

THE EFFECTS OF THE AMERICANS WITH DISABILITIES ACT ON THE  
HEALTH COVERAGE AND POST-SECONDARY EDUCATION OF PEOPLE WITH  
DISABILITIES

By

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## ABSTRACT OF THE DISSERTATION

The Effects of the Americans with Disabilities Act on the Health Coverage and Post-Secondary Education of People with Disabilities

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In 1990, Congress passed the ADA to address many of the larger issues related to discrimination and access that individuals with disabilities face. A rich and varied literature has emerged on the ADA's effects on employment, and this study builds on that literature by focusing on whether the ADA, as an environmental factor, affected the relationship between having an activity limitation and having a participation restriction in either health coverage or post-secondary education. The study uses a difference-in-differences modeling approach to compare outcomes for individuals with and without limitations before and after the ADA was implemented, and also capitalizes on a natural experiment resulting from differences in state laws protecting people with disabilities. The key results are as follows: 1) for the working-age population, individuals with limitations had a shift in their health coverage away from private health insurance (such as from an employer) and toward public coverage (such as Medicaid or Medicare) that was largely related to a rise in federal disability benefits rather than the ADA; 2) full-time workers with limitations (particularly those working for private for-profit firms) had a decline in their employer-based health insurance rates after the ADA was implemented,

and the effect was larger in states where the ADA represented an addition to existing state law, which is consistent with the ADA having a perverse effect; and 3) the ADA did not improve post-secondary educational enrollment among individuals with limitations, though younger adults with a high school education had an increase in college enrollment after the ADA was implemented. While the ADA addressed barriers for people with disabilities regarding discrimination and access, it provided no supports to address additional barriers to participation, such as having less education and fewer resources. Future policies to promote the economic independence of people with disabilities should build on the ADA to address such barriers, particularly those regarding financial costs. Two such policies would be to implement broad health care reform (such as implemented in Massachusetts) and provide more post-secondary education funding.

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## I. Introduction

Between 13 and 16 percent of the non-elderly working-age population have a disability and their labor force participation lags significantly behind that of persons without disabilities (Rehabilitation Research and Training Center on Disability Demographics and Statistics 2005; Steinmetz 2006). This exclusion from the labor force and employment marginalizes people with disabilities and places additional burdens on taxpayers. The proportion of working-age people receiving federal disability benefits was four percent in 2005 and is expected to rise to six percent (or 1 in 17 workers), a non-negligible portion of the workforce (Autor and Duggan 2006), and the current Great Recession may accelerate this trend. Federal programs that are targeted to people with disabilities overwhelmingly favor income replacement over rehabilitation and employment initiatives (Goodman and Stapleton 2007). Although the 1990 Americans with Disabilities Act (ADA) was intended to improve the employment status of people with disabilities, evaluations have found mixed success depending on how disability is defined (Kruse and Schur 2003; Stapleton, Goodman, and Houtenville 2003).

In 1990, Congress passed the ADA to address many of the larger issues related to discrimination and access that individuals with disabilities face. A rich and varied literature has emerged on the ADA's effects on employment, and this study builds on that literature by examining additional areas of consequence (health coverage and post-secondary education) for persons with disabilities that may have been affected by the ADA. This dissertation answers three questions regarding the ADA's effects on health coverage and education:

1. Did the ADA alter the sources of health coverage for the working-age population with disabilities, and were there differential effects by education level?
2. Did the ADA increase the rates of employer-based health insurance for full-time workers with disabilities?
3. Did the ADA improve the post-secondary educational enrollment of people with disabilities?

Disability is a heterogeneous classification and attempts to use a single measure, such as a limitation in one's ability to work, may fail to capture the population that is covered under the ADA. Some characteristics, such as when the disability begins and the type of disability, may affect educational or labor market outcomes. For example, the human capital and occupational opportunities of people whose conditions are present at birth (such as developmental disabilities) may be quite different than for those whose onset occurred after age 25 (when formal education is largely complete). The former may obtain less education and have lower incomes compared to the latter so that their employment experiences, earnings, access to health insurance, and involvement in public disability programs may be quite different. Categorizing both as "having a work limitation" ignores these key differences in human capital.

Education may be a differential factor leading to disparities in employment, occupational attainment, and economic status between workers with and without disabilities. People with disabilities are disproportionately less likely to have completed high school compared to people without disabilities, which may affect both the types of jobs they have access to and their productivity in these jobs, and therefore their labor

market outcomes. This education differential suggests divergent experiences and, if not recognized, could confound evaluations of the impact of disability on education and subsequent labor market success.

This chapter continues by providing an overview of major issues regarding disability status and policy. These include the definition of disability; estimates of the size of the population with disabilities; employment issues for people with disabilities; the role of federal disability income; the ADA and its documented effects on employment; and the relationship between disability and education. It concludes with methodological considerations that cut across the three proposed questions.

### How is Disability Defined?

Disability is a dynamic concept that defies classification through responses to a simple yes/no question. This complexity has led to varying definitions of disability and a lack of consistent questions across surveys to identify who has a disability. These variations subsequently limit the applicability of research findings to people with disabilities or lead to disparate and sometimes conflicting research findings. For example, a review of disability estimates found a wide range in the number of people with disabilities, depending on the survey, disability definition, and even phrasing of the question (Field and Jette 2007).

The World Health Organization (2002) developed an international standard to classify disability in a format similar to its other classifications, such as the International Statistical Classification of Diseases and Related Health Problems (ICD-10). The International Classification of Functioning, Disability and Health (ICF) places disability in the context of a health condition's effect on functioning (Table 1.1 and Figure 1.1). A

disability at the level of the body or body part is called an impairment; at the level of the whole person, an activity limitation; and at the level of the whole person in the context of her environment, a participation restriction. Personal and environmental factors mediate the relationships between health conditions and disability, so that an activity limitation, for example, does not necessarily follow from a health condition that causes an impairment, given personal and environmental supports that prevent a loss in activity level. This definition blends aspects of both the medical model of disability (where disability is defined as a gap in or lack of individual functioning due to a health condition requiring corrective medical interventions) and the social disability model (that emphasizes a gap in functioning between individuals and their physical and social environment). The model does have some limitations (for instance, the model fails to distinguish between activities and participation or to provide clearer conceptions of personal and environmental factors, and the model omits the broader notion of quality of life), but the strengths of the model outweigh these limitations (Field and Jette 2007).

The ICF model provides a conceptual framework that guides this dissertation, specifically the hypotheses on the relationships between disability, health coverage, and education. The main advantage in using the ICF model is that it offers a specific and testable logic model that clearly specifies how the ADA could affect the relationships between different types of disability, a clarity that has been lacking in prior research. The ADA targets a specific group of individuals—people with health conditions that limit their functioning but not their work participation—and the ICF model provides an approach for examining this relationship. An ancillary advantage is that the broader adoption of the ICF model by the disability research community could help organize the

disability field and provide a better understanding of disability, though current surveys are limited in their applicability to the ICF model's concepts. For example, national surveys have little information on environmental supports (Field and Jette 2007). However, ICF constructs are applied to existing measures where possible, with the schema reviewed in Figure 1.1 used to illustrate hypotheses and focus the results.

### How Many People Have a Disability?

The US Census Bureau combines many disability measures to identify the population who may be considered as having a disability. Their composite measure cuts across the ICF concepts of impairment and activity limitations: having a mobility limitation<sup>1</sup>, a functional limitation<sup>2</sup>, having difficulty in performing activities of daily living (ADLs)<sup>3</sup> or instrumental activities of daily living (IADLs)<sup>4</sup>, or having a mental or emotional condition (such as Alzheimer's, mental retardation, developmental disability, or mental illness). In 2002, 24 million Americans between the age of 25 and 64, or 16 percent of the non-elderly working-age population, had some level of disability (Steinmetz 2006). By using a narrower definition that identifies those with severe disabilities (persons having one or more of the following conditions: mobility limitations; needing the help of another person to perform ADLs; needing the help of another person to perform IADLs; an inability to perform functional activities at all; having a mental or

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<sup>1</sup> Mobility limitations questions ask if the person uses a cane, crutches, walker, or wheelchair to get around.

<sup>2</sup> Functional limitation questions ask if the person has any difficulty seeing words or letters in ordinary newsprint, hearing another person, having his or her speech understood, lifting and carrying 10 pounds, walking up a flight of stairs without resting, walking a quarter of a mile.

<sup>3</sup> ADL questions ask if the person has any difficulty bathing, eating, dressing, getting around inside one's home, getting in and out of a bed or chair, and toileting by one's self.

<sup>4</sup> IADL questions ask if the person has any difficulty going outside one's home, doing light housework, managing money and bills, preparing meals, taking prescription medications, and using the telephone by one's self.



emotional disorder), the number of Americans was 16 million, or 11 percent of the working-age population (Steinmetz 2006).

An alternative and commonly used disability definition, particularly with ADA research, is having a condition that limits employment. In ICF terminology, these individuals have a participation restriction regarding employment, but this is a different concept than the measures identifying impairments and activity limitations. Sixteen million working-age people (11 percent of all working-age individuals) reported having a work limitation, and while this definition overlaps with the severe disability limitation measure, these two definitions are not mutually inclusive. Seventy percent of people with severe disabilities also report having a work limitation, compared to 20 percent of people with non-severe disabilities and 2 percent of people without a disability.

#### Employment Issues for People with Disabilities

People with disabilities lag behind those without disabilities on multiple aspects of employment. Following the broad definition used by the US Census Bureau discussed in the previous section, the proportion of people with any disability who worked in the past 12 months was 56 percent, while 88 percent of people without disabilities were employed (Steinmetz 2006). (The category, “not employed,” includes individuals who are either unemployed or out of the labor force.) Workers with disabilities had lower earnings, were more likely to work part-time or part-year, and had fewer non-pecuniary benefits when they worked full-time than those without disabilities (Steinmetz 2006). The poorer employment outcomes for people with disabilities have implications for engagement in other social spheres such as education, friendship and the development of social capital, and leisure. Moreover, the relationship between employment and disability

is not constant across types of disability. Persons with physical disabilities reported higher employment rates than persons with mental disabilities, and persons with more severe disabilities had lower employment rates than those with less severe disabilities (Steinmetz 2006).

In January 2009, the Bureau of Labor Statistics began publishing monthly labor force statistics for people with disabilities drawing on the expanded disability questions in the Current Population Survey. This step was important in monitoring the employment of people with disabilities by tracking real time data to understand their labor dynamics, just as is done for the general population. For instance, the effect of the current recession on people with disabilities can be observed, and while in December 2009, the unemployment rate for men with disabilities (14.9 percent) was substantially greater than that for men without disabilities (11.1 percent), the difference in unemployment rates for men with disabilities had been as much as twice as large in late summer and early fall of 2009 (Bureau of Labor Statistics 2009).

Several societal factors help to keep employment rates low for this population. To begin with, people with disabilities face discrimination in the employment marketplace (Baldwin and Johnson 1995). Employers may fail to see the need to actively recruit workers with disabilities, as they do with women or minorities, and they may view accommodations (such as flexible work schedules) as a reward for desirable workers with disabilities or as unreasonable requests by workers with disabilities to avoid their responsibilities, rather than as mechanisms for facilitating the employment of all such workers (Stensrud 2007). Shifts in the characteristics of work, such as the decline in manufacturing jobs and an increase in the number of jobs that require more specific

vocational preparation and language skills, may marginalize some workers with disabilities (Stapleton, Goodman, and Houtenville 2003). Health care costs have increased, making federal health coverage for individuals with disabilities (through Medicare and/or Medicaid) more appealing and perhaps necessary. Other barriers include transportation and mobility needs and the additional time people with disabilities need to address health concerns (National Council on Disability 2007a). Company size may be a factor in making accommodations, since large companies may be more willing, see more of a need, or have more resources to make modifications needed by workers with disabilities (Bruyere, Erickson, and VanLooy 2006).

Having a disability is also associated with many individual barriers to employment, such as lower education, older ages, and poverty (Rehabilitation Research and Training Center on Disability Demographics and Statistics 2005; Steinmetz 2006). For example, using the US Census Bureau disability definition mentioned earlier, among the working-age population (adults age 25 to 64 years), only 22 percent of people with severe disabilities and 33 percent of people with non-severe disabilities had college degrees, which is sizably less than the 43 percent of people without disabilities who had college degrees (Steinmetz 2006).

### The Importance of Federal Disability Income

Federal disability benefits function both as important supports for people with disabilities who cannot work and as disincentives to work for people who receive benefits. Social Security Disability Income (SSDI) is a federal program that is part of the Old Age, Survivors, and Disability Insurance program; to qualify, a worker must be insured (that is, they must have paid into the Social Security system). Supplemental

Security Income (SSI) is a federal program (with state supplements) that provides basic means-tested supports for people with disabilities as “assistance of last resort;” a person has to meet specific income and asset requirements. For both programs, the disability requirements are the same: a person must be unable to perform any substantial gainful activity because of physical or mental impairments that are expected to last for 12 months or result in death. Benefits include cash benefits, health coverage (Medicare after a two-year waiting period for SSDI beneficiaries; Medicaid for most SSI beneficiaries, depending on state criteria) and vocational rehabilitation services. For many beneficiaries, these cash and health benefits are their sole source of support. Concerns over losing benefits serve as a disincentive to work for beneficiaries, many of whom can and want to work. The earnings limits are particularly rigid as SSI beneficiaries who work lose \$1 in benefits for every \$2 in earnings (after certain income and expense disregards), while SSDI beneficiaries who earn over a certain threshold lose their cash benefits altogether.

The proportion of individuals receiving federal disability benefits has increased dramatically. For example, the percentage of the non-elderly working-age population that receives SSDI has almost doubled in the past two decades (Autor and Duggan 2006). This increase is due to a combination of programmatic changes in who qualifies for benefits, an increase in the amount of wages that benefits replace (particularly for low income and low skilled workers), and an increase in the population who now qualify for benefits (due to an increase in the number of women in the labor force). In part to address this issue, SSA provides work incentives to encourage employment. For example, SSDI beneficiaries who leave the rolls can maintain their Medicare benefits for up to nine

years, SSI beneficiaries who earn below a certain income threshold can keep their Medicaid coverage through specific waivers, and SSA's Ticket to Work program expands available vocational services (Social Security Administration 2009a). However, there is little evidence that these or other incentives have been effective in encouraging beneficiaries to return to work.

The rise in the number of persons receiving disability benefits overlapped with the implementation of the ADA, confounding attributions of observed effects to the ADA. For example, the receipt of disability benefits (and particularly SSDI) may explain the decreased employment among individuals with disabilities that many attribute to the ADA (Burkhauser and Stapleton 2003; Goodman and Waidmann 2004).

#### The ADA and Its Documented Effects

The purpose of the ADA was to eliminate employment discrimination against people with disabilities and to promote access to public accommodations, communication, and transportation. The law was signed on July 26, 1990, with large employers (those with 25 or more employees) having to comply with the employment components of the law within two years of that date and smaller employers (those with 15 to 24 employees) having to comply within four years of that date (US Department of Justice 2002).<sup>5</sup> The ADA has four major titles (US Department of Justice 2005):

- Title I promotes employment for people with disabilities by requiring employers with at least 15 employees to provide equal opportunities to people with disabilities (such as prohibiting discrimination in hiring).

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<sup>5</sup> State and local governments fell under the law on January 26, 1992; earlier laws placed similar requirements on the federal government, and so it was exempt.

- Title II requires the provision of equal opportunities by state and local governments (for instance, with standards for accessibility to public buildings and programs, including public primary and secondary education) and addresses the accessibility of public transportation.
- Title III states that private and non-profit businesses that are open to the public adhere to nondiscrimination requirements.
- Title IV mandates that telephone companies create and maintain telecommunication relay services for people with hearing and speech disabilities.

For each title, entities must provide reasonable accommodations and remove barriers when the expenses are practical. The law provides employment protection to “people who have a substantial limitation on a major daily life activity who are ‘qualified’—that is, those who with or without reasonable accommodation can perform essential job functions” (Blanck, Schwochau, and Song 2003). According to the ICF model, the definition includes individuals with both an impairment and activity limitation in “major” life areas, but excludes individuals with a participation restriction regarding employment. It does not provide employment protection to people with a non-life activity limiting condition or to people with conditions that do limit a life activity but who are unqualified for a job. Similar protections also apply in the post-secondary education environment. A post-secondary institution must provide accommodations to its students with disabilities who meet the institution’s admissions requirements (that is, they are qualified to attend the institution), but not to individuals who cannot meet those minimum standards or who do not have health conditions that impair their ability to attend school.

Congress recently updated the ADA with the Americans with Disabilities Act Amendments Act of 2008 to address the narrow interpretation of the law by the judicial branch. The amendment interprets “disability” broadly to make it easier for individuals to seek protections under the ADA. The specific provisions include expanding major life activities to include additional activities such as reading as well as major bodily functions; as such, the definition includes individuals with impairments but not necessarily activity restrictions, and includes more individuals who have activity limitations (as conceptualized in the ICF model). In addition, individuals may be considered as having a disability even though they may be able to mitigate that condition (as with medication) or the condition is episodic or in remission. These changes were effective as of January 1, 2009.

The ADA has been successful in expanding basic access to societal activities (National Council on Disability 2007c). On a practical level, it has paved the way for better physical access to buildings, improvements to sidewalks and right of ways, access to public transportation, and accommodations in public areas. Moreover, people with disabilities believe the quality of their lives is better because of the ADA.

Such compelling evidence cannot be found regarding a positive effect of the ADA either in economic independence or in the workplace. Table 1.2 reviews the major studies examining the impacts of the ADA on the employment of people with disabilities. Many show a negative impact of the law on the employment status of people with disabilities using either a work limitation definition (Acemoglu and Angrist 2001; DeLeire 2000) or an activity limitation definition (having a mobility limitation, having functional limitations or limitations in performing ADL’s and IADL’s, having a mental or emotional

condition, or receiving federal disability benefits) and work limitation definition (Moon and Shin 2006), largely attributing the finding to the additional burden of mandated accommodations on employers. However, Kruse and Schur (2003), using a definition of disability more in line with the ADA's definition of having a severe activity limitation but not a work limitation, found an increase in employment for people with limitations whose conditions do not prevent work. Alternatively, Houtenville and Burkhauser (2004) replicated the strategy used by Acemoglu and Angrist, finding that the decline in employment actually began in the mid-1980s for individuals with work limitations in CPS (well before the ADA's passage), while employment increased for people reporting work limitations for two years (a definition indicating more severity) when the ADA was implemented.

A different line of inquiry has focused on variations in state laws protecting individuals with disabilities. Beegle and Stock (2003) found that states that passed anti-discrimination laws for people with disabilities had no change in the employment rates of people with a disability that limits work, relative to people without such disabilities, though they did find small negative effects on the wages of people with disabilities. These results suggest that the ADA would have no impact or would have only incremental impacts nationally. Jolls and Prescott (2004) found that individuals with work limitations had a 10 percent decline in employment when they lived in states where the accommodation component of the ADA was new (compared to states that already had laws requiring accommodations), though they observed no long term declines in employment for people with work limitations relative to people without disabilities.



Similar to the findings for overall employment, the studies have differed as to whether the ADA also had an effect on wages. DeLeire (2001) (using both a work limitation and functional limitation definition) and Acemoglu and Angrist (2001) (using a work limitation definition) observed no relative differences in the wages of men with and without disabilities. Moon and Shin (2006), on the other hand, found that men with functional or activity limitations had a decline in their wages (at  $p < 0.10$ ) because of the ADA compared to men without such limitations; there was no significant difference in wages for men with work limitations.

Part of the challenges in evaluating the impact of the ADA on these outcomes is assessing whether changes during this period were due to the ADA or to other factors. During the period that the ADA was implemented, two trends emerged which complicate identifying employment changes for persons with disabilities: a recession from 1990 to 1991 and a dramatic increase in the number of individuals applying for and receiving federal disability benefits (described earlier). Another complication in interpreting the ADA's effect on employment is that enforcement and investigations of ADA-related complaints by the US Equal Employment Opportunity Commission may not have adequately addressed worker grievances (Moss, Burris, Ullman, Johnsen, and Swanson 2001). For example, only 16 percent of Title I claims at the state and federal levels are resolved in favor of the claimant, while 62 percent of lawsuits from 1993 through 2001 were resolved in the claimant's favor (either through a court ruling or a settlement) (Moss, Swanson, Ranney, and Burris 2005). Finally, the vagueness of the law can encourage both employees and employers to misinterpret its provisions, which is partly why Congress updated the ADA in 2008.

## Education and Disability

The evidence of a link between education and health, and, as a consequence, disability, is strong. For example, the likelihood of having an activity limitation in functioning decreases as education level increases, and it does so in a more or less stepwise fashion, with older adults who completed college having the lowest level of limitations while those who did not complete high school having the highest level (Minkler, Fuller-Thomson, and Guralnik 2006). Findings such as these suggest that the relationship between having an impairment and having an activity limitation is influenced by one's education level. A somewhat unresolved question, however, is whether poor health causes low education, or whether low education causes poor health. Education is part of a larger, multidimensional concept of socioeconomic status (SES), which also includes income, status, and rank, though even accounting for these other factors, education remains strongly related to health (Cutler and Lleras-Muney 2006). Further, causality is difficult to ascribe, since data, particularly over the lifespan, are incomplete. To illustrate, though two individuals may have the same educational attainment, in survey data we often know nothing about the actual quality of that schooling or the individual's academic achievements as a student.

Education has a direct effect on health and, subsequently, disability status. Adults with lower educational achievement have lower functioning (resulting in an activity limitation) should they have an impairment and less of an ability to cope with their impairment (Cutler, Landrum, and Stewart 2006). Individuals with impairments who have more education use more assistive technology aids, but use less personal help (and

when they do, it is more likely to be paid help rather than help from family and friends, who are less likely to be skilled in the care they provide) (Cutler, Landrum, and Stewart). Education level also relates to one's ability to produce health: individuals with more education are able to have better health outcomes or status than individuals with less education because they use inputs of medical care and time more efficiently (productive efficiency) and can make better health choices because they better understand the effects of those inputs on their health (allocative efficiency) (Grossman 2000). For instance, individuals with more education may be more likely to exercise and seek preventive care than individuals with less education (Cutler and Lleras-Muney 2006). Further evidence of the causal link from education to health comes from quasi-natural experiments in which health outcomes among residents of states with different compulsory education laws or with different economic conditions that could affect educational attainment are compared. For example, while individuals in states with higher unemployment rates stay in school longer because the opportunity cost of staying in school is lower (as there are fewer jobs and wages are lower than when the economy is strong), there is also a consequential health benefit. Individuals living in states with higher unemployment during their teenage years are less likely to self-report a work disability or require personal care 30 to 40 years later (Arkes 2003). In addition, individuals with lower education are more likely to engage in risky behaviors (such as tobacco or alcohol abuse) or to take jobs that have greater risk of injury or demand more of their physical capital, leading to poor health later in life. The effect of education on health may be present even before birth, as pregnant women with more education may be more likely to follow recommended guidelines for prenatal care, resulting in healthier infants.

Health also affects education. Consider, at the beginning of the lifespan, youths with health conditions. Youths whose parents have lower SES are less likely to be diagnosed with a condition (should they have one) and less likely to receive treatment, compared to youths whose parents have higher SES (Case, Lubotsky, and Paxton 2002). Such children will have fewer days in school, learn less, and be at greater risk of failing or dropping out (see, for example, Currie & Stabile (2006)). Low-income children with health conditions will have fewer years of schooling than high-income children with health conditions, resulting in both poorer health and lower education (among other socio-economic status variables) as adults.

Given these pathways, the most likely relationship between education and health is a dynamic perspective that takes the lifespan into account (Cutler, Lleras-Muney, and Vogl 2008). The relationship from health to education may be more important at a younger age. However, once in adulthood, it is one's education level that primarily affects health. The intergenerational effects between education and health can also readily be seen, as parental SES affects childhood health, which in turn affects their eventual health as adults, as well as their education and other SES outcomes (Currie 2009).

Because of these relationships, some analyses in this study compare outcomes (such as health coverage) for individuals with different education levels. While the intent of the ADA was to open up opportunities to all individuals with disabilities and to level the playing field, benefits may have accrued to individuals in a better position to take advantage of those opportunities. For instance, workers with disabilities who had more education may have been seen by their employers as more productive or, alternatively,

been more knowledgeable about the ADA and thus better able to advocate for the appropriate workplace accommodations required by law.

### Methodological Considerations

Several methodological issues emerge that are common across each of the three proposed analytical question, such as the empirical approach used and how disability is defined. This section presents overarching methodological issues that must be addressed across the analyses, beginning with a discussion of the data used.

#### *Data Source*

Data for each analysis are drawn from the Survey of Income and Program Participation (SIPP). The SIPP is a nationally representative longitudinal survey that provides detailed financial and programmatic information, including employment, health insurance, disability, and education, about individuals, families, and households over a period of years. The SIPP panels – 1990, 1991, 1992, 1993, and 1996 – track individuals for up to four years in four-month increments (or waves).

All analyses use the SIPP longitudinal data file as the basis for analysis, supplemented with disability information from SIPP topical modules. The exception is the 1996 panel used for the third analytical question. Since that panel does not have a longitudinal file, data were drawn from the specific waves needed. The functional limitations and disability topical modules are matched to the wave after the modules were administered. This approach allows the disability assessment to temporally correspond to work, insurance and other variables, since the disability questions (described below) ask about a person's current health and functioning status, rather than her health and functioning status during the reference period. Wave 3 is used for the 1990 and 1991

panels, wave 6 is used for the 1992 and 1993 panels, and wave 5 is used for the 1996 panel. Because the disability measure is taken from the topical module file, the topical model weight is used for the analysis.

None of the selected cases in the SIPP contain missing data for most of the variables of interest for two reasons. First, the analyses only use SIPP cases where the individual was in the sample (that is, the variable PP-MIS equaled 1 for the month). Second, the SIPP uses a combination of logical and statistical imputation methods (the latter a hot deck imputation based on demographic similarities) to impute data that are missing. The exception involved the activity limitation variable, which, as explained above, was asked in the wave before the wave used in the study. Individuals in the selected wave may not have participated in the previous wave, when the topical module with disability questions was administered, and so did not have the opportunity to be asked about having activity limitations.

The number of cases of the full sample used, as well as individuals with any or severe limitations, is provided in Table 1.3. Overall, from six to eleven percent of the unweighted sample had activity limitations and from two to five percent had severe limitations. The table also shows the number of cases that were excluded because they had nonpositive weights (zero or missing).<sup>6</sup> These excluded cases represent about two to three percent of the entire SIPP sample. For the third analysis, an additional 14 percent of

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<sup>6</sup> Compared to individuals included in the analysis, individuals who were excluded because of nonpositive weights were younger (by 1.8 years), less likely to be white and more likely to be black, have lower education, have lower levels of private health coverage, and higher levels of no health coverage (all significant at  $p < 0.005$  (using a Bonferroni correction, with  $p < 0.05$  divided by 10 comparisons)). The absolute value of the phi coefficient for all categorical comparisons was less than 0.03, suggesting that the effect size is small.

individuals age 18 to 58 and 20 percent of individuals age 18 to 30 did not have 12 months of data (which was a requirement for inclusion).<sup>7</sup>

### *The ADA as Natural Experiment*

Although the outcomes of public policy interventions can be difficult to measure because we do not know what would have happened in the absence of the policy (that is, we cannot observe the counterfactual), natural experiments may provide a method for identifying their effects. The ADA provides such a natural experiment since it has a clear pre- and post-implementation period and well-defined treatment and control groups (that is, persons with and without disabilities, respectively).

Prior to the passage of the ADA, some states had passed legislation that provided protection to workers with disabilities. In many cases, such coverage was similar to the ADA in that employers were prohibited from discriminating among workers on the basis of disabilities and they had to provide reasonable accommodations to employees with disabilities (Jolls 2004). Other states had less comprehensive laws that prohibited disability discrimination, but did not require employers to provide reasonable accommodations. Three states had no laws protecting individuals with disabilities. This variation in state laws related to employment protection for people with disabilities complicates any evaluation of the effects of the ADA. If states did not have prior laws, then the analysis could compare the outcomes of interest prior to the ADA's

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<sup>7</sup> Compared to individuals included in the analysis, individuals 18 to 58 who were excluded because of nonpositive weights or did not have 12 months of data were younger (by 3.0 years), more likely to be male, less likely to be white, more likely to be black or other race, less likely to have higher educational achievement, more likely to be enrolled in any post-secondary program and college, less likely to be enrolled in vocational education programs, and less likely to have any disability (all significant at  $p < 0.006$  (using a Bonferroni correction, with  $p < 0.05$  divided by 9 comparisons)). The absolute value of the phi coefficient for all categorical comparisons was less than 0.06, suggesting that the effect size is small. Similar patterns were observed for individuals 18 to 30, though other race and any disability variables were not significantly different for those included and excluded from the analysis.

implementation with the outcome afterward (though we still would not know what would have happened without the law). Not accounting for the different state laws could understate estimates of the ADA's effects. Using the state variation in employment-related laws, the three state groups are used to assess whether the impact of the federal policy varied, in addition to estimates that examine the broad effect of the ADA on outcomes. Table 1.4 shows the three categories of states: those with laws that were similar to the ADA before 1990, states with laws that provided protection against discrimination for people with disabilities but did not mandate accommodations, and states with no laws.<sup>8</sup>

### *Empirical Approach*

As noted, the impact of the ADA is identified by comparing specific outcomes of interest (health insurance status and educational enrollment) before and after its implementation, both broadly and among three groups of states that differed in the extent to which they had state laws similar to the ADA. In particular, the empirical test described in detail below reveals whether the ADA resulted in the elimination of differences in these outcomes first between individuals with and without disabilities and second among individuals with disabilities residing in different types of states. Specifically, a difference-in-differences (DD) modeling framework is applied to examine changes in outcomes between workers with and without disabilities or between state groups (for example, comparing pre- and post-ADA implementation outcomes for workers with disabilities in states with full protection to those in states that had limited or no protection prior to 1990). A difference-in-difference-in-differences (DDD) model is

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<sup>8</sup> Estimates on state variation exclude nine smaller states that the SIPP combines in the public use files. Excluded full protection states include Idaho, Iowa, Vermont, and Wyoming; excluded limited protection states include Alaska, Maine, Montana, North Dakota, and South Dakota.



used to compare trends at three levels, for example, between workers with and without disabilities of different education levels pre- and post-ADA implementation, or between workers with and without disabilities in the three groups of states pre- and post-ADA implementation.

Linear probability regression models are used to estimate each equation. Using linear models for data with binary outcomes is problematic in that the assumptions of the linear probability model are not met (for example, the error terms are not normally distributed, and the error variance is heteroskedastic, or varies across cases), and the predicted range of the dependent variable can lie outside the zero to one range (Netter, Kutner, Nachtsheim, and Wasserman 1996). However, as pointed out by Ai and Norton (2003), interaction effects are not directly interpretable as probabilities in non-linear models. Since each of these models reflects either a single interaction effect (DD equations) or multiple interaction effects (DDD equations) to measure the impact of the ADA's implementation, linear probability regression models are used (though a method proposed by Ai and Norton could be applied to models with a single interaction term). Linear probability modeling of binary outcome measures has been used in other applications studying the impact of policy interventions, including Gruber (1994) and Monheit and Schone (2003).

All estimates, unless otherwise noted, use SIPP person-level weights from the appropriate topical module file and adjust for the SIPP's complex survey design using the SURVEYMEANS (for descriptive statistics) or SURVEYREG (for regression models) procedures in SAS version 9.1.

### *Disability Definition*

A disability definition corresponding to the ICF activity limitation should identify problems in performing activities in an individual's environment with additional information about whether the individual can perform the activity without assistance, and the SIPP measures for activity limitations roughly correspond to this ideal, though for not as many areas as suggested by the ICF. Of the several areas that the ICF suggests for activity<sup>9</sup> assessment, the SIPP includes at least some items on general tasks, self care, mobility, communication, and domestic life. Its functional limitation and disability topical module (included in the SIPP beginning with the 1990 panel) includes the following measures: having any or severe ADLs<sup>10</sup>, having any or severe IADLs<sup>11</sup>, having any functional or severe limitations<sup>12</sup>, using a mobility aid for longer than 6 months<sup>13</sup>, having an emotional or mental condition, and having a work limitation. The analysis uses a composite objective measure of disability that includes those items that correspond best to the ICF's activity limitations for general tasks, communication, self care, and domestic life: the presence of ADLs, IADLs, and functional limitations. In addition, the study includes a more restrictive definition that indicates whether the limitation is so severe that a person requires the help of another to perform the ADL or IADL, or, for functional activities, is not able to perform the activity at all. Of the SIPP sample age 25 to 61 (used

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<sup>9</sup> These measures may also be considered as participation restrictions; the ICF does not clearly distinguish between activity and participation domains.

<sup>10</sup> ADL questions ask if the person has any difficulty bathing, eating, dressing, getting around inside one's home, getting in and out of a bed or chair, and toileting by one's self.

<sup>11</sup> IADL questions ask if the person has any difficulty going outside one's home, doing light housework, managing money and bills, preparing meals, taking prescription medications, and using the telephone by one's self.

<sup>12</sup> Functional limitation questions ask if the person has any difficulty seeing words and letters in ordinary newsprint, hearing another person, having speech understood, lifting 10 pounds, walking up a flight of stairs, or walking for a quarter of a mile.

<sup>13</sup> Mobility limitations questions ask if the person uses a cane, crutches, walker, or wheelchair to get around.

for chapter II), 13.2 percent had an activity limitation and 5.4 percent had a severe activity limitation. Among full-time workers age 25 to 61 (the sample for chapter III), 8.3 percent had an activity limitation and 1.9 percent had a severe activity limitation. The final analytic chapter focuses on two age groups, adults age 18 to 58 and age 18 to 30. Among the former group, 11.0 percent had an activity limitation and 4.4 had a severe activity limitation; of the latter group, the percentages were 5.6 and 2.0, respectively.

Prior studies examining disability, particularly on the impact of ADA, have been limited by disability definitions that focus on a subjective measure of work limitation. Though often used, the primary advantage of using work limitation as a definition of disability is that it has been the only measure in the Current Population Survey (CPS) to identify disability and it is commonly included across surveys (Burkhauser and Houtenville 2006). In the ICF model, this measure identifies only one aspect of participation restriction—work. Though the population identified as having work limitations overlaps with other populations with functional, activity, and participation disabilities (see, for example, Burkhauser, Houtenville, and Wittenburg (2003), the overlap is far from perfect, and moreover, the work limitation definition does not adequately capture the population targeted by the ADA (that is, individuals with a health condition who can work), and responses to this question may be influenced by the ADA itself (Kruse and Schur 2003).

### *Time Frame*

The time frame to examine impacts varies in each chapter, though all use 1990 and 1991 as the pre-ADA implementation years. A key assumption of this dissertation is that because the ADA did not take effect until 1992 for large employers (and 1994 for

small employers), it took several years for the ADA to have an impact after its passage in 1990, and people (and employers) did not change their behavior in anticipation of the ADA's passage. Therefore, the 1990 and 1991 SIPP data serve as a baseline measurement of the dependent variables (Kruse and Schur (2003) and Moon and Shin (2006) use a similar approach). The use of these years introduces a potential bias that may underestimate the results since employers could have responded immediately to the ADA's passage in July of 1990, and other studies (such as DeLeire (2000)) found a decline in employment beginning in 1990.

The rest of the dissertation is structured as follows. Chapter II explores the ADA's effects on health coverage for people with disabilities. Chapter III identifies the changes in health coverage for full-time workers with disabilities after the ADA was implemented. Chapter IV considers the effect of the ADA on post-secondary enrollment for people with disabilities. The final chapter includes an overview of the findings and policy implications.

## II. Did the ADA Alter the Health Coverage for Working-Age Persons with Disabilities?

Health coverage promotes access to health care and prevents the loss of assets in the event of an adverse health condition. However, for people with health conditions that are severe enough to affect their functioning, health insurance becomes a method of financial assistance to pay for the medical care necessary to perform daily activities. This group faces significant challenges in obtaining coverage, since private coverage is largely a benefit of full-time employment, and public coverage (through Medicare or Medicaid) has typically prohibited employment at substantial levels. This chapter examines whether the 1990 Americans with Disabilities Act (ADA) was responsible for changes in the health coverage of people with disabilities. During the period that the ADA took effect, private health coverage decreased for all individuals, including people with disabilities, while the number of people with disabilities who were uninsured or received public coverage increased (McNeil 1993; McNeil 1997).

Congress passed the ADA to help integrate people with disabilities into all aspects of society, prohibit discrimination, and remove barriers they face in access. Specific goals included increasing employment and independence for people with disabilities. These goals were to be achieved by requiring employers to provide equal opportunities to people with disabilities and make reasonable workplace accommodations for individuals who need them. The ADA could have influenced health coverage for persons with disabilities in two ways: (1) by increasing their access to private coverage, particularly employer-based health insurance (EBHI), or (2) by reducing such access by increasing public and private sector costs of employment. Increased access could occur through eliminating barriers to employment and reducing the costs of job search, thereby giving

people with disabilities access to jobs that offer EBHI. Alternatively, the ADA could have increased costs (such as in making physical workplace changes) by mandating employer provision of reasonable accommodations for people with disabilities, by requiring equal opportunities for workers with disabilities, and (if open to the public) by ensuring nondiscriminatory access. If the costs of making these changes were substantial, employers may have sought ways to decrease their costs in other areas. Reductions in health insurance benefits could have been one such area, either through passing costs (via higher premiums or employee contributions) to workers, reducing the value of coverage by eliminating or curtailing certain benefits, or by not offering health insurance to employees.<sup>14</sup>

Reducing health benefits or raising premium costs could lead individuals to seek less expensive coverage (for example, should the employer offer more than one health plan) or to go without coverage. The effect of such adjustments by employers in health insurance benefits and costs may have been borne disproportionately by workers with disabilities. Their employers would be more affected by the mandate (since these firms employed individuals covered under the law), or their employment opportunities would shrink (if employers either reduced the number of workers with disabilities on their payroll or refused to hire people with disabilities). Such an effect would be in line with other perverse effects of the ADA regarding employment (see, for example, Burkhauser and Stapleton (2003)). Since many states had laws with provisions similar to the ADA, costs imposed by the ADA may have been greater for employers in states that did not have such legislation, as employers in states with ADA-like laws were already subject to

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<sup>14</sup> Given that offers did not decrease during this period (Cooper, Philip F. and Barbara Steinberg Schone. 1997. "More Offers, Fewer Takers for Employer-Based Health Insurance: 1987 and 1996." *Health Affairs* 16:142-149.), premium increases may be the most likely option.

these costs. The presence of a federal discrimination law may have also increased costs across all states by making people with disabilities and employers more aware of the requirements of protection.

If the ADA did unintentionally shift the health coverage of individuals with disabilities away from private coverage to public or no coverage, such an effect could result in a decrease in the use of needed health services by this population and with an accompanying decline in their health status. A shift to public coverage also creates barriers to employment, as individuals must prove they cannot work to obtain public coverage and then refrain from working to retain public coverage. Over time, being uninsured may negatively affect health, further decreasing the employment opportunities of people with disabilities.

At the same time as the ADA took effect, other factors occurred that could also have affected coverage changes in the US population. These factors—the increase in the number of federal disability beneficiaries, a rise in health care costs coupled with an overall decline in employer-based health insurance, and an economic recession—make attributing change directly to the ADA more difficult. The United States had just emerged from the 1990-1991 recession, and because private coverage is tied to employment, the jobs that were lost were accompanied by a decline in the number of workers covered by employer-based health insurance. Recessions may also have more of an effect on low-income workers and workers with disabilities; while employment declined for workers with and without disabilities during the 1990-1991 recession, the recovery in jobs after the recession was quicker for workers without disabilities (Maag and Wittenburg 2004). Also during this period, health costs and insurance premiums rose at greater rates than

income, contributing to an overall decline in private health insurance (Kronick and Gilmer 1999). Finally, and perhaps most importantly, the number of individuals receiving federal disability benefits rose as a result of programmatic changes in the 1980s and an increase in the relative value of benefits, particularly for low-income workers (Goodman and Waidmann 2004). A growth in the number of individuals receiving disability benefits would be accompanied by an expansion in the Medicare and Medicaid rolls.

Education may be an intervening factor of the type of health coverage held by people with disabilities during the ADA's implementation. Overall, individuals with less education are less likely to have health coverage, which is important given that individuals with disabilities tend to have less education than individuals without disabilities. For example, individuals who do not complete high school are about twice as likely to have no health coverage as individuals with a high school degree or GED and are three to four times more likely as individuals who have at least some college (Cohen, Martinez, and Free 2008). Another reason that education may be an intervening factor is that individuals with higher levels of education may have more skills to offer employers and so have higher rates of employment (and therefore access to employer-based health coverage).

This chapter examines whether the ADA contributed to the changes in health coverage of working-age people with disabilities by addressing three questions:

- 1) **Did the coverage of working-age adults with disabilities change relative to working-age adults without disabilities after the ADA's implementation?**

Given that the ADA reduced barriers to those with disabilities, the tested hypothesis is that adults with disabilities had significant increases in private



coverage (and decreases in rates of public or no coverage) compared to adults without disabilities (or alternatively, less of a decrease in coverage, if the rates of private coverage decreased for people without disabilities). The hypotheses stated in the remaining questions also are based on the assumption that the ADA reduced employment barriers.

- 2) **Did working-age adults with disabilities in states that had limited or no ADA-like laws have greater shifts in coverage after the implementation of the ADA than working-age adults with disabilities in states with ADA-like laws that were enacted before the ADA's passage?** The tested hypothesis is that the coverage for working-age adults with disabilities in states that did not have laws (or had limited laws) protecting employees with disabilities had a greater shift toward private coverage (and away from public or no coverage) than occurred for working-age adults with disabilities in states that had protective laws (or less of a decrease, if those in states with protective laws had a decrease in private coverage).
- 3) **Was the ADA effective in eliminating the educational disparity in coverage among individuals with disabilities?** Since individuals with high education levels are more likely to have private coverage than individuals with low education levels, was the ADA effective in eliminating the educational disparity in coverage among individuals with disabilities? The tested hypothesis is that it was not. Though the ADA was intended to reduce disparities, it is more likely that, in the short term, the ADA could have exacerbated private coverage rate differences between individuals with higher and lower levels of education. The

rationale is that individuals with more education may have been in a better position to take advantage of the employment opportunities created by the ADA (or if individuals with lower education were perceived to be less productive and thus more likely to be negatively affected by an increase in the cost of employing people with disabilities after the ADA's implementation).

The rest of this chapter is structured as follows. The following section explores the methodology, including the data source, variables, and estimation approaches. The next section presents the results for each of the research questions posed. The last section concludes with an overview of the strengths and limitations, findings, and policy implications.

### Method

The goal of the study is to identify trends in private, public, and no health coverage among people with activity limitations, looking at the period just before and after the implementation of the ADA to detect whether the changes in coverage were causally related to the ADA. The first approach to detect trends (used for the first and third hypotheses) compares changes in coverage of working-age adults with and without disabilities. The second approach (used for the second and third hypotheses) examines the health coverage for working-age adults with disabilities in three types of states: states with laws protecting workers with disabilities that were similar to the ADA, states with laws that were limited in the protections they offered, and states with no laws protecting workers with disabilities. Both approaches apply difference-in-differences (DD) or difference-in-difference-in-differences (DDD) models to the data from the Survey of

Income and Program Participation (SIPP) from 1990 to 1994 to obtain estimates for the study's research questions.

### *Data Source and Population*

The study uses multiple panels of SIPP data (1990, 1991, 1992, and 1993 panels) for the years 1990 through 1994. The analysis limits the sample to adults 25 to 61 years of age. This age restriction excludes individuals who might have been covered by their parents' health insurance at one end of the spectrum and people who may have retired at the other end. The models control for a standard set of demographic characteristics, including age, age-squared (to detect any non-linearities in the age-outcome relationship), gender (females as reference group), race (white, black, or other race, with white as the reference group), marital status (married or unmarried, with unmarried as the reference group), education (high school degree or less versus some college or college degree, with the former as the reference group), and also includes an indicator for post-ADA implementation (which equals one if the year is 1993 or 1994 and zero for earlier years). Specifications include state fixed-effects to account for time-invariant state characteristics or, because state fixed-effects are collinear with the state type variables, state-level monthly unemployment rates from the Bureau of Labor Statistics are instead used to account for variation in state economic conditions.<sup>15</sup>

### *Health Coverage*

The outcome variable of interest is health coverage, which is defined as one of three mutually exclusive categories: private coverage, public coverage, or no coverage. Private coverage includes employer coverage, either through one's own employer or

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<sup>15</sup> Including state unemployment rates with the state-fixed effects models does not substantially change the results.

one's spouse's employer, or individually purchased coverage. Public coverage includes Medicare, Medicaid, or military-related coverage through the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS, now TRICARE). Individuals who do not report receiving any of the above types of coverage are considered as having no health coverage. Only one type of coverage is assigned to an individual, with the order presented above taking precedence.

### *Subgroup Analyses*

Health coverage trends may differ by federal disability income status and work status, and these differences may lend evidence as to whether the ADA is responsible for any observed changes in coverage among people with disabilities. Individuals who receive Supplemental Security Income (SSI) or who receive Social Security income and also have a work limitation are flagged as having federal disability income. The latter is a proxy for Social Security Disability Income, which is not consistently identified in the SIPP data. Individuals who report having a job during the reference month for any number of hours (including self-employment) are classified as working, while those who do not have a job or are out of the labor force are classified as not working.

### *Analysis*

The impact of the ADA is assessed by comparing health coverage status before and after its implementation. In particular, the empirical tests described in detail below reveal whether the ADA reduced or eliminated differences in these outcomes among groups of individuals overall or in specific states. As noted earlier, a DD modeling framework is applied to examine changes in outcomes after ADA's implementation between individuals with and without disabilities or between individuals in state groups,

while a DDD model is used to compare trends by education level for the groups used in the DD models.

The first research question is addressed through separate difference-in-differences (DD) estimates of coverage comparing outcomes for people with and without limitations before and after ADA implementation:

$$\text{Prob (COVERAGE}_{iy}) = \beta_0 + \beta_1 X_{iy} + \beta_2 \text{ADA}_y + \beta_3 \text{LIMITATION}_i + \beta_4 \text{ADA}_y * \text{LIMITATION}_i + e_{iy} \quad (1)$$

where  $i$  indexes individuals and  $y$  indexes years. COVERAGE is a binary variable showing the type of health coverage (private, public or no coverage). The differences are estimated for three models: private versus public coverage (with public as the reference group), private versus no coverage (with no coverage as the reference group), and public versus no coverage (again, with no coverage as the reference group). A typical approach might broadly compare private coverage to any other type of coverage, but the approach used for this analysis has the advantage of identifying the dynamics of a shift from one type of coverage to another (for example, if private coverage declines, does public coverage, no coverage, or both increase as a result?).  $X$  represents a vector of demographic and state/year dummy variables, ADA is a dummy variable that takes a value of one for years post-ADA implementation (1992 and after; zero for prior years), and LIMITATION indicates the presence of an activity limitation.  $\beta_4$  is the coefficient of interest (the DD estimate): it indicates whether there was a change in the coverage rates among adults with limitations after the ADA's implementation compared to adults without disabilities. A positive value would indicate that the ADA affected one type of

coverage over another by the first type of coverage increasing at a greater rate (or decreasing at a smaller rate) for individuals with limitations than the second type of coverage compared to individuals without limitations. A negative estimate would signify the opposite effect (that the first type of coverage decreased at a greater rate (or increased at a lower rate) for individuals with limitations than for the second type of coverage, compared to individuals without disabilities. If the coefficient  $\beta_4$  is small and insignificant then it implies that ADA had no significant effect on the two health insurance coverage types among workers with disabilities.

The second model (addressing the second research question) narrows the focus by sub-setting to the population with limitations to determine whether the ADA itself was a factor in any observed changes in the coverage status of persons with limitations across states with varying ADA-like laws that were enacted before the federal provision. Coverage among adults with limitations between states with and without ADA-like laws are compared before and after the 1992 implementation of the ADA:

$$\text{Prob (COVERAGE}_{ijy}) = \gamma_0 + \gamma_1 X_{iy} + \gamma_2 \text{ADA}_y + \gamma_3 \text{SLP}_{ij} + \gamma_4 \text{SNP}_{ij} + \gamma_5 \text{ADA}_y * \text{SLP}_{ij} + \gamma_6 \text{ADA}_y * \text{SNP}_{ij} + e_{ijy} \quad (2)$$

with  $j$  indexing state type. This model recognizes that the impact of the ADA on health insurance status may be affected by the presence of prior ADA-like legislation in some states. It takes advantage of variation in the latter to assess whether the ADA had differential impacts on the outcomes of interest for persons with activity limitations in limited-protection states (SLP) and states with no ADA-like laws (SNP) compared to the reference group of full-protection states. SLP and SNP are dummy variables, each taking

a value of one for observations residing in the specific type of state, and zero for those residing in all other state types providing full protection to individuals with limitations similar to the federal ADA legislation (the reference group). Positive values for coefficients  $\gamma_5$  and  $\gamma_6$  would indicate that residents with limitations of limited or no protection states had a larger increase (or less of a decrease) in the first type of coverage compared to residents with limitations in full protection states. Negative values would indicate that residents with limitations in limited or no protection states had a larger decline (or less of an increase) of the first type coverage compared to residents with limitations in full protection states. An insignificant value would indicate that the ADA did not have an effect that was detected by the analysis.

The third question regarding the differential effects of education is explored through a DDD model. Equation (3), based on equation (1), introduces a dichotomous measure of education level (EDUCATION, which equals one if the individual had at least some college, zero otherwise):

$$\begin{aligned} \text{Prob (COVERAGE}_{iy}) = & \delta_0 + \delta_1 X_{iy} + \delta_2 ADA_y + \delta_3 LIMITATION_i \\ & + \delta_4 EDUCATION_i + \delta_5 ADA_y * LIMITATION_i \\ & + \delta_6 ADA_y * EDUCATION_i + \delta_7 LIMITATION_i * EDUCATION_i \\ & + \delta_8 ADA_y * LIMITATION_i * EDUCATION_i + e_{iy} \end{aligned} \quad (3)$$

The DDD estimate ( $\delta_8$ ) shows the change in coverage post-ADA implementation compared to pre-ADA implementation for people with limitations by education level (at least some college versus high school or less) relative to the change in the coverage between people without limitations by education level, as follows:

$$\delta_8 = (\Delta \text{ Coverage}_{\text{Limitation, At Least Some College}} - \Delta \text{ Coverage}_{\text{Limitation, High School or Less}}) -$$

$$(\Delta \text{ Coverage}_{\text{No Limitation, At Least Some College}} - \Delta \text{ Coverage}_{\text{No Limitation, High School or Less}})$$

A positive coefficient is consistent with a finding that the ADA resulted in a reduction in the education difference of having coverage for individuals with limitations compared to the change in education difference in coverage for individuals without limitations, either because lower educated individuals with limitations had greater increases or lesser declines in coverage. A negative coefficient is consistent with a narrowing of the gap in insurance by education for people with limitations after the ADA took effect compared to those without limitations (or a larger decrease, should coverage have declined).  $\delta_8$  is hypothesized to be positive and significant in the two equations predicting private coverage and negative for the equations predicting public coverage.

Table 2.1 provides an overview of the three equations, the interaction of interest, and the hypothesized direction of the effect.

As mentioned, supplementary analyses on subgroups (those with and without federal disability income and those working or not working) may help identify some of the mechanisms behind coverage trends, particularly whether observed trends may be more likely the result of the ADA than alternative explanations. Competing influences on health coverage include the rise in the number of federal disability beneficiaries, the 1990-1991 recession, and increases in health costs and private insurance premiums. While the ADA could result in either an increase or decrease in private coverage, a decrease in private coverage might also be due to the recession (though the analysis controls for changes in unemployment, which serves as a proxy for economic dynamics) or rising health costs, with a corresponding increase in the number of individuals with no



coverage. If there was an increase in public coverage (away from private or no coverage), that would suggest that the observed changes in coverage were due more to the increased number of federal disability beneficiaries rather than the ADA.<sup>16</sup> A shift in coverage observed more for workers than non-workers, particularly when comparing private to no coverage, would provide evidence for effects by the ADA, economy<sup>17</sup>, or high health coverage costs, while effects that are more pronounced for federal disability beneficiaries than non-beneficiaries would suggest changes on account of the federal disability program that primarily affected non-workers.

Effects resulting from the ADA, rather than the recession or rising health costs, should result in greater impacts in states with limited or no protection than in states with full protection. If changes in coverage are found more in states that did not have full protection laws prior to the ADA's implementation, that would provide the strongest evidence of effects resulting from the ADA, as it is not clear how differential effects by state type would arise from federal disability policy, the recession, or rising health costs.

In the discussion that follows, all results, unless otherwise noted, are statistically significant at  $p < 0.05$  or better for a two-tailed test.

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<sup>16</sup> The ADA may have directly affected the number applying for and receiving federal disability benefits. For example, if the employer costs of complying with the ADA restricted the labor market opportunities for people with disabilities, then they may have applied for and received federal disability benefits in greater numbers than they would have otherwise, and this would create a shift to public health coverage. However, given the length of time it takes for disability income applications to be approved, the two-year waiting period for DI beneficiaries to obtain Medicare, and the fact that the rolls had been increasing since the 1980s, it is not likely that the ADA would have any effect on disability benefits in this study's time frame.

<sup>17</sup> If the recession affected some sectors, particularly those that employ people with disabilities, more than others, then the current model does not include variables that would account for such effects.

## Results

### *Sample Characteristics*

Many characteristics of the sample differed by limitation status (Table 2.2). People with and without limitations were compared using chi-square or t-tests, with a threshold of  $p < 0.003$ <sup>18</sup> used in order to account for the multiple comparisons. When people with limitations were no different than people without limitations on a characteristic, the statistics have the same subscript (a). When people with and without limitations differed, the statistics have different subscripts (a and b). Separate comparisons were made for any limitation and severe limitation, and statistics were calculated using SIPP sample weights and accounted for the complex survey design. Adults with any or severe activity limitations were less likely to be male, white, married, or have at least some college education. Adults with limitations were also older than adults without limitations. About two-thirds of the sample resided in states that had laws against discrimination (limited protection laws) and three to six percent of the sample resided in states that had no laws related to the employment of people with limitations. Individuals with limitations had higher rates of federal disability benefit receipt and lower employment rates. On the dependent variables, individuals with any limitations were less likely to have had private coverage and more likely to have had public health coverage or no health coverage than individuals without any limitations, while individuals with severe limitations were less likely to have private coverage more likely to have public coverage than individuals without severe limitations.

Working-age adults with activity limitations in states with no protection laws differed on several characteristics from those in states with limited or full protection laws

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<sup>18</sup> Based on a Bonferroni correction of  $p < 0.05$  divided by 19 comparisons.

(Table 2.3). These analyses follow the same analytical strategy as Table 2.2, but the comparisons are among state types. When a chi-square test indicated differences among state types, pairwise comparisons were used to identify which state types differed, with a significance level of  $p < 0.0009$  used to account for multiple comparisons. Statistics that do not differ by state type have the same subscript (a); state types that have statistically significant differences for a characteristic have different subscripts (a, b, and c).

Working-age adults with activity limitations in states with no protection were more likely to be black, less likely to be employed or have private health coverage, and more likely to have no health coverage, compared to those in states with limited or full protection.

Working-age adults with any or severe limitations in full and limited protection states had similar characteristics, although in full protection states, people with limitations were more likely to have private coverage and resided in states where unemployment rates were lower than states with limited or no protection. Similar patterns occurred for individuals with and without severe limitations, though with fewer statistically significant differences (likely because of the smaller sample size for those with severe disabilities).

#### *Health Coverage before and after the ADA for People with and without Limitations*

The analysis begins by presenting the unadjusted mean values of health coverage before and after the ADA to assess the impact of the ADA on coverage status. The top section of Table 2.4 shows the proportion of individuals with (severe) limitations who had specific types of coverage before and after the ADA, along with standard errors and unweighted sample sizes. All statistics use sample weights and adjust for the complex sampling design of the SIPP but do not control for demographic or state characteristics. The middle section contains the same statistics for individuals without (severe)

limitations. This presentation provides a context for later analyses that account for demographic and state characteristics, and also shows the overall proportion of individuals with coverage (and the number of such individuals in the SIPP).

People with limitations had a 6.1 percentage point decline in private coverage after the ADA, and the decline was largely offset by an increase in public coverage. People without limitations had a 1.9 percentage point decrease in private coverage, about one-third the size of the decline for people with limitations. The general patterns (positive or negative changes in coverage) were similar in direction, if not magnitude, for all but one of the time differences for people with and without disabilities. The exception was for the no coverage comparison for individuals with and without severe disabilities; individuals with severe disabilities had no change in the proportion who lacked health coverage.

Comparing the mean changes in coverage for individuals with and without limitations leads to unadjusted DD estimates, which are shown at the bottom of Table 2.4, and these estimate indicate that after the ADA was implemented, the decline in private health insurance coverage was 4.2 percentage points larger for individuals with limitations than for individuals without limitations. The increase in public health insurance coverage after the ADA implementation was 3.7 percentage points larger for people with limitations than for people without limitations. The patterns in private, public, and no coverage for the population with and without severe limitations were similar as for the populations with and without any limitations

Table 2.4 also shows two broader issues related to coverage. First, people with limitations were less likely than those without limitations to have had private or no

coverage (and correspondingly, more likely to have public coverage)—for example, 64.9 percent of individuals with limitations had private coverage before the ADA, compared to 82.8 percent of individuals without limitations. Second, private coverage declined for everyone (either with or without limitations) after the ADA was implemented.

The next series of analyses presents DD estimates using linear-probability regression models that follow equation (1). As noted, the outcome measures for these models compare changes in one type of coverage with another (for example, private coverage relative to public coverage) so that the DD and DDD estimates apply only to the population with those two types of coverage; this approach identifies how specific coverage patterns changed after the ADA was implemented. By contrast, the proportions presented in the unadjusted DD analysis tables are for the entire population (and so for all three coverage types), and the unadjusted regression-based estimates are therefore not directly comparable. Table 2.5 shows a series of estimates from linear probability models that compare the change between private and public coverage rates (the first and second columns), the change between private and no coverage rates (the third and fourth columns), and the change in public and no coverage rates (the fifth and sixth columns). These regression-based estimates control for age, age-squared, gender, race, education, and marital status, as well as state fixed-effects (full results not shown). The first section of the table shows the results for the full sample (all individuals age 25 to 61), followed by estimates for the subgroups of interest (where the sample sizes were sufficient). The first column of each comparison includes any activity limitation as the disability variable; the second column includes the narrower disability specification, comparing individuals

with severe activity limitations to those without severe activity limitations. This latter group includes people with non-severe activity limitations.

Broadly, individuals with limitations had a loss of private coverage and an increase in public coverage after the ADA. Among workers, the loss in private coverage was accompanied by an increase in both public and no coverage; while among individuals without federal disability benefits, private coverage was replaced by no coverage. Details for the specific groups shown in Table 2.5 follow.

*Full sample.* Individuals with limitations had lower levels of private coverage relative to public coverage after the ADA. Individuals with any activity limitation had a 4.4 percentage point decline in the rate of private coverage (versus public coverage) after the ADA was implemented, compared to individuals without activity limitations; the comparable number for individuals with severe activity limitations was a 4.8 percentage point decline.<sup>19</sup> Based on the information presented in Table 2.4, this result is due to both a decline in private coverage and an increase in public coverage for people with (severe) limitations, while for people without (severe) limitations, their private coverage declined slightly with no real change in their public coverage. Such a finding suggests that the coverage decline observed was due to the “treatment” group, those with limitations, rather than an increase in coverage for the “control,” those without limitations.

There were no significant changes in private to no coverage or public to no coverage for all individuals with limitations after the ADA. In general, the DD coefficient for each of the comparison tests is small in magnitude and not statistically significant.

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<sup>19</sup> The 1992 and 1993 panels overlap and allow use of alternative waves for the analysis; using wave 9 of the 1992 panel and wave 3 of the 1993 panel (instead of wave 6 for both) do not substantially change the results for this and other main estimates.

*Individuals receiving federal disability income.* Individuals with federal disability income had no significant changes in their coverage after the ADA. The DD estimates for the any and severe activity limitation equations are roughly equivalent to those for the full sample and in the same direction, though the standard error is much larger. An exception is the private versus public estimate for individuals with severe limitations, in which the coefficient was less than half the size of the coefficient for the full sample (and not significant). Few individuals with no limitations and who had federal disability income lacked coverage, and so ADA impacts could not be estimated for those cells.

*Individuals without federal disability income.* Looking at individuals without federal disability income provides some evidence that the ADA had a perverse effect on the lack of coverage for people with activity limitations compared to those without limitations. First, the period after the ADA is associated with a 2.4 percentage point increase in no coverage at the expense of private coverage for people with any activity limitation. For individuals with severe limitations, this estimate was not significant, though the coefficient was similar in size and direction as that for individuals with any limitation. Second, individuals with severe activity limitations (but not any activity limitation) were also 6.7 percentage points less likely to have public coverage than no coverage after the ADA, relative to individuals without severe limitations, although this finding obtained statistical significance only at  $p < 0.10$ .

*Workers.* The ADA had a negative effect on the private coverage of workers with any activity limitations. Compared to workers without limitations, workers with any limitations had a 2.5 percentage point shift from private to public coverage, a 3.0 percentage point shift from private to no coverage, and 4.7 percentage point shift from no

to public coverage (though the latter was significant at  $p < 0.10$ ). This effect is rather strong and consistent, given the estimates observed for the entire population, and suggests that as noted above, employers may have been negatively affected by the ADA.

*Non-workers.* No DD effects on coverage were observed for individuals who were not working.

*Health Coverage before and after the ADA for Individuals with Activity Limitations by State Type*

To compare changes in the health coverage for those residing in states that may have been differentially affected by the ADA, the analysis first examines unadjusted means estimates and then uses regression models to provide DD estimates. With either approach, few differences in health coverage changes are observed by state type.

Table 2.6 shows the unadjusted DD means estimates of the impact of the ADA on coverage rates for people with and without limitations by state type in a similar way as Table 2.4. As found in the demographic patterns observed in Table 2.3, the coverage rates and changes for residents of full and limited protection states before and after the ADA were more similar to each other than to changes for residents of no protection states. The DD estimates (the last panel of the table) show that after the ADA, residents with limitations in full protection states had a 5.3 percentage point decline in private coverage and 5.0 percentage point increase in public coverage compared to residents without limitations. The comparative percentage point changes for residents in limited protection states were -4.0 and 3.4, respectively, and for residents in no protection states, -1.5 and -0.4, respectively (both statistically insignificant). The sample sizes for residents in no protection states were small and not sufficient for many later subgroup analyses. The



findings comparing the population with and without severe limitations residing in full and limited protection states (Table 2.7) were similar to those for any limitation, whereas the changes in coverage for residents of no protection states with severe limitations were considerably larger than those observed for residents of no protection states with any limitation. The sample sizes for many of the no protection cells are not sufficient for DD analyses (using a rule of thumb of 50 cases per cell); these statistics are shown for illustrative purposes only, and further analyses do not include this group.

The coverage change for people with limitations in limited or no protection states after the ADA was no different than the change in coverage for people with limitations in states that had full protection for people with limitations. The regression results presented in Table 2.8 follow equation (2) and include the same demographic covariates as the previous model, though substituting state unemployment rates for state fixed-effects to account for state-level economic conditions (since state fixed-effects cannot be included because they are collinear with the state type variable). The DD results for the full sample, either for limited or no protection states, were not statistically significant; the sample sizes for subgroups were too small to allow further comparisons.

People in limited or no protection states may have had changes in coverage during this period that are masked by restricting the sample only to those with limitations; however, in looking at the sample without either any or severe activity limitations, the ADA did not have an effect on the coverage of individuals without limitations in limited or no protection states compared to those in full protection states (Table 2.9). The non-significance of the DD coefficients in this table suggests that the decline in private coverage after the ADA was pervasive; that is, residents of limited and no protection

states where the ADA may have imposed additional costs on employers had no changes in their private coverage beyond that which occurred nationally.

#### *Education and Coverage after the ADA*

The effects of the ADA did not differ by education level for the full sample. The results in Table 2.10, following equation (3), include demographic characteristics and state fixed-effects. The DDD estimate (ADA \* limitation \* education) is not significant for any coverage comparison, so the ADA did not have a differential impact on the health coverage of people with limitations who had different levels of education. Further, the subgroup results show no effects of the ADA by disability status and education level for specific groups, though for many cells, particularly for workers, the sample sizes were too small to allow estimates. In addition, the number of individuals with limitations by state type was not sufficient to allow planned DDD analyses using education as an additional interaction term.

#### Discussion

The results of this chapter are not entirely consistent with the possibility that the ADA imposed an additional cost to accessing private coverage for the general population with disabilities. Though private coverage decreased, public coverage (rather than no coverage) increased and there were no detected differences among states that varied in the extent to which laws protected workers with disabilities before the ADA was passed. The shift in coverage for the general population seemingly results more from the rise in federal disability benefits rather than from the ADA. However, the increase in no coverage among subgroups of the population with limitations (workers and those without federal disability benefits) provides some evidence that the ADA may have increased

costs to employers, which they passed to employees in the form of increased costs for health coverage or restrictions in coverage. This section describes the strengths and limitations of the analysis, provides additional review of the findings, and concludes with policy implications and areas for further research.

### *Strengths and Limitations*

Before reviewing the results and implications, it is important to understand this study's strengths and limitations. The strengths include the use of a broader definition of disability that focuses on physical and activity limitations, rather than a definition solely involving work limitation (which may not capture individuals covered under the ADA). It also capitalizes on state differences in their pre-ADA laws protecting people with disabilities to assess the relative effect of the ADA where the ADA represented a novel addition to existing state law (requiring employers to provide accommodations).

This analysis has several limitations that should be understood to help with interpreting the results. First, an important assumption for the DD and DDD analyses—that the treatment and control groups are equivalent on observable characteristics—is not met. As seen in Table 2.2, people with disabilities differ on many demographic and economic characteristics, such as age, race, marital status, and employment, all of which are related to a key observable characteristic—having a health condition limiting their functional ability—that is used to define this population. For analyses comparing state differences, people with disabilities residing in limited and full protection states are largely similar, though those with disabilities in the three no protection states differ across many characteristics. Given these differences among the groups, and despite

holding constant selected observable characteristics, the results may be due to omitted or unobservable factors other than the ADA that differ between the groups.

The second limitation is the narrow pre-ADA window. The analysis uses 1990 and 1991 as the baseline period. While two-year pre- and post-periods are typically used to assess policy impacts, the ADA was passed in 1990 and took effect in 1992 (for large employers) or 1993 (for small employers), and so employers may have changed their behavior before the law took effect. If employers anticipated negative effects on account of the ADA, they may have prepared for the ADA's implementation by discharging or not hiring people with disabilities. This scenario is not likely, however, since employers would have to be cognizant of the details of the law and anticipate its effects. Further, if employers anticipated negative effects, the observed coverage changes might have occurred earlier, beginning in 1991. Additional analyses (not shown) found that coverage for people with limitations did not change from 1990 to 1991. Alternatively, the post-period combines 1993 and 1994, the former being the implementation year for smaller employers. Again, additional analyses (not shown) found no significant differences in coverage between these two years.

Third, the small sample sizes in the SIPP allow detection of only large effects for many of the analyses, particularly for people with severe limitations, residents of no protection states, and differences by education level. This lack of power is unfortunate, since members of each group may have been the most likely to benefit from the ADA. Rather than suggesting that the ADA had no effect for these groups, the lack of statistically significant findings in many equations may be because any changes resulting from the ADA may have been too small to detect with the SIPP.

*Did the Coverage of Working-age Adults with Disabilities Change Relative to Working-age Adults without Disabilities after the ADA's Implementation?*

After the implementation of the ADA, individuals with limitations had a shift in their health coverage away from private coverage and toward public coverage. Private coverage decreased during this period for everyone, but these results suggest that individuals with limitations were disproportionately affected. The finding is consistent with other research on the perverse effects of the ADA that indicate that employment decreased for individuals with disabilities (for example, DeLeire (2000)): individuals who do not work are less likely to have access to private (employer-based) coverage. However, the analysis also shows that the decline in private coverage for the general population was accompanied by a shift to public coverage, which is likely due to the rise in the number on the disability rolls (which, as noted, would be unrelated to the ADA during this period), since the DD coefficients that involved public coverage comparisons were not significant when federal disability beneficiaries were excluded from the sample.

The change in coverage is driven largely by changes for workers and individuals without disability benefits. Workers with limitations had declines in private coverage after the ADA that were greater than the declines observed for workers without limitations. Private coverage was replaced by both public coverage and no coverage. Individuals without federal disability income were observed to have a significant shift from private to no coverage. While the increases in no coverage suggest an effect caused by the ADA, the finding related to the increase for public coverage is puzzling, since public coverage is only available for individuals who are assessed as being unable to work at substantial levels. Methodological issues may be driving this finding, since

employment and health insurance variables are distinct sets of questions in the SIPP; without an employment “anchor,” respondents may not accurately report their health insurance coverage. While possible, it is more likely that public coverage may actually be underreported by respondents in the SIPP and other national surveys (see, for example, Card, Hildreth and Shore-Sheppard (2004)), so that the reported estimates regarding public coverage may underestimate the true effect.

The pattern for workers with limitations to have both public and no coverage may have been because the ADA expanded the employment opportunities for individuals with disabilities, and these newly hired workers were not yet eligible for health coverage through their employers, or their employers did not offer health insurance. This reasoning is suspect, since as previously noted, many studies have found that the ADA resulted in a decline in employment for people with disabilities. Additional analyses (not shown), based on the regression model presented in equation (1) and substituting any employment as the dependent variable for coverage, found that the ADA resulted in a 1.9 percentage point decline in employment (significant at the  $p < 0.10$  level) for people with any limitations compared to people without limitations. (The comparable estimate for individuals with severe limitations was small and not significant.)

A more likely explanation may involve employer behavior or employee characteristics. The shift from private to no coverage among workers and those without disability income suggests that the ADA may have imposed additional costs on employers, which they then passed to employees with disabilities through reduced access for private coverage. This logic does not explain, however, the increase in public coverage. The observed result for workers with limitations could result from their

increased reliance on part-time employment, whereby individuals could both receive federal disability benefits and work at low levels. However, while workers with limitations are more likely to work part-time than workers without limitations, the proportion of part-time workers with limitations did not change after the ADA (28.5 percent of all workers with limitations were part-time before the ADA and 28.9 percent were part-time after the ADA; a similar pattern was observed when looking at part-time workers as a proportion of all individuals with limitations, not just workers). What did change, however, is that the proportion of workers with limitations who reported receiving federal disability benefits increased from 5.2 percent to 6.4 percent (and from 12.6 percent to 14.5 percent among workers with severe limitations). This increase corresponds to the weighted public coverage rates of all workers with any limitations (unadjusted for other factors) almost doubling after the ADA, increasing from 2.9 percent to 5.2 percent; public coverage for part-time workers increased from 6.3 percent to 11.9 percent. (Separate analyses could not be conducted for full-time workers because so few full-time workers had public coverage, a fact that also lends support to this argument.) The observed shift from private to public coverage therefore could be due to an increase in the number of workers, particularly part-time workers, who receive federal disability benefits.

One positive finding is that individuals with limitations were not more likely to lack any coverage after the ADA's implementation (aside from workers and individuals without federal disability income); the shift from private to public coverage suggests that the safety net worked as intended, providing people with disabilities access to health care during this period. Public coverage, however, comes at a cost, since the financial cost of

such coverage is shared by society, rather than borne by those who benefit the most (individuals with disabilities and, most likely, their employers). It also suggests that the changes in coverage were not due to the economic recession, which, if it had been a factor, would have increased the number of individuals with no coverage (though it could have encouraged individuals to apply for federal disability benefits). Further, because the safety net of public coverage is so hard to access, and individuals with disabilities would be expected to be more likely to lack coverage if the ADA resulted in increasing costs to employers to such an extent that individuals, particularly those with disabilities, were forced out of the private coverage market.

*Did Working-age Adults with Disabilities in States That Had Limited or No ADA-like Laws Have Greater Shifts in Coverage After the Implementation of the ADA than Working-age Adults with Disabilities in States with ADA-like Laws Enacted Before the ADA's Passage?*

People with limitations who lived in states that did not have ADA-like laws or had limited ADA-like laws before the ADA's passage did not differ in their health insurance coverage changes in amounts large enough to be detected in these data from people with limitations who lived in states with ADA-like laws. States are likely as varied within each of the state-categories in terms of local enforcement, employer awareness of state laws protecting workers with disabilities, and employee awareness of laws protecting their employment, as states between the state-types, and it is hard to argue that these factors differed systematically according to pre-ADA state laws. This finding suggests that employers in states without full ADA protection did not have



additional costs because of the ADA, or at least costs that were passed on via health coverage.

*Was the ADA Effective in Eliminating the Educational Disparity in Coverage Among Individuals with Disabilities?*

The ADA had no clear impact on the types of health coverage held by people with activity limitations with different education levels. Education level does have a large influence on the type of coverage held by a person with disabilities, with higher education associated with a higher likelihood of having private coverage. A possible reason for this finding is their enhanced human capital relative to those with lower educational attainment and thus, their better access to such coverage through their employment at jobs that offer health insurance. Workers with more education may be more valued by employers, or be more likely to work at companies in which the ADA did not represent an additional cost. However, this difference in coverage was not affected by the ADA, suggesting that the ADA neither closed nor widened this disparity, at least in the short term, or at levels that could be detected by the analysis.

*Policy Implications*

Rates of private coverage are lower for individuals with disabilities than for individuals without disabilities; while the ADA may not have been entirely responsible for the observed decline in private rates, the law also does not appear to have facilitated access to private coverage. Private health coverage in the United States is dominated by coverage provided by employers, and there are many reasons that individuals with disabilities might lack access to private coverage. They may work, but not enough to meet their employers' offer of coverage. The coverage itself may not be affordable, either

because the premium is high or their wages are low (or both). The individual market, regulated by states, is often expensive, even for those without a health condition (and having a pre-existing health condition may disqualify individuals with disabilities from this market). Regardless, without access to private coverage through an employer, individuals may be forced to look for alternatives such as public coverage, where individuals must be assessed as not able to work in order to qualify. The motives behind this change in health insurance status may be difficult to untangle: for example, do individuals with limitations leave the private market in order to obtain public coverage (as well as cash benefits), or are they pushed out of the private coverage market and so forced to seek public coverage as a replacement? The answer, though beyond the scope of this analysis, is likely both. Regardless, public coverage for people with disabilities imposes a participation restriction on those who are covered. Even with changes extending Medicare and Medicaid access for federal disability beneficiaries who choose to return to work, few beneficiaries are aware of these work incentives (Livermore, Stapleton, and Roche 2009).

Another problem with public coverage involves parity: do publicly insured individuals with activity limitations have the same access to health care as their counterparts with private coverage? Individuals with Medicare coverage have wide access to medical providers and treatment, though they would have lacked prescription drug coverage (until Medicare Part D was implemented in 2005) and mental health care supports. Individuals with Medicaid have fewer choices in providers (since not all providers accept Medicaid because of its low provider payments), but would have prescription coverage and access to home- and community-based care. Another parity

consideration arises with Medicaid being a federal/state program; the benefits that beneficiaries can access vary by state (Medicare benefits are uniform across the nation) as well as access to providers.

### *Future Research*

The current findings suggest two future avenues of research. First, the analyses intentionally focus on a definition that corresponds to the activity limitation of the ICF model. People using other disability definitions, such as functional limitations (for example, development disabilities or learning disabilities) or participation limitations (for example, having a work limitation) could have different results, and the intersection of definitions would be particularly useful to explore. For example, individuals with both activity and work limitations may have different patterns of health coverage after the ADA than individuals with activity but not work limitation, though as suggested by Kruse and Schur (2003), how people respond to the work limitation question may have been influenced by the ADA itself.

Further research is also warranted on the pathway through which coverage changes of workers with disabilities are manifested. The findings suggest shifts away from private coverage for workers, which could result from individuals with limitations moving from full-time employment (which provides health coverage as a fringe benefit) to part-time (where health coverage is less likely to be an option) or restricted offers of insurance by employers on account of increased cost imposed by the ADA.

### III. Did the ADA Increase Rates of Employer-Based Health Insurance for Workers with Disabilities?

Employer-based health insurance (EBHI), a benefit typically associated with full-time employment, is the largest source of private health insurance in the United States and is available to many working Americans (Stanton 2004). However, coverage access may be limited for people with disabilities (National Council on Disability 2007a). For example, enrollees likely to experience high costs (including persons with disabilities) may drive up premiums in the small-group coverage market (Monheit and Schone 2003; Simon 2004). “Job lock” may tie individuals with health conditions to an employer to avoid the risk of not having coverage or obtaining less generous coverage with an alternative employer (Reinhardt 1999). Health issues may limit the nature and duration of employment (for example, type of job, weekly hours, and weeks worked), and therefore, the receipt of health insurance benefits since, as noted, such benefits are offered largely to full-time workers (National Council on Disability 2007a). Finally, waiting periods may limit immediate access to coverage and pre-existing condition limitations may preclude coverage for those with specific health problems (Simon 2004).

EBHI is a critical issue for this population because workers with disabilities are also more likely to be in occupations with lower rates of EBHI (Stapleton, Goodman, and Houtenville 2003), and no practical coverage alternatives exist should people with disabilities seek employment. Public coverage may be available, but that coverage comes conditionally—a person must be assessed as being able to participate only minimally in the labor market and must either be extremely poor (in order to qualify for Medicaid) or wait two years (to receive Medicare, the medical benefit for Social Security Disability

Insurance beneficiaries). The high use of health care for this population and the corresponding high expenditures limits the affordability of health insurance in individual markets, as insurers view persons with disabilities as adverse health risks.

That health coverage is an issue for people with disabilities and for employers is reflected in current policies to promote health insurance for this population, such as the Medicaid buy-in program (Centers for Medicare and Medicaid Services 2006), COBRA rules that extend health coverage for individuals with disabilities (US Department of Labor 2008), and demonstration projects by the Social Security Administration (SSA) that include health coverage (like the accelerated benefits demonstration which is testing the provision of Medicare to new disability beneficiaries) (Social Security Administration 2008).

As noted earlier, in 1990, Congress passed the Americans with Disabilities Act (ADA) to promote the independence of people with disabilities by eliminating discrimination against such persons and the barriers they face in access. For most states, the ADA did not represent entirely new laws for people with disabilities. Eighteen states had legislation prior to 1990 that provided protection to workers with disabilities that was similar to the ADA; 29 states had less comprehensive laws that prohibited disability discrimination but did not require employers to provide reasonable accommodations; and three states had no laws protecting individuals with disabilities.

The ADA may have increased the health insurance status of workers with disabilities (or prevented greater erosion of EBHI since EBHI coverage declined for all workers over the period from 1987 through 1998 (Gabel 1999)). Since the intent of the ADA was to improve the employment circumstances for people with disabilities and

prohibit discrimination with regard to wages, the ADA could have increased access to jobs with benefits like health insurance. By enhancing such access, the ADA could have reduced the costs to persons with disabilities of obtaining jobs with coverage. This result arises from reducing the cost of searching for such jobs (since at least in theory, prior to ADA, fewer employers would have provided job-related accommodations thereby raising the costs of finding favorable employment circumstances with health insurance compared to the post-ADA period) and/or by reducing the stigma and discrimination they face when seeking work in a “mainstream” employment setting. Second, the ADA may have had an indirect effect through its educational provisions. To the extent that the ADA induced greater educational attainment by persons with disabilities through provisions that improved access to educational institutions, their enhanced human capital and value in the workplace may have led to jobs that provide benefits such as health insurance.

However, the ADA may have also decreased the health insurance status of workers with disabilities or had no impact. Just as the policy could have expanded access to jobs with health insurance (as mentioned in the previous paragraph), it could also have expanded access to jobs where EBHI was either not offered or priced beyond the employee’s willingness to pay, or the ADA may have expanded access equally to jobs with and without benefits, thereby not expanding EBHI. Alternatively, if the accommodations required by the ADA resulted in increased costs for employers, then employers may have had to pass those costs on through a reduction of wages, through higher employee contributions to health insurance premiums, through reductions in other non-pecuniary fringe benefits, or by no longer offering health coverage to their employees. In particular, if employees with disabilities disproportionately experience

“job lock,” then employers are better able to pass their increased costs to those employees. Additionally, if the health conditions associated with a worker’s disability resulted in lengthy waiting periods or exclusions from coverage, or if the ADA had unintended adverse consequences for employment, then access to EBHI may not have improved and so persons with disabilities may have sought other sources of coverage.

The impact of the ADA among workers may also depend on educational attainment. Employers who depend on employees with higher education levels or very job-specific human capital may be less likely to change benefit levels since employers may have more difficulty replacing them (that is, finding a person with similar skills and training). Moreover, workers with higher education may have been more attractive to employers (because of their higher human capital), and so may have been “first in line” to take advantage of the opportunities created by the ADA.

These considerations frame the analytical focus of this chapter, which addresses three questions regarding the impact of the ADA on employment-related health coverage:

1. **Did the EBHI coverage for full-time workers with disabilities increase relative to the rates for full-time workers without disabilities after the ADA’s implementation?** Workers with disabilities are hypothesized to have had significant increases in EBHI coverage in their own name compared to workers without disabilities (or alternatively, less of a decrease in coverage, if EBHI rates decreased for people without disabilities).
2. **After the ADA’s implementation, did full-time workers with disabilities who lived in states with limited ADA-like laws before the ADA’s passage have an increase in their EBHI coverage relative to full-time workers**

**with disabilities who lived in states with full protection (states that had ADA-like laws)?** Given that the intent of the ADA was to improve employment and decrease discrimination, the ADA should have leveled the playing field among states, and so workers with disabilities who lived in states without full protection should have had significant increases (or less of a decline) in their levels of EBHI compared to workers with disabilities who lived in states with full protection.

3. **Did EBHI rates for workers with disabilities who had lower education levels increase relative to workers with higher education levels after the ADA's implementation?** Though the intent of the ADA was to reduce discrimination, the difference in EBHI coverage between those with higher and lower education is hypothesized to have widened after the ADA was implemented since employers would value the higher human capital of those with more education. As a result, more highly educated workers with disabilities would have an advantage in terms of access to EBHI after the ADA compared to those with less education.

#### Method

This study examines the changes in EBHI coverage among workers with activity limitations during the implementation of the ADA using two frameworks. The first framework compares the coverage of workers age 25 to 61 with and without limitations before and after the ADA was implemented. The second framework examines the health coverage for workers age 25 to 61 with and without limitations in two types of states: those with laws protecting workers with disabilities that were similar to the ADA, and



those either without laws or with laws that had limited protections. Both types of analyses use difference-in-differences (DD) or difference-in-difference-in-differences (DDD) models to provide estimates using the 1990 through 1993 Survey of Income and Program Participation (SIPP) data.

### *Data Source and Sample*

The study uses multiple panels of SIPP data (1990, 1991, 1992, and 1993) as discussed in Chapter I. The analysis includes full-time workers 25 to 61 years of age. Full-time workers are those who work at least 35 hours a week, *excluding* those who are self-employed. The age restriction excludes individuals who might have been covered by their parents' health insurance at one end of the spectrum and people who may have retired at the other end. Regression models control for age, age-squared, gender (females as reference group), race (white, black, or other race, with white as the reference group), marital status (married or unmarried, with unmarried as the reference group), education (high school degree or less versus some college or college degree, with the former as the reference group), and an indicator for post-ADA implementation (which equals one if the year is 1993 or 1994). In addition, the models include employer- and employee-characteristics of occupation (managerial/professional, sales and office workers, service, construction/extraction/maintenance, production/transportation/moving, farming/forestry/fishing, other), industry (manufacturing, service, other), and sector of employment (private for-profit, private non-profit, government, other). Specifications include state fixed-effects to account for time-invariant state characteristics or alternatively, because the state fixed-effects and the state type variable are collinear,

state-level unemployment rates by month and year from the Bureau of Labor Statistics to account for state economic conditions for models that include state type comparisons.<sup>20</sup>

### *Health Coverage*

The outcome variable of interest is EBHI, defined as coverage in one's own name obtained through one's employer or union. As noted, EBHI is the most prevalent type of coverage for workers. Other types include coverage obtained through a spouse (dependent coverage), coverage in one's own name but not through an employer (presumably purchased in the individual insurance market), public coverage (Medicare, Medicaid, or CHAMPUS), and no coverage. The main analyses calculate EBHI relative to having any other type of coverage or being without health insurance. Some analyses contrast EBHI separately with dependent or no coverage; few full-time workers in the SIPP sample have either public coverage or coverage in one's own name not obtained through an employer, and so these comparisons cannot be calculated.

### *Analysis*

The impact of the ADA is estimated by comparing EBHI (health coverage in one's own name obtained through an employer or union) before and after ADA's implementation. DD or DDD estimates reveal whether the ADA resulted in the elimination of differences in EBHI coverage rates among groups of individuals or those in specific types of states. Specifically, a DD modeling framework examines changes in outcomes between individuals with and without limitations, while a DDD model is used to compare trends by education level for the groups in the DD models or between

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<sup>20</sup> Including state unemployment rates with the state-fixed effects models does not substantially change the results.

individuals with and without limitations in state groups defined based on having ADA-like laws.

The first model compares the change in the proportion of full-time workers with limitations who had EBHI with the change in the proportion of full-time workers without limitations who had EBHI before and after the ADA's implementation. The equation is as follows:

$$\text{Prob (EBHI}_{iy}) = \beta_0 + \beta_1 X_{iy} + \beta_2 \text{ADA}_y + \beta_3 \text{LIMITATION}_i + \beta_4 \text{ADA}_y * \text{LIMITATION}_i + e_{iy} \quad (1)$$

where  $i$  indexes individuals,  $y$  indexes years, EBHI is a binary variable showing the presence of health insurance in one's own name through one's employer or union,  $X$  are demographic and state and year dummy variables, ADA is a dummy variable that takes a value of one for years post-ADA implementation (1992 and after; zero for prior years), and LIMITATION indicates the presence of an activity limitation (either any or severe).  $\beta_4$  is the coefficient of interest (the DD estimator), which will indicate whether the ADA was responsible for any changes in EBHI rates among full-time workers with limitations after implementation compared to full-time workers without limitations. A positive value would indicate that the ADA had a positive effect on EBHI, with EBHI increasing at a greater rate (or decreasing at a smaller rate) for workers with limitations compared to workers without limitations. A negative estimate would indicate the opposite effect: that EBHI decreased at a greater rate (or increased at a lower rate) for workers with limitations than for workers without disabilities. A coefficient  $\beta_4$  that is small and insignificant suggests that the ADA had no measurable effect on EBHI among workers with disabilities that could be detected with these data.

The second model compares changes in EBHI rates of full-time workers with and without limitations between states with and without ADA-like laws before and after the 1990 passage of the ADA:

$$\begin{aligned} \text{Prob (EBHI}_{ijy}) = & \gamma_0 + \gamma_1 X_{iy} + \gamma_2 \text{ADA}_y + \gamma_3 \text{LIMITATION}_i + \gamma_4 \text{SLP}_{ij} \\ & + \gamma_5 \text{SNP}_{ij} + \gamma_6 \text{ADA}_y * \text{SLP}_{ij} + \gamma_7 \text{ADA}_y * \text{SNP}_{ij} \\ & + \gamma_8 \text{ADA}_y * \text{LIMITATION}_i + \gamma_9 \text{LIMITATION}_i * \text{SLP}_{ij} \\ & + \gamma_{10} \text{LIMITATION}_i * \text{SNP}_{ij} + \gamma_{11} \text{ADA}_y * \text{SLP}_{ij} * \text{LIMITATION}_i \\ & + \gamma_{12} \text{ADA}_y * \text{SNP}_{ij} * \text{LIMITATION}_i + e_{ijy} \end{aligned} \quad (2)$$

This DDD model acknowledges that states had ADA-like legislation prior to the federal rule and recognizes that the impact of ADA on health insurance status may be affected by the presence of prior ADA-like legislation in some states. Thus, the specification includes a dummy variable (SLP) indicating that a state that had ADA-like laws providing *limited* protections for workers with disabilities before 1990 (value of one if no such law present, zero otherwise) and a dummy variable (SNP) indicating that a state had *no* ADA-like laws providing protections for workers with disabilities before 1990 (value of one if present, zero otherwise); the subscript  $j$  indexes state type. The reference group includes states that had laws providing *full* protection to individuals with disabilities similar to the federal ADA legislation. The coefficients on the interactions between ADA, state laws, and limitations,  $\gamma_{11}$  and  $\gamma_{12}$  (the DDD estimators), indicate the change in the EBHI rates among full-time workers with and without limitations in the states that had limited or no protection before and after the enactment of the ADA compared to workers with and without limitations in states with full protection. This coefficient is hypothesized to be positive, indicating that the ADA resulted in a coverage gain for full-time workers with limitations in limited or no protection states compared to full-time workers with limitations in full protection states that was greater than the coverage gain for the

corresponding states for full-time workers without limitations. Alternatively, a negative coefficient would be consistent with the ADA resulting in decreased coverage for workers with limitations in limited or no protection states compared to those in full protection states that was greater than the decrease observed for full-time workers without limitations.

Differential effects by education level are explored through two DDD models. Equation (3) extends equation (1), introducing a dichotomous measure of education level (EDUCATION, which equals one if the individual has at least some college, zero otherwise):

$$\begin{aligned} \text{Prob (EBHI}_{iy}) = & \delta_0 + \delta_1 X_{iy} + \delta_2 ADA_y + \delta_3 \text{LIMITATION}_i + \delta_4 \text{EDUCATION}_i \\ & + \delta_5 ADA_y * \text{LIMITATION}_i + \delta_6 ADA_y * \text{EDUCATION}_i \\ & + \delta_7 \text{LIMITATION}_i * \text{EDUCATION}_i \\ & + \delta_8 ADA_y * \text{LIMITATION}_i * \text{EDUCATION}_i + e_{iy} \end{aligned} \quad (3)$$

The DDD estimate ( $\delta_8$ ) shows the change in EBHI pre- and post-ADA implementation for workers with limitations by education level relative to the change in EBHI for workers without limitations by education level, as follows:

$$\delta_8 = (\Delta \text{EBHI}_{\text{Limitation, At Least Some College}} - \Delta \text{EBHI}_{\text{Limitation, High School or Less}}) - (\Delta \text{EBHI}_{\text{No Limitation, At Least Some College}} - \Delta \text{EBHI}_{\text{No Limitation, High School or Less}})$$

A positive coefficient is consistent with the ADA resulting in a widening of the difference in having EBHI for people with limitations by education level that was greater than the change in the education gap for people without limitations; a negative coefficient indicates that the ADA resulted in a coverage decrease for the education gap (or less of an increase) for people with limitations compared to people without limitations. The

coefficient for  $\delta_8$  (the DDD estimate) is hypothesized to be positive and significant in the equation, consistent with the finding that the disparity in EBHI by education level for workers with limitations increased after the ADA's implementation.

Equation (4) extends equation (2), though subset only to full-time workers with limitations, to examine educational differences among persons with limitations, comparing those in states with limited or no protection to those in states with full protection:

$$\begin{aligned} \text{Prob (EBHI}_{ijy}) = & \varepsilon_0 + \varepsilon_1 X_{iy} + \varepsilon_2 ADA_y + \varepsilon_3 SLP_{ij} + \varepsilon_4 SNP_{ij} + \varepsilon_5 EDUCATION_i \\ & + \varepsilon_6 ADA_y * SLP_{ij} + \varepsilon_7 ADA_y * SNP_{ij} + \varepsilon_8 ADA_y * EDUCATION_i \\ & + \varepsilon_9 SLP_{ij} * EDUCATION_i + \varepsilon_{10} SNP_{ij} * EDUCATION_i \\ & + \varepsilon_{11} ADA_y * SLP_{ij} * EDUCATION_i + \varepsilon_{12} ADA_y * SNP_{ij} * EDUCATION_i \\ & + e_{ijy} \end{aligned} \quad (4)$$

$\varepsilon_{11}$  and  $\varepsilon_{12}$  (the DDD estimates) are the coefficients of interest. The DDD estimate shows the change in EBHI pre- and post-ADA implementation for people with limitations by education level in states with limited or no protection relative to the change in EBHI for people with limitations by education level pre- and post-ADA implementation in states with full protection:

$$\varepsilon_{11/12} = (\Delta \text{EBHI}_{SLP/SNP, \text{ At Least Some College}} - \Delta \text{EBHI}_{SLP/SNP, \text{ High School or Less}}) - (\Delta \text{EBHI}_{SLP, \text{ At Least Some College}} - \Delta \text{EBHI}_{SLP, \text{ High School or Less}})$$

A positive coefficient is consistent with the difference between those with high and low levels of education having increased during this period (or, if coverage declined, less of a decrease) for workers with limitations residing in limited or no protection states compared to those in full protection states; a negative coefficient is consistent with a

finding that workers with limitations in limited or no protection states with no or only a high school education had an increase (or less of a decrease) in EBHI coverage compared to those with at least some college, relative to workers with limitations in full protection states. The value of  $\epsilon_{11/12}$  is hypothesized to be positive, indicating that the ADA increased the disparities in coverage by education level since the benefits are more likely to accrue to individuals with higher human capital.

Table 3.1 provides an overview of the four equations, the interaction of interest, and the hypothesized direction of the effect. In the discussion that follows, all results, unless otherwise noted, are statistically significant at  $p < 0.05$  or better for a two-tailed test.

## Results

### *Sample Characteristics*

Workers with limitations differed from workers without limitations on many demographic and background variables (Table 3.2). Workers with and without limitations were compared using chi-square or t-tests, with a threshold of  $p < 0.002^{21}$  used to account for multiple comparisons. When workers with limitations were no different than workers without limitations on a characteristic, the statistics have the same subscript (a). When workers with and without limitations differed, the statistics have different subscripts (a and b). Separate comparisons were made for any limitation and severe limitation, and statistics were calculated using SIPP sample weights and accounted for the complex survey design. Compared to workers without limitations, workers with any limitations were more likely to be white and older and less likely to be of another race or ethnicity besides white, black, or Hispanic or to have at least some college education. Fewer

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<sup>21</sup> Based on a Bonferroni correction of  $p < 0.05$  divided by 28 comparisons.

workers with any limitations resided in limited protection states. In addition, workers with any limitation differed from workers with no limitations in terms of occupation and industry categories, though not on employment sector (private for-profit, private non-profit, and public). Finally, for the dependent measure, workers with limitations had similar levels of EBHI. Workers with severe limitations differed from workers without severe limitations only on education, age, occupation, and EBHI.

Characteristics of workers with limitations who resided in different state types were largely similar (Table 3.3). These analyses follow the same analytical strategy as Table 3.2, comparing workers with limitations in one state type with workers with limitations in other state types. When a chi-square or t-test test indicated differences among state types, pairwise comparisons were used to identify which state types differed, with a significance level of  $p < 0.0006^{22}$  used to account for multiple comparisons. Statistics that do not differ by state type have the same subscript (a); state types that have statistically significant differences for a characteristic have different subscripts (a, b, and c). The only differences noted among workers with limitations by state type were that workers with any activity limitation in no protection states were less likely to be white and more likely to be black than workers with any activity limitation in full and limited protection states. Only 39 workers with severe limitations resided in no protection states, and the small representation of these workers prohibits including this group in later calculations.

#### *EBHI before and after the ADA for Workers with and without Limitations*

The analysis first presents the unadjusted EBHI means before and after the ADA for each type of worker to show the impact of the ADA on EBHI (Table 3.4), and then

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<sup>22</sup> Based on a Bonferroni correction of  $p < 0.05$  divided by 84 comparisons.



follows with linear regression DD estimates that adjust for demographic and state fixed effects (Table 3.5). The results for both show that the EBHI declined after the ADA for full-time workers with limitations. Before the ADA, 75.8 percent of workers with limitations had EBHI, while 71.4 percent had EBHI after the ADA, a significant decline of 4.4 percentage points. The decline for workers without limitations was 0.9 percentage points (also significant). Comparing the changes for workers with and without limitations results in an unadjusted DD estimate: the decline in EBHI for workers with limitations exceeded that for workers without limitations by 3.5 percentage points. The DD estimate for workers with severe limitations was larger but insignificant, perhaps because the smaller sample size for this group restricts precise estimates. All statistics in this table use sample weights and adjust for the complex sampling design of the SIPP, though they do not control for demographic or state characteristics. The table also shows the standard errors and unweighted sample sizes.

DD estimates using regression models that follow equation (1) are consistent with the unadjusted estimates (Table 3.5). Controlling for individual characteristics and state fixed-effects, full-time workers with limitations experienced a greater loss of EBHI over the period than those without limitations. For workers with any limitations, EBHI coverage declined by 4.0 percentage points and for workers with severe limitations, coverage declined by 5.9 percentage points. The year estimates (also shown in Table 3.5) indicate that the impact was greater in 1993 than in 1994, and that, for those with severe limitations, the decline in EBHI began in 1991.

*EBHI before and after the ADA for Workers with Limitations by State Type*

To compare changes in EBHI for those residing in states that may have been differentially affected by the ADA, the analysis first examines unadjusted means estimates and then uses linear regression models to provide DD estimates. With both approaches, full-time workers with limitations who resided in limited protection states had a decline in EBHI compared to those who resided in full protection states.

The comparison of unadjusted means shows that the implementation of the ADA was associated with a subsequent decline in the rates of EBHI for workers in limited and no protection states, while workers in full protection states improved their rates of EBHI after the ADA's implementation (Table 3.6, which are derived in a similar way as those shown in Table 3.4). Among workers with any limitation, those in full protection states had an insignificant increase of 0.6 percentage points in EBHI rates after the ADA, while the EBHI rates declined for workers in limited and no protection states by 6.3 percentage points and 3.4 percentage points, respectively (significant only for the workers in limited protection states). The unadjusted DD estimates (which compare workers with and without limitations in the same state type) show that after the ADA, workers with limitations in full protection states improved their EBHI rates by an insignificant 2.1 percentage points, while those in limited states had a significant decline of 5.4 percentage points, and those in no protection states had a nonsignificant decline of 6.7 percentage points, compared to workers without limitations in the same states.

Comparing the DD estimates for limited and no protection states with the DD estimate for full protection states produces an unadjusted DDD estimate (lower panel, Table 3.6), which shows that compared to workers without limitations, workers with

limitations in limited protection states had 7.5 percentage point lower rates of EBHI after the ADA (and workers in no protection states had 8.8 percentage point lower rates, though not significant) than workers with limitations in full protection states. The DDD estimates for workers with and without severe limitations (Table 3.7) had a similar pattern, though the magnitude was larger, particularly for workers with severe limitations in full protection states. As noted earlier, the sample size for workers with severe limitations in no protection states are not sufficient (using a rule of thumb of 50 cases per cell); these statistics are shown for illustrative purposes only, and further analyses do not include this group. The relative advantage in EBHI for workers with limitations in full protection states is maintained when accounting for worker and state characteristics.

The regression DD and DDD estimates, which control for demographic characteristics and state unemployment rates, follow equation (2) and provide similar results as for the unadjusted means comparisons (Table 3.8). Among workers with limitations, those residing in states that did not have ADA-like laws had large declines in EBHI coverage compared to those in states that had ADA-like laws. Compared to workers without limitations, workers with any limitations in limited protection states had a 6.4 percentage point larger decline than workers with any limitations in states with full protection ( $p < 0.10$ ); workers with any limitations in no protection states also had declines in coverage, though the estimate was not statistically significant. In addition to providing DDD estimates to show changes before and after the ADA, year estimates identify the changes for each year to determine when the pattern changed, though the estimates can be less precise because of the decrease in sample size. The year estimates (the lower portion of Table 3.8) use 1990 as the reference, and the 1993 and 1994

estimates, while not significant, are large and negative. While the estimates are greater in magnitude for workers with severe limitations, the estimates are imprecise and not significant. Compared to workers in full-protection states, workers in limited protection states had a nonsignificant 10.0 percentage point decline in EBHI coverage. The sample size for workers with severe limitations in no protection states was not sufficient to include in the equation.

#### *Educational Differences in EBHI Changes*

Nationally, changes in EBHI coverage were not statistically different for individuals with varying education levels; that is, the declines in EBHI observed for workers with limitations were similar for individuals with both high and low educational achievements. The third level interaction for ADA implementation, limitation, and education level was small and positive but not statistically significant for workers with any or severe limitations (Table 3.9). These findings may be due to the lack of an effect of the ADA by education level, or the models did not have sufficient power to detect the difference that the ADA had.

With state differences among workers with limitations, there is limited evidence that EBHI coverage varied by education level, with a widening in the EBHI rates by education status in limited protection states (which is consistent with the hypothesized direction). The third-level interaction term (Table 3.10) comparing workers in limited and full protection states by education level is positive and large; its t-statistic exceeds unity but is not statistically significant: after the ADA, workers with limitations in limited protection states with higher education had EBHI rates that were 9.8 percentage points greater than that of workers with lower education, relative to workers with limitations in

full protection states. The sample sizes were not sufficient to examine results for workers in no protection states or for workers with severe limitations.

### *Exploratory Analyses*

These findings—that workers with limitations were less likely to have EBHI after the ADA, particularly among residents of states where the ADA represented a significant change to pre-existing state laws—raise three additional questions: 1) What type of coverage did workers with limitations have if they did not have EBHI? 2) Are there patterns for different types of workers that would lead us to conclude that the ADA was responsible for the loss of EBHI? 3) Are there patterns for different kinds of employers who may have been affected differently by the ADA? Analyses addressing these questions are exploratory, since they were not anticipated in the original design of the study.

Possible alternative sources of coverage for full-time workers are dependent coverage (such as through a spouse), public coverage (such as Medicare or Medicaid), other private coverage (likely through the individual market), or no coverage. As measured in the SIPP, fewer than four percent of full-time workers had either public coverage or private coverage not through one's employer or spouse, so additional analyses were conducted to identify whether dependent coverage, no coverage, or both substituted for the loss of EBHI. From a theoretical perspective, it is not clear that a negative effect of the ADA would have led one type of coverage to shift more or less than another.

Rather than comparing EBHI to all other types of coverage (as in earlier analyses), EBHI was contrasted with dependent coverage or no coverage for the full

sample (following equation (1), including individual characteristics and state fixed-effects). Table 3.11 contrasts EBHI first with dependent coverage (coverage as a family member on someone else's plan) and then with no coverage, with EBHI taking a value of one and the alternative coverage a value of zero. In addition, for the full sample, two subgroups are compared: married (for dependent or no coverage) and unmarried (for no coverage). Married workers with limitations whose EBHI coverage premiums increased (if employers are passing increased costs associated with the ADA onto workers through their EBHI coverage) might have had the opportunity to switch to dependent coverage if their spouses worked and had access to their (presumably cheaper) coverage. Unmarried workers with limitations lack such access to dependent coverage (and there are few individuals in the sample with such coverage); they may have been more likely to have lacked coverage after the ADA if there were unable to find or afford coverage outside of that offered by their employer. If married workers were more likely to obtain dependent coverage, while unmarried workers had no change in coverage, then employers may have reacted by increasing premiums just enough so that workers who had the option to obtain alternative cheaper insurance through dependent coverage did so; otherwise, as for unmarried workers, they continued their coverage, albeit at a higher price. However, if employers restricted coverage in the face of the ADA (such as through extended periods to first become eligible or not offering coverage), stopped offering coverage, or sizably raised the direct costs (such as through increased premiums), married workers would shift to dependent coverage when able, and both married and unmarried workers would shift to no coverage.

After the ADA, workers with any limitation, particularly unmarried workers, were more likely to have no coverage, whereas workers with severe limitations were more likely to have dependent coverage. After the ADA took effect, the likelihood of having no coverage for workers with any limitation was 3.2 percentage points greater than workers without limitations, whereas workers with severe limitations experienced increases in rates of dependent coverage that were 4.9 percentage points greater than workers without severe limitations. Similar patterns were observed for married workers (significance level of  $p < 0.10$ ). Unmarried workers with any limitations were more likely to have no coverage relative to workers without limitations (at roughly twice the magnitude as married workers, which is consistent with the lack of an alternative source of coverage through dependent coverage, as married workers with working spouses may have).

When comparing coverage estimates for workers with limitations by state type after the ADA (Table 3.12), workers in limited protection states were more likely to have shifted from EBHI to dependent coverage, a substitution likely due to the ADA since workers in full protection states did not have a similar change in coverage.<sup>23</sup> Workers with any or severe limitations were less likely to have EBHI coverage than dependent coverage, and the magnitude of the estimate for workers with severe limitations was larger than that for workers with any limitations. The estimates for no coverage were not statistically significant for workers with any or severe limitations. While similar effects were observed for married workers with limitations, the no coverage estimate was larger than for the full sample but not statistically significant. For unmarried workers, the no

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<sup>23</sup> The sample for no protection states was too small to result in meaningful estimates. Combining limited and no protection states does not substantially change the results.

coverage estimate was positive (and so inconsistent with prior estimates) but statistically insignificant.<sup>24</sup>

The final exploratory question, whether the ADA had differential impacts on types of employers, is assessed by comparing impacts for private for-profit, private non-profit, and government employers. There are several reasons why the ADA might have had differential effects on sectors. Among public employers (local, state, and federal government entities), only local and state governments were covered by the ADA; the federal government was exempt because it was already covered in similar ways by existing laws (the Rehabilitation Act of 1973 and the Architectural Barriers Act). In addition, state and local government entities might have already had to comply (or been more likely to comply, given the regulation and oversight they receive) with state laws regarding employees with disabilities. Finally, public employers generally offer more generous benefits (for example, more workers receive EBHI in the public sector than in the private sector), in part because of collective bargaining agreements. Passing additional costs that are related to the ADA directly to public workers might be more administratively difficult than for private employers, on average, because of collective

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<sup>24</sup> Workers with limitations may have been adversely affected in their EBHI rates compared to workers with limitations if the former had shift in their worker characteristics (for example, if more such workers were employed in occupations or industries that either had lower EBHI to begin with or a decline in EBHI during the observation period) or if newly hired workers with limitations were in positions where the employer did not offer EBHI. Because the SIPP does not contain information about job tenure, the SIPP cannot provide evidence for the latter situation, though it might be difficult logistically for employers to limit workers with limitations to jobs where EBHI is not offered or delayed without doing the same for their workers without limitations. Further analyses (not shown) do not indicate any significant changes in the occupations, industries, or sectors. However, workers with limitations were overrepresented in construction occupations (15 percent of full-time workers with limitations compared to 12 percent of full-time workers without limitations), production occupations (21 percent to 16 percent) and manufacturing industries (33 percent to 28 percent), and were underrepresented in management occupations (22 percent to 31 percent) and service industries (67 percent to 70 percent). Of these, a decrease in EBHI after the ADA was observed among all workers (with and without limitations) for construction occupations and the manufacturing industry, while an increase in EBHI was observed in the service industry. Such broader shifts by industry and occupation may have thus been responsible for the impact on workers with limitations.



bargaining and other contractual obligations; private employers would therefore have had more of an opportunity to pass increased costs through changes in the health coverage they offer.

A negative effect of the ADA on EBHI is found among private for-profit workers but not private non-profit or public workers, with more of an impact found in limited protection states (as opposed to full protection states). These findings are consistent with a perverse effect of the ADA in which the additional costs imposed by the ADA resulted in reduced coverage. As shown in Table 3.13, private for-profit workers with any limitation had a negative decline of 3.8 percentage points in their EBHI after the ADA (which is similar to the estimates observed in Table 3.5), though the estimate for private workers with severe limitations was not significant. The results for government workers with any or severe limitations and private non-profit workers with any limitation show no difference after the ADA (the sample for private non-profit workers with severe limitations was too small for valid estimates). Moreover, the negative impact for private for-profit employers was focused on those in limited protection states (Table 3.14), which is again consistent with the ADA being responsible for the decline in EBHI. EBHI rates were 11.9 percentage points lower after the ADA for workers with limitations in limited protection compared to workers with limitations in full protection states, relative to workers without limitations.

### Discussion

The evidence presented in this study—that the EBHI rates for full-time workers with limitations declined after the ADA was implemented, that the effect was larger in states where the ADA represented an addition to existing state law, and that workers of

private firms were affected more than workers of government firms—is consistent with the logic that the ADA had a perverse effect on EBHI among full-time workers with limitations. After presenting strengths and limitations of the study, the section will review the findings for each of the three research question, consider whether the ADA was, in fact, responsible for the decline in EBHI, and conclude with policy implications and areas for further research.

### *Strengths and Limitations*

Before reviewing this study’s findings and implications, it is important first to assess its strengths and limitations. Among its strengths are its disability definition, its novel examination of a benefit of employment (which complements existing research on the ADA’s impact on employment and wages), and its use of variation in existing laws protecting people with disabilities. This study included a specific definition of disability—having a limitation in one’s daily activities—that is a more objective measure of disability and in line with the activity limitation definition of the ICF model. Other definitions, such as having a work limitation, may be more likely to be influenced by factors such as a negative economy or the ADA. The analysis focused on a characteristic of employment—EBHI—that had previously not been examined regarding the effect of the ADA, though could be affected by increased employer costs related to the ADA. It also examined whether the ADA had the effect of achieving greater equity in health insurance coverage among persons with activity limitations by considering the impact of the ADA across states that varied in the stringency of laws protecting persons with limitations prior to ADA implementation.

Several caveats should be considered when interpreting the results. Ideally, when comparing two groups using a DD approach, the groups should not differ on observable characteristics. As seen in Table 3.2, workers with and without limitations differ on many key variables, such as industry and occupation, that may be related to EBHI. Though these variables are held constant in the regression estimates, controlling for these factors may not be sufficient to account for possible unobservable characteristics that are related to the outcomes of interest. In practice, however, this requirement is often not met and is impossible for research on people with disabilities, given that the treatment and control groups are defined according to whether individuals have a health condition that affects their day-to-day functioning. For state type comparisons, the observable differences are few, with one notable exception for the state unemployment rate, which is considered in more detail in a later section.

The narrow pre-ADA window may be problematic, though two-year pre- and post-years are typically used to assess policy impacts. This analysis used 1990 and 1991 as the baseline period and 1993 and 1994 for the post-intervention period. Congress passed the ADA in 1990, which took effect in 1992 (for large employers) and 1993 (for small employers). Employers may have changed their behavior before the law took effect, perhaps discharging or not hiring people with disabilities. If true, it may have affected the number of employed or the nature of employment (such as more individuals with disabilities working part-time), neither of which would affect the EBHI coverage for full-time workers with disabilities and so the observed EBHI changes might occur earlier, beginning in 1991. Additional analyses (not shown) found that EBHI coverage for workers with limitations did not change from 1990 to 1991, and the inclusion of time-

specific fixed-effects in specifications shown do not suggest a consistent change beginning in 1991. A more problematic issue involves the implementation of ADA coverage for smaller employers, who were affected beginning in the second year of the post-intervention period. Workers for small employers cannot be excluded from the analysis because employer size is not included in the SIPP; the inclusion of workers of small employers in the analysis therefore dilutes the estimates (assuming that they would not be affected in the first post-ADA observation period). To assess the possible effect, an analysis contrasting 1994 with 1993 found a significant difference in coverage between these two years when using the 1992 panel for 1993 data and the 1993 panel for 1994 data, but not when using the 1992 panel for 1994 data and the 1993 panel for 1993 data.<sup>25</sup> However, there was not a consistent trend toward lower EBHI in 1994 than in 1993, which suggests that the delay in the small employer implementation was not a factor in assessing the impact of the ADA on EBHI.

*Did EBHI Coverage for Full-time Workers with Disabilities Increase Relative to the Rates for Full-time Workers without Disabilities after the ADA's Implementation?*

Full-time workers with limitations—and specifically full-time workers for private for-profit firms—had lower rates of EBHI after the ADA took effect, and the magnitude of the decline in coverage was larger for workers with severe limitations than for workers

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<sup>25</sup> The 1992 and 1993 SIPP panels, which capture the post-ADA period, overlap, so that the 1993 and 1994 estimates can be obtained from either panel. Replicating the main results using the 1992 panel for 1994 estimates and the 1993 panel for 1993 estimates provided estimates that differ from national estimates (the DD estimates were negative and large, but not significant) but not for state type estimates. The reason is that the characteristics between full-time workers with limitations in the 1992 and 1993 panels differ: those in the 1992 panel were more likely to be black, to reside in a limited protection state, to work in a construction occupation, and to work in the private for-profit sector, and were less likely to reside in full protection states or to be employed in the government sector. In addition, those in the 1993 panel were less likely to be married and more likely to have at least some college education. Restricting the main analyses to full-time workers in the private for-profit show robust and negative impacts of the ADA on EBHI that are consistent between the panels used.

with any limitation. The ADA may have therefore imposed an extra cost on employers, who either raised premiums to a level that was unaffordable for workers with limitations, stopped offering coverage, or made coverage less attractive by altering the generosity of coverage. The result was that individuals with severe limitations who were married shifted to dependent coverage, while workers with any limitations shifted to having no coverage at all.

This perverse effect of the ADA is directly unrelated to the decline in employment for people with disabilities and the rise in applications for federal disability benefits. Whether or not firms stopped employing people with disabilities (or more individuals applied for and received federal disability benefits), firms also may have made changes in their EBHI that affected workers with disabilities disproportionately. However, if the changes in EBHI resulted in compromised access to health care, rehabilitation, and other supports, then the lack of access could have thus impaired the ability of individuals with disabilities to maintain their health and remain employed.

The findings contrasts with those found by DeLeire (2000), who observed no change in wages that could be attributed to the ADA. One possible reason that there would be a change in EBHI but not wages may be because of anti-discrimination laws. An employer may not be likely to directly reduce an employee's wages because of increased costs, though may cut wages across all employees or not provide wage increases. In addition, the anti-discrimination provision of state laws and the ADA would constrain employers from differentially reducing the wages of workers with limitations compared to those without limitations. A valid alternative for an employer is to pass

higher legal or health care costs directly to employees through increased EBHI premiums or dropping coverage entirely.

An alternative explanation for the decline in EBHI could be that the ADA facilitated employment for many individuals with disabilities, and those new workers did not immediately have access to EBHI (either because they did not yet qualify for such coverage, their employers did not offer it, or they did not choose to be covered by it). No such expansion is observed in the SIPP estimates. The proportion of full-time workers with limitations among all full-time workers actually declined from 8.5 to 8.0 percent (weighted estimates; chi-square comparison significant at  $p < 0.10$ ) after the ADA was implemented. Similarly, there was no change in the rates of full-time employment among the population with limitations; 38.3 percent of people with limitations had full-time employment before the ADA, compared to 37.0 (weighted estimates; chi-square comparison not significant).

*After the ADA's Implementation, Did Full-time Workers with Disabilities who Lived in States with Limited ADA-like Laws before the ADA's Passage Have an Increase in their EBHI Coverage Relative to Full-time Workers with Disabilities who Lived In States with Full Protection?*

The evidence from the unadjusted means table for state-type differences (Tables 3.6 and 3.7) is quite striking: the ADA resulted in a slight (insignificant) increase in the EBHI rates for workers with disabilities in states that had both anti-discrimination and accommodations laws compared to workers without disabilities in the same states, while rates for those in states without both laws decreased. The DD and DDD regression estimates showing the differences between workers with limitations in limited and full

protection states were large but significant only at  $p < 0.10$ , so these results are tentative. More evidence pointing to the ADA's role is that married workers with limitations who lived in limited protection states shifted from EBHI to dependent coverage (though unmarried workers in limited protection states had no such shift to no coverage, suggesting a differential, and unexplained, effect). In addition, EBHI rates among workers with disabilities employed by private for-profit firms in limited protection states had significant declines relative to workers with disabilities employed by private for-profit firms in full protection states. One possible reason for these findings is that employers in states that had ADA-like laws before the ADA had already adapted to the protections and accommodation requirements, whereas employers in state that did not have such comprehensive laws had to make an adjustment. Nonetheless, this finding is congruent with other research (such as Jolls and Prescott (2004)) that finds that the ADA imposed additional costs on employers because of its accommodation component. That cost was passed to workers with disabilities in the form of lower employment rates, but the evidence here suggests that the cost was passed on in another way for those in states with limited protection: through lower rates of EBHI. As observed in Jolls and Prescott, this difference in coverage may be short-lived, with workers and employers in limited protection states eventually catching up to those in full protection states.

An alternative explanation for the differences by state type is that for new federal policies, states where the federal laws enhanced current laws benefit the most or perhaps earlier. Either because of exposure to the ideas or policies contained in the federal laws, having an infrastructure in place to accommodate and promote the laws, or having state leadership supportive of federal laws, these states are ahead of other states in benefiting

from federal policies. Other states are therefore in the position of catching up as their policy makers, agencies, and others affected by the new law (in the ADA's case, people with disabilities and employers) take time to understand the law, determine how it should be applied, and build the infrastructure to accommodate the law. The implication for federal policy makers is that federal laws that overlap with existing state laws are neither unnecessary nor unneeded; the federal law strengthens policies enacted at the state level.

*Did EBHI Rates for Workers with Disabilities Who Had Lower Education Levels Increase Relative to Workers with Higher Education Levels After the ADA's Implementation?*

This analysis did not uncover national or state type differences in the EBHI rates of workers with limitations by education level. While the ADA could have promoted the opportunities for people with disabilities with higher education more than the opportunities for those with lower education (thereby increasing the disparities in participation by all people with disabilities), the window of this analysis—two years post-ADA—may be too short a period to observe changes, or the sample too small to detect significant differences.

*Was the ADA Responsible For the Lower EBHI Among Full-time Workers?*

The identification strategy of the DD and DDD frameworks is designed to identify a causal relationship between the ADA and the outcomes of interest in this study. To the extent that this framework can eliminate other observable or unobservable confounding influences, the ADA is likely responsible for the decline in EBHI for full-time workers with limitations observed after the ADA was implemented. The magnitude of the ADA's effect was strong, particularly among workers at private for-profit firms



(but not government employers), and observed in states where the ADA represented an addition to existing state laws.

Alternative explanations—increasing federal disability rolls, economic recession, and overall declines in EBHI—are not sufficient to explain the results. The increase in federal disability benefits is typically a confounding explanation for ADA impacts on employment. While that may be true for overall employment (since workers may choose to leave the job market and apply for disability benefits), that decision would not affect the health coverage of full-time workers with disabilities who remain in the job market. Another alternative is the recession that had affected the economy around the same time as the ADA's implementation. Workers with disabilities may be less likely to be hired after a recession, but it is not clear how EBHI would be affected by the recession among those with disabilities who work. Further, the differences in findings among states with differing pre-ADA laws would not necessarily be explained by the impact of the recession. Though the limited and no protection states had higher unemployment rates, there is no mechanism that would explain why full-time workers with limitations would be adversely affected in their EBHI compared to full-time workers in the same states without limitations.

A final alternative is that the decline in EBHI might result if EBHI premiums for firms that employed more workers with disabilities increased at disproportionately higher rates than the premiums for firms that employed fewer workers with disabilities. This divergence might occur in two situations. First, if small or low-wage firms were more likely to employ workers with disabilities after the ADA, the cost associated with an individual worker's health care would have a more immediate effect on the premiums an

insurer charges the employer and co-workers. In the second scenario, smaller or low-wage firms would be no more or less likely to employ workers with disabilities than larger or high-wage firms, but the EBHI costs for those small or low-wage firms with workers with limitations rose at such a rate that it adversely affected those firms and, consequently, the EBHI of workers with limitations. This process could occur for small group policies that are medically underwritten and result in increases in the EBHI costs for workers with limitations more than for other workers. The evidence for state types, however, suggests that neither scenario is likely, and so the more direct interpretation—that the observed decline in EBHI for workers with limitations is due to the ADA—is appropriate.

### *Policy Implications*

These findings suggest that there was a real cost to workers with disabilities because of the ADA. Despite its promise of increasing access to and participation in society, the ADA led to less EBHI for workers with disabilities during the period immediately following its implementation. As noted in Chapter II, the disparity in EBHI for persons with activity limitations compared to those without such conditions represents either a market failure in the provision of health coverage by employers (if workers with disabilities did not receive other compensation in response to the decrease in access to EBHI) or a distributional inequality in having access to EBHI (just as the ADA required that people with disabilities have equal access to employment). Further, at the time the ADA was implemented, neither public coverage nor the individual insurance market was a viable alternative to replace the EBHI coverage lost by full-time workers with disabilities. Public coverage (through Medicaid or Medicare) was available only for those

who qualify for disability benefits, but to be eligible, a person must be unable to work at a substantial level because of a work-limiting medical condition or impairment.<sup>26</sup> The individual market can be prohibitively expensive for those with health conditions, or, perhaps more likely, those with health conditions might be excluded because of pre-existing medical conditions. Any policy solution has to improve the affordability of health coverage for both employers and employees, but also break the poverty trap that people with disabilities face (Stapleton, O'Day, Livermore, and Imparato 2006).

The loss of EBHI for full-time workers becomes a public health issue, since the decline in coverage can result in decreased health care access for a group that needs a potentially wide range of health care services. For full-time workers who are married and whose spouse works for an employer that offers health insurance, dependent coverage may be available to fill the gap in coverage. However, EBHI is not an option for unmarried workers or for workers who are married but whose spouse does not work or lacks access to EBHI.

Possible policy approaches to enhance access to EBHI by workers with limitations that focus on offsetting costs for employers include voucher programs and reinsurance. Employers could obtain vouchers or tax credits for each of their workers with disabilities who enroll in the employer-offered EBHI plan. These payments or offsets could be applied to any increase in the costs of covering workers with disabilities. However, given past experiences with voucher programs, few employers would be likely to take up these offers, and the administration of such a program would be difficult, since an employer would have to prove in some way that a worker has a qualifying disability

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<sup>26</sup> Medicaid buy-in programs were later authorized by the Balanced Budget Act of 1997 and the Ticket to Work and Work Incentives Improvement Act of 1999, and allowed individuals with disabilities to pay a premium to enroll in Medicaid coverage.

(perhaps by the voucher only applying to individuals who are federal disability beneficiaries) and that the employer is facing rising health insurance costs due to employing workers with disabilities. Another option is the development of a tax-financed reinsurance program for small employers and non-group insurers who may face disproportionately large medical care costs from employing or enrolling persons with limitations (Swartz 2005). Employers and their insurers could then pass all or part of the costs of insuring individuals with very high health costs above a specified dollar threshold (which would include some, but not all, workers with disabilities) to all taxpayers. This policy would also have the effect of lowering premiums for all insured and reducing the fear of adverse selection that insurers have regarding individuals with health conditions.

Policy solutions for the worker include individual vouchers and expansions of public coverage to individuals with disabilities who are not receiving federal disability benefits. As with employers, employees could be provided vouchers or tax credits to offset the cost of insurance premiums (either through their employer or through the nongroup market). This system would allow employees a choice of plans (including the EBHI options offered by their employer and plans in the individual insurance market). Since the voucher would be portable, this approach would also reduce job lock (where individuals choose not to leave their jobs for fear of losing their health insurance) since the voucher could be used in alternative employment as well as in the nongroup market. It could also cover individuals with disabilities who are self-employed, who work part-time, or who are non-traditional workers (temporary or part-year employees), a large proportion of whom are workers with disabilities (Schur 2003). Expansion of public

coverage already exists through the 1619(a), 1619(b), and Medicaid buy-in programs, with a Medicare buy-in sometimes suggested as an option, particularly for individuals nearing retirement age. The 1619(a) program allows Supplemental Security Income (SSI) beneficiaries to retain their eligibility for cash benefits and Medicaid (in states that offer Medicaid with SSI) though they have earnings above the program threshold; the 1619(b) program allows beneficiaries with high earnings to retain Medicaid benefits. The buy-in program offers workers with disabilities the option to pay a premium to obtain Medicaid coverage. This solution is dependent on states offering a program (eight states have no buy-in program) and reflects the quality of access to providers that the state Medicaid program provides (since access may differ for workers on account of state variation in providers accepting Medicaid and the services and home and community-based services offered by Medicaid). Neither program has many enrollees; in December 2008, 16,000 SSI beneficiaries were 1619(a) participants and another 99,000 were 1619(b) participants (Social Security Administration 2009b), while the Medicaid buy-in program had 90,000 participants (Mathematica Policy Research 2009). Further expansion of public coverage could include offering Medicare through a buy-in program for individuals with severe health conditions, but not severe enough to qualify for disability benefits.

The above solutions are incremental and (as shown with the public coverage expansions) not likely to be successful at greatly improving coverage for workers with disabilities; a third policy solution involves comprehensive state- or federal-level health coverage reforms that expand the options available to all residents—workers and non-workers, those with disabilities and without. Massachusetts has increased the percentage of its residents with health coverage through expanding the criteria to qualify for

Medicaid, creating a public option with subsidies according to income to address affordability issues, and mandates for employers to provide health insurance and for employees to obtain health insurance. It will be interesting to observe how persons with disabilities, particularly those who work, fare in such a model (and whether the expansion in coverage results in lower federal disability application rates since fewer individuals with disabilities will seek benefits solely for the health coverage and the health access it provides).

### *Future Research*

This analysis found that EBHI rates for full-time workers with disabilities after the ADA was influenced by at least one employer factor, whether the employer was private for-profit or not. Future research should focus on other employer characteristics, such as industry, occupation, firm size, and wage level and distribution, which may be a particularly critical area given that some sectors (as noted) employ a higher than average number of people with disabilities. A further area to explore would be health coverage by worker type. The ADA may have influenced the EBHI rates of full-time, part-time, full-year, and part-year workers differently, which in part may be driven by an increase in temporary and transitional workers.

Other future areas of research regarding coverage for workers with disabilities, though unrelated to the ADA, include job lock and the effects of comprehensive state reforms. Workers with disabilities may be disproportionately more likely not to leave their jobs for fear of losing their health insurance. Alternatively, those with public coverage may refrain from or limit their labor force and employment participation for fear of losing their public benefits because of earnings. Further research should focus on

the extent to which both are factors for workers with disabilities. In addition, researchers should examine the Massachusetts comprehensive reform to determine if workers with disabilities were better off after reform and whether they were less likely to apply for federal disability benefits because of the increased access to health coverage.

#### IV. The Effects of the ADA on the Post-secondary Education Enrollment of People with Disabilities

Education and health are mutually determined; that is, each affects the other, with the relationship changing throughout the life course. For children, the relationship from health to education may be most important, since poor health as a child can affect both educational success and subsequent educational attainment. However, for working-age adults, many education decisions are made when younger and so educational attainment may more directly affect ongoing health status.

The educational achievement of people with disabilities is consistently lower than that of people without disabilities, and the disparity is greatest for post-secondary education (college and vocational programs). Adults with disabilities are less likely to have obtained secondary and post-secondary degrees, although educational achievement improved among young adults (between 18 and 29 years of age) with disabilities during the 1990s (Horvath-Rose, Stapleton, and O'Day 2004; Wagner, Newman, Cameto, and Levine 2005). Policies such as the Individuals with Disability Education Act (IDEA, a version of which was implemented in 1975 and revised in 1990, 1997, and 2004) and section 504 of the Rehabilitation Act of 1973 have focused supports to improve secondary education achievement—more youth now have high school diplomas—but large gaps remain for post-secondary education achievement.

Education is important for long term economic and health outcomes because it leads to better jobs, more income, and better health through a variety of potential pathways (Hammond 2003; Monheit 2007). To illustrate, educational attainment is



associated with better financial prospects. In 2007, the median annual salary for a worker without a high school diploma was \$19,000, with a high school diploma, \$27,000, with some college or an associate's degree, \$33,000, and with a bachelor's degree, \$47,000 (US Census Bureau 2009). The cumulative earnings differences across a lifetime become staggering.

The link between education and disability status is complicated and intertwined with developmental issues. Greater educational attainment has a strong association with improved health, although whether this association represents a causal relationship has not been resolved and the precise mechanism governing this relationship has not been identified (Monheit 2007). Youth with disabilities, for example, may encounter barriers to completing school. Adults with lower educational achievement, on the other hand, may be more likely to have a health condition resulting in a disability later in life, perhaps because of increased occupational hazards or poorer health care access.

Given that individuals with disabilities have less education than those without disabilities, increasing their education levels could have an impact on their health and the quality of their health care. One possible relationship between education and health is through a causal pathway with education influencing health. This pathway can be seen in at least two ways: individuals with more education are able to produce a given level of health with fewer health inputs than individuals with less education (productive efficiency) and individuals with more education can choose more appropriate health inputs because they better understand the effects of those inputs on their health (allocative efficiency) (Grossman 2000). Education is associated with several intervening

factors that lead to better health (Hammond 2003), all of which have implications for individuals with disabilities:

- Economic factors. People with more education tend to have more income and higher occupational status (for example, safer work environments).
- Access to health services. Those with more education may be able to assimilate and interpret important medical information. This knowledge may enhance their ability to select better medical facilities and medical providers who are more familiar with new diagnostic and treatment techniques. Additionally, those with greater educational attainment may have better communication with their health care professionals.
- Health-related practices. People with more education are better able to understand their symptoms and process the health information they receive. Having more education is associated with an increase in complying with treatment regimens and health-related practices (Goldman and Smith 2002), and willingness to engage in health-promoting activities such as exercise. Other positive health practices related to education involve having more highly educated people within one's social network (who also have better health and health behaviors as a consequence of their education) and having better self-esteem, confidence, and perception of personal control.
- Coping with stress. Persons with more education have more tools to cope with stress and are more resilient in the face of (medical) adversity.

A second pathway between education and health moves in the opposite direction, with health influencing education level. For example, children with attention deficit and hyperactivity disorder are more likely to have lower test scores and to repeat a grade than other children or compared to children who have physical health conditions (Currie and Stabile 2006).<sup>27</sup> Finally, a third pathway for the relationship between health and education posits that other factors may jointly influence education and health decisions. For example, individuals with a higher valuation for the future or who have better abstract reasoning ability may choose more education and also make better investments in their health (Fuchs 1982).

Given the lower educational status of individuals with disabilities, their educational deficits could significantly impair their health and effective use of health care. Policies and interventions that promote education for this population could have lasting benefits or prevent a worsening of their disabilities later in life. The value that public policy assigns to education can be seen in the many existing programs that seek to improve the educational outcomes for people with disabilities, such as the IDEA (which promotes special education services for students under 21 years of age), as well as education-related incentives that the Social Security Administration (SSA) offers for its disability beneficiaries.

### *Post-secondary Education*

Post-secondary education includes college (two- and four-year schools, graduate programs, and professional programs) and vocational (vocational, business, and technical schools) programs after the receipt of a high school diploma. In 2007, 7.6 percent of the

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<sup>27</sup> Parental education also influences children's health (see, for example, Case, Anne, Darren Lubotsky, and Christina Paxton. 2002. "Economic Status and Health in Childhood: The Origins of the Gradient." *American Economic Review* 92:1308-1334.).

population 15 years of age or older (18.0 million individuals) was enrolled in college either full-time or part-time, while 1.7 percent (3.9 million individuals) was enrolled in vocational courses (US Bureau of the Census 2007). The age of students enrolled in vocational programs differs from that of colleges; whereas 85 percent of college students are less than 35 years old, just 47 percent of those in vocational programs are. Individuals enrolled in vocational courses also have varying education levels, with 33 percent of those taking vocational courses already holding a four-year college degree. Enrollment in both college and vocational institutions has increased substantially during the 1990s and 2000s (National Center for Education Statistics 2005).

Post-secondary students with and without disabilities differ in important characteristics, and these differences may affect the ability of people with disabilities to complete their studies. Students with disabilities were more likely to be male, older, and white non-Hispanic, had lower high school grade point averages and admission scores, and were less likely to graduate within five years (the period of study) than their counterparts without disabilities (Horn and Berkold 1999). Moreover, students with disabilities were more likely to have characteristics that are associated with not completing post-secondary school: having a GED, not attending post-secondary school directly after high school, and having dependents. On a positive note, graduates with disabilities had similar employment and earnings outcomes as graduates without disabilities.

#### *ADA and Education*

Title II of the ADA was intended to improve the educational opportunities for people with disabilities. The ADA requires that public and private post-secondary

institutions provide *reasonable accommodations* to students with disabilities as long as students satisfy institutional standards (that is, they meet the minimum admission criteria) and are able to perform course activities (US Department of Justice 2005).<sup>28</sup> The implementation of the ADA in the post-secondary context has been hampered in similar ways as its application to employment. Students have had a limited ability to sue schools for violating the law, and as Kiuahara and Huefner (2008) note, the courts have left it up to the institutions themselves to decide what accommodations are reasonable. These authors also point out that in many respects, students with disabilities, particularly those with psychiatric impairments, have difficulty proving that they meet the disability requirement outlined by the ADA while also meeting the institution's standards for admissions and performance.

Few studies have examined the ADA's impact on post-secondary education. One exception is Jolls (2004), who found that the ADA had a positive effect on education in states that had no prior anti-discrimination laws for people with work limitations. She used data from the 1987 to 1997 Current Population Survey (CPS) for individuals age 18 to 58. However, the CPS disability definitions<sup>29</sup> (who is limited or prevented from working because of a health condition) are not ideal measures for examining ADA effects (Blanck, Schwochau, and Song 2003). Moreover, the age range used may be too inclusive since older individuals, whether with or without disabilities, may be less likely to make additional human capital investments such as returning to school, and, as noted,

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<sup>28</sup> The ADA also applies to primary and secondary educational institutions; however, this chapter only considers the effects for post-secondary education.

<sup>29</sup> For the study period, the CPS includes a question asking if anyone in this household has "a health problem or disability which prevents them from working or which limits the kind or amount of work they can do?" The CPS added additional disability questions in June 2008.

there may be important differences for the type of post-secondary school, particularly for different age groups.

### *Study Overview*

This chapter considers the ADA's effect on post-secondary enrollment for persons with disabilities by addressing two questions:

1. Did post-secondary enrollment increase for people with disabilities after the implementation of the ADA relative to people without disabilities?
2. Among people with disabilities, did post-secondary enrollment increase more in states in which the ADA provided additional protections than it did in states that already had ADA-like protections?

To answer the first question, the post-secondary enrollment for adults is examined to determine whether it increased after the ADA was implemented, hypothesizing that the ADA improved post-secondary enrollment for people with disabilities (that is, more individuals with disabilities attended college or obtained post-secondary vocational training after implementation of ADA than before) compared to people without disabilities. The underlying causal mechanism leading to this change is the reduction in an individual's costs (in terms of time and effort) of accessing educational institutions and courses under the federal ADA. Additionally, ADA's stated intent of improved access to employment opportunities may raise the return to an investment in education.

To address the second question, Jolls' (2004) methodology is replicated using the presence of an activity limitation to define the population with disabilities (as opposed to Jolls' work limitation definition). However, individuals in the three states with no protection laws prior to the ADA's passage are excluded because the number of cases for

those states is insufficient to produce valid estimates. Individuals with disabilities in states with limited protection laws are hypothesized to have had an increase in post-secondary education enrollment greater than (or a decrease less than) that for individuals with disabilities in states with full protection.

Both questions use a sample of adults age 18 to 58 (following Jolls' methodology) but also narrow the population to young adults age 18 to 30, a more likely population to attend post-secondary college institutions. The magnitude of the estimates is expected to be greater for young adults than for adults age 18 to 58.

### Method

This study uses two approaches to examine the changes in post-secondary enrollment among people with activity limitations before and after the ADA. The first approach compares the enrollment of people with and without disabilities before and after the ADA was implemented. The second approach examines enrollment for people with disabilities in two types of states: those with laws protecting workers with disabilities that were similar to the ADA, and those with laws that had limited protections. Both approaches use difference-in-differences (DD) or difference-in-difference-in-differences (DDD) models to provide estimates using the 1990 through 1996 Survey of Income and Program Participation (SIPP) data.

### *Data Source and Sample*

The study uses multiple panels of SIPP data (1990, 1991, 1992, 1993, and 1996) that cover the years 1990 through 1999. Data are included for a one-year period from September to August that overlaps with the wave of the earliest functional limitations and disability topical module (1990 panel, wave 3; 1991 panel, wave 3; 1992 panel, wave 6;

1993 panel, wave 6; and 1996 panel, wave 5). Only individuals with data for all 12 months are included in the analysis.

The analysis provides estimates for two age groups. The first age group, replicating Jolls' approach, includes adults age 18 to 58. The second group includes young adults age 18 to 30. As noted, this group represents individuals who are most likely to be enrolled in college.

Models control for age, age-squared, gender (females as reference group), race (white, black, or other race, with white as the reference group), marital status (married or unmarried, with unmarried as the reference group), and an indicator for post-ADA implementation (which equals one if the year is 1992 or later; zero otherwise). Specifications include either state fixed-effects to account for time-invariant state characteristics or, because the state type variable precludes the use of state fixed-effects, state-level month and year unemployment rates from the Bureau of Labor Statistics to account for state economic conditions.<sup>30</sup>

#### *Post-secondary Educational Enrollment*

The outcome variable of interest is post-secondary educational enrollment, which is defined as enrollment in college (two-year or four-year institutions) or vocational institutions for one or more months during a one-year period (September to August) that included the first functional limitations and disability topical module of the SIPP panel. (Graduate programs are excluded in this definition.) In addition, since enrollment patterns may differ by type of post-secondary institution, separate estimates are used to evaluate college and vocational enrollment. In contrast, Jolls (2004) identified post-secondary

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<sup>30</sup> Including state unemployment rates with the state-fixed effects models does not substantially change the results.



enrollment through a labor measure: individuals who reported not working in a given year because they were attending school. This definition of school enrollment seems restrictive, given that many students both attend school and work. The CPS does not contain information about the type of school enrollment or enrollment for individuals who both worked and attended school at the same time.

### *Analysis*

The first model uses a difference-in-differences estimation to focus on the overall post-secondary enrollment of adults using separate time- and state-specific fixed estimates:

$$\begin{aligned} \text{Prob (ENROLL}_{iy}) = & \beta_0 + \beta_1 X_{iy} + \beta_2 \text{ADA}_y + \beta_3 \text{LIMITATION}_i \\ & + \beta_4 \text{ADA}_y * \text{LIMITATION}_i + e_{iy} \end{aligned} \quad (1)$$

In this model,  $i$  indexes individuals,  $y$  indexes years, ENROLL is a binary variable showing post-secondary enrollment in college, vocational school, or both (one indicating being enrolled in school, zero otherwise),  $X$  are demographic variables and state and year dummy variables, ADA is a dummy variable with one showing a post-ADA implementation year (1992 and after; zero for prior years), and LIMITATION is a individual indicator of having either an activity limitation or a severe activity limitation. A positive and significant coefficient for  $\beta_4$  will provide support for the hypothesis, showing that individuals with disabilities had greater rates of enrollment in post-secondary institutions after the ADA's passage (or less of a decrease in enrollment). A negative estimate would indicate the opposite, that enrollment decreased at a greater rate (or increased at a lower rate) for individuals with limitations than for individuals without

limitations. A small and insignificant coefficient would indicate that the ADA had no measurable effect on post-secondary enrollment among individuals with limitations that could be detected with these data. The analysis will produce separate results for the general working-age population and young adults, with  $\beta_4$  estimated to be larger for the latter group since they are more likely to be enrolled in post-secondary programs.

The second specification replicates part of Jolls' (2004) analysis, which used a difference-in-difference-in-differences (DDD) approach to compare post-secondary education among 18 to 58 year olds. The following model examines whether people with limitations in limited protection states had a greater change in their post-secondary enrollment than those living in states with full protection:

$$\begin{aligned} \text{Prob (ENROLL}_{ijy}) = & \gamma_0 + \gamma_1 X_{iy} + \gamma_2 \text{ADA}_y + \gamma_3 \text{SLP} + \gamma_4 \text{LIMITATION}_i \\ & + \gamma_5 \text{ADA}_y * \text{SLP}_{ij} + \gamma_6 \text{ADA}_y * \text{LIMITATION}_i \\ & + \gamma_7 \text{SLP}_{ij} * \text{LIMITATION}_i + \gamma_8 \text{ADA}_y * \text{LIMITATION}_i * \text{SLP}_{ij} \\ & + e_{ijy} \end{aligned} \quad (2)$$

This DDD specification shows whether the federal ADA provisions resulted in changes in educational attendance during the study period for persons with disabilities more in states where the ADA represented additional benefits above preexisting state laws. This model follows (1) with  $y$  indexing years. SLP is a dummy variable indicating states with ADA-like laws providing limited protections for people with disabilities before 1990 (value of one, zero otherwise). The reference group includes states that had laws that provided similar protections as the ADA prior to its passage. The coefficient of interest ( $\gamma_8$ ) shows the effect of the ADA on post-secondary education enrollment outcomes among people with disabilities in limited protection states versus full protection

states relative to the people without disabilities. A positive coefficient would indicate that individuals with limitations who lived in limited protection states had higher rates of post-secondary enrollment (or less of a decline) after the ADA than individuals with limitations who lived in full protection states, compared to individuals without limitations in the same states. A negative coefficient would indicate that individuals with limitations who lived in limited protection states had lower rates of post-secondary enrollment (or less of an increase) after the ADA than individuals with limitations who lived in full protection states, compared to individuals without limitations in the same states. A positive and significant coefficient will support the hypothesis that the ADA eliminated barriers to post-secondary education. Again, separate analyses will be run for the working-age population and younger adults, with the estimates expected to be larger for young adults than adults age 18 to 58.

#### *Analyses Restricted to High School Graduates*

Only a subset of the entire population of adults or young adults is likely to enroll in post-secondary education—those whose highest educational attainment is a high school diploma or equivalent. At one end of the spectrum, individuals without a high school degree are not eligible to enroll in college and are least likely to enroll in vocational classes; including these individuals could dilute enrollment estimates. At the other end of the spectrum, the ADA may have been least applicable to young adults with disabilities who had already been able to navigate the post-secondary system despite their health conditions. In addition, the financial returns to post-secondary education may be highest among those with only a high school diploma (that is, the financial benefits in returning to school for individuals with a four-year or graduate education are likely to be

less than for other education levels). To account for these issues, an additional set of analyses are conducted that examine only individuals whose highest educational achievement is a high school diploma or equivalent and have not completed a year of college.

In the discussion that follows, all results, unless otherwise noted, are statistically significant at  $p < 0.05$  or better for a two-tailed test.

## Results

### *Sample Characteristics*

Table 4.1 shows the demographic and outcome characteristics for adults age 18 to 58 and 18 to 30 by limitation status. Comparisons contrasted the statistics for individuals with and without limitations using chi-square or t-tests, with a threshold of  $p < 0.003$ <sup>31</sup> used in order to account for multiple comparisons. When individuals with limitations were no different than individuals without limitations on a characteristic, the statistics have the same subscript (a). When individuals with and without limitations differed, the statistics have different subscripts (a and b). Separate comparisons were made for any limitation and severe limitation, and statistics were calculated using SIPP sample weights and accounted for the complex survey design. Eleven percent of all adults had an activity limitation, and four percent had a severe activity limitation; the respective numbers for young adults were four and two percent. Adults with any or severe limitations were less likely to be male, white, or married. Consistent with expectations, adults with limitations were older than their counterparts with no limitations. While adults with any limitation were less likely to reside in states with limited protection and more likely to reside in no protection states compared to adults without limitations, adults with severe limitations

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<sup>31</sup> Based on a Bonferroni correction of  $p < 0.05$  divided by 19 comparisons.

were only more likely to reside in no protection states compared to adults without severe limitations. Adults with limitations also tended to have lower educational attainment and to be less likely to enroll in college; however, adults with limitations were not different from adults without limitations in terms of vocational school enrollment. The demographic and educational patterns were similar for young adults, though there were no differences among young adults with and without severe limitations for gender, and young adults with severe limitations were similar in age to young adults without severe limitations.

The demographic and background characteristics for people with limitations in full and limited protection states were largely equivalent (Table 4.2). These analyses follow the same analytical strategy as Table 4.1, contrasting the characteristics of people with limitations in full protection states with people with limitations in limited protection states and using a significance level of  $p < 0.003$  used to account for multiple comparisons. Statistics that do not differ by state type have the same subscript (a); state types that have statistically significant differences for a characteristic have different subscripts (a and b). Individuals age 18 to 58 with any limitation in full protection states were more likely to be white and to reside in states with lower unemployment rates than individuals in limited protection states. Among individuals 18 to 58 with severe limitations, only the state-level unemployment rate differed, with those in full protection states more likely to reside in states where the unemployment rate was lower. Young adults with any or severe limitation did not have any differences by state type.

*Post-secondary Enrollment for Adults with and without Limitations*

Using unadjusted analyses of means, the ADA had no impact on the post-secondary education enrollment for individuals 18 to 58 years old (Table 4.3). All statistics use sample weights and adjust for the complex sampling design of the SIPP (though they do not control for demographic or state characteristics), and show the standard error and unweighted sample size as well as the mean. Before the ADA, 8.8 percent of individuals 18 to 58 with limitations were enrolled in post-secondary institutions, while 8.0 percent were enrolled after the ADA, a non-significant decline of 0.8 percentage points. While individuals without limitations had higher enrollment rates, they also had a decline after the ADA, albeit smaller. The resulting DD estimate, comparing the change in post-secondary enrollment for individuals with and without limitations, is  $-0.4$  percentage points (insignificant). This estimate, which is small in magnitude, negative, and not significant, is similar to the estimates for individuals with severe limitations, as well as for enrollment in college or vocational institution enrollment. The exception to this pattern is for individuals with severe limitations and vocational enrollment, for whom the DD estimates were positive, though not significant.

DD estimates obtained from regression models that follow equation (1) are consistent with the unadjusted estimates: that for all adults in the sample, those with limitations did not have significantly different post-secondary enrollment relative to adults without limitations after the ADA was implemented (Table 4.4). The interaction term (ADA \* limitation) shows that the change in enrollment did not differ for those with and without a limitation after the ADA. This finding was true for all post-secondary measures.

Overall, individuals with limitations were less likely to be enrolled in college (by 1.6 percentage points for individuals with any limitation and 2.9 percentage points for individuals with severe limitations), while individuals with any limitation were more likely (at  $p < 0.10$ ) to be enrolled in vocational institutions. These results confirm the observations on type of enrollment found in the earlier descriptive table, which showed that individuals with disabilities had enrollment in vocational institutions that was similar to or higher than for individuals without disabilities.

The interactions between limitation and year, also shown in Table 4.4, suggest differences across the post-ADA years. Individuals with limitations were no more or less likely to be enrolled in 1993 and 1994 than in 1990 (the reference year) for any post-secondary measures. However, individuals with any limitation were less likely to be enrolled in any post-secondary (by 1.3 percentage points ( $p < 0.10$ )) or college (by 1.5 percentage points) institutions in 1997; the 1997 estimates for individuals with severe limitations were similar in magnitude but not significant.

#### *Post-secondary Enrollment for Young Adults with and without Limitations*

Similar to all adults, young adults with disabilities did not have significantly different post-secondary enrollment from young adults without disabilities after the ADA was implemented, though the magnitude of the interaction terms tended to be larger than the estimates for all adults. Table 4.5 shows the results for the unadjusted means (following Table 4.3), while Table 4.6 shows the linear-probability regression estimates (following Table 4.4 and equation (1)). All of the DD coefficients estimated through the unadjusted means or regression interaction terms are small and insignificant. In addition, there was no significant decline in post-secondary or college enrollment for individuals

age 18 to 30 with any limitation in 1997 (from the year-limitation interaction in Table 4.6) as was observed earlier for individuals age 18 to 58.

*Post-secondary Enrollment by State Type for Adults with and without Limitations*

As with the DD results comparing people with and without limitations, no significant ADA effects are observed when comparing outcomes of adults with limitations in states with and without ADA-like protections. Tables 4.7 and 4.8 show the unadjusted means for adults with any and severe limitations before and after the ADA, respectively, while Table 4.9 shows the estimates for regression models following equation (2). Adults with limitations who lived in states with limited protection were no more or less likely to be enrolled in post-secondary education after the ADA than adults with limitations who lived in states with full protection, relative to adults without limitations. No estimates for any enrollment are significant, and the magnitude is small for all outcomes. The third level interaction terms by year, shown at the bottom of Table 4.9, also suggests no clear enrollment trends.

*Post-secondary Enrollment by State Type for Young Adults with and without Limitations*

Young adults with any limitations in limited protection states had post-secondary enrollment rates that were lower after the ADA than for young adults with any limitation in full protection states, compared to the same individuals without limitations. Table 4.10 shows the unadjusted means for adults with any limitations and Table 4.11 shows the estimates for regression models following equation (2). Sample size issues permit examination only of the post-secondary and college enrollment for young adults with any limitations; there are too few young adults with severe limitations or young adults enrolled in vocational programs to permit reliable estimates of differences among those in



states with and without protections before the implementation of the ADA. The DDD coefficient regression estimate shows a 7.1 percentage point ( $p < 0.10$ ) decrease in post-secondary enrollment for young adults with disabilities in limited protection states compared to those in full protection states, and no differences for college enrollment.

*Post-secondary Enrollment for Individuals with High School Education*

Individuals whose highest educational attainment is a high school diploma or equivalent may be the most likely to have benefited from improved access to post-secondary education after the ADA. The unadjusted means for post-secondary and college enrollment of adults age 18 to 58 and age 18 to 30 whose highest education achievement was a high school diploma or equivalent (which excludes individuals who had completed at least one year of college) are shown in Table 4.12. The DD estimate is not significant for either group, but the table also shows that college enrollment increased for young adults with limitations (rather than their enrollment staying the same while enrollment for young adults without limitations decreased, which could also produce a positive DD estimate). Sample size issues did not permit college enrollment estimates for individuals 18 to 30 with severe limitations, or for vocational enrollment estimates. Table 4.13 shows the DD regression estimates for the same populations, though with slightly different results..<sup>32</sup> Adults age 18 to 58 with high school education with any or severe limitations were as likely as adults without limitations to enroll in post-secondary, college, or vocational institutions after the ADA. The post-secondary enrollment for young adults with limitations was positive but not significant (2.2 percentage points greater for young adults with any limitation and 5.6 percentage points greater for young adults with severe limitations), while young adults with any limitation who had a high

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<sup>32</sup> Sample size issues did not permit subgroup analyses for the DDD equations.

school education had a statistically significant increase in their college enrollment of 4.5 percentage points after the ADA, compared to young adults without any limitation who had a high school education. Additional analyses (not shown) examining post-secondary enrollment for those with some college experience or who had completed a four-year degree, as well as high school or vocational enrollment for those without a high school diploma or equivalent, showed no statistically significant differences for individuals with or without limitations.

## Discussion

The evidence presented in this study does not indicate that the ADA improved access to post-secondary education, as measured by enrollment, among individuals with limitations. However, younger adults with a high school education may have had increased enrollment in college after the ADA was implemented. This section first presents the strengths and limitations of the study, followed by a review of the findings for each of the research question, policies that could improve the post-secondary enrollment and outcomes for people with disabilities, and areas for further research.

### *Strengths and Limitations*

This study has several strengths, including its focus on post-secondary education, how disability is defined, and its use of variation in state laws to assess the relative impact of the ADA. Post-secondary education is extremely important for the economic and health well-being for people with disabilities, and identifying differences in the type of post-secondary education (four-year versus vocational institutions) is particularly relevant given the higher relative use of vocational institutions among people with disabilities compared to those without disabilities. The study uses a specific definition of

disability—having a limitation in one’s daily activities—that is a more objective measure of disability than work limitation and so is less likely to be influenced by factors such as the economy or the ADA. It also capitalizes on the ADA’s effect by examining variation in earlier state laws protecting people with disabilities to assess the relative impact of the ADA where the ADA represented a new addition to existing state law.

This study also has several limitations that must be considered when interpreting its results. First, DD and DDD comparison groups should not differ on observable characteristics. However, individuals with and without limitations differ on many key variables (including, of course, limitation status) that may be related to the outcome variable (post-secondary enrollment). While analyses can control for these observable differences in regression models, systematic differences in unobserved characteristics between these groups that change over time are potential more problematic and can introduce bias into the findings. For state type comparisons, the observable differences are few, with one notable exception for the state unemployment rate. Additionally, while the study focused on people with activity limitations, this heterogeneous group includes individuals with a broad range of conditions. The ADA could have had differential effects on post-secondary enrollment for people with specific conditions (for example, smaller effects for individuals with mental retardation or developmental disorders, and larger effects for individuals with physical disabilities). However, the data had too few cases for such comparisons, and was also too small to assess the effects in the three states that had no laws protecting people with disabilities. The latter issue also points to another limitation, that the study was underpowered, and the sample was sufficient only to detect large effects.

*Did Post-secondary Enrollment Increase for People with Disabilities after the Implementation of the ADA Relative to People without Disabilities?*

There were no noticeable effects for post-secondary enrollment for the larger population with limitations, above the effects observed for the population without limitations. The lack of findings for the broader working-age population with limitations is consistent with what is known about the educational enrollment of older individuals—they are not likely to return to school. In addition, when individuals acquire a condition that leads to a disability or limitation later in life, such individuals may be more concerned with obtaining federal disability benefits (SSDI and SSI) as a path to retiring early, especially for low wage or low skilled workers with limitations, for whom federal disability benefits replace wages at a level that is higher than for those with high wages or high skills. Federal disability benefits would therefore be a disincentive to pursuing additional education to remain in or return to the workforce.

The analysis also did not find effects for all younger working-age individuals (18 to 30 years old), but did find effects for those whose highest educational attainment was a high school diploma or equivalent. This result is positive (4.5 percentage points), albeit one based on a small sample. There was no evidence that enrollment changed for all adults with a high school diploma or equivalent or adults who had at least some college experience. This finding is consistent with how the ADA might have affected students with disabilities: people who already had experience with post-secondary institutions may not have been as likely to have benefited from the new requirements imposed by the ADA on those institutions.

Focusing on the fact that the enrollment of people with disabilities after the ADA did not increase relative to those without disabilities may ignore a positive finding: post-secondary enrollment for people with disabilities did not lag behind their peers without disabilities. Post-secondary enrollment increased during the 1990s for all individuals, perhaps because of increased awareness of the value of such education, more opportunities being offered by colleges and vocational schools, and readily available financing to provide access to school. As more individuals enrolled in post-secondary institutions, people with disabilities also increased their enrollment at similar rates, which may or may not have been related to the ADA. The lack of findings also contrasts with other findings related to the impact of the ADA, in which, for many studies, there was a perverse effect of the ADA on employment outcomes.

Finally, there was no evidence that people with severe limitations had better enrollment outcomes compared to people with any limitations. This finding is not consistent with the intention of the ADA to promote outcomes for individuals with significant life impairments.

*Among People with Disabilities, Did Post-secondary Enrollment Increase More in States in Which the ADA Provided Additional Protections Than It Did in States That Already Had ADA-like Protections?*

This study confirms Jolls' (2004) findings: the ADA did not have an effect on the post-secondary enrollment of adults with disabilities in states with limited protection compared to that of adults with disabilities in states with full protection. The lack of an ADA effect in the post-secondary enrollment of all adults in full and limited protection states is robust across different disability definitions and post-secondary enrollment

measures. While Jolls found a positive effect for adults with disabilities in no protection states, her result could not be confirmed, since the sample of people with disabilities in the SIPP residing in no protection states was too small to provide valid estimates. A different story emerges for younger adults, which Jolls did not examine. Younger adults with disabilities who lived in states with limited protection were less likely to enroll in post-secondary institutions than younger adults with disabilities who lived in states that already had ADA-like laws. Why this group had a decrease in enrollment is not clear. One possibility is that individuals in those states either were not prepared to enroll in school or lacked the means to do so.

#### *Policy Implications*

Since the ADA was not sufficient as a policy intervention to decrease the enrollment gap between individuals with and without disabilities (except for younger adults whose highest educational achievement was a high school diploma or equivalent), a more direct approach to decrease the cost of education for people with disabilities may be required. A primary way to decrease cost is to offer federal grants or scholarships for individuals with disabilities to attend post-secondary institutions. Such a policy may be a particularly important method to encourage enrollment by older adults who are interested in retooling their skills. However, an important feature of any such system is to keep the administrative burden low, both for the recipient and the agency overseeing the program. As Deming and Dynarski (2009) find, individuals with low incomes may have problems completing complex paperwork associated with post-secondary incentive programs (that is, the time costs to apply are high). The same effect may be true for individuals with disabilities.

Any program targeted to individuals with disabilities would have to obtain evidence of the disability. Such a program would necessarily be administratively complex; the cost of running SSA's disability insurance program is 80 percent that of its retirement and survivors programs, despite having four individuals in the latter program for every one of the former. One possible route to decrease the burden is to use the existing disability determination system for federal and state disability benefits. Each state already has an agency to assess the disability status of individuals who apply for federal disability benefits; an education program that provides grants or scholarships to individuals could use a streamlined application method to be administered by the same disability determination system. Adequate funding would have to be provided to these agencies, since many already have difficulty assessing their current applicants for disability benefits.

An alternative to using the existing disability determination system would be to provide block grants to post-secondary institutions to provide direct funding to students with disabilities. Such a system would provide assistance to students after they are already enrolled, rather than to those who are considering enrolling, so it is not clear that an institution-based program would have an effect on the overall enrollment of people with disabilities. Another financing system, using tax incentives to encourage post-secondary enrollment, would likely benefit only families on the higher end of the income spectrum (Deming and Dynarski 2009).

In addition to decreasing the financial cost, there should also be policies to keep people with disabilities in school once they begin a program. Providing block grants to institutions, as mentioned in the previous paragraph, could provide resources to current

students with disabilities; a portion of such grants could also provide additional resources to institutions to provide direct accommodations and assistance to students with disabilities. Overall declines in post-secondary completion rates are due in part to the resources that institutions provide to help students remain in school (Bound, Lovenheim, and Turner 2009); improving the resources for institutions to work with students with disabilities may therefore help students continue and complete their education.

SSA provides many incentives for students who receive disability benefits. SSI recipients who are enrolled in school and have earnings are allowed to keep more of their disability benefits (that is, the impact of earnings on benefit levels is not as great for beneficiaries enrolled in school as for beneficiaries who not enrolled). They may also have savings plans to accumulate funds for educational purposes; such savings would not count as assets in the benefit calculation and the amount placed in savings would be excluded in monthly benefit calculations. Both SSI and SSDI beneficiaries may obtain educational services through a state vocational rehabilitation program, depending on whether additional education is included in the employment plan. SSA may want to consider investing in improving the awareness of these incentives among beneficiaries. In addition, it could consider more actively promoting post-secondary education through its Ticket to Work program, which currently provides financial incentives to employment networks (vocational rehabilitation programs or employment agencies) that provide employment services to encourage the return to work of SSA beneficiaries. Post-secondary institutions could also be encouraged to provide education services to beneficiaries, with Ticket funds used to offset the tuition costs for beneficiaries who



attend school. Outcome payments would be provided for successful completion of courses and a larger payment provided when a beneficiary obtains a degree.

Any public policy intended to promote post-secondary enrollment must account for the prominence of vocational programs in the post-secondary experiences of people with disabilities. This analysis confirms others' observations that a sizeable proportion of individuals with limitations enroll in vocational programs, and at a level that is larger than that of individuals without limitations. One concern with this pattern is that since vocational institution enrollees are less likely to obtain a degree, the educational achievement gap between individuals with and without disabilities cannot be closed. The greater emphasis on vocational training programs for people with disabilities may reflect differences in their goals and aspirations compared to people without disabilities. However, it could also reflect lower goals and aspirations of their family member and school officials, the limited financial opportunities to obtain degrees from four-year institutions, and lower perceived payoffs in obtaining a college degree.

#### *Future Research*

Several issues related to the post-secondary education of people with disabilities remain unanswered. First, this study looked only at enrollment, not at educational achievement. Considering whether the ADA led to the attainment of post-secondary educational degrees may be a more meaningful measure of ADA impact (or lack thereof). Second, future research should also examine how enrollment differs for various definitions of disability. As mentioned, enrollment could vary for those with specific conditions. It could also vary for people with work limitations or other kinds of participation limitations, especially since the latter could preclude participation in school.

Third, the ADA may only have had long-term changes in enrollment beyond the window used in this study since the payoff for additional school might be delayed. The value that the additional education could bring to people with disabilities in the employment marketplace (per more opportunities brought about by the ADA) would not be immediately apparent. Alternatively, individuals may have needed to benefit first from the ADA in high school (which itself might not have been immediate) before being able to seek post-secondary education; a cohort of individuals would first have to have entered high school after the ADA took effect and only then be in a better position to pursue post-secondary education. Such an analysis might compare the post-secondary experiences of a cohort that had entered high school before the ADA with a cohort that had entered high school after the ADA. Post-secondary educational institutions may also be a reason for taking a long-term approach to assessing enrollment effects, since they may have been delayed in their understanding and application of the requirements of the ADA as students presented themselves as needing assistance per the ADA and staff learned how to accommodate those requests.

## V. Conclusion

Congress passed the ADA to eliminate employment discrimination against people with disabilities and to promote access to public accommodations, communication, and transportation. Signed on July 26, 1990, large employers (those with 25 or more employees) and state and local governments were to comply within two years of passage and smaller employers (those with 15 to 24 employees) within four years.<sup>33</sup> As noted in Chapter I, the ADA achieved many of its statutory goals by expanding basic physical access and accommodations to public areas and promoting access to public transportation (National Council on Disability 2007c), yet the economic gains, through expanded employment opportunities, have been mixed.

The first part of this chapter reviews the results and limitations from the preceding three chapters, interpreting them in the context of the ICF disability model. It then discusses why the ADA might not have been sufficient to improve the study's outcomes for individuals with limitations. It concludes with policy interventions and recommendations to address additional barriers in health coverage and post-secondary educational enrollment.

### What Were the Effects of the ADA on Health Coverage and Post-secondary Education?

The effects of the ADA on health coverage and post-secondary education can be viewed through the lens of the ICF disability model discussed in Chapter I. The relationship between having an activity limitation and having a participation restriction, either in an individual's health coverage or the post-secondary enrollment, is not a given, and environmental factors—here, the ADA—can influence the relationship between activity limitations and participation restrictions. The relationship could be attenuated if

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<sup>33</sup> The federal government is exempt.

the ADA removed the barriers to and reduced the costs of participation, such as through opening access to employers or post-secondary educational institutions. Conversely, if the costs and barriers were increased, such as through higher legal costs for employers or increased burden on post-secondary educational institutions, then having an activity limitation would be more likely to be associated with also having a participation restriction in these areas.

Did the ADA (a policy intervention) exacerbate or reduce participation restrictions in health coverage for people with activity limitations? For the broader population with activity limitations, the answer is a qualified no. Chapter II showed that after the implementation of the ADA, individuals with limitations had a shift in their health coverage away from private coverage and toward public coverage. While private coverage for all individuals decreased during this period, individuals with limitations were disproportionately affected. Because of the lack of state variation in health coverage trends, and the increase in public coverage (rather than no coverage), it is likely that the observed shifts in health coverage for the broader population were due, at least in part, to an increase in federal disability benefits. However, an impact by the ADA cannot be discounted because of the observed increase in no coverage at the expense of private coverage among individuals with limitations without federal disability benefits and workers with limitations.

Conversely, the decline in EBHI observed for full-time workers with disabilities after the ADA is consistent with a perverse effect of the ADA. That is, the ADA likely increased the likelihood of having a participation restriction for enrollment in EBHI for full-time workers with activity limitations, likely as a result of the reaction of employers

to the law. Full-time workers with activity limitations, and specifically those in private firms, had lower rates of EBHI after the ADA took effect, and the magnitude of the effect was larger for workers with severe limitations than for workers with any limitation. As further evidence that the ADA was in part responsible for this shift, a negative effect on EBHI was observed in states that did not have laws protecting workers with disabilities that were similar to the ADA. This perverse effect may reflect the fact that employers had additional costs imposed by the ADA, and so they passed those costs to workers with disabilities through avoiding offering health coverage to workers with disabilities (for example, through increasing premiums for their workforce, extending waiting periods, or imposing pre-existing condition limitations in the plans offered). This negative effect on workers is consistent with many other findings on the effects of the ADA on employment, which has found a largely perverse effect on employment of people with disabilities, though this larger effect on employment may be confounded by the rise in federal disability income rolls.

Finally, the ADA did not affect the relationship between having an activity limitation and having a participation restriction in attending post-secondary institutions. The results in Chapter IV suggest that there were no noticeable effects on post-secondary enrollment for the larger population with limitations that could be attributed to the ADA, above the effects for the population without limitations. There was, however, a positive effect on college enrollment for young adults who were high school graduates. The lack of a broader effect is consistent with prior research (Jolls 2004) which showed that the ADA had a positive effect on post-secondary enrollment only in states that had no laws protecting people with disabilities (comparable analyses could not be completed here on

account of data limitations). The ADA may have been effective in lowering some of the institutional barriers regarding access to post-secondary schools (such as promoting accommodations and increasing awareness among professors of the needs of students with disabilities), but reducing those barriers was not sufficient to increase post-secondary enrollment over trends observed for persons without disabilities, and other factors, such as cost, remain.

Comparable to other studies on the impact of the ADA, there are several caveats that should be recognized when assessing these findings. First, one of the key limitations of this research is the short-term window of observation. The ADA may have had impacts in improving health coverage and post-secondary education for years beyond the study period as workplaces and educational institutions became more accessible, transportation more available, and individuals, employers, and post-secondary institutions became more aware of how to apply the law and to determine who was covered by the ADA. Second, although the SIPP provides a more serviceable definition of disability than the more commonly used CPS, the SIPP contained few cases for many of the desired comparisons. Many analyses, particularly for individuals with severe disabilities and state comparisons, could not be completed because of small sample size issues. Analyses with a larger and more representative sample could yield different and more precise findings. An extension of this issue involves the power of the analyses to detect significant differences. The sample for many analyses, particularly ones involving education, had the power to observe only large effects. As such, the ADA may have had impacts, but at a smaller level than could be detected in the sample. However, smaller effects might not be substantially meaningful, either economically or for people with disabilities. Third,

differences between state types (or the lack thereof) may not be the best indicator of the ADA's effects. State laws protecting workers with disabilities or requiring accommodations may have been inconsistently applied or enforced, and awareness of such laws likely differed among residents and employers of states categorized as having protection similar to the ADA or providing more limited protection. Fourth, a critical assumption of the difference-in-differences analyses—that the treatment and control groups do not differ on observable characteristics—cannot be met when comparing people with and without disabilities, since the groups are defined according to whether an individual has a disability. In these analyses, disability is defined as having a health condition that affects one's activity level. While the regression models can control for observable differences, there may be systematic differences in unobservable characteristics that change over time and can introduce bias in the results.

Why the ADA Should Not Have Changed the Relationship between Having an Activity

#### Limitation and Having a Participation Restriction

The ADA is focused in its main provisions: it bans discrimination based on having a disability, and it requires that government institutions, businesses, and public areas be accessible. As noted in the first chapter, people with disabilities face many barriers to participation, both at the individual level (such as having less education and fewer resources) and the societal level (such as discrimination by employers and employer attitudes). While the ADA addressed two societal barriers, it provided no supports to address individual or other societal barriers. As such, the ADA played an important role in eliminating some of the indirect costs related to accessibility and discrimination, but individuals with disabilities faced additional barriers during the

analysis period that the ADA cannot have been expected to eliminate (National Council on Disability 2007b). If these barriers continued to play important roles, then the ADA could not, by itself, have been able to improve the studied outcomes.

Another factor in the expectations of the ADA's impact involves who it covers. As pointed out by Blanck et al. (2003), one of the critical issues in assessing the impact of the ADA is that the employment provisions of the ADA do not apply to all people with disabilities, only those with disabilities that substantially limit major life activities and who are able to perform the duties of a job.<sup>34</sup> This definition excludes individuals who cannot perform job duties (such as individuals with health conditions that prevent them from working), or who have conditions that do not substantially limit a major life activity (for instance, an individual with depression that does not affect any major life activity once treated with medication, or having a vision impairment that is mitigated through corrective lenses). The same caveat also applies to the assessment of the ADA on health coverage (as regards private coverage in general and coverage through one's employer in particular, though for the latter, the qualification caveat would not apply) and post-secondary education.

The ADA could have had an impact on those individuals who were covered, but not everyone in the analysis sample falls into that category and so those results could not be detected. This analysis focused on individuals with activity limitations, with separate analyses for individuals with severe activity limitations. The latter definition should meet the disability criteria of the ADA, yet these individuals still might not fit the qualification criteria. This study finds that for the most part, the estimated impacts are similar for

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<sup>34</sup> As discussed in Chapter I, this definition has been somewhat attenuated with the Americans with Disabilities Act Amendments Act of 2008.



individuals with any and severe limitations, though the estimates for the latter were not statistically significant in many instances.

The inclusion of individuals with disabilities who are not covered under the ADA could result in two types of bias. First, assessing the effects of the ADA on a broader population than those covered could dilute an actual positive or negative impact of the ADA on an outcome. Second, trends for the larger population with disabilities during the period the ADA was implemented could be falsely attributed to the ADA, though the actual impact for those covered may be zero or in the opposite direction. The results from Kruse and Schur (2003) suggest this latter scenario for employment. Further, since the number of individuals with disabilities (and specifically a limitation in the ability to work) increased during the early 1990s, such an expansion could encompass a significant number of individuals not covered by the ADA. Such a trend could produce negative effects on employment and other outcomes for people with disabilities, and not be the result of the ADA being a failed or ineffective policy (Blanck, Schwochau, and Song 2003).

Given these issues, the ADA can be seen as a necessary, but not sufficient, step to expanding the economic opportunities for people with disabilities. The next sections identify policies that could address additional barriers and costs to health coverage and post-secondary education participation for individuals with disabilities.

#### Policy Interventions to Address Gaps in Health Coverage for People with Disabilities

Government intervention in private markets can be justified when there is evidence of a market failure or a distributional inequality, and the latter is likely the case for full-time workers with activity limitations. They lacked less access to EBHI directly

after the ADA was implemented and were likely to be unable to purchase private non-group coverage. This effect is perverse; before the ADA, the proportion with EBHI was roughly equivalent for full-time workers with and without disabilities (though overall access differed on account of the potentially higher coverage costs and/ or lower employment rates for persons with disabilities). The limited positive effects of the ADA may reflect the unintended consequences of government intervention to correct the larger problem (less access to employment) through the imposition of additional costs to employers. This cost may be acceptable, given the success of the ADA, at least in areas outside of employment.

What policies should federal or state governments implement to change the relationship for a worker with an activity limitation who also has a participation restriction regarding access to EBHI? Several policy reforms were suggested in chapter III to promote access to EBHI, but these ideas—such as individual-level vouchers for to purchase either EBHI or non-group health coverage for people with disabilities who work, tax credits for employers, high cost reinsurance plans—may be administratively complex to carry out. More promising are the ideas contained in the current health reform proposals under consideration by Congress. Though the final legislation has not been agreed upon as of this writing (the House and Senate bills have both passed with further progress stalled under the threat of a Republican filibuster), these reforms could affect both the demand for coverage by persons with disabilities (such as through individual mandates to purchase insurance and employer “play or pay” mandates to provide insurance) and the supply of coverage to such workers (such as promoting health insurance exchanges with guaranteed issue). Requiring an individual mandate and

requiring insurers to include individuals with pre-existing conditions, for example, immediately expands the health insurance marketplace for individuals with disabilities, assuming adequate subsidies are available to assist those with low incomes. Health insurance exchanges should provide broader access to health coverage (and perhaps options for more affordable plans) for both smaller employers and for individuals with disabilities who lack access to EBHI and who purchase individual plans. Coverage obtained through the exchanges will also help to reduce the impact of “job lock” which may be especially relevant to persons with disabilities who may be reluctant to change jobs because of the possible loss of coverage, valued benefits, or provider access.

In addition to the above policies that directly affect health coverage, other policies promoting employment for people with disabilities may indirectly affect access to health coverage. These policies may be appropriate, given the gap in employment between those with and without disabilities. Most federal government funding goes to income replacement (through Social Security Disability Income or Supplemental Security Income) and health coverage (through Medicare and Medicaid); few dollars go to promoting the independence of people with disabilities. Moreover, federal funds are largely targeted to individuals with the most severe disabilities—those who cannot work at a substantial level. Eliminating the inability to work definition to qualify for federal disability benefits, providing tax credits to people with disabilities who work, and improving access to rehabilitation services are some of the policies that can help individuals with disabilities not only become more economically self-sufficient but also enhance their ability to obtain health insurance (Stapleton, O'Day, Livermore, and Imparato 2006).

## Policy Interventions to Improve Post-secondary Education for People with Disabilities

Individuals with activity limitations do not access post-secondary institutions at the same rates as individuals without activity limitations, and the ADA did not change the relationship between activity limitations and participation restrictions in post-secondary education except for a narrowly defined group. This inequality in access has not been rectified either by the marketplace or by government policies (such as the Rehabilitation Act of 1973 and the vocational rehabilitation program), and so requires additional government intervention. This gap has clear consequences for people with activity limitations in terms of employment prospects in skilled jobs, earnings, wealth accumulation, and health. One reason for the markedly lower educational enrollment despite the additional accommodations that post-secondary institutions provide is that individuals with disabilities may lack access to appropriate capital markets to finance education. For example, people with disabilities may be viewed as bad risks by lenders because of their lower socio-economic status (SES) status (people with disabilities have disproportionately lower income levels relative to people without disabilities). People with disabilities may therefore need assistance with their educational financing to help with this distributional inequality. Another reason may be that many who do have financial means encounter other significant barriers to participating in school, such as lack of personal assistance (for those with physical disabilities) or a lack of staff or other resources provided through student disability centers (Dowrick, Anderson, Heyer, and Acosta 2005; Stumbo, Martin, and Hedrick 2009).

Several policies were suggested in Chapter IV to promote the demand for higher education by reducing the financial costs faced by individuals with disabilities. Tax

incentives could offset the cost of schooling, as could government-sponsored grants or low-interest loans for people with disabilities. The problem with these policies is the administrative complexity, both on the supply side (such as deciding who qualifies for the policy because of a disability) and the demand side (such as consumers having sufficient information about the policies and the ease of applying for assistance).

Federal and state policies to promote post-secondary education could instead build on two existing programs, vocational rehabilitation (VR) agencies and post-secondary student disability centers, to address issues regarding post-secondary access by persons with disabilities. These programs already have an established infrastructure to identify individuals with qualifying health conditions, and many individuals with disabilities are already using these programs to enroll in post-secondary programs and obtain degrees.

People with disabilities currently have access to financing post-secondary educations through vocational rehabilitation (VR) agencies. VR agencies serve individuals with disabilities, including federal disability beneficiaries, who can benefit from services that improve their employment situation. Such services include paying for post-secondary tuition should the classes be tied to the individual's vocational goals. About one-third of VR consumers in a longitudinal VR study received post-secondary training or education during the course of services received through VR (Hayward and Schmidt-Davis 2003). About equal numbers of these consumers attended a business or training program, a two-year community college, or a four-year institution, with between 11 and 25 percent completing a degree during the study period.

Despite the availability of a financing mechanism through VR agencies, there are two larger concerns affecting an individual's access to post-secondary education through VR. The first centers on awareness. Are people with disabilities, and transitioning youth in particular, aware that VR agencies can facilitate post-secondary education? Many individuals may see their local VR agencies as primarily focused on employment and not be cognizant of the role that the agency can provide for post-secondary educational goals. The second, and perhaps more critical issue, involves access. VR agencies are restricted in their ability to serve all individuals with disabilities who could benefit from services since each has finite funding. Additionally, state VR agencies also periodically operate under an "order of selection" in which they can only accept those individuals with the most significant disabilities because the agency has exhausted their funding. To address the first issue, state VR agencies could increase outreach efforts to promote awareness of the post-secondary educational supports they can provide to the broader community with disabilities. The second issue is more problematic, but could be addressed by increasing federal funding to state VR agencies that is specifically targeted for post-secondary education.

Another possible mechanism to assist with financing post-secondary education would be for the federal government to provide additional funding to post-secondary educational institutions, perhaps in the form of block grants to states, to support their students with disabilities. The institutions could distribute a majority of the funding directly to students with disabilities in the form of scholarships. The remaining funds would provide additional resources for the institution's student disability center. Improving these kinds of resources could be important to address deficiencies related to

students with disabilities maintaining their enrollment. For example, institutions could obtain additional counselors to provide one-on-one counseling or mentoring services, pay for personal assistance for students with disabilities, and increase the available technological aids that may be too costly for students to purchase themselves.

### Conclusion

Much evidence has accumulated against the ADA regarding its effects on employment, and this research has found that the ADA has not facilitated access to health coverage and post-secondary education for people with limitations, and in some cases (as with full-time workers with limitations) the relationship has actually deteriorated during the period of observation. However, expecting the ADA to have improved health coverage and post-secondary education outcomes may be unrealistic. A key aspect of the law was to remove barriers to access, either through physical barriers (such as access to public transportation and areas) or discriminatory barriers (such as for employment and post-secondary education). It was not intended to eliminate other kinds of barriers (such as financial barriers, low education and employer attitudes) commonly encountered by people with disabilities. Future policies to promote the economic independence of people with disabilities should build on the ADA to address these barriers, particularly those barriers regarding financial costs. More research is needed, however, on which barriers are the most important to address and which policies would better serve the interests of both people with disabilities and federal and state governments.

Table 1.1. ICF Disability Schema

Level	Functioning	Disability
Body or parts of the body	Body function and structure	Impairments
Whole person	Activities	Activity limitation
Whole person in the environment	Participation	Participation limitation
Source. World Health Organization (2002).		



Table 1.2. Summary of Studies Examining ADA Employment Impacts

Study	Data	Disability definition	Method and dependent variables	Findings
Acemoglu and Angrist (2001)	CPS 1988-1997  Men and women age 21-58	Work limitation	OLS estimates of weeks worked and wages	Post-ADA (1992/ 1993) decline in employment for men and women with disabilities age 21-39 and men age 40-58 (absolute and relative to people without disabilities) No effect on wages Declines attributed to costs arising from reasonable accommodation requirement rather than costs related to lawsuits DI/SSI trends do not account for ADA effects States where ADA was an innovation to state laws experienced greater declines
Beegle and Stock (2003)	US Census 1970, 1980, 1990  Men and women age 18-64	Work limitation	Quasi-experimental: exploits time of state anti-discrimination laws protecting workers with disabilities  Labor force participation, employment, and log of annual earnings	Absolute declines in employment and labor participation for people with disabilities between 1970 and 1990 no matter the state (increases in earnings) Marginally lower (1 percent) labor force participation for people with disabilities relative to people without disabilities in states with disability discrimination laws No effect of laws on employment Marginal negative (2-3%) effect of laws on earnings No effect on hours of employment Because states had varying laws similar to the ADA, examining ADA effects will find only incremental impact Reasonable accommodation laws appear to have no effect on employment-related outcomes
DeLeire (2000)	1986-1993 SIPP panels (1986-1995)  Men age 18-64	Work-limitation resulting from health impairment	Pooled observations from each panel; probit of (change in) relative probability of employment; log wage regressions	Employment lower by 7.2 percentage points No change in wages Results not attributed to federal disability programs or changes in disability measurement
Houtenville and Burkhauser (2004)	CPS	Two-period work limitation	Annual average weekly hours, annual hours worked, worked 52 hours or more annually, full-year full-time employment	Employment declined beginning in mid-1980s Employment increased for some groups in 1992 Changes in SSA regulations, and not the ADA, is responsible for employment decline

Study	Data	Disability definition	Method and dependent variables	Findings
Jolls & Prescott (2004)	CPS 1988-1998  Men and women age 21-58	Work limitation	Exploit state variation in laws protecting workers with disabilities  Annual weeks worked	10% decline in employment in states where reasonable accommodation was novel No effect in states where anti-discrimination provision was novel No long term declines in employment no matter the state type Reasonable accommodation had a measurable and immediate negative effect on employment ADA had no real effect in states where ADA was novel; no connection between ADA and decline in employment for people with disabilities
Kruse and Schur (2003)	SIPP 1990-1994  Men and women age 21-58	14 different SIPP disability measures (combining functional limitation, disability income, and work limitation)	Proportion of weeks worked in a three-month period	People most likely to be covered under ADA (with limitations but no disability income or conditions that prevent work) had increased employment Accounting for economic conditions did not change estimates
Moon & Shin (2006)	SIPP 1990  Men age 20-62	Work limitations and functional limitations/ADL/IADL measures/disability income	Any employment, hours worked, full-time vs. part-time, hourly wages, earnings, income	5.8% decline in employment for people with disabilities relative to people without disabilities 5.2% marginally significant decline in log wages for functional limitations, ADLs/IADLs Similar results for both disability definitions

Table 1.3. Unweighted Sample Sizes by SIPP Panel

	1990 wave 3	1991 wave 3	1992 wave 6	1993 wave 6	1996 wave 5
Question 1					
Adults age 25 - 61	26,008	16,971	23,077	22,855	na
With activity limitation	3,472	2,234	3,040	2,941	
With severe activity limitation	1381	871	1263	1230	
Nonpositive weight	450	338	345	395	
Question 2					
Full-time workers age 25 – 62	15,305	9,811	13,576	13,493	na
With activity limitation	1,337	835	1,150	1,039	
With severe activity limitation	314	173	263	243	
Nonpositive weight	259	207	199	890	
Question 3					
Adults age 18 – 58	27,080	17,968	24,346	23,772	36,123
With activity limitation	3,036	2,011	2,732	2,611	3,795
With severe activity limitation	1,153	759	1,095	1,033	1,665
Nonpositive weight	324	472	483	572	943
Did not have 12 months of data	3,825	1,661	2,169	2,514	7,897
Adults age 18 – 30	9,524	5,948	7,718	7,146	10,124
With activity limitation	595	336	411	411	476
With severe activity limitation	212	110	148	144	178
Nonpositive weight	217	234	221	270	402
Did not have 12 months of data	1,765	832	1,030	1,138	3,196

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains unweighted sample sizes of the data used for each research question by SIPP panel, including the number with any or severe limitations and a count of cases that were not used because the weight was zero or missing, or, for the third question, the case did not have data for the entire 12 month observation period.

na = Not applicable (panel not included in the analysis).

Table 1.4. States with Full, Limited, and No ADA-like Laws Protecting People with Disabilities

Full protection	Limited protection	No protection
Arizona	Alaska	Alabama
Colorado	California	Arkansas
Delaware	Connecticut	Mississippi
Idaho	Florida	
Iowa	Georgia	
Louisiana	Hawaii	
Massachusetts	Illinois	
Minnesota	Indiana	
New Mexico	Kansas	
North Carolina	Kentucky	
Oregon	Maine	
Pennsylvania	Maryland	
Rhode Island	Michigan	
Vermont	Missouri	
Virginia	Montana	
Washington	Nebraska	
Wisconsin	Nevada	
Wyoming	New Hampshire	
	New Jersey	
	New York	
	North Dakota	
	Ohio	
	Oklahoma	
	South Carolina	
	South Dakota	
	Tennessee	
	Texas	
	Utah	
	West Virginia	

Source. Jolls (2004).

Note. Full protection states had state laws that prohibited discrimination of people with disabilities by private employers before the ADA's passage and also required employers to provide reasonable accommodations. Limited protection states prohibited discrimination, but imposed no reasonable accommodation requirements. No protection states did not have laws prohibiting discrimination or requiring accommodations.

Table 2.1. Hypothesized Direction of DD and DDD Estimates for Coverage for Adults

Age 25 to 61

Equation	Interaction of interest	Private vs. public <u>coverage</u>		Private vs. no <u>coverage</u>		Public vs. no <u>coverage</u>	
		Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation
1	ADA * limitation	+	+	+	+	0	0
2	ADA * SLP/SNP	+	+	+	+	0	0
3	ADA * limitation * education	+	+	+	+	-	-

Note. + indicates a positive hypothesized effect. - indicates negative hypothesized effect. 0 = no hypothesized effect.

Table 2.2. Characteristics of Working-age Adults by Limitation Status, 1990 - 1994

Variable	Working-age adults with limitations		Working-age adults with severe limitations	
	Any limitation (N = 11,687)	No limitation (N = 77,224)	Severe limitation (N = 4,745)	No severe limitation (N = 84,166)
Male (%)	47.2 <sub>a</sub>	49.3 <sub>b</sub>	42.5 <sub>a</sub>	49.5 <sub>b</sub>
Race (%)				
White	83.3 <sub>a</sub>	85.0 <sub>b</sub>	80.3 <sub>a</sub>	85.1 <sub>b</sub>
Black	13.9 <sub>a</sub>	10.9 <sub>b</sub>	16.9 <sub>a</sub>	11.0 <sub>b</sub>
Other	2.8 <sub>a</sub>	4.1 <sub>b</sub>	2.8 <sub>a</sub>	4.0 <sub>b</sub>
Married (%)	59.3 <sub>a</sub>	68.2 <sub>b</sub>	53.7 <sub>a</sub>	67.8 <sub>b</sub>
Education level (%)				
High school or less	69.5 <sub>a</sub>	50.2 <sub>b</sub>	75.4 <sub>a</sub>	52.0 <sub>b</sub>
At least some college	30.2 <sub>a</sub>	49.3 <sub>b</sub>	24.6 <sub>a</sub>	48.0 <sub>b</sub>
Age (mean)	45.2 <sub>a</sub>	39.7 <sub>b</sub>	46.5 <sub>a</sub>	40.1 <sub>b</sub>
Activity limitation (%)				
Any	100.0 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	8.2 <sub>b</sub>
Severe	40.9 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	0.0 <sub>b</sub>
State type <sup>1</sup> (%)				
No protection state	5.0 <sub>a</sub>	3.4 <sub>b</sub>	5.9 <sub>a</sub>	3.5 <sub>b</sub>
Limited protection state	63.7 <sub>a</sub>	67.1 <sub>b</sub>	65.0 <sub>a</sub>	66.8 <sub>a</sub>
Full protection state	26.8 <sub>a</sub>	25.9 <sub>a</sub>	26.4 <sub>a</sub>	26.0 <sub>a</sub>
State month/ year unemployment rate (mean)	6.4 <sub>a</sub>	6.4 <sub>a</sub>	6.5 <sub>a</sub>	6.4 <sub>a</sub>
Federal disability beneficiaries (%)	24.3 <sub>a</sub>	1.3 <sub>b</sub>	42.3 <sub>a</sub>	2.2 <sub>b</sub>
Employed (%)	52.8 <sub>a</sub>	81.4 <sub>b</sub>	33.0 <sub>a</sub>	80.2 <sub>b</sub>
Health coverage (%)				
Private	61.9 <sub>a</sub>	81.8 <sub>b</sub>	51.4 <sub>a</sub>	80.8 <sub>b</sub>
Public	20.8 <sub>a</sub>	4.2 <sub>b</sub>	32.8 <sub>a</sub>	4.8 <sub>b</sub>
No coverage	17.3 <sub>a</sub>	14.0 <sub>b</sub>	15.8 <sub>a</sub>	14.4 <sub>a</sub>

Source. SIPP (1990, 1991, 1992, 1993).

Note. Statistics use SIPP sampling weights and adjust for the SIPP's complex survey design. Any limitation column includes individuals with severe limitations. T-tests or chi-square tests were used to compare individuals with (severe) limitations to individuals without (severe) limitations; comparisons significantly different at  $p < 0.003$  (using a Bonferroni correction for multiple comparisons) do not share the same subscript.

<sup>1</sup> State type does not total to 100 percent since some states are omitted from this classification.

Table 2.3. Characteristics of Working-age Adults with Activity Limitations, by State Type, 1990 - 1994

Variable	<u>Any activity limitation</u>			<u>Severe activity limitation</u>		
	Full protection (N = 3,040)	Limited protection (N = 7,545)	No protection (N = 560)	Full protection (N = 1,213)	Limited protection (N = 3,137)	No protection (N = 267)
Male (%)	47.4 <sub>a</sub>	46.8 <sub>a</sub>	45.6 <sub>a</sub>	40.9 <sub>a</sub>	43.7 <sub>a</sub>	45.0 <sub>a</sub>
Race (%)						
White	86.1 <sub>a</sub>	82.8 <sub>a</sub>	66.9 <sub>b</sub>	83.7 <sub>a</sub>	80.1 <sub>a</sub>	61.9 <sub>b</sub>
Black	11.2 <sub>a</sub>	14.3 <sub>a</sub>	31.6 <sub>b</sub>	13.4 <sub>a</sub>	17.1 <sub>a</sub>	36.6 <sub>a</sub>
Other	2.7 <sub>a</sub>	3.0 <sub>a</sub>	1.5 <sub>a</sub>	3.0 <sub>a</sub>	2.8 <sub>a</sub>	1.4 <sub>a</sub>
Married (%)	58.9 <sub>a</sub>	58.8 <sub>a</sub>	61.9 <sub>a</sub>	52.9 <sub>a</sub>	53.6 <sub>a</sub>	57.3 <sub>a</sub>
Education level (%)						
High school or less	69.8 <sub>a</sub>	69.3 <sub>a</sub>	79.9 <sub>a</sub>	75.1 <sub>a</sub>	74.7 <sub>a</sub>	86.2 <sub>b</sub>
At least some college	30.2 <sub>a</sub>	30.7 <sub>a</sub>	20.1 <sub>a</sub>	24.9 <sub>a</sub>	25.3 <sub>a</sub>	13.8 <sub>b</sub>
Age (mean)	45.2 <sub>a</sub>	45.2 <sub>a</sub>	46.5 <sub>a</sub>	47.4 <sub>a</sub>	46.6 <sub>a</sub>	46.2 <sub>a</sub>
Activity limitation (%)						
Any	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
Severe	40.3 <sub>a</sub>	41.7 <sub>a</sub>	48.3 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
State month/ year unemployment rate (mean)	5.9 <sub>a</sub>	6.7 <sub>b</sub>	6.7 <sub>b</sub>	5.9 <sub>a</sub>	6.7 <sub>a</sub>	6.8 <sub>a</sub>
Federal disability beneficiaries (%)	23.6 <sub>a</sub>	24.6 <sub>a</sub>	31.8 <sub>a</sub>	42.1 <sub>a</sub>	42.0 <sub>a</sub>	49.6 <sub>a</sub>
Employed (%)	54.7 <sub>a</sub>	52.0 <sub>a</sub>	43.2 <sub>b</sub>	33.7 <sub>a</sub>	33.3 <sub>a</sub>	24.2 <sub>a</sub>
Health coverage (%)						
Private	64.4 <sub>a</sub>	61.5 <sub>b</sub>	45.6 <sub>c</sub>	52.8 <sub>a</sub>	52.1 <sub>a</sub>	36.0 <sub>b</sub>
Public	19.7 <sub>a</sub>	21.2 <sub>a</sub>	27.8 <sub>a</sub>	32.7 <sub>a</sub>	32.5 <sub>a</sub>	39.3 <sub>a</sub>
No coverage	16.0 <sub>a</sub>	17.3 <sub>a</sub>	26.6 <sub>b</sub>	14.6 <sub>a</sub>	15.4 <sub>a</sub>	24.7 <sub>b</sub>

Source. SIPP (1990, 1991, 1992, 1993).

Note. Statistics use SIPP sampling weights and adjust for the SIPP's complex survey design. Any limitation columns include individuals with severe limitations. T-tests or chi-square tests were used to compare individuals by state type; comparisons significantly different at  $p < 0.0009$  (using a Bonferroni correction for multiple comparisons) do not share the same subscript.

Table 2.4. Unadjusted Mean and Difference-in-differences (DD) Estimates of the ADA's Impact on Coverage Rates for the Population 25 to 61 with and without Limitations

Population/ coverage type	Before ADA	After ADA	Time difference	Before ADA	After ADA	Time difference
Population with limitations			Population with severe limitations			
Private coverage	0.649 (0.007) [3,694]	0.589 (0.007) [3,601]	-0.061** (0.010)	0.543 (0.013) [1,210]	0.488 (0.010) [1,249]	-0.056** (0.017)
Public coverage	0.185 (0.006) [1,060]	0.230 (0.006) [1,319]	0.045** (0.009)	0.299 (0.012) [676]	0.355 (0.011) [856]	0.056** (0.016)
No coverage	0.166 (0.006) [952]	0.181 (0.006) [1,061]	0.015+ (0.009)	0.158 (0.009) [366]	0.158 (0.009) [388]	-0.001 (0.012)
Population without limitations			Population without severe limitations			
Private coverage	0.828 (0.003) [30,900]	0.809 (0.003) [32,809]	-0.019** (0.004)	0.819 (0.003) [33,384]	0.797 (0.003) [35,161]	-0.021** (0.004)
Public coverage	0.037 (0.001) [1,400]	0.046 (0.001) [1,729]	0.008** (0.002)	0.043 (0.001) [1,784]	0.053 (0.001) [2,192]	0.010** (0.002)
No coverage	0.135 (0.003) [4,973]	0.146 (0.002) [5,413]	0.011** (0.003)	0.138 (0.002) [5,559]	0.150 (0.002) [6,086]	0.012** (0.003)
<i>DD</i>						
Private coverage			-0.042** (0.011)			-0.034* (0.017)
Public coverage			0.037** (0.009)			0.046** (0.016)
No coverage			0.005 (0.009)			-0.012 (0.013)

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains health coverage means for the population age 25 to 61, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993 and 1994. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is calculated as the time difference of the population with (severe) limitations minus the time difference of the population without (severe) limitations.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .



Table 2.5. Linear Probability Difference-in-differences (DD) Estimates of the ADA's  
Impact on Coverage Rates for Adults Age 25 to 61 with and without Limitations

	Change between private (1) and public (0) coverage		Change between private (1) and no (0) coverage		Change between public (1) and no (0) coverage	
Population/ variable	Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation
Full sample						
ADA * limitation	-0.044** (0.010)	-0.048** (0.018)	-0.015 (0.009)	-0.001 (0.016)	0.019 (0.017)	0.017 (0.024)
Sample size	[76,512]	[76,512]	[83,403]	[83,403]	[17,907]	[17,907]
R <sup>2</sup>	0.157	0.168	0.102	0.100	0.174	0.179
With federal disability income						
ADA * limitation	-0.038 (0.043)	-0.018 (0.035)	<sup>a</sup>		<sup>a</sup>	0.020 (0.028)
Sample size	[3,451]	[3,451]				[2,398]
R <sup>2</sup>	0.231	0.233				0.083
Without federal disability income						
ADA * limitation	-0.003 (0.009)	0.020 (0.017)	-0.024* (0.011)	-0.019 (0.020)	-0.025 (0.021)	-0.067+ (0.035)
Sample size	[73,061]	[73,061]	[81,788]	[81,788]	[15,509]	[15,509]
R <sup>2</sup>	0.084	0.083	0.103	0.102	0.125	0.123
Workers						
ADA * limitation	-0.025** (0.007)	<sup>a</sup>	-0.030** (0.009)	-0.003 (0.021)	0.047+ (0.024)	<sup>a</sup>
Sample size	[61,302]		[68,015]	[68,015]	[9,029]	
R <sup>2</sup>	0.026		0.074	0.073	0.065	
Non-workers						
ADA * limitation	-0.005 (0.016)	-0.009 (0.021)	0.030 (0.021)	0.009 (0.024)	0.017 (0.023)	0.004 (0.029)
Sample size	[15,210]	[15,210]	[15,388]	[15,388]	[8,878]	[8,878]
R <sup>2</sup>	0.392	0.387	0.257	0.257	0.174	0.172

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of the interaction from equation (1), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), limitation indicates having any or a severe activity limitation. Estimates include state fixed-effects.

<sup>a</sup> Sample size not sufficient for valid estimates.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 2.6. Unadjusted Mean and Difference-in-differences (DD) Estimates of the ADA's Impact on Coverage Rates for the Population 25 to 61 with and without Limitations by State Type

Population/ coverage type	Before ADA			After ADA			Time difference		
	SFP	SLP	SNP	SFP	SLP	SNP	SFP	SLP	SNP
Population with limitations									
Private coverage	0.679 (0.016) [1,009]	0.646 (0.009) [2,328]	0.462 (0.030) [139]	0.607 (0.016) [959]	0.585 (0.010) [2,350]	0.450 (0.023) [123]	-0.072** (0.022)	-0.061** (0.014)	-0.012 (0.038)
Public coverage	0.167 (0.014) [252]	0.191 (0.008) [694]	0.278 (0.031) [74]	0.227 (0.012) [332]	0.233 (0.009) [878]	0.277 (0.028) [74]	0.060** (0.018)	0.042** (0.012)	-0.001 (0.041)
No coverage	0.154 (0.013) [224]	0.163 (0.007) [606]	0.260 (0.020) [78]	0.166 (0.012) [264]	0.182 (0.008) [689]	0.273 (0.016) [72]	0.012 (0.017)	0.019+ (0.010)	0.013 (0.025)
Population without limitations									
Private coverage	0.859 (0.006) [8,339]	0.819 (0.004) [20,492]	0.752 (0.012) [897]	0.840 (0.005) [8,745]	0.798 (0.004) [21,778]	0.756 (0.015) [1,001]	-0.019* (0.008)	-0.021** (0.005)	0.004 (0.020)
Public coverage	0.032 (0.002) [310]	0.039 (0.002) [994]	0.044 (0.009) [53]	0.042 (0.002) [416]	0.047 (0.002) [1,200]	0.047 (0.005) [58]	0.010** (0.003)	0.008** (0.002)	0.003 (0.010)
No coverage	0.109 (0.006) [1,054]	0.142 (0.003) [3,494]	0.203 (0.007) [238]	0.118 (0.004) [1,149]	0.155 (0.003) [3,853]	0.197 (0.015) [239]	0.009 (0.007)	0.013** (0.004)	-0.007 (0.017)
DD									
Private coverage							-0.053* (0.024)	-0.040** (0.015)	-0.015 (0.042)
Public coverage							0.050** (0.019)	0.034** (0.012)	-0.004 (0.043)
No coverage							0.003 (0.019)	0.006 (0.011)	0.020 (0.030)

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains health coverage means for the population age 25 to 61 in full protection (SLP), limited protection (SLP), and no protection (SNP) states, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993 and 1994. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is calculated as the time difference of the population with limitations minus the time difference of the population without limitations for each state type.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 2.7. Unadjusted Mean and Difference-in-differences (DD) Estimates of the ADA's Impact on Coverage Rates for the Population 25 to 61 with and without Severe Limitations by State Type

Population/ coverage type	Before ADA			After ADA			Time difference		
	SFP	SLP	SNP	SFP	SLP	SNP	SFP	SLP	SNP
Population with severe limitations									
Private coverage	0.559 (0.031) [319]	0.552 (0.014) [797]	0.373 (0.053) [56]	0.497 (0.020) [322]	0.493 (0.014) [849]	0.343 (0.053) [44]	-0.062+ (0.037)	-0.059** (0.020)	-0.030 (0.075)
Public coverage	0.283 (0.026) [163]	0.298 (0.015) [438]	0.404 (0.037) [57]	0.369 (0.020) [225]	0.349 (0.014) [566]	0.378 (0.046) [47]	0.086** (0.033)	0.051* (0.021)	-0.026 (0.059)
No coverage	0.158 (0.019) [93]	0.150 (0.010) [230]	0.222 (0.028) [32]	0.134 (0.015) [91]	0.158 (0.010) [257]	0.279 (0.034) [31]	-0.024 (0.024)	0.008 (0.014)	0.057 (0.044)
Population without severe limitations									
Private coverage	0.850 (0.006) [9,029]	0.810 (0.004) [22,023]	0.730 (0.010) [980]	0.827 (0.004) [9,382]	0.787 (0.004) [23,279]	0.735 (0.013) [1,080]	-0.023** (0.007)	-0.023** (0.006)	0.005 (0.016)
Public coverage	0.037 (0.003) [399]	0.046 (0.002) [1,250]	0.056 (0.008) [70]	0.049 (0.002) [523]	0.055 (0.002) [1,512]	0.061 (0.006) [85]	0.012** (0.004)	0.009** (0.003)	0.005 (0.010)
No coverage	0.113 (0.006) [1,185]	0.144 (0.003) [3,870]	0.214 (0.008) [284]	0.124 (0.004) [1,322]	0.158 (0.003) [4,285]	0.204 (0.013) [280]	0.011 (0.007)	0.014** (0.004)	-0.010 (0.015)
<i>DD</i>									
Private coverage							-0.039 (0.038)	-0.036+ (0.021)	-0.035 (0.077)
Public coverage							0.074* (0.033)	0.042* (0.021)	-0.031 (0.060)
No coverage							-0.035 (0.025)	-0.006 (0.015)	0.067 (0.047)

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains health coverage means for the population age 25 to 61 in full protection (SFP), limited protection (SLP), and no protection (SNP) states, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993 and 1994. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is calculated as the time difference of the population with severe limitations minus the time difference of the population without severe limitations for each state type.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 2.8. Linear Probability Difference-in-differences (DD) Estimates of the ADA's Impact on Coverage Rates for Adults Age 25 to 61 with Limitations by State Type

Variable	Change between private (1) and public (0) coverage		Change between private (1) and no (0) coverage		Change between public (1) and no (0) coverage	
	Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation
ADA * SLP	0.000 (0.024)	0.005 (0.038)	-0.010 (0.024)	-0.036 (0.037)	-0.026 (0.047)	-0.052 (0.052)
ADA * SNP	0.011 (0.051)	<sup>a</sup>	-0.018 (0.047)	-0.106 (0.082)	-0.048 (0.071)	<sup>a</sup>
Sample size	[9,212]	[3,679]	[8,841]	[3,121]	[4,237]	[2,063]
R <sup>2</sup>	0.212	0.238	0.089	0.095	0.060	0.052

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of the interactions from equation (2), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), SLP is a dummy variable for states that had laws offering limited protection for workers with disabilities, and SNP is a dummy variable for states that had no laws protecting workers with disabilities. Estimates include state month/year unemployment rates.

<sup>a</sup> Sample size not sufficient for valid estimates.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 2.9. Linear Probability Model and Difference-in-differences (DD) Estimates of the ADA's Impact on Coverage Rates for Adults Age 25 to 61 without Limitations

Variable	Change between private (1) and public (0) coverage		Change between private (1) and no (0) coverage		Change between public (1) and no (0) coverage	
	Excludes any limitation	Excludes severe limitation	Excludes any limitation	Excludes severe limitation	Excludes any limitation	Excludes severe limitation
ADA	-0.017** (0.004)	-0.018** (0.004)	-0.022** (0.007)	-0.024** (0.007)	0.037+ (0.021)	0.038 (0.023)
SLP	-0.002 (0.003)	-0.002 (0.003)	-0.022** (0.007)	-0.021** (0.006)	-0.022 (0.017)	-0.018 (0.019)
SNP	0.001 (0.013)	-0.007 (0.013)	-0.074** (0.016)	-0.083** (0.015)	-0.097** (0.034)	-0.082** (0.034)
ADA * SLP	0.003 (0.004)	0.003 (0.004)	0.001 (0.009)	0.001 (0.009)	-0.016 (0.024)	-0.016 (0.026)
ADA * SNP	-0.001 (0.014)	-0.001 (0.015)	0.006 (0.024)	0.010 (0.023)	-0.010 (0.039)	-0.008 (0.039)
Sample size	[64,283]	[69,612]	[71,279]	[76,999]	[13,058]	[15,065]
R <sup>2</sup>	0.078	0.085	0.088	0.088	0.096	0.089

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of variables of interest from equation (2) for individuals without limitations, with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), SLP is a dummy variable for states that had laws offering limited protection for workers with disabilities, and SNP is a dummy variable for states that had no laws protecting workers with disabilities. Estimates include annual state unemployment rates.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 2.10. Linear Probability Model and Difference-in-differences (DD) Estimates of the ADA's Impact on Coverage Rates for Adults Age 25 to 61 with and without

Limitations by Education Attainment

Population/ variable	Change between private (1) and public (0) coverage		Change between private (1) and no (0) coverage		Change between public (1) and no (0) coverage	
	Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation
Full sample						
ADA	-0.017** (0.004)	-0.020** (0.004)	-0.023** (0.005)	-0.023** (0.005)	0.018+ (0.011)	0.023* (0.010)
Limitation	-0.203** (0.009)	-0.325** (0.017)	-0.067** (0.009)	-0.078** (0.015)	0.296** (0.016)	0.393** (0.019)
Education	0.050** (0.003)	0.057** (0.003)	0.116** (0.005)	0.120** (0.005)	-0.060** (0.014)	-0.062** (0.012)
ADA * limitation	-0.053** (0.014)	-0.040 (0.024)	-0.006 (0.013)	0.002 (0.022)	0.033 (0.022)	0.016 (0.027)
ADA * education	0.011* (0.004)	0.014* (0.004)	0.014* (0.006)	0.013* (0.006)	0.001 (0.018)	-0.009 (0.016)
Limitation * education	0.118** (0.013)	0.180** (0.026)	0.027* (0.012)	0.025 (0.020)	0.006 (0.035)	0.002 (0.047)
ADA * limitation * education	0.031 (0.020)	-0.014 (0.039)	-0.021 (0.019)	-0.003 (0.031)	-0.074 (0.049)	-0.001 (0.063)
Sample size	[76,512]	[76,512]	[83,403]	[83,403]	[17,907]	[17,907]
R <sup>2</sup>	0.164	0.172	0.102	0.100	0.174	0.179
With federal disability income						
ADA * limitation * education	0.076 (0.090)	0.025 (0.088)	a	-0.081 (0.088)	a	-0.119 (0.085)
Sample size	[3,451]	[3,451]		[1,615]		[2,398]
R <sup>2</sup>	0.231	0.233		0.114		0.085
Without federal disability income						
ADA * limitation * education	0.010 (0.015)	-0.021 (0.031)	0.010 (0.015)	0.029 (0.035)	-0.066 (0.047)	0.003 (0.079)
Sample size	[73,061]	[73,061]	[81,788]	[81,788]	[15,509]	[15,509]
R <sup>2</sup>	0.085	0.084	0.103	0.102	0.125	0.123
Workers						
ADA * limitation * education	a	a	-0.008 (0.021)	a	a	a
Sample size			[68,015]			
R <sup>2</sup>			0.074			
Non-workers						
ADA * limitation * education	-0.014 (0.035)	-0.017 (0.049)	-0.045 (0.034)	a	-0.066 (0.057)	a
Sample size	[15,210]	[15,210]	[15,388]		[8,878]	
R <sup>2</sup>	0.392	0.388	0.257		0.175	

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of variables of interest from equation (3), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), limitation indicates having any or a severe activity limitation, and education is a dummy variable that has a value of one for individuals having at least some college education. Estimates include state fixed-effects.

<sup>a</sup> Sample size not sufficient for valid estimates.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 3.1. Hypothesized Direction of DD and DDD EBHI Estimates for Full-time Workers Age 25 to 61

Equation	Interaction of interest	Any limitation	Severe limitation
1	ADA * limitation	+	+
2	ADA * SLP/SNP * limitation	+	+
3	ADA * limitation * education	+	+
4	ADA * SLP/SNP * education	+	+

Note: + indicates a positive hypothesized coefficient. - indicates negative hypothesized coefficient.



Table 3.2. Characteristics of Full-time Workers Age 25 to 61 by Limitation Status, 1990 - 1994

Variable	Workers with limitations		Workers with severe limitations	
	Any limitation (N=4,361)	No limitation (N=47,824)	Severe limitation (N=993)	No severe limitation (N=51,192)
Male (%)	57.4 <sub>a</sub>	57.6 <sub>a</sub>	48.2 <sub>a</sub>	57.7 <sub>b</sub>
Race (%)				
White	87.1 <sub>a</sub>	84.8 <sub>b</sub>	85.0 <sub>a</sub>	85.0 <sub>a</sub>
Black	10.5 <sub>a</sub>	11.3 <sub>a</sub>	12.7 <sub>a</sub>	11.2 <sub>a</sub>
Other	2.4 <sub>a</sub>	3.8 <sub>b</sub>	2.3 <sub>a</sub>	3.7 <sub>a</sub>
Married (%)	64.8 <sub>a</sub>	66.4 <sub>a</sub>	62.5 <sub>a</sub>	66.3 <sub>a</sub>
Education level (%)				
High school or less	59.7 <sub>a</sub>	47.1 <sub>b</sub>	60.8 <sub>a</sub>	47.9 <sub>b</sub>
At least some college	40.3 <sub>a</sub>	52.9 <sub>b</sub>	39.2 <sub>a</sub>	52.1 <sub>b</sub>
Age (mean)	43.6 <sub>a</sub>	39.3 <sub>b</sub>	44.7 <sub>a</sub>	39.5 <sub>b</sub>
Activity limitation (%)				
Any	100.0 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	6.5 <sub>b</sub>
Severe	23.0 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	0.0 <sub>b</sub>
State type <sup>1</sup> (%)				
No protection state	4.2 <sub>a</sub>	3.4 <sub>a</sub>	4.0 <sub>a</sub>	3.5 <sub>a</sub>
Limited protection state	63.0 <sub>a</sub>	66.9 <sub>b</sub>	67.8 <sub>a</sub>	66.5 <sub>a</sub>
Full protection state	27.2 <sub>a</sub>	26.0 <sub>a</sub>	25.2 <sub>a</sub>	26.2 <sub>a</sub>
State month/ year unemployment rate (mean)	6.3 <sub>a</sub>	6.4 <sub>a</sub>	6.4 <sub>a</sub>	6.4 <sub>a</sub>
Occupation (%)				
Management/ professional	22.1 <sub>a</sub>	31.1 <sub>b</sub>	21.9 <sub>a</sub>	30.5 <sub>b</sub>
Sales/ office	28.1 <sub>a</sub>	29.6 <sub>a</sub>	31.5 <sub>a</sub>	29.5 <sub>a</sub>
Service	11.4 <sub>a</sub>	9.6 <sub>b</sub>	13.5 <sub>a</sub>	9.7 <sub>b</sub>
Construction/ extraction/ maintenance	14.8 <sub>a</sub>	12.3 <sub>b</sub>	10.2 <sub>a</sub>	12.5 <sub>a</sub>
Production/ transportation/ material moving	21.3 <sub>a</sub>	15.6 <sub>b</sub>	20.5 <sub>a</sub>	16.0 <sub>b</sub>
Farming/ forestry/ fishing	1.8 <sub>a</sub>	1.1 <sub>b</sub>	2.1 <sub>a</sub>	1.1 <sub>a</sub>
Other	0.5 <sub>a</sub>	0.8 <sub>a</sub>	0.2 <sub>a</sub>	0.7 <sub>a</sub>
Industry (%)				
Goods-production	33.0 <sub>a</sub>	29.5 <sub>b</sub>	27.9 <sub>a</sub>	29.8 <sub>a</sub>
Service-providing	66.5 <sub>a</sub>	69.7 <sub>b</sub>	71.9 <sub>a</sub>	69.4 <sub>a</sub>
Other	0.5 <sub>a</sub>	0.8 <sub>a</sub>	0.2 <sub>a</sub>	0.7 <sub>a</sub>
Sector (%)				
Private for-profit	73.8 <sub>a</sub>	74.2 <sub>a</sub>	71.4 <sub>a</sub>	74.2 <sub>a</sub>
Private non-profit	5.2 <sub>a</sub>	5.1 <sub>a</sub>	6.8 <sub>a</sub>	5.0 <sub>a</sub>
Public	20.6 <sub>a</sub>	20.4 <sub>a</sub>	21.0 <sub>a</sub>	20.4 <sub>a</sub>
Other	0.4 <sub>a</sub>	0.3 <sub>a</sub>	0.8 <sub>a</sub>	0.3 <sub>a</sub>
EBHI (%)	73.6 <sub>a</sub>	75.8 <sub>a</sub>	71.3 <sub>a</sub>	75.7 <sub>b</sub>

Source. SIPP (1990, 1991, 1992, 1993).

Note. Statistics use SIPP sampling weights and adjust for the SIPP's complex survey design. Any limitation column includes individuals with severe limitations. T-tests or chi-square tests were used to compare workers with (severe) limitations to workers without (severe) limitations; workers with (severe) limitations who were significantly different from workers without (severe) limitations at  $p < 0.002$  (using a Bonferroni correction for multiple comparisons) do not share the same subscript.

<sup>1</sup> State type does not total to 100 percent since some states are not included.

Table 3.3. Characteristics of Full-time Workers Age 25 to 61 with Activity Limitations  
by State Type, 1990 - 1994

Variable	<u>Any activity limitation</u>			<u>Severe activity limitation</u>		
	Full protection (N = 1,151)	Limited protection (N = 2,773)	No protection (N = 177)	Full protection (N = 239)	Limited protection (N = 681)	No protection (N = 39)
Male (%)	58.4 <sub>a</sub>	56.4 <sub>a</sub>	58.2 <sub>a</sub>	42.4 <sub>a</sub>	49.2 <sub>a</sub>	62.6 <sub>a</sub>
Race (%)						
White	88.8 <sub>a</sub>	86.5 <sub>a</sub>	72.1 <sub>b</sub>	89.6 <sub>a</sub>	83.6 <sub>a</sub>	71.1 <sub>a</sub>
Black	9.1 <sub>a</sub>	10.8 <sub>a</sub>	26.4 <sub>b</sub>	8.8 <sub>a</sub>	13.6 <sub>a</sub>	28.9 <sub>a</sub>
Other	2.1 <sub>a</sub>	2.7 <sub>a</sub>	1.6 <sub>a</sub>	1.6 <sub>a</sub>	2.8 <sub>a</sub>	0.0 <sub>a</sub>
Married (%)	64.2 <sub>a</sub>	63.8 <sub>a</sub>	70.6 <sub>a</sub>	60.1 <sub>a</sub>	62.3 <sub>a</sub>	75.8 <sub>a</sub>
Education level (%)						
High school or less	60.8 <sub>a</sub>	58.8 <sub>a</sub>	66.1 <sub>a</sub>	60.2 <sub>a</sub>	61.1 <sub>a</sub>	68.7 <sub>a</sub>
At least some college	39.2 <sub>a</sub>	41.2 <sub>a</sub>	33.9 <sub>a</sub>	39.8 <sub>a</sub>	38.9 <sub>a</sub>	31.3 <sub>a</sub>
Age (mean)	43.7 <sub>a</sub>	43.4 <sub>a</sub>	45.0 <sub>a</sub>	44.9 <sub>a</sub>	44.7 <sub>a</sub>	45.7 <sub>a</sub>
Activity limitation (%)						
Any	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
Severe	21.3 <sub>a</sub>	24.7 <sub>a</sub>	21.8 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
State month/ year unemployment rate (mean)	5.8 <sub>a</sub>	6.6 <sub>a</sub>	6.6 <sub>a</sub>	5.9 <sub>a</sub>	6.7 <sub>a</sub>	6.5 <sub>a</sub>
Occupation (%)						
Management/ professional	21.9 <sub>a</sub>	22.6 <sub>a</sub>	16.5 <sub>a</sub>	21.5 <sub>a</sub>	22.4 <sub>a</sub>	16.9 <sub>a</sub>
Sales/ office	26.5 <sub>a</sub>	29.5 <sub>a</sub>	24.9 <sub>a</sub>	33.2 <sub>a</sub>	31.0 <sub>a</sub>	29.7 <sub>a</sub>
Service	12.1 <sub>a</sub>	10.9 <sub>a</sub>	11.6 <sub>a</sub>	16.4 <sub>a</sub>	12.7 <sub>a</sub>	7.6 <sub>a</sub>
Construction/ extraction/ maintenance	16.4 <sub>a</sub>	14.0 <sub>a</sub>	13.9 <sub>a</sub>	9.4 <sub>a</sub>	9.6 <sub>a</sub>	19.8 <sub>a</sub>
Production/ transportation/ material moving	20.7 <sub>a</sub>	20.9 <sub>a</sub>	29.9 <sub>a</sub>	17.8 <sub>a</sub>	21.7 <sub>a</sub>	22.8 <sub>a</sub>
Farming/ forestry/ fishing	1.8 <sub>a</sub>	1.8 <sub>a</sub>	2.6 <sub>a</sub>	1.6 <sub>a</sub>	2.4 <sub>a</sub>	0.0 <sub>a</sub>
Other	0.7 <sub>a</sub>	0.3 <sub>a</sub>	0.7 <sub>a</sub>	0.0 <sub>a</sub>	0.1 <sub>a</sub>	3.3 <sub>a</sub>
Industry (%)						
Goods-production	36.3 <sub>a</sub>	31.7 <sub>a</sub>	36.0 <sub>a</sub>	27.3 <sub>a</sub>	28.7 <sub>a</sub>	26.4 <sub>a</sub>
Service-providing	62.9 <sub>a</sub>	68.0 <sub>a</sub>	63.3 <sub>a</sub>	72.7 <sub>a</sub>	71.2 <sub>a</sub>	70.3 <sub>a</sub>
Other	0.7 <sub>a</sub>	0.3 <sub>a</sub>	0.7 <sub>a</sub>	0.0 <sub>a</sub>	0.1 <sub>a</sub>	3.3 <sub>a</sub>
Sector (%)						
Private for-profit	72.8 <sub>a</sub>	74.9 <sub>a</sub>	70.8 <sub>a</sub>	65.0 <sub>a</sub>	74.7 <sub>a</sub>	56.9 <sub>a</sub>
Private non-profit	5.1 <sub>a</sub>	5.3 <sub>a</sub>	2.8 <sub>a</sub>	7.4 <sub>a</sub>	6.5 <sub>a</sub>	6.9 <sub>a</sub>
Public	21.5 <sub>a</sub>	19.5 <sub>a</sub>	26.4 <sub>a</sub>	26.3 <sub>a</sub>	18.2 <sub>a</sub>	36.2 <sub>a</sub>
Other	0.6 <sub>a</sub>	0.3 <sub>a</sub>	0.0 <sub>a</sub>	1.2 <sub>a</sub>	0.6 <sub>a</sub>	0.0 <sub>a</sub>
EBHI (%)	73.7 <sub>a</sub>	73.8 <sub>a</sub>	64.5 <sub>a</sub>	70.3 <sub>a</sub>	72.3 <sub>a</sub>	60.1 <sub>a</sub>

Source. SIPP (1990, 1991, 1992, 1993).

Note. Statistics use SIPP sampling weights and adjust for the SIPP's complex survey design. Any limitation columns include individuals with severe limitations. T-tests or chi-square tests were used to compare individuals by state type; comparisons significantly different at  $p < 0.0006$  (using a Bonferroni correction for multiple comparisons) do not share the same subscript.

Table 3.4. Unadjusted Mean and Difference-in-differences (DD) Estimates of the ADA's Impact on EBHI Rates for Full-time Workers Age 25 to 61 with and without Limitations

Population/ coverage type	Before ADA	After ADA	Time difference	Before ADA	After ADA	Time difference
	Any limitations			Severe limitations		
With limitations	0.758 (0.011) [2,172]	0.714 (0.011) [2,189]	-0.044** (0.016)	0.743 (0.021) [487]	0.684 (0.022) [506]	-0.059** (0.030)
Without limitations	0.762 (0.003) [22,944]	0.753 (0.003) [24,880]	-0.009* (0.004)	0.762 (0.003) [24,629]	0.751 (0.003) [26,563]	-0.011** (0.004)
DD			-0.035* (0.016)			-0.048 (0.031)

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains EBHI means for workers age 25 to 61, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993 and 1994. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is estimated as the EBHI time difference of workers with (severe) limitations minus the EBHI time difference of workers without (severe) limitations.

+  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ .

Table 3.5. Linear Probability Difference-in-differences (DD) Estimates of the ADA's  
Impact on EBHI Rates for Full-time Workers Age 25 to 61 with and without Limitations

Variable	Any limitation	Severe limitation
ADA * limitation	-0.040* (0.015)	-0.059* (0.030)
Sample size	[52,185]	[52,185]
R <sup>2</sup>	0.091	0.090
1990 * limitation	Reference	Reference
1991 * limitation	-0.010 (0.020)	-0.104* (0.043)
1993 * limitation	-0.058** (0.017)	-0.146** (0.034)
1994 * limitation	-0.030 (0.020)	-0.061 (0.038)
Sample size	[52,185]	[52,185]
R <sup>2</sup>	0.091	0.091

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of the interaction from equation (1), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), limitation indicates having any or a severe activity limitation. Estimates include state fixed-effects.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 3.6. Unadjusted Mean and Difference-in-differences (DD) and Difference-in-difference-in-differences (DDD) Estimates of the ADA's Impact on EBHI Rates for Full-time Workers Age 25 to 61 with and without Limitations by State Type

Population	Before ADA			After ADA			Time difference		
	SFP	SLP	SNP	SFP	SLP	SNP	SFP	SLP	SNP
With any limitations	0.734 (0.024) [584]	0.771 (0.011) [1,358]	0.662 (0.063) [87]	0.740 (0.018) [567]	0.708 (0.014) [1,415]	0.628 (0.042) [90]	0.006 (0.030)	-0.063** (0.018)	-0.034 (0.076)
Without any limitations	0.784 (0.008) [6,034]	0.760 (0.004) [15,327]	0.651 (0.012) [728]	0.769 (0.006) [6,465]	0.751 (0.003) [16,625]	0.684 (0.017) [835]	-0.015 (0.010)	-0.009+ (0.005)	0.033 (0.021)
DD							0.021 (0.032)	-0.054* (0.018)	-0.067 (0.079)
DDD								-0.075* (0.037)	-0.088 (0.085)

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains EBHI means for workers age 25 to 61 in full protection (SFP), limited protection (SLP), and no protection (SNP) states, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993 and 1994. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is estimated as the EBHI time difference of workers with limitations minus the EBHI time difference of workers without limitations. "DDD" is estimated as the EBHI DD estimate for limited/no protection states minus the EBHI DD estimate for full protection states.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 3.7. Unadjusted Mean and Difference-in-differences (DD) and Difference-in-difference-in-differences (DDD) Estimates of the ADA's Impact on EBHI Rates for Full-time Workers Age 25 to 61 with and without Severe Limitations by State Type

Population	Before ADA			After ADA			Time difference		
	SFP	SLP	SNP	SFP	SLP	SNP	SFP	SLP	SNP
With severe limitations	0.680 (0.044) [130]	0.769 (0.025) [327]	0.722 (0.147) [15]	0.732 (0.042) [109]	0.679 (0.024) [354]	0.530 (0.077) [24]	0.052 (0.061)	-0.090 (0.035)	-0.192 (0.166)
Without severe limitations	0.782 (0.009) [6,488]	0.761 (0.004) [16,358]	0.651 (0.011) [800]	0.767 (0.006) [6,923]	0.749 (0.003) [17,686]	0.682 (0.015) [901]	-0.015 (0.011)	-0.012* (0.005)	0.031 (0.019)
DD							0.067 (0.062)	-0.078* (0.035)	-0.223 (0.167)
DDD								-0.145* (0.071)	-0.290 (0.178)

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains EBHI means for workers age 25 to 61 in full protection (SFP), limited protection (SLP), and no protection (SNP) states, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993 and 1994. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is estimated as the EBHI time difference of workers with severe limitations minus the EBHI time difference in EBHI of workers without severe limitations. "DDD" is estimated as the DD estimate for limited/no protection states minus the DD estimate for full protection states.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.



Table 3.8. Linear Probability Model and Difference-in-difference-in-differences (DDD)  
Estimates of the ADA's Impact on EBHI Rates for Full-time Workers Age 25 to 61 with  
and without Limitations by State Type

Variable	Any limitation	Severe limitation
ADA * SLP	0.007 (0.010)	0.004 (0.011) <sup>a</sup>
ADA * SNP	0.028 (0.026)	
ADA * limitation	0.010 (0.030)	0.024 (0.056)
SLP * limitation	0.053* (0.022)	0.091+ (0.047)
SNP * limitation	0.040 (0.072)	<sup>a</sup>
ADA * SLP * limitation	-0.064+ (0.033)	-0.100 (0.066) <sup>a</sup>
ADA * SNP * limitation	-0.058 (0.097)	
Sample size	[50,115]	[48,375]
R <sup>2</sup>	0.085	0.082
1990 * SLP * limitation	Reference	Reference
1991 * SLP * limitation	0.041 (0.044)	-0.046 (0.111)
1993 * SLP * limitation	-0.036 (0.048)	-0.082 (0.105)
1994 * SLP * limitation	-0.052 (0.044)	-0.176+ (0.090) <sup>a</sup>
1990 * SNP * limitation	Reference	
1991 * SNP * limitation	-0.030 (0.123)	
1993 * SNP * limitation	-0.095 (0.128)	
1994 * SNP * limitation	-0.056 (0.170)	
Sample size	[50,115]	[48,375]
R <sup>2</sup>	0.038	0.035

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of the interactions from equation (2), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), SLP is a dummy variable for states that had laws offering limited protection for workers with disabilities, and SNP is a dummy variable for states that had no laws protecting workers with disabilities. Estimates include state month/year unemployment rates.

<sup>a</sup> Sample size not sufficient for valid estimates.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 3.9. Linear Probability Model and Difference-in-difference-in-differences (DDD)  
Estimates of the ADA's Impact on EBHI Rates for Full-time Workers Age 25 to 61 with  
and without Limitations by Education Attainment

Variable	Any limitation	Severe limitation
ADA	-0.023** (0.006)	-0.025** (0.006)
Limitation	0.006 (0.014)	-0.018 (0.028)
Education	0.052** (0.007)	0.050** (0.007)
ADA * limitation	-0.041* (0.020)	-0.062 (0.040)
ADA * education	0.019* (0.009)	0.020* (0.008)
Limitation * education	-0.020 (0.021)	0.035 (0.039)
ADA * limitation * education	0.009 (0.028)	0.016 (0.059)
Sample size	[52,185]	[52,185]
R <sup>2</sup>	0.091	0.091

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of variables of interest from equation (3), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), limitation indicates having any or a severe activity limitation, and education is a dummy variable that has a value of one for individuals having at least some college education. Estimates include state fixed-effects.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 3.10. Linear Probability Model and Difference-in-difference-in-differences (DDD)  
Estimates of the ADA's Impact on EBHI Rates for Full-time Workers Age 25 to 61 with  
Limitations by Education Attainment and State Type

Variable	Any limitation
ADA	0.016 (0.043)
SLP	0.049 (0.033)
Education	0.076+ (0.042)
ADA * SLP	-0.103* (0.049)
ADA * education	-0.041 (0.058)
SLP * education	-0.047 (0.044)
ADA * SLP * education	0.098 (0.063)
Sample size	[3,924]
R <sup>2</sup>	0.079

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of variables of interest from equation (4), with standard errors in parentheses. Sample size was not sufficient to provide estimates for no protection states or for workers with severe limitations. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), SLP is a dummy variable for states that had laws offering limited protection for workers with disabilities, and education is a dummy variable that has a value of one for individuals having at least some college education. Estimates include state month/year unemployment rates.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 3.11. Linear Probability Difference-in-differences (DD) Estimates of the ADA's Impact on EBHI and Dependent or No Coverage Rates for Full-time Workers Age 25 to 61 with and without Limitations by Marital Status

Population/ variable	Any limitation	Severe limitation
Full sample		
EBHI vs. dependent coverage	-0.015 (0.011)	-0.049* (0.023)
Sample size	[45,991]	[45,991]
R <sup>2</sup>	0.115	0.115
EBHI vs. no coverage	-0.032** (0.011)	-0.020 (0.026)
Sample size	[43,873]	[43,873]
R <sup>2</sup>	0.109	0.109
Married		
EBHI vs. dependent coverage	-0.016 (0.015)	-0.061+ (0.033)
Sample size	[32,157]	[32,157]
R <sup>2</sup>	0.087	0.087 <sup>a</sup>
EBHI vs. no coverage	-0.023+ (0.013)	
Sample size	[28,011]	
R <sup>2</sup>	0.096	
Unmarried		
EBHI vs. no coverage	-0.045* (0.021)	<sup>a</sup>
Sample size	[15,862]	
R <sup>2</sup>	0.108	

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains DD linear regression estimates (ADA \* limitation) comparing EBHI with dependent or no coverage based on equation (1), with standard errors in parentheses. Estimates include state fixed-effects.

<sup>a</sup> Sample size not sufficient for valid estimates.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 3.12. Linear Probability Difference-in-difference-in-differences (DDD) Estimates of the ADA's Impact on EBHI and Dependent or No Coverage Rates for Full-time Workers Age 25 to 61 with and without Limitations by State Type and Marital Status

Population/ variable	Any limitation	Severe limitation
Full sample		
EBHI vs. dependent coverage	-0.074** (0.025)	-0.123* (0.056)
Sample size	[42,744]	[42,744]
R <sup>2</sup>	0.047	0.047
EBHI vs. no coverage	-0.011 (0.024)	-0.065 (0.055)
Sample size	[40,766]	[40,766]
R <sup>2</sup>	0.088	0.088
Married		
EBHI vs. dependent coverage	-0.098** (0.033)	-0.145* (0.071)
Sample size	[29,738]	[29,738]
R <sup>2</sup>	0.082	0.082
EBHI vs. no coverage	-0.047 (0.030)	<sup>a</sup>
Sample size	[25,914]	
R <sup>2</sup>	0.082	
Unmarried		
EBHI vs. no coverage	0.043 (0.045)	<sup>a</sup>
Sample size	[14,852]	
R <sup>2</sup>	0.093	

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains DDD linear regression interaction estimates (ADA \* SLP \* limitation) comparing EBHI with dependent or no coverage based on equation (2), with standard errors in parentheses. Estimates include state month/year unemployment rates.

<sup>a</sup> Sample size not sufficient for valid estimates.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 3.13. Linear Probability Difference-in-differences (DD) Estimates of the ADA's Impact on EBHI Rates for Full-time Workers Age 25 to 61 with and without Limitations by Employer Sector

Variable	<u>Any limitation</u>			<u>Severe limitation</u>		
	Government workers	Private non-profit workers	Private for-profit workers	Government workers	Private non-profit workers	Private for-profit workers
ADA * limitation	-0.020 (0.028)	-0.068 (0.059)	-0.038* (0.018)	-0.098 (0.064)	<sup>a</sup>	-0.044 (0.037)
Sample size	[10,713]	[2,671]	[38,649]	[10,713]		[38,649]
R <sup>2</sup>	0.146	0.057	0.072	0.147		0.072
1990 * limitation	Reference	Reference	Reference	Reference	<sup>a</sup>	Reference
1991 * limitation	-0.028 (0.038)	0.101 (0.093)	-0.011 (0.026)	-0.028 (0.038)		-0.111* (0.045)
1993 * limitation	-0.054 (0.035)	-0.035 (0.087)	-0.058** (0.020)	-0.054 (0.035)		-0.139** (0.040)
1994 * limitation	-0.015 (0.036)	-0.002 (0.085)	-0.025 (0.024)	-0.016 (0.036)		-0.039 (0.047)
Sample size	[10,713]	[2,671]	[38,649]	[10,713]		[38,649]
R <sup>2</sup>	0.147	0.058	0.072	0.147		0.072

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of the interaction from equation (1) by employer sector, with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), limitation indicates having any or a severe activity limitation. Estimates include state fixed-effects.

<sup>a</sup> Sample size not sufficient for valid estimates.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 3.14. Linear Probability Difference-in-difference-in-differences (DDD) Estimates of the ADA's Impact on EBHI Rates Between Full and Limited Protection States for Full-time Workers Age 25 to 61 with and without Any Limitations by State Type and Employer Sector

Variable	Government workers	Private for-profit workers
ADA * SLP * limitation	0.030 (0.065)	-0.119** (0.041)
Sample size	[9,727]	[36,022]
R <sup>2</sup>	0.142	0.072
1990 * SLP * limitation	Reference	Reference
1991 * SLP * limitation	0.069 (0.091)	0.060 (0.052)
1993 * SLP * limitation	0.030 (0.098)	-0.046 (0.051)
1994 * SLP * limitation	0.093 (0.074)	-0.129* (0.051)
Sample size	[9,727]	[36,022]
R <sup>2</sup>	0.144	0.072

Source. SIPP (1990, 1991, 1992, 1993).

Note. Table contains linear regression estimates of the DDD interaction from equation (2) by employer sector, with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993 and 1994), limitation indicates having any activity limitation (the sample sizes for private non-profit workers and workers with severe disabilities were too small for valid estimates). +  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 4.1. Characteristics of Sample by Age and Limitation Status, 1990 – 1997

Population/ variable	<u>Adults with limitation</u>		<u>Adults with severe limitation</u>	
	<u>Any limitation</u>	<u>No limitation</u>	<u>Severe limitation</u>	<u>No severe limitation</u>
<i>Age 18-58</i>				
N	14,185	115,104	5,705	123,584
Male (%)	46.3 <sub>a</sub>	49.2 <sub>b</sub>	42.8 <sub>a</sub>	49.1 <sub>b</sub>
Race (%)				
White	82.7 <sub>a</sub>	84.6 <sub>b</sub>	79.6 <sub>a</sub>	84.6 <sub>b</sub>
Black	14.3 <sub>a</sub>	11.1 <sub>b</sub>	17.2 <sub>a</sub>	11.2 <sub>b</sub>
Other	2.9 <sub>a</sub>	4.3 <sub>b</sub>	3.1 <sub>a</sub>	4.2 <sub>b</sub>
Married (%)	56.2 <sub>a</sub>	60.4 <sub>b</sub>	50.4 <sub>a</sub>	60.4 <sub>b</sub>
Age (mean)	42.1 <sub>a</sub>	36.1 <sub>b</sub>	43.0 <sub>a</sub>	36.5 <sub>b</sub>
Activity limitation (%)				
Any	100.0 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	4.4 <sub>b</sub>
Severe	40.2 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	0.0 <sub>b</sub>
State type <sup>a</sup> (%)				
Full protection state	27.0 <sub>a</sub>	26.0 <sub>a</sub>	26.1 <sub>a</sub>	26.1 <sub>a</sub>
Limited protection state	63.4 <sub>a</sub>	66.9 <sub>b</sub>	64.8 <sub>a</sub>	66.6 <sub>a</sub>
No protection state	5.3 <sub>a</sub>	3.5 <sub>b</sub>	6.3 <sub>a</sub>	3.6 <sub>b</sub>
State month/ year unemployment rate (mean)	6.1 <sub>a</sub>	6.1 <sub>a</sub>	6.1 <sub>a</sub>	6.1 <sub>a</sub>
Education level				
No high school diploma	28.6 <sub>a</sub>	12.8 <sub>b</sub>	36.8 <sub>a</sub>	13.5 <sub>b</sub>
High school diploma/ equivalent	39.0 <sub>a</sub>	36.4 <sub>b</sub>	36.9 <sub>a</sub>	36.7 <sub>b</sub>
Some college	20.7 <sub>a</sub>	26.2 <sub>b</sub>	17.6 <sub>a</sub>	25.9 <sub>b</sub>
4-year college degree	11.7 <sub>a</sub>	24.7 <sub>b</sub>	8.7 <sub>a</sub>	23.9 <sub>b</sub>
Any post-secondary education enrollment	8.3 <sub>a</sub>	13.9 <sub>b</sub>	6.9 <sub>a</sub>	13.6 <sub>b</sub>
College enrollment	5.2 <sub>a</sub>	11.1 <sub>b</sub>	4.2 <sub>a</sub>	10.7 <sub>b</sub>
Vocational enrollment	3.7 <sub>a</sub>	3.5 <sub>a</sub>	3.3 <sub>a</sub>	3.5 <sub>a</sub>
<i>Age 18-30</i>				
N	2,229	38,231	792	39,668
Male (%)	45.2 <sub>a</sub>	49.0 <sub>b</sub>	46.5 <sub>a</sub>	48.8 <sub>a</sub>
Race (%)				
White	79.7 <sub>a</sub>	83.0 <sub>b</sub>	77.7 <sub>a</sub>	82.9 <sub>b</sub>
Black	17.2 <sub>a</sub>	12.6 <sub>b</sub>	18.7 <sub>a</sub>	12.7 <sub>b</sub>
Other	3.2 <sub>a</sub>	4.4 <sub>a</sub>	3.6 <sub>a</sub>	4.3 <sub>a</sub>
Married (%)	31.5 <sub>a</sub>	36.9 <sub>b</sub>	24.3 <sub>a</sub>	36.9 <sub>b</sub>
Age (mean)	24.9 <sub>a</sub>	24.3 <sub>b</sub>	24.3 <sub>a</sub>	24.3 <sub>a</sub>
Activity limitation (%)				
Any	100.0 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	3.6 <sub>b</sub>
Severe	36.4 <sub>a</sub>	0.0 <sub>b</sub>	100.0 <sub>a</sub>	0.0 <sub>b</sub>
State type <sup>1</sup> (%)				
Full protection state	28.0 <sub>a</sub>	25.6 <sub>a</sub>	26.3 <sub>a</sub>	25.7 <sub>a</sub>
Limited protection state	62.0 <sub>a</sub>	67.1 <sub>b</sub>	62.5 <sub>a</sub>	66.9 <sub>a</sub>
No protection state	5.6 <sub>a</sub>	3.7 <sub>b</sub>	7.4 <sub>a</sub>	3.8 <sub>b</sub>
State month/ year unemployment rate	6.1 <sub>a</sub>	6.1 <sub>a</sub>	6.0 <sub>a</sub>	5.9 <sub>a</sub>



Population/ variable (mean)	<u>Adults with limitation</u>		<u>Adults with severe limitation</u>	
	<u>Any limitation</u>	<u>No limitation</u>	<u>Severe limitation</u>	<u>No severe limitation</u>
Education level				
No high school diploma	27.9 <sub>a</sub>	14.5 <sub>b</sub>	32.9 <sub>a</sub>	14.8 <sub>b</sub>
High school diploma/ equivalent	44.0 <sub>a</sub>	37.1 <sub>b</sub>	46.8 <sub>a</sub>	37.3 <sub>b</sub>
Some college	20.7 <sub>a</sub>	30.3 <sub>b</sub>	16.1 <sub>a</sub>	30.1 <sub>b</sub>
4-year college degree	7.4 <sub>a</sub>	18.1 <sub>b</sub>	4.2 <sub>a</sub>	17.8 <sub>b</sub>
Any post-secondary education enrollment	20.7 <sub>a</sub>	28.8 <sub>b</sub>	19.6 <sub>a</sub>	28.5 <sub>b</sub>
College enrollment	15.8 <sub>a</sub>	25.4 <sub>b</sub>	14.3 <sub>a</sub>	25.0 <sub>b</sub>
Vocational enrollment	6.3 <sub>a</sub>	4.6 <sub>a</sub>	7.1 <sub>a</sub>	4.7 <sub>a</sub>

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Statistics use SIPP sampling weights and adjust for the SIPP's complex survey design. Any limitation columns include individuals with severe limitations. T-tests or chi-square tests were used to compare individuals by limitation type; individuals with (severe) limitations who were significantly different from individuals without (severe) limitations at  $p < 0.003$  (using a Bonferroni correction for multiple comparisons) do not share the same subscript.

<sup>1</sup> State type does not total to 100 percent since some states are not included.

Table 4.2. Characteristics of Sample with Activity Limitations by Age and State Type,  
1990 - 1997

Population/ variable	<u>Any activity limitation</u>		<u>Severe activity limitation</u>	
	<u>Full protection</u>	<u>Limited protection</u>	<u>Full protection</u>	<u>Limited protection</u>
Age 18 to 58				
N	3,752	9,038	1,425	3,739
Male (%)	46.6 <sub>a</sub>	45.7 <sub>a</sub>	41.4 <sub>a</sub>	42.8 <sub>a</sub>
Race (%)				
White	85.7 <sub>a</sub>	82.3 <sub>b</sub>	83.2 <sub>a</sub>	79.7 <sub>a</sub>
Black	11.2 <sub>a</sub>	14.6 <sub>a</sub>	13.2 <sub>a</sub>	17.3 <sub>a</sub>
Other	3.1 <sub>a</sub>	3.0 <sub>a</sub>	3.6 <sub>a</sub>	3.1 <sub>a</sub>
Married (%)	55.5 <sub>a</sub>	55.8 <sub>a</sub>	49.9 <sub>a</sub>	50.4 <sub>a</sub>
Age (mean)	42.1 <sub>a</sub>	42.1 <sub>a</sub>	42.8 <sub>a</sub>	43.1 <sub>a</sub>
Activity limitation (%)				
Any	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
Severe	38.9 <sub>a</sub>	41.4 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
State month/ year unemployment rate (mean)	5.5 <sub>a</sub>	6.3 <sub>b</sub>	5.6 <sub>a</sub>	6.4 <sub>b</sub>
Education level				
No high school diploma	26.2 <sub>a</sub>	29.2 <sub>a</sub>	35.4 <sub>a</sub>	36.9 <sub>a</sub>
High school diploma/ equivalent	40.7 <sub>a</sub>	38.0 <sub>a</sub>	38.1 <sub>a</sub>	35.9 <sub>a</sub>
Some college	21.2 <sub>a</sub>	21.0 <sub>a</sub>	18.0 <sub>a</sub>	18.1 <sub>a</sub>
4-year college degree	12.0 <sub>a</sub>	11.7 <sub>a</sub>	8.5 <sub>a</sub>	9.0 <sub>a</sub>
Any post-secondary education enrollment	7.4 <sub>a</sub>	8.9 <sub>a</sub>	7.0 <sub>a</sub>	7.2 <sub>a</sub>
College enrollment	4.8 <sub>a</sub>	5.4 <sub>a</sub>	4.4 <sub>a</sub>	4.3 <sub>a</sub>
Vocational enrollment	3.2 <sub>a</sub>	4.1 <sub>a</sub>	3.1 <sub>a</sub>	3.6 <sub>a</sub>
Age 18 to 30				
N	617	1,397	207	499
Male (%)	44.7 <sub>a</sub>	44.2 <sub>a</sub>	43.7 <sub>a</sub>	45.0 <sub>a</sub>
Race (%)				
White	82.6 <sub>a</sub>	80.9 <sub>a</sub>	80.9 <sub>a</sub>	80.1 <sub>a</sub>
Black	13.4 <sub>a</sub>	16.0 <sub>a</sub>	13.2 <sub>a</sub>	17.0 <sub>a</sub>
Other	3.9 <sub>a</sub>	3.1 <sub>a</sub>	5.9 <sub>a</sub>	2.9 <sub>a</sub>
Married (%)	30.6 <sub>a</sub>	31.6 <sub>a</sub>	25.8 <sub>a</sub>	24.0 <sub>a</sub>
Age (mean)	25.1 <sub>a</sub>	24.9 <sub>a</sub>	24.5 <sub>a</sub>	24.9 <sub>a</sub>
Activity limitation (%)				
Any	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
Severe	34.2 <sub>a</sub>	36.7 <sub>a</sub>	100.0 <sub>a</sub>	100.0 <sub>a</sub>
State month/ year unemployment rate (mean)	5.6 <sub>a</sub>	6.4 <sub>a</sub>	5.7 <sub>a</sub>	6.4 <sub>a</sub>
Education level				
No high school diploma	27.3 <sub>a</sub>	27.9 <sub>a</sub>	34.8 <sub>a</sub>	31.9 <sub>a</sub>
High school diploma/ equivalent	44.4 <sub>a</sub>	43.4 <sub>a</sub>	41.0 <sub>a</sub>	47.8 <sub>a</sub>
Some college	20.7 <sub>a</sub>	21.2 <sub>a</sub>	18.8 <sub>a</sub>	16.2 <sub>a</sub>
4-year college degree	7.6 <sub>a</sub>	7.4 <sub>a</sub>	5.4 <sub>a</sub>	4.4 <sub>a</sub>

Population/ variable	<u>Any activity limitation</u>		<u>Severe activity limitation</u>	
	<u>Full protection</u>	<u>Limited protection</u>	<u>Full protection</u>	<u>Limited protection</u>
Any post-secondary education enrollment	18.9 <sub>a</sub>	22.0 <sub>a</sub>	19.5 <sub>a</sub>	21.1 <sub>a</sub>
College enrollment	15.0 <sub>a</sub>	16.8 <sub>a</sub>	15.0 <sub>a</sub>	15.1 <sub>a</sub>
Vocational enrollment	5.5 <sub>a</sub>	6.4 <sub>a</sub>	5.0 <sub>a</sub>	8.4 <sub>a</sub>

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Statistics use SIPP sampling weights and adjust for the SIPP's complex survey design. Any activity limitation columns include individuals with severe limitations. T-tests or chi-square tests were used to compare individuals by state type; comparisons significantly different at  $p < 0.003$  (using a Bonferroni correction for multiple comparisons) do not share the same subscript.

Table 4.3. Unadjusted Mean and Difference-in-differences (DD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 58 with and without Limitations

Population/ limitation	Any limitation			Severe limitation		
	Before ADA	After ADA	Time difference	Before ADA	After ADA	Time difference
Any post-secondary enrollment						
With limitation	0.088 (0.005) [5,047]	0.080 (0.003) [9,138]	-0.008 (0.006)	0.073 (0.008) [1,912]	0.066 (0.005) [3,793]	-0.007 (0.009)
Without limitation	0.141 (0.003) [40,001]	0.137 (0.001) [75,103]	-0.003 (0.003)	0.138 (0.002) [43,136]	0.134 (0.001) [80,448]	-0.003 (0.003)
DD			-0.004 (0.006)			-0.003 (0.010)
College enrollment						
With limitation	0.050 (0.004) [5,047]	0.053 (0.003) [9,138]	0.002 (0.005)	0.041 (0.006) [1,912]	0.044 (0.004) [3,793]	0.003 (0.008)
Without limitation	0.108 (0.002) [40,001]	0.112 (0.001) [75,103]	0.004* (0.002)	0.104 (0.002) [43,136]	0.109 (0.001) [80,448]	0.004+ (0.002)
DD			-0.002 (0.005)			-0.001 (0.008)
Vocational enrollment						
With limitation	0.044 (0.004) [5,047]	0.033 (0.002) [9,138]	-0.010* (0.004)	0.038 (0.005) [1,912]	0.030 (0.003) [3,793]	-0.008 (0.006)
Without limitation	0.040 (0.001) [40,001]	0.031 (0.001) [75,103]	-0.009** (0.002)	0.041 (0.002) [43,136]	0.031 (0.001) [80,448]	-0.009** (0.002)
DD			-0.001 (0.005)			0.002 (0.006)

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains post-secondary enrollment means for individuals age 18 to 58, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993, 1994, and 1997. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is estimated as the post-secondary enrollment time difference of people with (severe) limitations minus the post-secondary enrollment time difference of people without (severe) limitations.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 4.4. Linear Probability Model and Difference-in-differences (DD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 58 with and without Limitations

Variable	Any post-secondary enrollment		College		Vocational, technical or business school	
	Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation
ADA	-0.003 (0.003)	-0.003 (0.003)	0.010** (0.002)	0.010** (0.002)	-0.008** (0.002)	-0.009** (0.002)
Limitation	-0.008 (0.005)	-0.026** (0.008)	-0.016** (0.004)	-0.029** (0.007)	0.008+ (0.004)	0.001 (0.006)
ADA * limitation	-0.005 (0.006)	-0.002 (0.009)	-0.002 (0.005)	0.001 (0.007)	-0.001 (0.004)	0.002 (0.006)
Sample size	[129,289]	[129,289]	[129,289]	[129,289]	[129,289]	[129,289]
R <sup>2</sup>	0.176	0.176	0.204	0.204	0.007	0.007
Year						
1990	Reference	Reference	Reference	Reference	Reference	Reference
1991	-0.001 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.000 (0.003)	-0.001 (0.002)	-0.001 (0.002)
1993	0.003 (0.004)	0.003 (0.003)	0.009** (0.003)	0.009* (0.003)	-0.007** (0.002)	-0.006** (0.002)
1994	0.001 (0.004)	0.001 (0.003)	0.007 (0.003)	0.007+ (0.003)	-0.006* (0.002)	-0.006** (0.002)
1997	0.004 (0.004)	-0.003 (0.003)	0.015** (0.003)	0.014* (0.003)	-0.015** (0.002)	-0.015** (0.002)
Limitation	-0.009 (0.007)	-0.029* (0.012)	-0.014* (0.007)	-0.026** (0.010)	0.007 (0.006)	0.000 (0.007)
Year * limitation						
1990	Reference	Reference	Reference	Reference	Reference	Reference
1991	0.003 (0.009)	0.006 (0.013)	-0.004 (0.008)	-0.005 (0.012)	0.003 (0.006)	0.003 (0.009)
1993	0.000 (0.009)	0.001 (0.014)	-0.000 (0.007)	0.002 (0.012)	0.004 (0.007)	0.005 (0.009)
1994	0.000 (0.010)	0.015 (0.014)	0.001 (0.009)	0.007 (0.012)	-0.005 (0.007)	0.005 (0.009)
1997	-0.013+ (0.008)	-0.013 (0.014)	-0.015* (0.007)	-0.016 (0.011)	-0.000 (0.006)	0.001 (0.008)
Sample size	[129,289]	[129,289]	[129,289]	[129,289]	[129,289]	[129,289]
R <sup>2</sup>	0.176	0.176	0.204	0.204	0.007	0.007

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains linear regression estimates of variables of interest from equation (1), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993, 1994, and 1997), limitation indicates having any or a severe activity limitation. Estimates include state fixed-effects.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 4.5. Unadjusted Mean and Difference-in-differences (DD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 30 with and without Limitations

Population/ limitation	Any limitation			Severe limitation		
	Before ADA	After ADA	Time difference	Before ADA	After ADA	Time difference
Any post-secondary enrollment						
With limitation	0.200 (0.015) [931]	0.214 (0.013) [1,298]	0.014 (0.020)	0.191 (0.025) [322]	0.200 (0.023) [470]	0.009 (0.034)
Without limitation	0.272 (0.005) [14,541]	0.299 (0.004) [23,690]	0.028** (0.006)	0.269 (0.005) [15,150]	0.297 (0.004) [24,518]	0.028** (0.006)
DD			-0.014 (0.021)			-0.019 (0.035)
College enrollment						
With limitation	0.143 (0.013) [931]	0.169 (0.013) [1,298]	0.026 (0.018)	0.134 (0.023) [322]	0.149 (0.020) [470]	0.015 (0.030)
Without limitation	0.235 (0.005) [14,541]	0.267 (0.004) [23,690]	0.032** (0.006)	0.232 (0.005) [15,150]	0.264 (0.003) [24,518]	0.032** (0.006)
DD			-0.006 (0.019)			-0.017 (0.031)
Vocational enrollment						
With limitation	0.068 (0.012) [931]	0.059 (0.008) [1,298]	-0.009 (0.014)	0.063 (0.018) [322]	0.076 (0.015) [470]	0.013 (0.023)
Without limitation	0.049 (0.002) [14,541]	0.044 (0.002) [23,690]	-0.005+ (0.003)	0.050 (0.003) [15,150]	0.044 (0.002) [24,518]	-0.006* (0.003)
DD			-0.004 (0.015)			0.019 (0.023)

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains post-secondary enrollment means for individuals age 18 to 30, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993, 1994, and 1997. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is estimated as the post-secondary enrollment time difference of people with limitations minus the post-secondary enrollment time difference of people without (severe) limitations.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 4.6. Linear Probability Model and Difference-in-differences (DD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 30 with and without Limitations

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Variable	Any post-secondary enrollment		College		Vocational, technical or business school	
	Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation <sup>a</sup>
ADA	0.016*	0.016*	0.020**	0.020**	-0.005+	
	(0.005)	(0.006)	(0.005)	(0.005)	(0.003)	
Limitation	-0.057**	-0.079**	-0.077**	-0.097**	0.018	
	(0.014)	(0.026)	(0.014)	(0.024)	(0.012)	
ADA * limitation	0.000	0.000	0.009	0.000	-0.004	
	(0.021)	(0.033)	(0.020)	(0.031)	(0.014)	
Sample size	[40,460]	[40,460]	[40,460]	[40,460]	[40,460]	
R <sup>2</sup>	0.202	0.202	0.222	0.221	0.005	
Year						
1990	Reference	Reference	Reference	Reference	Reference	
1991	0.001	-0.001	0.008	0.008	-0.007	
	(0.008)	(0.008)	(0.008)	(0.008)	(0.004)	
1993	0.020+	0.019*	0.027**	0.027**	-0.008	
	(0.008)	(0.008)	(0.009)	(0.007)	(0.004)	
1994	0.013	0.013	0.018*	0.019*	-0.003	
	(0.009)	(0.008)	(0.008)	(0.008)	(0.004)	
1997	0.018	0.019*	0.027**	0.028**	-0.017**	
	(0.007)	(0.007)	(0.007)	(0.007)	(0.003)	
Limitation	-0.063**	-0.101**	-0.070**	-0.091**	0.008	
	(0.021)	(0.031)	(0.019)	(0.031)	(0.017)	
Year * limitation						
1990	Reference	Reference	Reference	Reference	Reference	
1991	0.012	0.049	-0.014	-0.013	0.021	
	(0.032)	(0.054)	(0.028)	(0.044)	(0.023)	
1993	-0.007	0.004	-0.014	-0.006	0.022	
	(0.028)	(0.047)	(0.026)	(0.046)	(0.021)	
1994	0.022	0.072	0.025	0.027	-0.009	
	(0.032)	(0.051)	(0.030)	(0.047)	(0.021)	
1997	0.003	-0.020	-0.005	-0.051	0.005	
	(0.029)	(0.045)	(0.024)	(0.041)	(0.020)	
Sample size	[40,460]	[40,460]	[40,460]	[40,460]	[40,460]	
R <sup>2</sup>	0.202	0.202	0.222	0.221	0.006	

Note. Table contains linear regression estimates of variables of interest from equation (1), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993, 1994, and 1997), limitation indicates having any or a severe activity limitation. Estimates include state fixed-effects.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 4.7. Unadjusted Mean and Difference-in-differences (DD) and Difference-in-difference-in-differences (DDD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 58 with and without Limitations by State Type

Population/ coverage type	Before ADA		After ADA		Time difference	
	Full protection states	Limited protection states	Full protection states	Limited protection states	Full protection states	Limited protection states
Population with limitations						
Post-secondary	0.075 (0.009) [1,341]	0.097 (0.006) [3,164]	0.073 (0.006) [2,411]	0.085 (0.004) [5,874]	-0.002 (0.011)	-0.012 (0.007)
College	0.050 (0.007) [1,341]	0.053 (0.005) [3,164]	0.047 (0.005) [2,411]	0.055 (0.003) [5,874]	-0.003 (0.008)	0.002 (0.006)
Vocational	0.035 (0.006) [1,341]	0.049 (0.005) [3,164]	0.029 (0.003) [2,411]	0.036 (0.003) [5,874]	-0.006 (0.007)	-0.013* (0.006)
Population without limitations						
Post-secondary	0.140 (0.004) [10,285]	0.142 (0.003) [26,858]	0.133 (0.003) [19,803]	0.140 (0.002) [49,805]	-0.007 (0.005)	-0.002 (0.004)
College	0.106 (0.003) [10,285]	0.110 (0.003) [26,858]	0.107 (0.002) [19,803]	0.114 (0.002) [49,805]	0.001 (0.004)	0.005 (0.003)
Vocational	0.043 (0.004) [10,285]	0.040 (0.002) [26,858]	0.032 (0.001) [19,803]	0.031 (0.001) [49,805]	-0.011** (0.004)	-0.008** (0.002)
<i>DD</i>						
Post-secondary					0.005 (0.012)	-0.010 (0.008)
College					-0.004 (0.009)	-0.002 (0.007)
Vocational					0.005 (0.008)	-0.004 (0.006)
<i>DDD</i>						
Post-secondary						-0.014 (0.014)
College						0.002 (0.011)
Vocational						-0.010 (0.010)

Source. SIPP (1990, 1991, 1992, 1993, 1996).



Note. Table contains post-secondary enrollment means for individuals age 18 to 58 in full and limited protection states, with standard errors in parentheses and unweighted sample sizes in brackets. “Before ADA” includes estimates for 1990 and 1991, “After ADA” includes estimates for 1993, 1994, and 1997. Means calculated using SIPP sampling weights and adjusting for the SIPP’s complex survey design. “DD” is estimated as the post-secondary enrollment time difference of people with limitations minus the post-secondary enrollment time difference of people without limitations for each state type. “DDD” is estimated as the post-secondary enrollment DD estimate of limited protection states minus the post-secondary enrollment DD estimate of full protection states.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 4.8. Unadjusted Mean and Difference-in-differences (DD) and Difference-in-difference-in-differences (DDD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 58 with and without Severe Limitations by State Type

Population/ coverage type	Before ADA		After ADA		Time difference	
	Full protection states	Limited protection states	Full protection states	Limited protection states	Full protection states	Limited protection states
Population with limitations						
Post-secondary	0.073 (0.017) [503]	0.075 (0.009) [1,224]	0.068 (0.011) [922]	0.070 (0.005) [2,515]	-0.006 (0.020)	-0.005 (0.010)
College	0.049 (0.013) [503]	0.037 (0.007) [1,224]	0.040 (0.008) [922]	0.046 (0.005) [2,515]	-0.008 (0.016)	0.010 (0.008)
Vocational	0.030 (0.010) [503]	0.044 (0.007) [1,224]	0.032 (0.006) [922]	0.032 (0.004) [2,515]	0.002 (0.012)	-0.012 (0.008)
Population without limitations						
Post-secondary	0.135 (0.004) [11,123]	0.140 (0.003) [28,798]	0.129 (0.002) [21,292]	0.137 (0.002) [53,164]	-0.006 (0.005)	-0.003 (0.003)
College	0.102 (0.003) [11,123]	0.107 (0.002) [28,798]	0.103 (0.002) [21,292]	0.111 (0.002) [53,164]	0.002 (0.004)	0.005 (0.003)
Vocational	0.043 (0.004) [11,123]	0.041 (0.002) [28,798]	0.032 (0.001) [21,292]	0.032 (0.001) [53,164]	-0.011** (0.004)	-0.009** (0.002)
<i>DD</i>						
Post-secondary					0.000 (0.021)	-0.002 (0.011)
College					-0.010 (0.016)	0.005 (0.009)
Vocational					0.013 (0.013)	-0.003 (0.008)
<i>DDD</i>						
Post-secondary						-0.002 (0.023)
College						0.015 (0.018)
Vocational						-0.016 (0.015)

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains post-secondary enrollment means for individuals age 18 to 58 in full and limited protection states, with standard errors in parentheses and unweighted sample sizes in brackets. “Before ADA” includes estimates for 1990 and 1991, “After ADA” includes estimates for 1993, 1994, and 1997. Means calculated using SIPP sampling weights and adjusting for the SIPP’s complex survey design. “DD” is estimated as the post-secondary enrollment time difference of people with severe limitations minus the post-secondary enrollment time difference of people without severe limitations for each state type. “DDD” is estimated as the post-secondary enrollment DD estimate of limited protection states minus the post-secondary enrollment DD estimate of full protection states.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 4.9. Linear Probability Model and Difference-in-difference-in-differences (DDD)  
 Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age  
 18 to 58 with and without Limitations by State Type

Variable	<u>Any post-secondary education</u>		<u>College</u>		<u>Vocational, technical or business school</u>	
	Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation <sup>a</sup>
ADA	0.000 (0.005)	0.001 (0.005)	0.007* (0.003)	0.007* (0.003)	-0.009* (0.004)	
Limitation	-0.023* (0.010)	-0.026** (0.018)	-0.017* (0.007)	-0.019** (0.014)	-0.004 (0.007)	
Limited protection state	-0.002 (0.005)	0.000 (0.005)	0.000 (0.004)	0.001 (0.004)	-0.005 (0.004)	
ADA * limitation	0.002 (0.012)	-0.003 (0.020)	-0.007 (0.09)	-0.014 (0.015)	0.005 (0.008)	
ADA * limited protection state	0.005 (0.006)	0.003 (0.006)	0.004 (0.004)	0.004 (0.004)	0.002 (0.005)	
Limitation * limited protection state	0.022+ (0.012)	-0.001 (0.020)	0.002 (0.09)	-0.016 (0.015)	0.017+ (0.009)	
ADA * limitation * limited protection state	-0.011 (0.015)	0.005 (0.023)	0.005 (0.011)	0.022 (0.016)	-0.010 (0.010)	
Sample size	[119,541]	[119,541]	[119,541]	[119,541]	[119,541]	
R <sup>2</sup>	0.174	0.174	0.203	0.203	0.004	
Year * limitation * limited protection state						
1990	Reference	Reference	Reference	Reference	Reference	
1991	0.019 (0.021)	0.035 (0.030)	0.009 (0.018)	-0.003 (0.023)	-0.001 (0.014)	
1993	-0.004 (0.021)	0.011 (0.035)	0.012 (0.018)	0.016 (0.027)	-0.010 (0.015)	
1994	0.016 (0.023)	0.039 (0.036)	0.011 (0.019)	0.030 (0.027)	0.003 (0.014)	
1997	-0.019 (0.020)	0.022 (0.033)	0.006 (0.017)	0.016 (0.025)	-0.027* (0.013)	
Sample size	[119,541]	[119,541]	[119,541]	[119,541]	[119,541]	
R <sup>2</sup>	0.174	0.174	0.203	0.204	0.004	

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains linear regression estimates of variables of interest from equation (2), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993, 1994, and 1997), limitation indicates having any or a severe activity limitation, and limited protection state is a dummy variable for states that had laws offering limited protection for workers with disabilities. Estimates include state month/ year unemployment rates.

<sup>a</sup> Sample size not sufficient for valid estimates.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 4.10. Unadjusted Mean and Difference-in-differences (DD) and Difference-in-difference-in-differences (DDD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 30 with and without Limitations by State Type

Population/ coverage type	Before ADA		After ADA		Time Difference	
	Full protection states	Limited protection states	Full protection states	Limited protection states	Full protection states	Limited protection states
Population with limitations						
Post-secondary	0.156 (0.030) [256]	0.224 (0.018) [579]	0.216 (0.023) [361]	0.216 (0.018) [818]	0.060 (0.038)	-0.007 (0.026)
College	0.138 (0.030) [256]	0.159 (0.017) [579]	0.160 (0.021) [361]	0.175 (0.018) [818]	0.022 (0.037)	0.016 (0.024)
Vocational	0.041 (0.014) [256]	0.071 (0.016) [579]	0.066 (0.012) [361]	0.058 (0.010) [818]	0.025 (0.018)	-0.013 (0.019)
Population without limitations						
Post-secondary	0.271 (0.008) [3,689]	0.275 (0.006) [9,792]	0.293 (0.007) [6,224]	0.304 (0.005) [15,673]	0.022* (0.011)	0.029* (0.008)
College	0.231 (0.007) [3,689]	0.239 (0.006) [9,792]	0.256 (0.007) [6,224]	0.271 (0.004) [15,673]	0.024* (0.010)	0.033* (0.008)
Vocational	0.054 (0.006) [3,689]	0.048 (0.003) [9,792]	0.049 (0.003) [6,224]	0.044 (0.002) [15,673]	-0.006 (0.007)	-0.004 (0.003)
<i>DD</i>						
Post-secondary					0.038 (0.039)	-0.036 (0.027)
College					-0.002 (0.038)	-0.016 (0.025)
Vocational					0.031 (0.020)	-0.009 (0.019)
<i>DDD</i>						
Post-secondary						-0.075 (0.048)
College						-0.014 (0.046)
Vocational						-0.040 (0.027)

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains post-secondary enrollment means for individuals age 18 to 30 in full and limited protection states, with standard errors in parentheses and unweighted sample sizes in brackets. “Before ADA” includes estimates for 1990 and 1991, “After ADA” includes estimates for 1993, 1994, and 1997. Means calculated using SIPP sampling weights and adjusting for the SIPP’s complex survey design. “DD” is estimated as the post-secondary enrollment time difference of people with limitations minus the post-secondary enrollment time difference of people without limitations for each state type. “DDD” is estimated as the post-secondary enrollment DD estimate of limited protection states minus the post-secondary enrollment DD estimate of full protection states.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .

Table 4.11. Linear Probability Model and Difference-in-difference-in-differences (DDD)  
Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age  
18 to 30 with and without Limitations by State Type

Variable	<u>Any post-secondary education</u>		<u>College</u>		<u>Vocational, technical or business school</u>	
	Any limitation	Severe limitation <sup>a</sup>	Any limitation	Severe limitation <sup>a</sup>	Any limitation <sup>a</sup>	Severe limitation <sup>a</sup>
ADA	0.008 (0.009)		0.011 (0.009)			
Limitation	-0.099* (0.028)		-0.076** (0.026)			
SLP	-0.003 (0.009)		0.001 (0.008)			
ADA * limitation	0.049 (0.036)		0.008 (0.033)			
ADA * SLP	0.011 (0.012)		0.012 (0.011)			
Limitation * SLP	0.060+ (0.033)		0.019 (0.032)			
ADA * limitation * SLP	-0.071+ (0.043)		-0.010 (0.041)			
Sample size	[37,392]		[37,392]			
R <sup>2</sup>	0.199		0.219			
<hr/>						
Year * limitation * SLP						
1990	Reference		Reference			
1991	0.056 (0.059)		0.023 (0.059)			
1993	-0.075 (0.069)		-0.015 (0.060)			
1994	-0.013 (0.063)		0.015 (0.064)			
1997	-0.048 (0.060)		0.003 (0.059)			
Sample size	[37,392]		[37,392]			
R <sup>2</sup>	0.199		0.220			

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains linear regression estimates of variables of interest from equation (2), with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993, 1994, and 1997), limitation indicates having any or a severe activity limitation, and SLP is a dummy variable for states that had laws offering limited protection for workers with disabilities. Estimates include state month/ year unemployment rates.

<sup>a</sup>Sample size not sufficient for valid estimates.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Table 4.12. Unadjusted Mean Difference-in-differences (DD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals Age 18 to 30 with a High School Education with and without Limitations

Population/ limitation	Before ADA	After ADA	Time difference
<i>Post-secondary enrollment</i>			
With limitation	0.169 (0.020) [422]	0.188 (0.019) [540]	0.019 (0.028)
Without limitation	0.220 (0.007) [5,682]	0.251 (0.005) [8,202]	0.031** (0.008)
DD			-0.012 (0.029)
<i>College enrollment</i>			
With limitation	0.102 (0.016) [422]	0.150 (0.017) [540]	0.048* (0.023)
Without limitation	0.174 (0.006) [5,682]	0.210 (0.005) [8,202]	0.036** (0.008)
DD			0.012 (0.025)

Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains post-secondary enrollment means for individuals age 18 to 30 whose highest educational achievement is a high school degree or equivalent, with standard errors in parentheses and unweighted sample sizes in brackets. "Before ADA" includes estimates for 1990 and 1991, "After ADA" includes estimates for 1993, 1994, and 1997. Means calculated using SIPP sampling weights and adjusting for the SIPP's complex survey design. "DD" is estimated as the post-secondary enrollment time difference of people with limitations minus the post-secondary enrollment time difference of people without limitations.

+  $p < 0.10$ . \*  $p < 0.05$ . \*\*  $p < 0.01$ .



Table 4.13. Linear Probability Difference-in-differences (DD) Estimates of the ADA's Impact on Post-secondary Enrollment Rates for Individuals with a High School

Education with and without Limitations by Age

Population/ variable	<u>Any post-secondary education</u>		<u>College</u>		<u>Vocational, technical or business school</u>	
	Any limitation	Severe limitation	Any limitation	Severe limitation	Any limitation	Severe limitation
DD 18-58						
ADA * limitation	-0.010 (0.009)	0.013 (0.012)	-0.002 (0.008)	0.013 (0.010)	-0.008 (0.008)	0.001 (0.010)
Sample size	[46,398]	[46,398]	[46,398]	[46,398]	[46,398]	[46,398]
R <sup>2</sup>	0.160	0.160	0.182	0.182	0.013	0.013
DD 18-30						
ADA * limitation	0.022 (0.023)	0.056 (0.037)	0.045* (0.023)	a	a	a
Sample size	[14,846]	[14,846]	[14,846]			
R <sup>2</sup>	0.233	0.233	0.263			

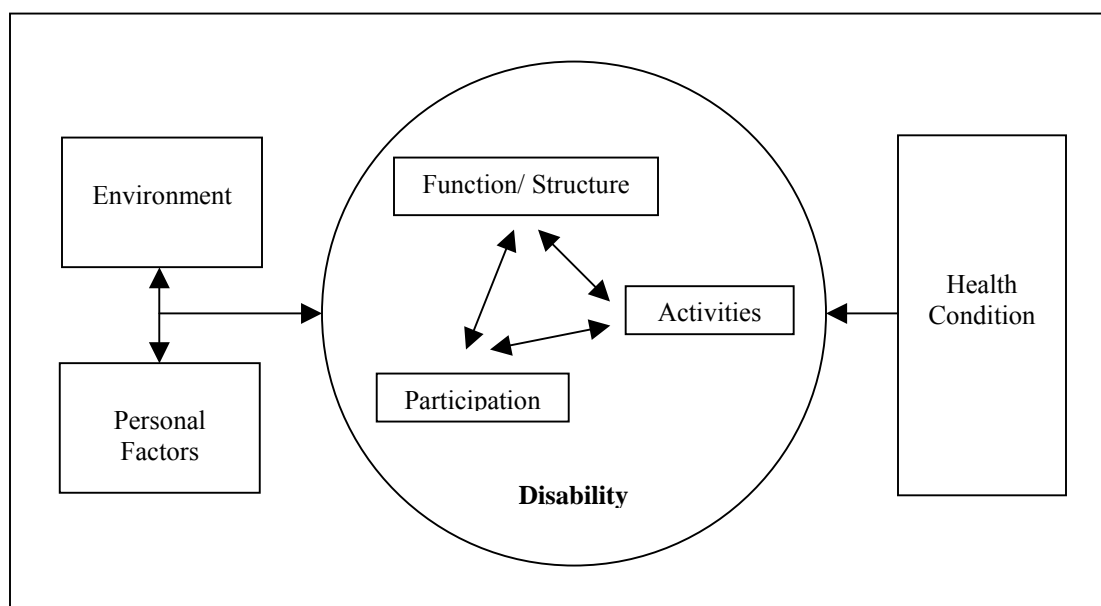
Source. SIPP (1990, 1991, 1992, 1993, 1996).

Note. Table contains linear regression estimates of the interaction from equation (1) for individuals whose highest educational achievement was a high school diploma or equivalent, with standard errors in parentheses. ADA is a dummy variable that takes a value of one for years post-ADA implementation (1993, 1994, and 1997), limitation indicates having any or a severe activity limitation. Estimates include state fixed-effects.

<sup>a</sup> Sample size not sufficient for valid estimates.

+ p < 0.10. \* p < 0.05. \*\* p < 0.01.

Figure 1.1. ICF Model of Disability



Source: Adaptation of World Health Organization (2002) diagram.

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## Curriculum Vitae

**Todd C. Honeycutt****Education**

- 2010 Ph.D. Candidate, Health Systems and Policy, University of Medicine and Dentistry of New Jersey  
 1998 M.A., Counselor Education, University of New Mexico  
 1991 B.S., Psychology, Texas A&M University

**Positions**

- 2006 - Mathematica Policy Research  
 2009 - Researcher  
 2006 - 2009 Research Analyst  
 2005 - 2006 Research Scientist, New Jersey Department of Health and Human Services, Trenton, NJ  
 2001 - 2005 Research Analyst, Rutgers University, Program for Disability Research, New Brunswick, NJ  
 2000 - 2001 Adjunct Professor, Texas Wesleyan University, Fort Worth, TX  
 1998 - 2000 Graduate Research Assistant, University of North Texas, Denton, TX

**Publications**

- Stapleton, David, Todd Honeycutt, and Bruce Schechter. "Out of Sight, Out of Mind: Including Group Quarters Residents with Household Residents Can Change What We Know About Working-Age People with Disabilities." Under review for *Demography*.
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