014 (Kaiser Family Foundation 2012), but it was still legal throughout most of our study period, which ended in 2016. Young women 19–25 years of age have also been shown to use more health care services than men: in 2011, the Centers for Disease Control and Prevention found that 81.3 percent of young adult women had had a doctor visit in the past twelve months, compared to 58.5 percent of young men (Kirzinger, Cohen, and Gindi 2012). Therefore, access to employer-sponsored dependent health insurance may be both more affordable and more valuable to young women than to young men. If true, then the ACA dependent coverage mandate may reduce the opportunity cost of attending school full-time more for young woman than for young men.

Research Design

Data

Our primary data source for this project is the American Community Survey (ACS), a nationally representative sample of approximately 295,000 US households surveyed each month by the Census Bureau, with data reported annually. We selected all respondents aged 23–25 and 27–29[2] from the 2001–16 annual ACS data files.[3] Because we were interested in college enrollment, we removed all respondents who had already completed college. Our analytic sample consisted of 1,953,967 observations, of which 914,177 are female and 1,037,790 are male.

2. As we explain below, most of our models do not include 26-year-olds because we cannot determine if they were ineligible for the dependent coverage during the year and, when ineligible, for what proportion of the year. In the "Robustness Checks" section we include some results with 26-year-olds.

3. Between 2001 and 2004, the ACS was a pilot study involving nearly 1,240 counties in the United States. The ACS was fully implemented in 2005, at which point all US counties were surveyed. The Census Bureau concluded that the pilot data matched the long form of the Census well (see Census Bureau 2006). We have included data from 2001 to 2016, but in the "Robustness Checks" section we also provide estimates using the 2005–16 window (see table 4F) and show that results from the period are nearly identical.

To answer our research questions effectively, we needed data that met two criteria. First, since the policy went into effect in late 2010, we required a sufficient period before and after 2010 to estimate the trend in college enrollment prior to the policy's implementation and to allow time for a behavioral response to the policy change. Second, we needed to identify young adults by age and year and to have recorded data on their college enrollment. The ACS was well suited for our analyses: it provided a large sample of individuals between the ages of 23 and 29 for each year, and by using the ACS, we could begin our time series in 2001, several years before the ACA's dependent coverage provision went into effect. Furthermore, we had six years post-ACA implementation to observe a post-effect, which allowed us to assess the pre- and post-trend assumptions required by the difference-in-differences empirical strategy. The ACS also contained annual data on college enrollment. Specifically, respondents were asked if they were enrolled in college, conditional on reporting that they were currently in school.

We used several control variables asked annually in the ACS. We had data on each respondent's age and used this information to create groups subject to the policy intervention (the "treatment group") and those who were ineligible due to their age (the "control group"). We also included indicators for several race/ethnicity categories: non-Hispanic, white; non-Hispanic, African American; Hispanic; non-Hispanic, Native American; non-Hispanic Asian/Pacific Islander; and non-Hispanic, other, which includes those who do not report a race and those who report multiple races. In addition, we used an indicator variable for female and for those who were married. We had information on the educational attainment of the respondents and created indicators for those who completed less than high school, high school, and some college. In addition to the indicator variables, we controlled for the annual state unemployment rate to capture variation in the aggregate economic conditions.

Table 1 reports the descriptive statistics for our sample, showing statistics for the full sample (23–25 and 27–29 years old), the treatment group (23–25 years old), and the control group (27–29 years old). Following the suggestions of Slusky (2017), we used several bandwidths in our robustness checks. In one of these tests, we include 26-year-olds in the control group, which we argue is a conservative check. For the sake of completeness, we include descriptive statistics for this potential control group in the last two columns. Clearly, college enrollment increased for both groups during the 2001–16 period. In several dimensions, our treatment and control groups look similar. Their racial and ethnic composition and

Table 1 Descriptive Statistics for ACS Sample

Characteristic	Pooled: 23–25 and 27–29 Years Old, 2001–16	Group: 23–25 Years Old, 2001–10	Group: 23–25 Years Old, 2011–16	Group: 27–29 Years Old, 2001–10	Group: 27–29 Years Old, 2011–16	Group: 26–29 Years Old, 2001–10	Group: 26–29 Years Old, 2011–16
N	1,953,967	548,773	467,255	514,218	423,721	688,143	567,867
College enrollment	0.161	0.200	0.221	0.105	0.118	0.113	0.125
Age (years)	25.89 (2.16)	23.99 (0.822)	23.99 (0.825)	27.98 (0.815)	27.98 (0.815)	27.48 (1.12)	27.47
Race/ethnicity							
Non-Hispanic, White	0.543	0.563	0.514	0.555	0.521	0.555	0.520
Non-Hispanic, African American	0.151	0.148	0.166	0.351	0.156	0.144	0.157
Hispanic	0.242	0.229	0.246	0.245	0.254	0.245	0.254
Non-Hispanic, Native American	0.009	0.008	0.009	0.008	0.009	0.008	0.009
Non-Hispanic, Asian/Pacific Islander	0.034	0.032	0.038	0.031	0.037	0.031	0.037
Non-Hispanic, Other	0.021	0.019	0.027	0.017	0.024	0.017	0.024
Female	0.467	0.466	0.460	0.474	0.466	0.474	0.465
Education							
Less than high school	0.173	0.184	0.133	0.197	0.158	0.195	0.156
High school	0.456	0.459	0.448	0.465	0.447	0.465	0.448
Some college	0.371	0.358	0.419	0.339	0.395	0.340	0.396
Married	0.327	0.281	0.189	0.456	0.351	0.437	0.331
State unemployment rate	6.42 (2.04)	6.17 (2.09)	6.80 (1.90)	6.19 (2.09)	6.81 (1.90)	6.18 (2.09)	6.81 (1.90)

Source: 2001–16 American Community Surveys (Ruggles et al. 2017)
Note: Data are proportion or mean (standard deviation).

the proportion of women are roughly the same, and both show a decline in the proportion of non-Hispanic whites over time. Educational attainment clearly increased throughout the period for both groups, while marriage declined. The data also show that unemployment rates were higher in 2011–16 than in 2001–9.

Empirical Methods

To identify the effect of expanding access to health insurance coverage on the human capital investment of young adults, ideally we would randomly assign eligibility for health insurance to two groups of young adults: one group that would be offered a new pathway to insurance coverage (i.e., the treatment group) and a second group (i.e., the control group) with the same options they had previously. After a period of observation, we would compare the college enrollment status among young adults in the two groups; the difference would represent the average treatment effect of the policy.

Because the ACA's dependent coverage provision was not randomly assigned to two groups of young adults but was a national mandate that went into effect for all young adults aged 26 and under at the same time, we followed Akosa Antwi, Moriya, and Simon (2013), Dillender (2014), and Barbaresco, Courtemanche, and Qi (2015) and used a differences-in-differences strategy to examine the causal effect of the ACA's dependent coverage provision on young adults' human capital investment decisions. By comparing young adults on either side of the age cutoff for the mandate, we can separately identify the impact of the ACA on the educational enrollment decisions of young adults from other potential changes. Because the mandate applies only to young adults 26 and under, we can compare the outcomes for a control group of slightly older individuals, 27–29 years old, to our treatment group, 23–25 years old. It is not clear whether the 26-year-olds should be included in the treatment group or control group since many are likely to reach 27 years of age during the year. Thus, in most of our models, we defined the treatment group as 23- to 25-year-olds; however, we included the 26-year-olds in the control group as a robustness check following the recommendation of Slusky (2017).

In its basic form, our approach was to estimate the following differences-in-differences model:

$$Y_{igst} = \alpha \mathrm{Treat}_g + \gamma \mathrm{Implement}_t + [\beta(\mathrm{Treat})_g \times \mathrm{Implement}_t] + \theta_s + \eta_t + \pi_{st} + \boldsymbol{\delta}\mathbf{X}_{igst} + \varepsilon_{igst},$$

where Y_{igst} represents college enrollment for individual i in age range g, in state s, and at time t. $Treat_g$ represents a dummy variable for being in the 23–25 age range (relative to those 27–29) and $Implement_t$ represents a dummy for the post-ACA enactment period. Because we had annual data and the ACA dependent care provision was implemented in September 2010, we classified the postperiod as 2011 and later. We estimated all models using ordinary least squares (i.e., we used a linear probability model), although we also report results for this specification using a probit model as a robustness check. The interaction of $Treat_g$ and $Implement_t$ captures the average differential impact for the treatment group in the postperiod. Thus, in this model, β represents our parameter of interest. The coefficient, α, is the mean difference in college enrollment for those in the treatment group relative to the control group in the pre-period, all else being equal. The coefficient, γ, represents the mean difference in college enrollment for the control in the post-period relative to those in the pre-period, all else being equal. The vector, δ, includes all coefficients for the control variables, including the intercept, and ε is a random error term. For the outcome college enrollment, if the estimated value of β is statistically significant and positive, we can conclude that allowing young adults aged 23–25 to obtain dependent coverage through their parents' health insurance plans increases their probability of enrollment relative to 27- to 29-year-olds on average.

The X_{igst} vector includes indicators for age, gender, race and ethnicity, marital status, and some college (more than twelve years but less than sixteen years) completed. Further, we interacted the "some college completed" indicator with a linear time trend to capture differences in college attending over time. Our models also included the annual state unemployment rate: θ_s represents state fixed effects, η_t represents year effects, and π_{st} is a state × year fixed effect. Following the recommendation of Cameron and Miller (2015) and the practice of Barbaresco, Courtemanche, and Qi (2015) and Slusky (2017), we clustered standard errors at the age level, generating six clusters in most of the models. For the linear probability models, we used a t-distribution with five degrees of freedom (the number of clusters − 1), again following the suggestions of Cameron and Miller (2015), to determine the p-value for all estimates. We also report results for the pooled sample and separately for females and males, given that Dillender (2014) found different results by sex.

The central assumption of the difference-in-differences approach is that any change in the difference in school enrollment between individuals 23–25 years old and individuals 27–29 years old should be attributed to the

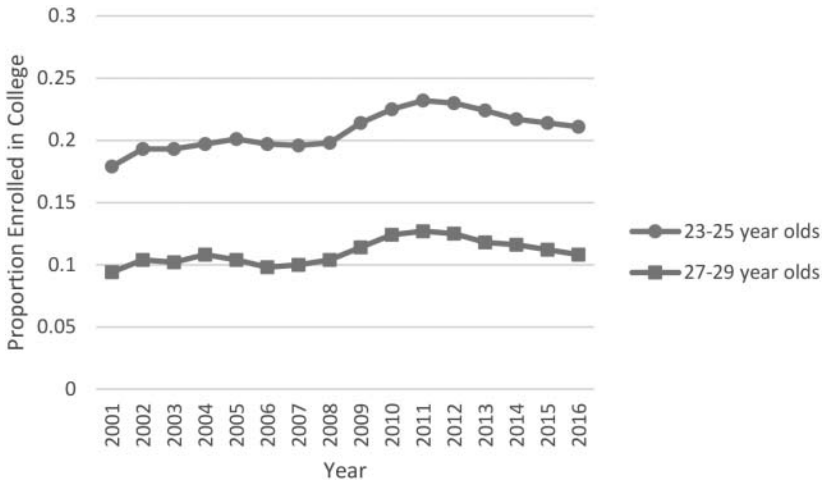

Figure 1 Trends in College Enrollment, 2001–16

ACA's dependent coverage mandate. Said differently, the trend in educational investment for the treatment group would have been identical to the control group in the absence of the policy change. If true, then looking at the "change in the changes" will result in an unbiased estimate of the impact of the ACA dependent coverage mandate on the human capital decision making of young adults.

One key limitation of all analyses using a difference-in-differences approach is that the common trends assumption is untestable, because there is no way to observe the counterfactual human capital investment for young adults 23–25 years old after the policy change. Figures 1–3 show the general trends in college enrollment for both groups between 2001 and 2016. While they appear to follow a similar trend in the preperiod, it is difficult to quantify any differences using these diagrams.

To more accurately address the possibility that our results were spurious and the result of a secular trend in education, we followed Barbaresco, Courtemanche, and Qi (2015) and Slusky (2017) and applied a variety of placebo tests. In these tests, we used the period prior to the ACA dependent care provision and assigned several different dates as the treatment period. If the changes we observed in treatment are part of a larger secular trend of rising disparities between 23- to 25-year-olds and 27- to 29-year-olds, then we should observe the differences in the pre-ACA period as well.

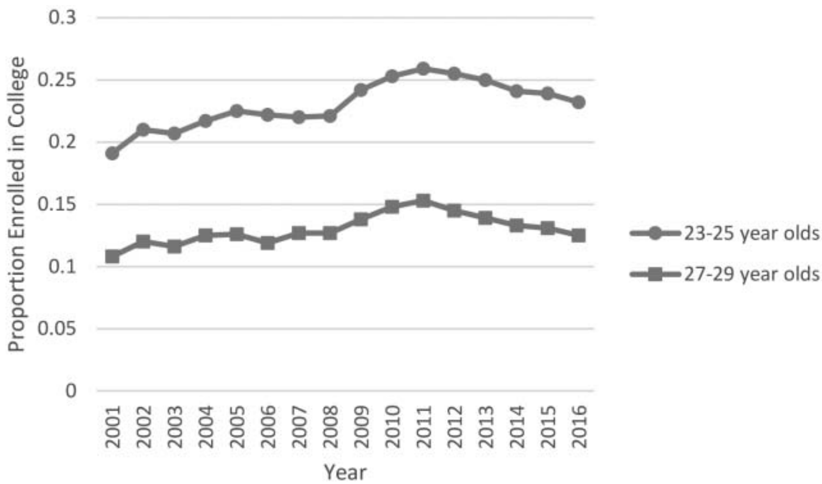

Figure 2 Trends in College Enrollment for Females, 2001–16

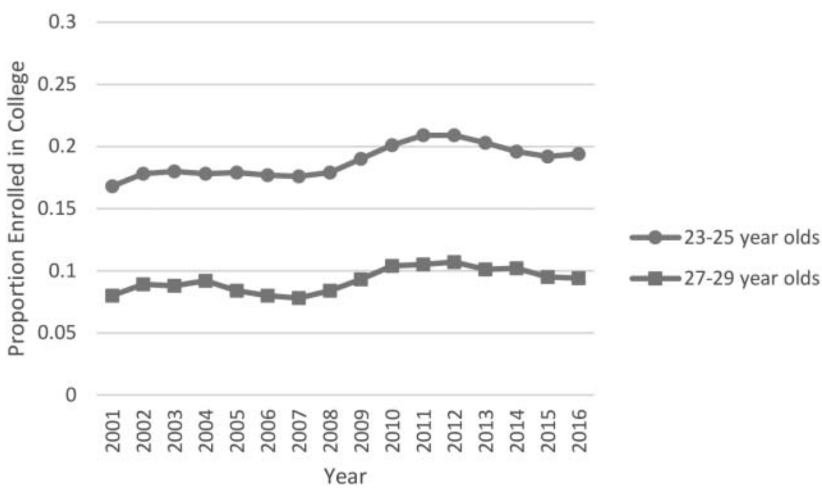

Figure 3 Trends in College Enrollment for Males, 2001–16

Table 2 Difference-in-Differences Models for College Enrollment, 2001–16

		Group	
Post-period 2011–16	Pooled	Female	Male
DD	0.0085*	0.0112*	0.0057*
Standard error	(0.0028)	(0.0041)	(0.0017)
p-Value	0.0272	0.0405	0.0190
N	1,953,967	914,177	1,039,790

Notes: DD, difference-in-differences. Robust standard errors clustered at age level: there are six clusters. For models removing the 26-year-olds, there are also six clusters. Control variables include race/ethnicity, female, state unemployment rate, educational attainment, marriage, an interaction between education indicators and time trend, state fixed effects, year fixed effects, and state × year fixed effects.

*$p < 0.05$

Results

Enrollment

Table 2 reports findings for college enrollment. The first column suggests that 23- to 25-year-olds following the ACA implementation in 2010 were about 0.85 percentage points more likely to enroll in college than the difference observed for 27- to 29-year-olds. Given that around 20 percent of 23- to 25-year-olds were enrolled in college between 2001 and 2010, this is about a 4 percent increase in the likelihood of attendance. For females, the point estimate is 1.12 percentage points. College enrollment rates for females aged 23–25 from 2001 to 2010 was 0.221; thus, this point estimate represents a 5 percent increase. For males, the difference-in-differences is about 0.57 percentage points or about a 3 percent increase (base rate = 18.1 percent). All estimates are statistically significant.

Placebo Tests

We ran several placebo tests similar to those run by Barbaresco, Courtemanche, and Qi (2015) and Slusky (2017). In these tests, we restricted the time period to 2001–9, the period before the ACA was implemented. In table 3, the "treatment period" is defined as 2006–9, 2007–9, and 2008–9. Again, our intention was to determine if there were secular trends in college enrollment that predate the ACA. We did not want to associate differences we observe post-ACA to these secular trends.

The results from the placebo tests are consistent across different treatment periods. We did not observe any statistically significant differences

Table 3 Placebo Tests for College Enrollment, 2001–9

		Group	
Model	Pooled	Female	Male
A: Treatment Period = 2006–9			
DD	0.0001	0.0011	–0.0010
Standard error	(0.0022)	(0.0017)	(0.0033)
p-Value	0.9590	0.5267	0.7723
N	915,954	437,975	477,979
B: Treatment Period = 2007–9			
DD	–0.0016	–0.0016	–0.0018
Standard error	(0.0030)	(0.0032)	(0.0040)
p-Value	0.6186	0.6453	0.6701
N	915,954	437,975	477,979
C: Treatment Period = 2008–9			
DD	0.0001	0.0022	–0.0017
Standard error	(0.0031)	(0.0037)	(0.0035)
p-Value	0.9691	0.5733	0.6321
N	915,954	437,975	477,979

Notes: DD, difference-in-differences. Robust standard errors clustered at age level. Control variables include race/ethnicity, female, state unemployment rate, educational attainment, marriage, an interaction between education indicators and time trend, state fixed effects, year fixed effects, and state × year fixed effects.

for the 23- to 25-year-olds compared to the 27- to 29-year-olds. Furthermore, the point estimates are trivial in size for both the females and the males regardless of the treatment period chosen, and often negative.

Robustness Checks

Table 4 presents data for several robustness checks. Again, following the recommendation of Slusky (2017), we defined different age bandwidths to determine the robustness of our result. Table 4A duplicates our primary model result for comparison.

In table 4B, we added 26-year-olds to the control group. This is a conservative estimate because some of the 26-year-olds were likely eligible for insurance coverage for at least part of the year. At the same time, adding an additional age to the analysis increased the sample size and increased the number of standard error clusters from six to seven. Given the small number of clusters, simply including one more age group will reduce the *p*-value, holding constant the coefficient estimate and the standard errors. The results in table 4B show point estimates similar to but larger than those in table 4A. The standard errors remain the same size, but the *p*-values

Table 4 Robustness Checks for College Enrollment, 2001–16

		Group	
Model	Pooled	Female	Male
A: Post-period, 2011–16			
DD	0.0085*	0.0112*	0.0057*
Standard error	(0.0028)	(0.0041)	(0.0017)
p-Value	0.0272	0.0405	0.0190
N	1,953,967	914,177	1,039,790
B: Post-period, 2011–16, including 26-year-olds in control			
DD	0.0088*	0.0115*	0.0061*
Standard error	(0.0028)	(0.0041)	(0.0017)
p-Value	0.0191	0.0300	0.0124
N	2,272,038	1,063,783	1,208,255
C: Post-period, 2011–16, removing 29-year-olds from control			
DD	0.0087*	0.0113	0.0060*
Standard error	(0.0029)	(0.0043)	(0.0018)
p-Value	0.0400	0.0581	0.0303
N	1,645,862	768,184	877,678
D: Post-period, 2011–16, removing 28- and 29-year-olds from control			
DD	0.0087	0.0121	0.0054
Standard error	(0.0032)	(0.0047)	(0.0018)
p-Value	0.0731	0.0807	0.0585
N	1,331,659	619,750	711,909
E: "Treatment group" 23- to 25-year-olds who had private health insurance			
DD	0.0054	0.0100	0.0016
Standard error	(0.0057)	(0.0065)	(0.0071)
p-Value	0.3865	0.1865	0.8350
N	1,953,967	914,177	1,039,790
F: Panel restricted to 2005–16			
DD	0.0080*	0.0101	0.0057*
Standard error	(0.0027)	(0.0041)	(0.0021)
p-Value	0.0330	0.0570	0.0388
N	1,737,501	807,049	930,452
G: Probit model			
DD	0.0036*	0.0071*	–0.0002
Standard error	(0.0015)	(0.0026)	(0.0007)
p-Value	0.045	0.040	0.741
N	1,953,967	914,177	1,039,790

Notes: DD, difference-in-differences. Robust standard errors clustered at age level. The results in B include seven clusters; the other models have six clusters. Control variables include race/ethnicity, female, state unemployment rate, educational attainment, marriage, an interaction between education indicators and time trend, state fixed effects, year fixed effects, and state × year fixed effects. A marginal effect for probit is reported; *p*-values for the probit are approximations using a *t*-distribution with five degrees of freedom.

*$p < 0.05$

decline noticeably. As mentioned, this likely is a function of using a t-distribution with an additional degree of freedom relative to the model reported in table 4A.

In table 4C, we removed the 29-year-olds from the control group. Because they are much older than the treated group, removing them should reduce the heterogeneity between the treatment and control groups. The college enrollment rate for 29-year-olds between 2001 and 2010 was about 9.6 percent, compared to 11.5 percent for 27- and 28-year-olds. Again, we observed little difference in the coefficient estimates or standard errors relative to table 4A, but the p-values increased, again, a likely function of the different t-distribution. The coefficient for the pooled sample and the male sample remained statistically significant with $\alpha = 0.05$. The p-value for the coefficient estimate for females is 0.0581.

In table 4D, we used only 27-year-olds as the comparison group, which should reduce the heterogeneity between the treatment and control group even more than in table 4C. Again, we observed similar point estimates for the pooled group: the coefficient for the females rose slightly relative to table 4A, while the coefficient for males fell slightly. The standard errors did not change appreciably. The p-values all fall between 0.05 and 0.09.

In table 4E, we redefined the treatment as individuals aged 23–25 who had private health insurance. We recognize that having private health insurance through one's parents may be endogenous to the college enrollment decision, a concern mentioned by Akosa Antwi, Moriya, and Simon (2013) as well. Furthermore, the ACS does not report the source of the private insurance, which means we cannot be sure that these children were receiving coverage through their parents. Despite these limitations, we ran a difference-in-differences model in which we refined the treatment to include 23- to 25-year-olds who had not completed college but who had private insurance in the postperiod. The control group included those 27–29 years old as well as those 23–25 who did not have private health insurance. Despite the concerns mentioned about this model, the point estimate for females is still around one percentage point. While the p-value is much higher than conventional levels, the result is still consistent with earlier findings. On the other hand, the result for males is substantially different from earlier models: trivial in size and statistically insignificant.

In table 4F, we restricted the sample period to fall between 2005 and 2016. Before 2005, the ACS was in a pilot phase, and some US counties were not sampled. Results for both males and females from this panel are roughly consistent with those reported in table 4A, but the p-values are slightly larger, likely due to the loss of sample size.

Finally, table 4G reports the marginal effects from a probit model using the same time period, treatment group, and control group as table 4A. The point estimate for the female sample is smaller than in table 4A, about 0.7 percentage points or about a 3 percent increase in college enrollment, but the estimate is statistically significant. Unlike the coefficients for the females, however, the coefficient for the males is small and insignificant using the probit model.

Discussion

Based on our primary results and the extensive set of robustness checks, we have shown that the ACA's dependent coverage mandate likely affected the college enrollment decisions of 23- to 25-year-olds. This finding seems to be particularly salient for females; the finding was not robust for males. Our point estimates for females, depending on the model and treatment/control group definition, ranged between 0.7 and 1.2 percentage points, which is approximately a 3–5 percent increase over the baseline college enrollment rates among females between 2001 and 2010. This result is consistent with the finding of Akosa Antwi, Moriya, and Simon (2013), who showed about a 1.5 percentage point decrease in employment. Our results suggest that many of these young women who exited the labor force likely went back to school. This finding among females was consistent across a variety of age bandwidths. Further, we observed similar point estimates even when we defined our treated group as 23- to 25-year-olds with private health insurance, although this estimate was not statistically significant. At the same time, we cannot conclude that the dependent care mandate of the ACA had an effect on young men — our results were too inconsistent for this group.

Because we used a linear probability model for most of our analyses, one concern may be that the estimate for females is simply a function of the higher baseline enrollment rate for 23- to 25-year-olds compared to 27- to 29-year-olds. Our placebo tests and robustness checks suggest that this is probably not the case. First, we observed this difference-in-differences only for females, yet there is a similar disparity in college enrollment for males. Further, we did not observe any estimated effect in our placebo tests. If the result were purely a function of the baseline rates, it should surface in the placebo tests as well.

Our results have substantive implications for policy makers. The first is that the US reliance on employer-sponsored health insurance as the key vehicle for health insurance provision may be restricting investment in human capital. The evidence from the ACA dependent coverage mandate shows that as we decouple health insurance availability for young adults from their place of employment, college enrollment rises for women. This suggests that efforts to increase flexibility for individuals to obtain high-quality, low-cost health coverage may result in greater human capital investment, particularly for women. Conversely, fewer options or decreased flexibility in health insurance markets may reduce human capital investment.

Second, our results imply that the long-run benefits of health insurance expansions may be larger than expected. In addition to the short-run benefits of health insurance coverage to an individual's finances, mental health, and physical well-being, additional investments in human capital have lifelong returns. Autor, Katz, and Kearney (2008) provide evidence of persistently large returns to educational attainment, while Black and Devereux (2011) document the importance of education in increasing intergenerational mobility. Given that the ACA dependent coverage mandate appears to induce greater enrollment of nontraditional college students, policies that expand the availability of high-quality, low-cost health insurance may play an important, if unintentional, role in decreasing inequality and improving social welfare in later years.

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