EFFECTS OF WELFARE REFORM ON VOCATIONAL EDUCATION AND TRAINING

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<u>ABSTRACT</u>

Exploiting variation in welfare reform across states and over time and using relevant comparison groups, this study estimates the effects of welfare reform on an important source of human capital acquisition among women at risk for relying on welfare: vocational education and training. The results indicate that welfare reform reduced enrollment in full-time vocational education and had no significant effects on part-time vocational education or participation in other types of work-related courses, though there is considerable heterogeneity across states with respect to the strictness of educational policy and the strength of work incentives under welfare reform. In addition, we find heterogeneous effects by prior educational attainment. We find no evidence that the previously-observed negative effects of welfare reform on formal education (including college enrollment), which we replicated in this study, have been offset by increases in vocational education and training.

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Introduction

A major goal of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 was to move recipients off of cash assistance and into the labor force. The legislation imposes time limits on welfare receipt, expands work requirements for recipients, and allows states to impose stricter sanctions for non-compliance with work requirements and other rules. PRWORA's "work first" approach de-emphasizes education and training, representing a departure from previous approaches that encouraged human capital formation as a strategy for achieving self-sufficiency. Although minor mothers are required to attend high school or training in order to receive welfare and are not subject to time limits or work requirements if they are full-time students, PRWORA sharply restricts the extent to which adult recipients can count education and training as required work activities.

Few studies have investigated the effects of welfare reform on educational acquisition of adult women even though the vast majority of mothers on welfare are adults, education and training activities are common among adults beyond traditional ages for schooling, and PRWORA de-emphasized education for this group. Previous research using a quasi-experimental design has found that welfare reform decreased the probability of both high school and college enrollment among adult women. No previous research has investigated the effects of welfare reform on vocational education and training, defined broadly as educational training that provides practical experience in a particular occupational field, despite the importance of this type of education for women likely to be on welfare. In 1995, 23% of unmarried mothers in the U.S. age 25-54 with less than a college education participated in non-college work-related courses (authors' own calculations from the dataset used for this study).

Using the National Household Education Survey Adult Education Supplement from

multiple years before and after welfare reform, we exploit variation in welfare policy across states and over time and use relevant comparison groups to estimate effects of welfare reform on vocational education and training of adult women who are at risk for relying on welfare—those who are unmarried, have low education, and have dependent children. Limitations in counting education and training as authorized work activities may increase the cost of engaging in those activities for adult mothers on welfare and thereby decrease their participation in any educational activities, including vocational education and training. However, if work and education are complementary (e.g., if welfare reform increases access to vocational education or training through employers), welfare reform could increase this type of education. Finally, findings from previous research that welfare reform decreased the probability of college enrollment among adult women leave open the possibility that women affected by welfare reform substituted vocational education and training for formal higher education. Thus, the effects of welfare reform on this important type of human capital acquisition for women at risk for relying on welfare are an important gap in the welfare reform and education literature.

Background

The PRWORA legislation of 1996 ended entitlement to welfare benefits under Aid to Families with Dependent Children (AFDC) and replaced AFDC with Temporary Assistance for Needy Families (TANF) block grants to states. Among the features of TANF and many pre-PRWORA state waiver programs,[1] which together constitute "welfare reform," were time limits on the receipt of welfare benefits, work requirements as a condition of receiving welfare, and

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[1] Although welfare reform is often dated to the landmark 1996 PRWORA legislation, reforms actually started taking place in the early 1990s when the Clinton Administration greatly expanded the use and scope of "welfare waivers" to allow states to carry out experimental or pilot changes to their AFDC programs, with random assignment required for evaluation. Waivers were approved in 43 states, ranging from modest demonstration projects to broad-based statewide changes, and constituted the first phase of welfare reform. Many policies and features of state waivers were later incorporated into PRWORA.

sanctions for non-compliance with program rules. PRWORA also strengthened child support enforcement and made it easier for married and cohabiting couples to qualify for welfare benefits. These sweeping changes ushered in a new "work first" era that de-emphasized education for adult women. The PRWORA legislation granted considerable discretion to states in establishing welfare eligibility and program rules. As a result, there is substantial state policy variation within the broad national regime of time-limited cash assistance for which work is required.

In terms of reducing caseloads, welfare reform (including the pre-PRWORA waivers) has been successful; welfare rolls have declined by over 50% since their peak in 1994 and at least one-third of the caseload decline can be explained by welfare reform (see Grogger & Karoly 2005). At the same time, employment rates of low-skilled mothers rose dramatically (Ziliak 2006), and at least some of that increase was a result of welfare reform (Schoeni & Blank 2000). The effects on family structure are less dramatic. A large literature on the effects of welfare reform on marriage and a smaller one on cohabitation reveal mixed findings, and the literature on non-marital childbearing and female headship indicates slightly negative but inconsistent effects of welfare reform (Blank 2002, 2007; Moffitt 1992, 1995, 1998; Grogger & Karoly 2005; Gennetian & Knox 2003; Peters, Plotnick & Jeong 2003; Ratcliffe et al. 2002).

Welfare reform and education

Traditionally, mothers on AFDC were not required to work and were allowed to attend school if they so chose. The situation changed for some mothers under the Job Opportunities and Basic Skills Training (JOBS) program, which was created under the Family Support Act of 1988 and required states, to the extent resources allowed, to engage mothers with no children below age 3 in education, work, or training activities. However, many women were exempt from

participation in JOBS, and between 1992 (just prior to the first statewide AFDC waiver program) and 1996 (enactment of PRWORA) only 10% of all welfare recipients in the U.S. participated in JOBS programs.[2]

Major statewide AFDC waiver programs, first implemented in late 1992, substantially altered the nature of welfare by imposing time limits, significantly reducing participation exemptions, imposing sanctions, increasing earnings disregards, imposing family caps, and/or implementing work requirements. Compared to JOBS programs, statewide waivers were broad-based in that they applied to large proportions of welfare recipients. While states were required to provide many specifics of their programs in their waiver plans, they were not required to report policies vis-à-vis educational activities. Complicating the picture, states could change their policies without having to amend their waiver plans (U.S. Department of Health and Human Services 1997). The situation changed notably under TANF, which required states to file detailed program specifics (including educational policies) at the outset as well as any intended changes to those policies. That is, under TANF, the extent to which educational activities could count toward work requirements was more explicit. Because of the reporting issues under the waivers, it is difficult to compare educational policies under AFDC waivers and TANF, even in a given state. However, it is clear that under both AFDC waivers and TANF, work and other requirements gave women less flexibility in deciding how to spend their time and many welfare recipients could attend school or vocational training only after fulfilling work requirements.

The PRWORA legislation treats education and training programs very differently depending on whether the potential recipient is a teen or an adult. The "work first" approach is

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[2] Committee on Ways and Means, U.S. House of Representatives, "Overview of Entitlement Programs" for 1994 and 1998 (Green Books). Available at:
http://aspe.hhs.gov/94gb/sec10.txt and http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=105_green_book&docid=f:wm007_07.105.

targeted to adult mothers, for whom the legislation sharply restricts the extent to which education and training can count as required work activities. In particular, PRWORA limits the extent to which education or training can count toward federal work participation requirements, generally restricting the length of full-time education and training to 12 months and for no more than 30 percent of TANF participants (Martinson & Strawn 2003). In contrast, minor mothers are subject to the "human capital" approach, as they are required to attend high school or training (and to live with their parents or in another approved setting) in order to receive welfare and are not subject to time limits or work requirements if they are full-time students. Several studies using quasi-experimental designs have examined the effects of welfare reform on teen drop-out rates (Hao & Cherlin 2004; Kaestner, Korenman & O'Neill 2003; Offner 2005; Dave, Reichman and Corman 2008; Koball 2007). Overall, the available evidence suggests that welfare reform has had favorable effects on high school completion of teenage girls.

For adult women, the situation vis-à-vis welfare reform and education is very different than that for teens. By requiring work and imposing restrictions on education and training, welfare reform increased the costs of engaging in such activities for this group. However, it also potentially increased the benefits of education and training, since the five-year lifetime limit created greater incentives for women to become more engaged in the labor market. Thus, it is not clear a priori whether welfare reform would have been expected to decrease or increase adult women's investments in education and training.

As far as we know, only two previous studies used nationally representative data and quasi-experimental designs to investigate the effects of welfare reform on adult women's educational enrollment and those focused on formal education. The more comprehensive study, by Dave, Reichman and Corman (2008), used annual data from the October Education

Supplement of the Current Population Survey (CPS) from 1992 to 2001 to estimate the effects of welfare reform on high school and college enrollment of adult women using a difference-in-differences methodology. The primary focus was on college enrollment, because the number of women in the relevant sample attending high school was quite small. The target group for the analyses of college enrollment was women aged 24-49 who were unmarried, had less than a college degree, and had minor children in the household, while the comparison group was women in the same age range and with the same educational levels but who had no children. They found that welfare reform reduced college enrollment by about 20% The authors also examined the extent to which college enrollment varied by state TANF education and work incentive policies and found that the negative effects of welfare reform on college enrollment were stronger in strict states (those that did not allow post-secondary education to be considered a valid work-related activity and those with stricter work requirements) than in more lenient states. Finally, they found that women who worked 20 or more hours per week were far less likely than those who worked fewer hours to attend college.

In an earlier study, Jacobs and Winslow (2003) compared the probability of post-secondary education enrollment at 2 points in time: 1995 and 2000 (using March CPS data) and 1995 and 1999 (using the National Household Education Survey—NHES). The CPS analysis included information on state policies but restricted the analysis to women age 16 to 24 (thereby missing many adults who may be affected by welfare reform) and confounding the differential educational incentives for teens versus adults. The NHES analysis included women of all ages, but did not include state policy data. In the CPS analysis, they found that single mothers are less likely to go to college post-welfare reform, holding welfare receipt constant, and that adult women in states that allow education to count toward work requirements are more likely than

those in stricter states to attend college. In the NHES analysis, they found that single mothers are more likely to attend college after welfare reform but that welfare receipt negatively affects enrollment. A shortcoming of this study is that it takes snapshots at 2 points in time and attributes all changes to PRWORA. Also, using 1995 as the pre-reform comparison would provide biased estimates because welfare reform was well under way by then (19 states had already implemented major AFDC waivers).

Overall, both previous studies found that welfare reform decreased acquisition of post-secondary education among women at risk for relying on welfare, and that the stricter the policies, the more negative the effects. Both studies, in their conclusions, discuss the possibility that other types of human capital acquisition may be more desirable or cost/effective than college education for women at risk for relying on welfare and that this group may have substituted vocational education or training for formal education as a response to welfare reform. To date, no studies have examined this question. Given that the existing literature indicates that welfare reform has led to decreases in formal education among adult women, the next obvious question is whether less formal, vocationally-oriented education has also decreased or whether welfare reform led to a substitution of vocational education for formal education.

Vocational education and training

Vocational education and training activities are not uncommon among adult women. For example, 80% of females taking vocational courses in the U.S. in 2006 were age 25 years or older (U.S. Census Bureau 2008). Figures on vocational education for population subgroups, such as low-educated unmarried women (i.e., women at risk for relying on welfare) are not readily available, and presenting some relevant statistics in that regard is one of the contributions of this study. According to Leigh & Gill (1997), the returns to community college education

(both degree-granting and vocational programs) are about the same for returning adult students as for traditional-age students. Welfare recipients are more likely to attend two-year rather than four-year colleges, and those who do so are less likely than non-recipients to graduate (London 2006). However, each year of credit at a community college yields, on average, a 5 to 8% increase in annual earnings—a return similar to that from one year of a four-year college (review, Kane & Rouse 1999). Thus, it appears that there are positive returns to vocational education in a formal school setting. Several studies have also examined returns to less formal vocational training activities as a form of human capital acquisition and found that such training, even firm-specific training, imparts a positive effect on wages (Veum 1999; Loewenstein & Spletzer 1999; Marcotte 2005). Frazis, Gittleman, and Joyce (2000) found a strong positive association between formal educational attainment and employer-provided or employer-financed training, and Marcotte (2005) suggests that complementarities between the two types of education have been growing over time. To the extent that complementarities exist between vocational training and formal education for women at risk for relying on welfare, we would expect that welfare reform had a negative impact on vocational education and training. To the extent that complementarities exist between work and access to work-related training, we would expect that higher employment rates among at-risk women due to welfare reform would have a positive impact on vocational education and training.

Data

We use data from the National Household Education Survey (NHES), which collects information about the educational activities of the U.S. population. Specifically, we use the Adult Education Supplements administered in 1991, 1995, 1999, 2001, 2003, and 2005, which span the period enveloping welfare reform, to estimate the effects of the welfare reform on

vocational education. We define any vocational education as having participated in a full-time vocational education program, part-time vocational education program, or other work-related courses. Full-time vocational education includes full-time activity toward a diploma or certificate from a vocational or technical school after high school or a formal vocational training program. It excludes those enrolled in any degree-granting program. It includes full-time community college enrollment if the individual is in the process of obtaining a certificate or diploma but not a degree. Our measure of part-time vocational education corresponds to the measure of full-time vocational education but pertains to part-time enrollment. Our measure of other work-related courses pertains to courses that are vocationally oriented but not part of a degree or vocational program. These are usually part-time and short-term, and include activities such as courses taken at one's job, courses taken anywhere else that relate to one's job or new career, or courses taken for a license or certification for one's job.

In our main analyses, we estimate models for participation in full time vocational education, part time vocational education, and other work-related courses, as defined above; a composite of those three, which we call "any vocational education;" and employer-paid education (that for which an employer paid for some or all of educational expenses or for the employee's time during which those activities occurred). The last outcome includes college in addition to the three types of vocational education. In other analyses, we examine enrollment in full-time and part-time degree programs (college or university) and in any type of education or training (college or any type of vocational education).

We attach measures of state implementation of welfare reform to the NHES data. Welfare reform was implemented in two phases. The first consists of federal waivers granted to states to experiment with AFDC rules prior to PRWORA. Since 1962, the Secretary of Health and Human

Services has had the authority to waive federal welfare rules if a state proposed experimental or pilot programs that furthered the goals of AFDC. Some waivers increased the amount of earnings that recipients were allowed to keep while maintaining welfare eligibility; others expanded work requirements to larger groups, established term limits for cash assistance, permitted states to issue sanctions to recipients who failed to meet work requirements, or allowed states to eliminate increases in benefits to families who had additional children while on welfare. We construct an indicator to reflect whether a given state in a given month and year had a statewide waiver in place that substantially altered the nature of AFDC with regard to time limits, work exemptions, sanctions, earnings disregards, family caps, and/or work requirements.[3] The second phase of welfare reform was the implementation of TANF programs post-PRWORA. Because all states implemented TANF programs between the 1995 survey and the 1999 survey, all states are coded with a zero for TANF implementation for 1991 and 1995, and a one for subsequent years.[4] These two measures follow the convention in the literature (reviewed in Blank 2002). For simplicity of exposition and because we find that the waiver/TANF distinction does little to enhance our analyses and has no bearing on our inferences, our primary measure of welfare reform combines the two into a dichotomous indicator of whether the state had either an AFDC waiver or TANF in place during the time period measured. However, we conduct corresponding analyses that include the separate indicators for AFDC waivers and TANF (several specifications are presented in Appendix Table 2 and the others are available upon request). Finally, in certain

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[3] The educational variables in the NHES reference the prior year. Based on the respondent's month of interview, we therefore match welfare reform policies that were in place in the respondent's state of residence during the midpoint of the past 12 months. Eleven states enacted major waivers to their AFDC programs across various months, between 1992 and 1994. Estimates are robust to alternative measures of the fraction of the past year (since the month of interview) that the welfare policy was in effect.

[4] Information on state implementation of major AFDC waivers and TANF is obtained from the Assistant Secretary for Planning and Evaluation at the U.S. Department of Health and Human Services: http://aspe.hhs.gov/HSP/Waiver-Policies99/policy_CEA.htm.

models we estimate differential effects by state educational policies, sanctions, and benefit generosity under TANF, as described later.

Since welfare reform is measured at the state level, we incorporate additional state-specific socioeconomic measures in the analyses to capture time-varying trends within areas. State unemployment rate and per capita personal income are derived from figures provided by the Bureau of Labor Statistics. Welfare caseloads, defined as the total number of welfare recipients in a state, are obtained from the Department of Health and Human Service's Administration for Children and Families Office of Family Assistance.[5] All models further include indicators for whether a given state in a given year had a strict high school exit exam (testing material at or above the 9th grade level) or a less strict exam (below the 9th grade level), with the reference category being no high school exit exam. For women who completed high school, we use the existence of the exam during their eighteenth year. For those who did not complete high school, we use the contemporaneous existence of the exam in their state. These data are derived from the Appendix provided by Dee & Jacob (2007).

Methods

The primary aim of this study is to evaluate the impact of welfare reform on adult women's vocational education and training. We employ a difference-in-difference-in-differences (DDD) framework – akin to a pre- and post-comparison with treatment and control groups – in conjunction with multivariate regression methods, which is standard in the economics literature on evaluating the effects of welfare reform and other state policies (e.g., Kaestner & Tarlov 2006; Bitler, Gelbach & Hoynes 2005; Blank 2002). Under certain conditions, described below, this quasi-experimental research design will yield causal estimates of the effects of welfare

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[5] Specifically, the data can be found at: http://www.acf.hhs.gov/programs/ofa/caseload/caseloadindex.htm.

reform on our outcomes of interest. We conduct various specification and robustness checks to assess the validity of the identification assumptions underlying this methodology.

Consider the following DDD model which relates changes in educational outcomes to implementation of welfare reform for the target group relative to a comparison group:

$$(1) \quad E_{ist} = \alpha' + (\alpha_1 - \alpha_1^*)Target_i + (\pi_1 - \pi_1^*)(WR_{st} * Target_i) + \pi_1^*(WR_{st}) + \\ + X_{ist}\beta' + Z_{st}\delta' + State_s\lambda' + Year_t\varphi' + (State_s * t)\phi' + \eta_{ist}$$

Equation 1 posits that the educational outcome (E), for the ith woman residing in state s during year t, is a function of welfare reform implementation (WR), measured here by an indicator reflecting whether a given state has enacted either a statewide AFDC waiver or TANF (based on the respondent's interview month and year). In addition, educational acquisition depends on a vector of individual characteristics (X) such as age, race, ethnicity, highest grade completed, and urban residence, a vector of time-varying state characteristics (Z) such as economic conditions and educational policies, state fixed effects ($State_s$), and year fixed effects ($Year_t$). The parameter μ represents an individual error term.[6]

There are several benefits to estimating Equation 1. It bypasses having to estimate the structural model relating welfare reform to welfare caseloads, which has been problematic in the literature (Kaestner & Tarlov 2006; Blank 2002).[7] Equation 1 is also more policy relevant as it represents the reduced-form model directly linking welfare policy measures to key outcomes,

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[6] We estimate equation (1) via OLS, though results are not affected when probit or logit methods are employed. All models control for the sampling weights as a covariate to increase efficiency, as recommended in Korn and Graubard (1995) and because the NHES over-sampled those who participated in educational activities. Reported standard errors are adjusted for arbitrary correlation across observations within each state.

[7] Changes in welfare caseloads are not due solely to welfare policy. Research suggests that much of the drop in caseloads, especially prior to TANF implementation in 1996, was not policy-related. While the welfare caseload fell dramatically in the 1990s, only part of the decline (≤ 35 %) was due to welfare reform legislation (Blank 2002). Changes in economic conditions and other factors also played an important role.

and therefore accounts for any and all mechanisms through which welfare policy may be affecting educational acquisition.

The direct focus on welfare reform, either an AFDC waiver or TANF, also underscores the point that the population of interest, that which is affected by welfare reform legislation, is *all* women at risk of being on public assistance, and not just current or former program participants (Kaestner & Tarlov 2006). Welfare reform can affect exit rates as well as entry rates. Considering all women at risk addresses some of the limitations from leavers' studies, which focus solely on individuals who have left welfare. These studies find it difficult to differentiate individuals who leave public assistance voluntarily from those who left because of welfare reform policies. They also do not consider the experiences of individuals who have been diverted from public assistance as a result of policy shifts. *Potential* welfare recipients are shown to behave strategically in their use of welfare benefits when faced with time limits and other regulatory constraints (DeLeire et al. 2006; Grogger 2004). Thus, in order to identify the population effect of welfare reform on key outcomes, the appropriate sample is *all* women at risk of being on public assistance.

Traditionally, the welfare caseload has consisted primarily of low-educated, unmarried mothers. This at-risk population group is the target group, for whom welfare policy would be expected to have the largest behavioral effects. In addition to the state-varying trends we consider when estimating equation (1), the possibility of omitted variables remains. This problem is addressed in the DDD framework by considering a comparison group – individuals who are similar in many ways to the target group but are unlikely to participate in public assistance programs and therefore not likely to be affected by welfare policies. In the above equation, *Target* represents a dichotomous indicator equal to one if the individual is in the target

group (population at risk of being on welfare) and zero if the individual is in the comparison group (population not at risk of being on welfare). The DDD estimates of the effects of welfare reform are the coefficients of the interaction terms between the policy measures (*WR* or, in supplemental analyses, separate indicators for *AFDC Waiver* and *TANF*) and the *Target* group indicator.[8] The impact of welfare reform is identified using variation in the timing and incidence of welfare reform across different states over time.

The assumption necessary for the DDD effect to represent an unbiased estimate is that in the absence of welfare reform, unobserved state-varying factors would affect the target and comparison groups similarly. Consequently, the choice of target and comparison groups is integral to a valid implementation of the DDD methodology. Following the literature, we employ target and comparison groups that are conventionally defined (Dave et al. 2008; Kaushal and Kaestner 2001; Kaestner and Kaushal 2003). Identifying the target group for our analyses—individuals who are at risk of relying on public assistance—is relatively straightforward. As indicated earlier, welfare reform is likely to have its strongest behavioral impacts on unmarried mothers with low levels of education and their children. As such, we compare unmarried women ages 25-54 who have less than a college education and live with children (target group) to unmarried women in the same age and education groups who do not live with any children (comparison group).

We confirm that baseline means between the target and comparison groups were similar in 1991, the period that predated any welfare reform. For instance, unadjusted weighted differences in full-time college enrollment (-0.0054), part-time college enrollment (-0.0193), and

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[8] For parsimony, Equation 1 imposes the restriction that, within states, the effects of the non-welfare reform measures (vectors *X*, *Z*, *Year* and *State*t*) are similar for the target and comparison groups. In supplemental analyses, we estimated all models allowing the effects of *X* and *Z* to differ across target and comparison groups, by including interactions between the target indicator and *X* and *Z*. Coefficient magnitudes are not materially affected, though standard errors are inflated somewhat due to reduced degrees of freedom.

any vocational education (-0.0051) between the target and comparison groups were insignificant. Individuals in the comparison group were significantly more likely (by about 10 percentage points) to participate in work-related courses in 1991 relative to the target group; this is to be expected since labor force participation and employment were much higher among individuals in the comparison group relative to individuals at-risk of welfare assistance (target group) who were not required to work in order to receive welfare benefits. Trends between 1991 and 1995 (excluding states that had implemented major AFDC waivers) were also generally similar between the groups for these measures; for work-related courses, the increasing trend was qualitatively similar for both groups but somewhat steeper for the target group. Some of this confounding is likely due to differential effects of the economic expansion on employment between the target and comparison groups as work-related courses are expected to be highly complementary to employment. We are therefore careful to control for measures of economic activity in all models, and in fact when we do so, the baseline difference in work-related courses between the target and comparison groups is attenuated by 60 percent and the difference in trend becomes statistically insignificant.

One concern is that states may have implemented major waivers to their AFDC programs in response to economic conditions or the behavior of welfare caseloads on the state. Therefore, all models control for one- and two-year lags of the state unemployment rate, real personal income per capita, and welfare caseloads. [9] We conduct several specification checks to assess the robustness of our estimates. First, in alternate models, we include state-specific trends to

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[9] Results (available upon request) are virtually unchanged if these lagged covariates are excluded from the models. In alternate models, we also control for a larger vector of state-specific factors including state child support expenditures, minimum wage, and poverty rates. Results (available upon request) are highly robust with respect to both magnitudes and significance. This robustness to additional controls for state-varying factors is validating since in a well-specified DD model, the comparison group accounts for time-shifting unobservable factors; thus, results should not be sensitive to parametric controls for state-specific factors.

account for systematically-varying unobservable factors within each state. Second, we assess whether our estimates are sensitive to the choice of the comparison group by utilizing an alternate comparison group (low-educated married women with children) that has also been used in the welfare reform literature. Third, we estimate alternate specifications only for individuals in the target group, separately controlling for state-specific prevalence of vocational and work-related educational engagement among unmarried women with no children and married women with children (individuals who are not likely to be impacted by welfare policies) to capture general trends in these educational activities. Our estimates remain generally robust across all of these specifications, adding to the weight of the evidence bearing on our conclusions.

Results

The results are organized as follows. Table 1 replicates previous work that estimated the effects of welfare reform on college attendance. Tables 2 and 3 present our main results--effects of welfare reform on vocational education and training and on employer-subsidized education. Table 4 presents results from models that stratify by state TANF policies vis-a-vis education, sanctions, and benefit generosity in order to explore effect heterogeneity along those dimensions. These analyses also assess the plausibility of our estimates by checking for a "dose-response" relation based on whether the effects are expectedly larger for stricter states. In Table 5, we allow for heterogeneous effects of welfare reform on vocational education by prior formal educational attainment, allowing us to explore complementarity between formal and vocational education. In Table 6, we present estimates from models of welfare reform on any schooling (formal or vocational education) to assess overall effects on potential human capital acquisition. In all tables, the estimated effects of welfare reform are indicated by the (bolded) coefficients on the interaction terms between the welfare reform and target group indicators. All sample sizes have

been rounded to the nearest 10, and we perform weighted analyses per National Center for Education Statistics guidelines.

In Table 1, we replicate previously discussed findings, based on the October supplement of the CPS, of Dave, Reichman and Corman (2008) that welfare reform reduced college enrollment of adult women at risk of relying on welfare. The estimates for any enrollment and full-time enrollment confirm these previous findings, although that for any enrollment is imprecisely estimated. For instance, welfare reform is associated with a 3.7 to 3.9 percentage points decline in college enrollment among low-educated single mothers ages 25-54, relative to similar aged and educated women without children. [10] Estimate magnitudes and standard errors are robust to the inclusion of state-specific trends. Sample sizes vary across outcomes because individuals engaging in types of education other than that being modeled are excluded from the sample (for example, the 2,910 observations in Column 3 consist of women who either engaged in no education or full-time degree education, and excludes women who engaged in any other type of education or training). Thus, the reference group in all models consists of individuals who did not participate in any schooling or training, making the marginal effects directly comparable across all specifications.

Table 2 presents our main results. As indicated earlier, nationally representative statistics are not readily available for vocational education participation among women at risk for relying on welfare—before or after welfare reform. As shown in the bottom row, in 1990-1991 (our "baseline" pre-welfare reform period), about 4.5% of women at-risk for welfare (aged 25 to 54 years, less than college-educated, unmarried, and with dependent children) were enrolled in a

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[10] For any degree enrollment, we find a higher-magnitude effect than the corresponding estimate by Dave, Reichman & Corman (3-4 percentage points versus 1-2 percentage points). This is partly due to a somewhat higher prevalence of any degree enrollment for the target group in the NHES relative to the October CPS (11.6 percent vs. 8.9 percent), suggesting that the educational focus of the NHES may be picking up greater participation in degree-granting activities that is perhaps missed in the CPS.

full-time vocational education program at some point during the year. Another 1.8% had been enrolled in a part-time vocational program, and another 13.6% had engaged in any other work-related courses during the year. Thus, about 20% of women at-risk for welfare participation engaged in some type of vocational education and over one-quarter were engaged in either vocational training or formal college education. For vocational education, the most common type was short-term, part-time training that does not lead to a degree or diploma ("any other work related courses"). We also find that almost 14% of women at risk for welfare reform in 1990-1991 received employer-subsidized education (including college or any type of vocational education).

The estimates in Columns 2-4 of Table 2 indicate that welfare reform reduced full-time vocational enrollment by about 4 percentage points but increased part-time vocational education by one percentage point. This latter represents a large effect relative to the baseline mean, though this effect is imprecisely estimated. There is no significant or substantial effect of welfare reform on participation on any other work-related training. When the three types of vocational education are combined (Column 1), we find no evidence that welfare reform had a significant impact on vocational education among women at risk for relying on welfare. In addition, we find no significant effects of welfare reform on employer-subsidized education. Table 3 presents estimates from models that control for state-specific trends; effect magnitudes and standard errors are not materially affected.

We would expect the negative effects of welfare reform on vocational education to be particularly strong in states that do not permit or that limit education as an authorized work activity for adults. To explore this, Table 4 (panel A) presents estimates from models with a three

way interaction between TANF, target, and state TANF education policy.[11] Specifically, we created a dichotomous variable equal to one if the state never allows post-secondary or other education to substitute for work requirements, or imposes substantial time limits on the duration of the educational activities. We then interacted this variable with our TANF*Target variable.[12] None of these states allow schooling, as a stand-alone activity, to satisfy work requirements. Since these state educational policies specifically refer to TANF, we focus on the TANF effect in these models and exclude states that had already implemented welfare reform through major waivers to AFDC prior to TANF implementation.

Although measured with some imprecision due to reduced effective cell size, we find that the negative effect of TANF on full-time vocational education becomes stronger in strict states and approaches zero in states that have more lenient policies with respect to educational enrollment. We also find some evidence of heterogeneity with respect to part-time vocational enrollment. That is, in lenient states, at-risk women are more likely to attend part-time vocational programs (by about 8 percentage points), and in strict states, at-risk women are less likely to attend such programs (by about 7 percentage points) relative to the lenient states. Combining the effects over all states thus yielded a net one percentage point increase in part-time vocational education. There is also some suggestive evidence of differential effects for other work-related courses (1.7 percentage points decline among the stricter states relative to the lenient states, and a 2.4 percentage points increase among the lenient states), though the difference here is not as

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[11] We investigate only TANF because there is no known source of information on educational policies under AFDC waivers.

[12] Specifically, we examined these policies at two points in time (1999 and 2002), and designated states as "strict" if they did not allow education as a stand-alone activity and they did not allow schooling to be combined with other work activities for more than one year. Twenty-two states (AZ, CO, CT, FL, ID, IN, KS, LA, MA, MD, MI, MS, ND, NM, NY, OH, OK, OR, SD, TX, WA, WI) and D.C. fall into this category. The data, available on the State Policy Documentation Project website, can be found at: http://www.spdp.org/tanf/postsecondary.PDF and http://clasp.org/publications/postsec_table_i_061902.pdf.

large as for vocational training. This is not surprising, since these courses do not represent major financial commitments compared to the other two categories.

We would also expect the effects of welfare reform on vocational education to be stronger in states with strict work incentives, such as sanctions for non-compliance with work requirements and low benefits generosity. As above for TANF education policy, we interacted a measure of strict state sanctions in Panel B and a measure of low or medium (relative to high) benefits generosity in Panel C (as characterized by Blank & Schmidt 2001). Again, we find significant differential effects on vocational education depending on strict versus less strict states. That is, women in states with stricter work incentives were less likely than women in more lenient states to engage in full-time and part-time vocational education.

As discussed earlier, more highly educated individuals are more likely than those with lower educational levels to engage in work-related courses. Thus, it is possible that our overall results may mask important differences in propensity to engage in vocational education within the at-risk population. Table 5 presents results that allow for differential effects of welfare reform depending on whether the woman had a high school diploma (about 70% of the target group). Because of small cell sizes, we present results only for the two largest categories of vocational education (any vocational education and work-related courses) and for employer-subsidized schooling (which includes college as well as vocational education). Similar to the above analyses of heterogeneous effects based on state variation in TANF policies, we interact our main DD effect (Welfare Reform*Target) with an indicator for whether the woman had a high school diploma. The coefficient of this triple interaction term (Welfare Reform* Target* High School Graduate) represents the effects of welfare reform for those at-risk women who have a high school degree, relative to those who do not.

Although imprecisely estimated, we find that for women with less than a high school diploma, welfare reform reduced any vocational education by about 3 percentage points and any other work-related courses by about 6 percentage points. *Relative to these women with less than a high school education*, welfare reform is associated with a 2.6 and 6.8 percentage points increase any vocational education and work-related courses, respectively. Overall, for these high-school graduates, there is no appreciable negative effects of welfare reform (sum of the coefficients of Welfare Reform*Target and Welfare Reform*Target*High School Graduate). These findings suggest that limitations in counting education and training as authorized work activities increase the cost of engaging in those activities overall, but that complementarities between work and education (such as access to employer-subsidized education) may largely offset those effects for high school graduates. The results for employer-subsidized education are consistent with this scenario. Although welfare reform had small and statistically insignificant effects on employer-subsidized education (Table 2), we see here that the effects were negative for the least educated women while small but positive for those with at least a high school diploma relative to those with less than a high school education.

Table 6 considers the overall effects of welfare reform on any type of education (formal college, vocational programs, or work-related courses). These estimates address the question of whether the decrease in formal schooling found by Dave et al. (2008) and corroborated in this study were tempered by increases in informal schooling in the form of vocational training and work-related courses. Models 1 and 2 (excluding and including state-specific trends, respectively) estimate average effects of welfare reform across the sample, while models 3 and 4 consider differential effects of welfare reform by the woman's prior education. From the first two columns, we can see that welfare reform had a negative (but statistically insignificant) effect

on overall educational participation, which is consistent with the separate findings for college

and vocational enrollment (in Tables 1 and 2, respectively). From the last two columns, we can

see that for women with at least a high school diploma, this effect is substantially attenuated.

Together, these estimates suggest that while welfare reform led to overall declines in educational

acquisition among women at risk for relying on welfare, the effects were confined for the most

part to very low-educated women. The effects for women with a least a high school diploma

appear to have been offset by increases in employer-subsidized education (from Table 5). In

other words, the "work first" strategy under welfare reform appears to have had uneven impacts

in terms of its effects on educational acquisition, with the most disadvantaged (in terms of

completed education) falling even farther behind and the others experiencing neutral effects.

In additional specifications (not shown) we used an alternative comparison group—

married women (with children in the household) in the same age range and with the same

education levels as the target group—and found that results were consistent in terms of both

effect magnitudes and significance relative to those presented in Tables 2 and 3. The only

substantive difference is that we find a significant decrease in other work-related courses,

confirming that welfare reform seemed to have an overall negative effect on the target women's

human capital acquisition through formal education and training.

When the target and comparison groups are defined according to characteristics, such as

education, parental status, and marital status, which may themselves be affected by welfare

reform, potential bias due to compositional selection is a concern. We confirm that key

characteristics used to define the target and comparison groups have not changed significantly

over the sample period. For instance, 6.85 percent of all women are classified into the target

group prior to TANF (being low-educated, unmarried, and with children) compared to 6.71

percent in 2005. Similarly, the prevalence of marriage among low-educated women and the number of children among low-educated unmarried and married women have remained relatively stable over the sample period. Thus, selection bias with respect to parental and marital status or family structure is unlikely, and this is consistent with prior research which has also found weak to no effects of welfare reform on those as outcomes.

As an alternative check for compositional selection, we also assessed whether welfare reform can predict who is in our analysis sample and who is in the target versus comparison samples (controlling for observed covariates). In both cases, welfare reform is not significantly or substantially associated with the probability of inclusion in the analysis sample (target or comparison group relative to all others) or inclusion in the target group relative to the comparison group (marginal effect of -0.008). When the welfare reform indicator is separated into AFDC waivers and TANF, we find that neither is significantly associated with the probability of inclusion in the analysis sample. However, TANF appears to reduce the probability that an adult woman is observed in the target group by about 6 percentage points (about 10% relative to the baseline prevalence of the target indicator). Since the only difference between the target and comparison groups is the presence of minor children in the household, this result could reflect changes in household structure post-TANF, such as formation of multi-family or intergenerational households (outcomes that have not been explored in the welfare reform literature). Thus, women who may otherwise have been in the target group are classified in the comparison group potentially because their living arrangements were affected by welfare reform. Since about 10 percent of the target group potentially shifted into the comparison sample as result of welfare reform, it should be noted that this would attenuate observed DDD effects by about 10 percent (Dave and Kaestner, 2008). Thus, if anything, the reported estimates are

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conservative and compositional selection has a negligible effect on the results. It is also validating that results are robust to alternate definitions of the comparison group as noted above.

Appendix Table 1 presents the separate effects of state AFDC waivers and TANF implementation on all reported educational outcomes. The patterns and magnitudes of the estimates are consistent with those discussed above with respect to the overall welfare reform indicator. In addition, both AFDC waivers and TANF similarly impacted educational outcomes; we are unable to reject the null hypothesis of no difference in effects between the two indicators. This is consistent with the results reported in Table 4, which suggest that work incentives were a key mechanism through which welfare reform impacted educational outcomes, and both AFDC waivers and TANF imposed strict work requirements as a condition for receiving benefits.

Conclusion

We found robust and convincing evidence that welfare reform significantly decreased the probability of full time vocational training and had no significant effects on part-time vocational education acquisition or participation in any other type of work-related education among adult women on average. We also found considerable heterogeneity across states, suggesting that states with stricter educational policies and stronger work incentives experienced larger declines in full- and part-time vocational training participation. Indeed, participation in part-time vocational education appears to have significantly increased (relative to no education or training) in lenient states. The negative effects of welfare reform on vocational education appear to be confined to women with less than a high school education. We found no evidence that the previously-reported negative effects of welfare reform on enrollment in formal education (particularly college), which we replicated in this study, have been offset by increases in vocational education and training on average. In other words, welfare reform appeared to

decrease adult women's education and training overall, and again, the effects appear to be confined to those with very low levels of completed education.

The results from this study fill an important gap in the welfare reform literature and confirm that the gains from welfare reform in terms of increasing employment and reducing caseloads have come at a cost—lower education and training among women at risk for relying on welfare. Our finding that the effects appear to be concentrated among women with very low education has negative implications for this group's ability to attain self-sufficiency and experience upward mobility. These negative effects of welfare reform on adult women's education may have become even larger under the Deficit Reduction Act of 2006, which raised states' work participation targets and narrowed the range of welfare-to-work activities that can be counted toward those targets, and during the recent economic downturn. Finally, the findings from this study contribute generally to the sparse economics literature on adult vocational education by identifying welfare policy as a determinant of vocational education and training, and underscore that public policies not specifically focusing on education can be important determinants of human capital acquisition.

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Table 1
Effects of Welfare Reform on Schooling Outcomes – Higher Education
(replicates October CPS results of Dave et al. 2008)
NHES 1991-2005

Sample	Target: Unmarried Women with Children, Less than College-Educated, Ages 25-54 Comparison: Unmarried Women with No Children, Less than College-Educated, Ages 25-54					
Outcome	Any Degree	Any Degree	Full-Time Degree	Full-Time Degree	Part-Time Degree	Part-Time Degree
Specification	1	2	3	4	5	6
Target	0.0586* (0.0298)	0.0557* (0.0302)	0.0888*** (0.0315)	0.0906*** (0.0316)	-0.0043 (0.0229)	-0.0086 (0.0237)
Any Welfare Reform	0.0571** (0.0284)	-0.0050 (0.0344)	0.0437* (0.0237)	0.0146 (0.0285)	0.0375 (0.0263)	-0.0101 (0.0332)
Any Welfare Reform* Target	**-0.0394 (0.0288)**	**-0.0369 (0.0299)**	**-0.0492** (0.0226)**	**-0.0497** (0.0237)**	**-0.0059 (0.0288)**	**-0.0043 (0.0293)**
Lagged State Covariates	Yes	Yes	Yes	Yes	Yes	Yes
State-specific Trends	No	Yes	No	Yes	No	Yes
Adj. R-squared	0.259	0.261	0.205	0.209	0.179	0.179
Observations	3350	3350	2910	2910	2960	2960
Sample Baseline Mean for Target Group	0.1157	0.1157	0.0695	0.0695	0.0532	0.0532

Notes: Coefficient estimates are from linear probability models. The reference group in all models corresponds to no schooling. Standard errors are adjusted for arbitrary correlation within each state and reported in parentheses. All models include age and age squared, indicators for race and Hispanic ethnicity, indicators for high school graduate and less than high school, number of children less than 16 years of age in the household, number of residents in the household, urban residence, state fixed effects, year fixed effects, and the appropriate sampling probability weights. State covariates include state-level unemployment rate, real state personal income per capita, and indicators for state high school exit exam requirements. Lagged state covariates include one- and two-year lags of the welfare caseload, unemployment rate, and real personal income per capita. Significance is denoted as follows: *** $p \leq 0.01$, ** $0.01 < p \leq 0.05$, * $0.05 < p \leq 0.10$. All sample sizes are rounded to the nearest 10 per National Center for Education Statistics guidelines. Baseline mean represents the weighted outcome mean for the analysis sample, for the target group, from 1991 and 1995 (excluding states in 1995 that had enacted statewide AFDC waivers).

Table 2
Main Results--Effects of Welfare Reform on Vocational Education
and Training and Employer Paid Schooling
NHES 1991-2005

Sample	Target: Unmarried Women with Children, Less than College-Educated, Ages 25-54				
	Comparison: Unmarried Women with No Children, Less than College-Educated, Ages 25-54				
Outcome	Any Vocational Education or Training	Full-Time Vocational Education or Training	Part-Time Vocational Education or Training	Any Other Work-Related Courses	Any Employer-Paid Schooling
Specification	1	2	3	4	5
Target	0.0416	0.0394*	-0.0132	0.0451*	0.0116
	(0.0254)	(0.0223)	(0.0168)	(0.0226)	(0.0217)
Any Welfare Reform	0.0110	0.0407**	0.0318**	-0.0106	-0.0382
	(0.0172)	(0.0195)	(0.0150)	(0.0217)	(0.0259)
Any Welfare Reform* Target	**-0.0085**	**-0.0436****	**0.0101**	**-0.0017**	**0.0126**
	(0.0286)	**(0.0216)**	**(0.0179)**	**(0.0289)**	**(0.0278)**
Lagged State Covariates	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.134	0.052	0.072	0.132	0.094
Observations	4160	2660	2700	3860	4980
Sample Baseline Mean for Target Group	0.1795	0.0447	0.0176	0.1356	0.1359

Notes: Any vocational education or training (1) includes full time (2), part-time (3), and other (4). Any employer-paid schooling (5) includes (1) or any college. Coefficient estimates are from linear probability models. The reference group in all models corresponds to no schooling. Standard errors are adjusted for arbitrary correlation within each state and reported in parentheses. All models include age and age squared, indicators for race and Hispanic ethnicity, indicators for high school graduate and less than high school, number of children less than 16 years of age in the household, number of residents in the household, urban residence, state fixed effects, year fixed effects, and the appropriate sampling probability weights. State covariates include state-level unemployment rate, real state personal income per capita, and indicators for state high school exit exam requirements. Lagged state covariates include one- and two-year lags of the welfare caseload, unemployment rate, and real personal income per capita. Significance is denoted as follows: *** $p \leq 0.01$, ** $0.01 < p \leq 0.05$, * $0.05 < p \leq 0.10$. All sample sizes are rounded to the nearest 10 per National Center for Education Statistics guidelines. Baseline mean represents the weighted outcome mean for the analysis sample, for the target group, from 1991 and 1995 (excluding states in 1995 that had enacted statewide AFDC waivers).

Table 3
Main Results--Effects of Welfare Reform on Vocational Education
and Training and Employer Paid Schooling
Controlling for State-specific Trends
NHES 1991-2005

Sample	Target: Unmarried Women with Children, Less than College-Educated, Ages 25-54				
	Comparison: Unmarried Women with No Children, Less than College-Educated, Ages 25-54				
Outcome	Any Vocational Education or Training	Full-Time Vocational Education or Training	Part-Time Vocational Education or Training	Any Other Work-Related Courses	Any Employer-Paid Schooling
Specification	1	2	3	4	5
Target	0.0436*	0.0386*	-0.0120	0.0450*	0.0084
	(0.0257)	(0.0226)	(0.0164)	(0.0235)	(0.0219)
Any Welfare Reform	-0.0127	0.0463	-0.0037	-0.0063	-0.0300
	(0.0342)	(0.0277)	(0.0230)	(0.0372)	(0.0451)
Any Welfare Reform* Target	**-0.0077**	**-0.0385***	**0.0144**	**-0.0040**	**0.0114**
	(0.0298)	**(0.0224)**	**(0.0180)**	**(0.0304)**	**(0.0280)**
Lagged State Covariates	Yes	Yes	Yes	Yes	Yes
State-specific Trends	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.134	0.053	0.082	0.131	0.095
Observations	4160	2660	2700	3860	4980
Sample Baseline Mean for Target Group	0.1795	0.0447	0.0176	0.1356	0.1359

Notes: Any vocational education or training (1) includes full time (2), part-time (3), and other (4). Any employer-paid schooling (5) includes (1) or any college. Coefficient estimates are from linear probability models. The reference group in all models corresponds to no schooling. Standard errors are adjusted for arbitrary correlation within each state and reported in parentheses. All models include age and age squared, indicators for race and Hispanic ethnicity, indicators for high school graduate and less than high school, number of children less than 16 years of age in the household, number of residents in the household, urban residence, state fixed effects, year fixed effects, and the appropriate sampling probability weights. State covariates include state-level unemployment rate, real state personal income per capita, and indicators for state high school exit exam requirements. Lagged state covariates include one- and two-year lags of the welfare caseload, unemployment rate, and real personal income per capita. Significance is denoted as follows: *** p≤0.01, ** 0.01<p≤0.05, * 0.05<p≤0.10. All sample sizes are rounded to the nearest 10 per National Center for Education Statistics guidelines. Baseline mean represents the weighted outcome mean for the analysis sample, for the target group, from 1991 and 1995 (excluding states in 1995 that had enacted statewide AFDC waivers).

Table 4
Effects of TANF on Vocational Education and Training
Differential Effects by State Education Policy, Sanctions, and Benefits Generosity under TANF
NHES 1991-2005

Panel A	Differential Effects by State Education Policy			
Outcome	Any Vocational / Work-Related	Full-Time Vocational	Part-Time Vocational	Any Other Work-Related Courses
Specification	1	2	3	4
Target	-0.0084	-0.0232	-0.0595*	0.0282
	(0.0438)	(0.0432)	(0.0343)	(0.0447)
TANF	0.0145	0.0865*	0.0929*	-0.0508
	(0.0508)	(0.0497)	(0.0486)	(0.0526)
TANF*Target	**0.0509**	**-0.0012**	**0.0782***	**0.0242**
	(0.0569)	**(0.0572)**	**(0.0415)**	**(0.0483)**
TANF*Target* Education Not Authorized	**-0.0624**	**-0.0608**	**-0.0747**	**-0.0166**
	(0.0695)	**(0.0605)**	**(0.0460)**	**(0.0670)**
Adj. R-squared	0.128	0.061	0.094	0.123
Observations	2910	1830	1860	2690

Panel B	Differential Effects by State Sanctions			
Outcome	Any Vocational / Work-Related	Full-Time Vocational	Part-Time Vocational	Any Other Work-Related Courses
Specification	1	2	3	4
Target	0.0128	0.0206	-0.0335	0.0326
	(0.0322)	(0.0302)	(0.0241)	(0.0304)
TANF	0.0580	0.1263**	0.1192**	-0.0220
	(0.0546)	(0.0500)	(0.0551)	(0.0557)
TANF*Target	**0.0214**	**-0.0322**	**0.0515****	**0.0037**
	(0.0369)	**(0.0377)**	**(0.0211)**	**(0.0330)**
TANF*Target* Strict Sanctions	**-0.0288**	**-0.0265**	**-0.0568**	**0.0228**
	(0.0674)	**(0.0478)**	**(0.0362)**	**(0.0746)**
Adj. R-squared	0.127	0.059	0.092	0.123
Observations	2910	1830	1860	2690

Panel C	Differential Effects by State Benefits Generosity			
Outcome	Any Vocational / Work-Related	Full-Time Vocational	Part-Time Vocational	Any Other Work-Related Courses
Specification	1	2	3	4
Target	0.0091	0.0522**	-0.0512**	0.0217
	(0.0410)	(0.0216)	(0.0235)	(0.0408)
TANF	0.1009	0.1164**	0.1923***	-0.0070
	(0.0689)	(0.0514)	(0.0587)	(0.0787)
TANF*Target	**0.0202**	**-0.0177**	**0.0263**	**0.0197**
	(0.0447)	**(0.0316)**	**(0.0345)**	**(0.0608)**
TANF*Target* Low Benefits Generosity	**-0.0137**	**-0.0330**	**0.0027**	**-0.0081**
	(0.0599)	**(0.0447)**	**(0.0400)**	**(0.0719)**
Adj. R-squared	0.128	0.061	0.094	0.123
Observations	2910	1830	1860	2690

Notes: See Tables 1 & 2. States which had implemented major waivers to their AFDC programs prior to 1995 are excluded from the sample. Models also control for interactions between the policy indicator and the target group indicator, and between the policy indicator and TANF. TANF represents the conditional difference between 1999, the first post-TANF NHES wave, and the pre-TANF wave 1995 which is the reference year indicator.

Table 5
Effects of TANF on Vocational Education and Training
Differential Effects by Formal Educational Attainment
NHES 1991-2005

Sample	Target: Unmarried Women with Children, Less than College-Educated, Ages 25-54		
	Comparison: Unmarried Women with No Children, Less than College-Educated, Ages 25-54		
Outcome	Any Vocational Education or Training	Any Other Work-Related Courses	Any Employer-Paid Schooling
Specification	1	2	3
Target	0.0832	0.1217*	0.0664*
	(0.0661)	(0.0630)	(0.0349)
Any Welfare Reform	0.0463	0.0666	-0.0050
	(0.0500)	(0.0487)	(0.0396)
Any Welfare Reform* Target	**-0.0326**	**-0.0621**	**-0.0193**
	(0.0685)	**(0.0633)**	**(0.0447)**
Any Welfare Reform*Target* High School Graduate	**0.0259**	**0.0676**	**0.0344**
	(0.0817)	**(0.0800)**	**(0.0454)**
Lagged State Covariates	Yes	Yes	Yes
Adj. R-squared	0.133	0.131	0.094
Observations	4160	3860	4980
Sample Baseline Mean for Target Group	0.1795	0.1356	0.1359

Notes: Outcome definitions correspond to those in Table 2. Coefficient estimates are from linear probability models. The reference group in all models corresponds to no schooling. Standard errors are adjusted for arbitrary correlation within each state and reported in parentheses. All models include age and age squared, indicators for race and Hispanic ethnicity, indicators for high school graduate and less than high school, number of children less than 16 years of age in the household, number of residents in the household, urban residence, state fixed effects, year fixed effects, and the appropriate sampling probability weights. Models also control for interactions between welfare reform and high school graduate indicators, and between the target group and high school graduate indicators. State covariates include state-level unemployment rate, real state personal income per capita, and indicators for state high school exit exam requirements. Lagged state covariates include one- and two-year lags of the welfare caseload, unemployment rate, and real personal income per capita. Significance is denoted as follows: *** $p \leq 0.01$, ** $0.01 < p \leq 0.05$, * $0.05 < p \leq 0.10$. All sample sizes are rounded to the nearest 10 per National Center for Education Statistics guidelines. Baseline mean represents the weighted outcome mean for the analysis sample, for the target group, from 1991 and 1995 (excluding states in 1995 that had enacted statewide AFDC waivers).

Table 6
Effects of Welfare Reform on Any Schooling
NHES 1991-2005

Sample	Target: Unmarried Women with Children, Less than College-Educated, Ages 25-54 Comparison: Unmarried Women with No Children, Less than College-Educated, Ages 25-54			
Outcome	Any Schooling	Any Schooling	Any Schooling	Any Schooling
Specification	1	2	3	4
Target	0.0542** (0.0234)	0.0541** (0.0237)	0.0777 (0.0540)	0.0757 (0.0558)
Any Welfare Reform	0.0348 (0.0218)	-0.0278 (0.0322)	0.0383 (0.0404)	-0.0211 (0.0430)
Any Welfare Reform* Target	**-0.0190 (0.0278)**	**-0.0148 (0.0290)**	**-0.0492 (0.0567)**	**-0.0499 (0.0583)**
Any Welfare Reform*Target* High School Graduate	–	–	**0.0393 (0.0640)**	**0.0456 (0.0657)**
Lagged State Covariates	Yes	Yes	Yes	Yes
State-specific Trends	No	Yes	No	Yes
Adj. R-squared	0.187	0.187	0.186	0.187
Observations	4980	4980	4980	4980
Sample Baseline Mean for Target Group (from 1991 survey)	0.2591	0.2591	0.2591	0.2591

Notes: Any schooling includes any vocational education or training, or college. Coefficient estimates are from linear probability models. The reference group in all models corresponds to no schooling. Standard errors are adjusted for arbitrary correlation within each state and reported in parentheses. All models include age and age squared, indicators for race and Hispanic ethnicity, indicators for high school graduate and less than high school, number of children less than 16 years of age in the household, number of residents in the household, urban residence, state fixed effects, year fixed effects, and the appropriate sampling probability weights. Models also control for interactions between welfare reform and high school graduate indicators, and between the target group and high school graduate indicators. State covariates include state-level unemployment rate, real state personal income per capita, and indicators for state high school exit exam requirements. Lagged state covariates include one- and two-year lags of the welfare caseload, unemployment rate, and real personal income per capita. Significance is denoted as follows: *** p≤0.01, ** 0.01<p≤0.05, * 0.05<p≤0.10. All sample sizes are rounded to the nearest 10 per National Center for Education Statistics guidelines. Baseline mean represents the weighted outcome mean for the analysis sample, for the target group, from 1991 and 1995 (excluding states in 1995 that had enacted statewide AFDC waivers).

Appendix Table 1
Effects of Welfare Reform on Schooling Outcomes
Controlling for AFDC Waivers and TANF Separately
NHES 1991-2005

Sample	Target: Unmarried Women with Children, Less than College-Educated, Ages 25-54 Comparison: Unmarried Women with No Children, Less than College-Educated, Ages 25-54								
Outcome	Any Degree	Full-Time Degree	Part-Time Degree	Any Vocational Education or Training	Full-Time Vocational Education	Part-Time Vocational Education	Any Other Work-Related Courses	Any Employer-Paid Schooling	Any Schooling
Specification	1	2	3	4	5	6	7	8	9
Target	0.0582*	0.0884***	-0.0045	0.0409	0.0391*	-0.0151	0.0442*	0.0116	0.0544**
	(0.0294)	(0.0312)	(0.0228)	(0.0254)	(0.0217)	(0.0169)	(0.0228)	(0.0217)	(0.0232)
AFDC Waiver	-0.0073	-0.0130	0.0049	-0.0191	0.0249	-0.0111	-0.0153	-0.0236	-0.0195
	(0.0370)	(0.0319)	(0.0302)	(0.0325)	(0.0192)	(0.0206)	(0.0324)	(0.0493)	(0.0322)
AFDC Waiver*Target	**-0.0290**	**-0.0339**	**-0.0018**	**0.0020**	**-0.0381**	**0.0150**	**0.0067**	**-0.0011**	**-0.0177**
	(0.0476)	**(0.0398)**	**(0.0380)**	**(0.0432)**	**(0.0310)**	**(0.0317)**	**(0.0327)**	**(0.0504)**	**(0.0480)**
TANF[1]	0.1473***	0.1185***	0.0844*	0.0738	0.0810**	0.1076***	0.0135	-0.0498	0.1106**
	(0.0421)	(0.0321)	(0.0457)	(0.0445)	(0.0344)	(0.0282)	(0.0453)	(0.0428)	(0.0414)
TANF*Target	**-0.0381**	**-0.0498****	**-0.0050**	**-0.0085**	**-0.0431***	**0.0134**	**-0.0030**	**0.0152**	**-0.0148**
	(0.0288)	**(0.0224)**	**(0.0303)**	**(0.0296)**	**(0.0218)**	**(0.0172)**	**(0.0312)**	**(0.0280)**	**(0.0277)**
Lagged State Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.260	0.206	0.179	0.134	0.054	0.074	0.131	0.094	0.187
Observations	3350	2910	2960	4160	2660	2700	3860	4980	4980

Notes: See notes from Tables 1 and 2. Models 1-3 correspond to results reported in Table 1; models 4-8 correspond to results reported in Table 2; and model 9 corresponds to specification 1 in Table 6.