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Estimating the effects of the ADA Amendments Act on the hiring and termination of individuals with disabilities, using new disability categorizations

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Estimating the Effects of the ADA Amendments Act on the Hiring and Termination of Individuals with Disabilities, Using New Disability Categorizations

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Estimating the Effects of the ADA Amendments Act on the Hiring and Termination of Individuals with Disabilities, Using New Disability Categorizations

Upjohn Institute Working Paper No. 22-377

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ABSTRACT

Disability discrimination laws are often used to potentially increase employment for individuals with disabilities. However, legal theory and empirical economics research do not provide conclusive answers as to how expansions in disability discrimination laws affect economic outcomes, namely hiring rates, for individuals with disabilities. We estimate the effect of the ADA Amendments Act (ADAAA) on employment transitions: hirings and terminations for individuals with disabilities relative to those without disabilities. To calculate employment transitions, we use data from the Survey of Income and Program Participation (SIPP). We also use the SIPP to develop additional measures and categorizations of disability based on whether the conditions are physical or mental, and whether they are salient to an employer at the hiring stage. We find that the ADAAA is generally associated with positive employment effects: increases or no effects on hiring rates, and decreases or no effects on termination rates. Our strongest and most robust results are that we find increases in hiring for those with nonsalient physical conditions and decreased terminations for those with salient physical conditions. Our results suggest that the effects of the ADAAA vary by disability type—especially by disability saliency—and are stronger for the groups most targeted by broader coverage of the ADAAA.

JEL Classification Codes: J71, J78, K31, J14

Key Words: disability, employment discrimination, discrimination law, Americans with Disabilities Act, Americans with Disabilities Amendments Act, Sutton Trilogy

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Individuals with disabilities face considerable economic challenges. Compared to individuals without disabilities, they are far less likely to be employed. In 2013, only 34.0 percent of individuals with disabilities aged 18 to 64 were employed, compared to 74.2 percent of those without disabilities. This varies by disability type, ranging from 15.2 percent (for self-care disabilities) to 15.3 percent (independent-living disabilities), 23.7 percent (cognitive), 23.9 percent (ambulatory), 40.0 percent (vision), and 50.2 percent (hearing). Individuals with disabilities also earn much less. The median earnings in 2013 were \$20,785 for individuals with disabilities but \$30,728 for those without disabilities (Houtenville, Brucker, and Lauer 2014). Conditional on working, there are still gaps in the wages for individuals with and without disabilities, even when controlling for how disabilities affect occupational job requirements (Baldwin and Choe 2014a,b; Kruse et al. 2018).

Many policies and programs have attempted to close these disparities, such as Ticket to Work, the Benefit Offset National Demonstration, and various rehabilitation programs. While these programs seek to improve the labor supply of individuals with disabilities, their effectiveness in increasing the employment and earnings of individuals with disabilities can be limited by the labor demand side through disability discrimination. While disability discrimination is difficult to measure, recent efforts to measure it in contexts where the disability should have no impact on productivity have still found persistent discrimination (Ameri et al. 2018).

Disability discrimination laws are one approach used to try to remove discriminatory barriers. The most notable is Title I of the Americans with Disabilities Act of 1990 (ADA), which became effective in July 1992. Title I of the ADA forbids discrimination in hiring, terminations, promotions, and wages based on disability. It also requires that employers provide accommodations to individuals with disabilities if the cost of the accommodation is reasonable,

which is partly a function of the size of the employer. The ADA applies to all firms with at least 15 employees. The ADA was followed up by the ADA Amendments Act of 2008 (ADAAA), effective January 1, 2009, which broadened the ADA in response to how the Supreme Court had narrowed the ADA in several notable cases. Most states also have disability discrimination laws, many of which differ from federal law across one or more dimensions (Long 2004; Neumark et al. 2019; Neumark, Song, and Button 2017).

While disability discrimination laws seek to help individuals with disabilities maintain employment, economic and legal theory suggests that they have ambiguous impacts. Given that a worker with a disability is employed, that worker less likely to be terminated under disability discrimination laws. These laws impose a possible cost to terminating a protected employee since the termination could be seen—correctly or incorrectly—as discriminatory, prompting legal action (Acemoglu and Angrist 2001). These laws could also reduce terminations, as employer-provided accommodations may increase the productivity of individuals with disabilities.

However, these laws could have adverse effects on hiring. Hiring an individual from a protected class imposes a cost through the possible legal costs that could be faced if the employee is terminated (Bloch 1994). For disability discrimination laws, there is also the added cost of reasonable accommodations, which further increases the costs of hiring an individual with a disability—another disincentive to hiring them in the first place (Acemoglu and Angrist 2001). While hiring discrimination is illegal under the ADA and similar laws, it is more difficult to detect, and it is harder to establish a class of affected workers. Both enforcement of laws on hiring discrimination and proving hiring discrimination are also more challenging compared to the case for terminations (Neumark and Button 2014). Economic damages are also smaller in hiring discrimination cases, which makes these cases less attractive to plaintiffs and their attorneys

(Bloch 1994). For these reasons, disability discrimination laws have much less scope to reduce hiring discrimination and could in fact make it worse.

The empirical evidence of the effects of disability discrimination laws on the labor market outcomes of individuals with disabilities is also mixed. Some studies suggest that laws have a negative effect (Angrist and Krueger 2001; Bell and Heitmueller 2009; DeLeire 2000; Jolls and Prescott 2004); others show no effect (Beegle and Stock 2003; Bell and Heitmueller 2009; Hotchkiss 2004; Houtenville and Burkhauser 2004; Jolls and Prescott 2004), and some find a positive effect (Ameri et al. 2018; Button 2018; Carpenter 2006; Kruse and Schur 2003). We summarize these studies in Appendix Table A1 and discuss them in the next section.

Given the lack of consensus on how disability discrimination laws affect labor market outcomes for individuals with disabilities, we probe this question further in three ways. First, we study the passage of the ADA Amendments Act of 2008 (ADAAA), which has not been studied much (see Thompkins [2015]). The ADAAA significantly broadened disability discrimination laws to allow more individuals with disabilities to be covered under the federal ADA. We study how these expanded disability discrimination protections affected individuals with disabilities relative to individuals without disabilities.

Second, we focus on measuring the effects on hiring and terminations (involuntary separations), rather than just employment as was done in previous studies. Measuring effects on these transitions to and from employment is important, since economic and legal theory suggest different impacts of discrimination laws on hiring and termination. The focus on hiring is also important, because looking just at employment can confuse the effects of the laws with unrelated movements into and out of the labor force for other reasons (Hotchkiss 2004; Houtenville and Burkhauser 2004).

Third, we measure the effects of these laws by using several classifications of disability. Doing so avoids a critique in the literature in which the sample of individuals with disabilities is derived solely from the potentially problematic “work limited” question. In this question, disability is determined based only on answering “yes” to a question if respondents have a condition that limits the amount or type of work they can do. This measure is clearly not the legislative definition of disability under the ADA. It applies only to perceived limitations in working, whereas ADA plaintiffs must allege discrimination based on a condition that limits other major life activities but not work capacity.¹ The work-limited measure also groups together a highly heterogeneous population.

But most importantly, the responses to the work-limited question may be endogenous to the worker’s employment situation, with those able to get suitable work sometimes no longer indicating that they are “work limited,” even if they have the same condition. Similarly, employer accommodations may cause individuals to report that they are no longer work limited because they feel adequately supported at their current job. This endogeneity can lead to negatively biased estimated employment effects using this measure (Button 2018; Kruse and Schur 2003).

To address these issues, we expand beyond the traditional work-limited measure in two ways. First, we use disability measures based on “any activity of daily living (ADL) or functional limitation” and “severe ADL or functional limitation,” as developed in the Survey of Income and Program Participation (SIPP) by Kruse and Schur (2003). This definition of disability is closer to the ADA definition and avoids the problems associated with defining disability based on perceived work limitations.

¹ “Working” is not considered a major life activity, and being “work limited” does not constitute coverage under the ADA unless the condition affects a major life activity. See, e.g., *Toyota v. Williams*, discussed later.

Second, we introduce a set of new disability categorizations based on which conditions an individual identifies as being the source of the individual's work limitation. Our new disability categorizations allow us to estimate heterogeneous effects of discrimination laws across four groups of individuals with disabilities:

- 1) individuals with physical disabilities that are salient to employers
- 2) individuals with physical disabilities that are not salient to employers
- 3) individuals with mental retardation or developmental disabilities (a unique category that requires separate consideration)
- 4) individuals with other mental disabilities (which are not usually salient to employers)

By separately estimating the effects of the ADAAA by the severity of functional impairment, by the type of disability, or by salience to the employer, we shed light on the mechanisms through which these laws affect hiring and termination and which subgroups of the disabled population are affected. The salience distinction is of importance because it relates to hiring, which is the main outcome of our analysis. Individuals with conditions that are more salient to an employer may face more of a hiring disincentive than individuals with conditions that are usually not salient.

We find that the ADAAA is almost always associated with nonnegative employment effects—that is, increases or no effect on hiring, and decreases or no effect on terminations. Our strongest and most robust results are that we find an increase in hiring for those with nonsalient physical disabilities and a decrease in terminations for those with salient physical disabilities.

RELATED RESEARCH

Disability Discrimination Laws

Effect of the ADA

We build off several other studies of how disability discrimination laws, namely the ADA, have affected the employment of individuals with disabilities. We summarize these papers in Appendix Table B1. The first papers examining the effect of disability discrimination laws are Acemoglu and Angrist (2001) and DeLeire (2000), who examine the ADA and argue that it was associated with a decrease in employment of individuals with disabilities, relative to individuals without disabilities.

This was followed by four papers that probe these results further. Houtenville and Burkhauser (2004) and Hotchkiss (2004) both find that employment of individuals with disabilities fell after the ADA, relative to that of individuals without disabilities, but they each attribute it to a trend that was independent of the ADA. Houtenville and Burkhauser (2004) note that employment of individuals with disabilities had been declining since the 1980s, and that this was likely attributable to SSDI and SSI programs becoming more accessible. Hotchkiss (2004) attributes the trend to a decrease in the labor force participation for individuals with disabilities, stemming from a reclassification of individuals without disabilities who were out of the labor force as “disabled.” Jolls and Prescott (2004) argue that the effects of the ADA were mediated by existing state disability discrimination laws, so that they only find a negative effect of the ADA in states without existing laws that required reasonable accommodations for individuals with disabilities.

Most important to our contribution to disability classification, Kruse and Schur (2003) find that the estimated impact of the ADA depended on how disability was defined. They replicate the negative estimates of Acemoglu and Angrist (2001) and DeLeire (2000), using SIPP data and the

work-limited measure of disability. They then use survey modules in the SIPP that include data on functional limitations to show that a definition of disability more in line with the ADA, in which an individual has a limitation to an ADL, results in a *positive* effect of the ADA on employment.

At this point, given these studies, the effect of the ADA on employment is still uncertain. This is still the case even if one does put more weight on the conclusions of some studies (e.g., Kruse and Schur 2003) over others.

Effect of other disability discrimination law changes or differences

There is little work, other than the ADA, that examines the effect of other changes or cross-sectional differences in disability discrimination law. The study most similar to our analysis of changes to the ADA is that of Thompkins (2015), who is the first to examine how post-ADA Supreme Court of the United States (SCOTUS) cases that changed the interpretation of the ADA, along with the subsequent ADAAA, affected employment for individuals with disabilities. We use much of the same legal variation, although our approach differs, as will be detailed later. Thompkins (2015) finds limited effects of the SCOTUS cases and the ADAAA on employment using data from the CPS Annual Social and Economic Supplement (ASEC). Another example of using court cases that affected the definition of disability under the ADA is Carpenter (2006), who finds that the expansion of ADA protections to obese individuals by the *Cook v. Rhode Island* case in 1994 led to an increase in employment for obese individuals.

Beegle and Stock (2003) examine state laws passed before the ADA, finding almost no effect on employment, even for those that required reasonable accommodation. Button (2018) examines a broadening of the definition of disability in California's disability discrimination law in 2001, which was in many ways similar to the ADAAA. Button finds that California's new law increased employment for individuals with disabilities, even when using the "work limited"

definition of disability in the CPS ASEC. Ameri et al. (2018) provide unique evidence by using a résumé-correspondence study to measure discrimination against individuals with spinal cord injuries or Asperger's, and to see whether this discrimination differs based on the coverage of the ADA and state laws. They compare firms on either side of the ADA's cutoff for coverage (15+ employees) and find some evidence that being covered by the ADA reduces discrimination. They also examine existing state laws that are stronger or broader than the ADA but do not find any effects from those.

Other Discrimination Laws

The effect of discrimination laws for other groups (e.g., groups based on sex, race, or age) sheds light on the effects of disability discrimination laws. The theoretical effect of these laws is similar—disincentives for both hiring and termination. However, the hiring disincentive is smaller because there is no reasonable accommodation requirement. Also, these laws cannot boost tenure at jobs through the mechanism of reasonable accommodations. The empirical literature on the effects of laws protecting other groups generally shows positive effects for Black or older workers, but there is no consensus. The literature on sex is much less developed and has mixed conclusions. The growing literature on discrimination based on sexual orientation and gender identity shows either positive effects or no effects.

There are several studies of age discrimination. Adams (2004) and Neumark and Stock (1999) both find that federal and state age-discrimination laws were associated with increased employment of older workers. In an interesting application, Neumark and Song (2013) find that hiring rates of older workers who were “caught” by the increase in the Social Security Administration's full retirement age were higher in states with stronger age-discrimination laws. Lahey (2008) finds that greater enforcement of the Age Discrimination in Employment Act

(ADEA) of 1968 in states where it was easier to file a discrimination claim led to lower hiring rates. Neumark (2009) and Neumark and Button (2014) dispute this conclusion. Neumark and Button find mixed evidence of the effects of state age-discrimination laws, with stronger or broader laws sometimes associated with worse labor market outcomes for older workers during and after the Great Recession, but with some evidence suggesting that these laws improved labor market outcomes before the recession. McLaughlin (2020) finds that age-discrimination laws protect women less, reflecting the legal quirk that age and sex fall under different statutes (Burn et al. 2020; McLaughlin 2019).

Neumark, Song, and Button (2017) and Neumark et al. (2019) both examine the impact of state age and disability discrimination laws on older workers, with the former finding that states with a broader definition of disability than the ADA had increased hiring of older workers compared to states where the ADA definition holds. Neumark et al. find the opposite result for men; however, they do find that some stronger state-level age discrimination laws boost hiring of older women.

Neumark and Stock (2006) and Donohue (2007) discuss the literature on sex and race. Donohue and Heckman (1991) and Neumark and Stock (2006) find that Title VII of the Civil Rights Act of 1964 is associated with increased employment of Black relative to White people (and Neumark and Stock of women relative to men). However, both sets of authors acknowledge that it is hard to say that these effects are necessarily causal, because there were even stronger improvements in labor market outcomes for the affected groups in periods before this law, and these improvements were caused by more secular forces. Neumark and Stock also investigate how state race discrimination laws affected Black people; they find no employment effect. They also find that state laws forbidding wage discrimination based on sex led to a decrease in

employment for women. Most other studies of the effect of sex discrimination laws focus on earnings and wages. There is also an evolving literature on the effect of laws protecting LGBTQ+ people (see, e.g., Burn 2018; Mann 2021; Martell 2013), with this research generally showing positive or null effects.

BACKGROUND ON THE ADA AMENDMENTS ACT OF 2008

Here we provide background on the legal changes to disability discrimination in employment law brought forth by the ADA Amendments Act of 2008 (ADAAA). In Online Appendix A, we provide additional details about the original ADA and Supreme Court cases related to the ADA, namely the “Sutton Trilogy” of cases, which motivated the passage of the ADAAA.

The ADA Amendments Act of 2008 (ADAAA) became effective January 1, 2009. The ADAAA made several significant changes to the ADA, with the goal of making the ADA broader and undoing some of the restrictions placed on it by the Supreme Court, particularly in the Sutton Trilogy. The ADAAA explicitly states that the intent of Congress was for the ADA to favor broad coverage of individuals.² Thus, the ADAAA rejects the “demanding standard” set by the Supreme Court’s interpretation of the ADA in *Toyota v. Williams* and other similarly demanding standards in other cases (Long 2008). One way the ADAAA removed this demanding standard was by making the “substantially limits” requirement less strict by requiring a “lower degree of functional

² “The definition of disability in this Act shall be construed in favor of broad coverage of individuals under this Act, to the maximum extent permitted by the terms of this Act.” ADA Amendments Act of 2008 sec. 4, § 3(4)(A).

limitation than the standard previously applied by the courts.”³ This change allows those who were on the margins of having a severe enough impairment to now be covered under the ADA.

In addition to these broad changes in the interpretation of the ADA, the ADAAA also made more specific changes to the ADA. These included the following:

1. Explicitly listing what were major life activities (and adding major bodily functions to this list)
2. Stating that conditions should be evaluated as if they were in their active state, regardless of whether they are episodic, in remission, or mitigated by “mitigating measures” (thus overturning the Sutton Trilogy)
3. Lowering the standard to be considered disabled under the “regarded as” prong of the ADA definition of disability

All these changes broadened who could be considered disabled under the ADA, leading more individuals to be covered.

First, the ADAAA explicitly listed what qualified as “major life activities.”⁴ Appendix Table B2 provides a summary of how different activities changed in their status of being “major life activities” over time, both before and after the ADAAA. The major life activities listed in the ADAAA have significant overlap with those issued in EEOC publications. Included in this table are all the major life activities that the ADAAA explicitly mentioned, plus one that was not (“interacting with others”).

³ See http://www1.eeoc.gov/laws/regulations/adaaa_fact_sheet.cfm?renderforprint=1 (accessed January 26, 2023).

⁴ “Major life activities include, but are not limited to, caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, lifting, bending, speaking, breathing, learning, reading, concentrating, thinking, communicating, and working.” (42 U.S.C. § 12102(2)(A)).

What differentiates these activities that the ADAAA added is the extent to which they were major life activities *before* the ADAAA. All but three activities (bending, communicating, and reading) were mentioned as major life activities by the EEOC at some point.⁵ Thus, for these three, it is more likely that the ADAAA added them as new major life activities, but the other major life activities were in question, even if the EEOC mentioned them, as discussed earlier.

The ADAAA also listed several major bodily functions as “major life activities.”⁶ This list, like the examples of major life activities in the EEOC publications, was not meant to be exhaustive. These are presented in Appendix Table B3. The EEOC did not explicitly mention any of these as being major life activities, but they were explicitly mentioned as major life activities in the ADAAA. Thus, the addition of major bodily functions is a significant expansion of coverage of the ADA. The inclusion of these functions makes it much easier for individuals with certain impairments or conditions (e.g., diabetes, cancer, heart disease) to be covered by the ADA.

Second, the ADAAA also deemed conditions that were episodic, in remission,⁷ or managed by “mitigating measures”⁸ to be considered as if they were in their active, unmitigated state. This overturned the interpretation of the Supreme Court that emphasized in *Sutton v. United Airlines*

⁵ However, bending was not deemed to be a major life activity in the courts, but courts were more favorable to communicating and reading (Taylor 2009). For bending, see *Parkinson v. Anne Arundel Medical Center Inc.*, 214 F. Supp. 2d 511 (D. Md. 2002); and *Petty v. Freightliner Corp.*, 123 F. Supp. 2d 979, 982 (W.D.N.C. 2000). For communicating, see *DeMar v. Car-Freshner Corp.*, 1999 WL 34973, *4 (N.D.N.Y. Jan. 14, 1999). For reading, see *Head v. Glacier Northwest, Inc.*, 413 F.3d 1053 (9th Cir., 2005); *Shaffer v. Spherion Corp.*, 2007 WL 4557778 (D. Col., Dec. 20, 2007); and *Szmaj v. AT&T*, 291 F.3d 955 (7th Cir., 2002). (But in *Szmaj*, “reading all day” is not a major life activity.)

⁶ “[A] major life activity also includes the operation of a major bodily function, including but not limited to, functions of the immune system, normal cell growth, digestive, bowel, bladder, neurological, brain, respiratory, circulatory, endocrine, and reproductive functions.”

⁷ “An impairment that is episodic or in remission is a disability if it would substantially limit a major life activity when active” (42 U.S.C. § 12102(4)(D)).

⁸ “The determination of whether an impairment substantially limits a major life activity shall be made without regard to the ameliorative effects of mitigating measures such as (I) medication, medical supplies, equipment, or appliances, low-vision devices (which do not include ordinary eyeglasses or contact lenses), prosthetics including limbs and devices, hearing aids and cochlear implants or other implantable hearing devices, mobility devices, or oxygen therapy equipment and supplies; (II) use of assistive technology; (III) reasonable accommodations or auxiliary aids or services; or (IV) learned behavioral or adaptive neurological modifications.” 42 U.S.C. § 12102(4)(E)(i). However, the ADAAA excludes corrective lenses (Long 2008).

and *Toyota v. Williams* that courts must consider the individual in that individual's present state, rather than considering what the individual would be like if the condition were active (or more active) (Long 2008). Thus, this change in the ADAAA led to the coverage of conditions such as epilepsy, bipolar disorder, and depression, as well as conditions that required mitigating measures such as prosthetic devices or medication.⁹

Third, the ADAAA also increased protections for those perceived as having a disability. One of the three definitions of disability under the ADA is to be "regarded as" having a disability. The ADAA removed from this definition of disability the requirement that the perceived disability be regarded as being of a magnitude that would "substantially limit" a major life activity.¹⁰ The previous "substantially limits" requirement of this prong made it even more difficult for plaintiffs to establish that they were perceived as being disabled, as they had to establish that the perception was that they were substantially limited in one or more major life activities. Now plaintiffs just needed to show that they were discriminated against because of a perceived impairment that was not transitory or minor.¹¹

⁹ For example, this would include those with epilepsy, bipolar disorder, and diabetes who took medication to manage their condition (Long 2008).

¹⁰ "An individual meets the requirement of being regarded as having such an impairment if the individual establishes that they have been subjected to an action prohibited under this Act because of an actual or perceived physical or mental impairment, whether or not the impairment limits or is perceived to limit a major life activity" (42 U.S.C. § 12102(3)(A)).

¹¹ "Transitory" is defined as "an impairment with an actual or expected duration of [six] months or less" (42 U.S.C. § 12102(3)(B)). However, "minor" is not defined (Long 2008).

DATA

We use the Survey of Income and Program Participation (SIPP) panels,¹² as they provide two benefits: 1) a longitudinal data structure that allows us to estimate effects on hiring and terminations and 2) survey modules that provide variable disability and functional impairment measures beyond the conventional “work limited” measure of disability.

The SIPP is a representative survey of U.S. households, reinterviewing these households every four months for between two and four years. In addition to the core set of questions about employment, income, and program participation, every interview contains targeted sets of questions referred to as “topical modules.” We use both the “Work Disability” and “Functional Limitations and Disability—Adults” topical modules for our disability classifications. We use individuals of any sex who are aged 21 to 61. We use the SIPP panels from 1996, 2001, 2004 and 2008, which include data from 1995 to 2012.

Measuring Hiring

The four-month frequency of SIPP interviews contains questions on each month since the prior interview, providing person-month data on employment status. We exploit this longitudinal nature of the SIPP to construct person-month hiring data, following the procedure outlined in Neumark, Song, and Button (2017). To measure hiring, we use the monthly employment status data to categorize respondents as employed, self-employed, or not working. If respondents report having a job for at least one week during the reference month, we record them as being employed. To categorize nonemployment, we use a limited definition which is defined either as individuals

¹² We use the 1990, 1991, 1992, 1993, 1996, 2001, 2004, and 2008 SIPP panels in our analyses, providing both pre- and post-treatment measures of employment for respondents around the discrimination-law policy changes we focus on.

who had no job all month and were on layoff or looking for work all weeks; or as individuals who had no job all month and were on layoff or looking for work at least one but not all weeks (Ryscavage 1988).

We follow Neumark, Song, and Button (2017) and focus on measuring hiring from nonemployment instead of all hiring. Job-to-job transitions are harder to interpret, as they are often caused by adverse outcomes at the previous job or may represent high turnover rather than a general change in economic conditions. For hiring from nonemployment, we can assume that nonemployed workers who become employed were looking to get hired. Thus, the hiring from nonemployment more cleanly captures to what extent hiring of individuals with disabilities changes in response to changes in legal protections (Neumark, Song, and Button 2017)

If they report having a job for at least one week during the reference month and own their own business, we define them as being self-employed. If they report having no job, we define them as not working. If they make a transition from having been self-employed or not working in the previous month (time $t - 1$) to being employed in the current month (time t), then we code them as hired. We focus on the sample not employed at period $t - 1$ and estimate models for whether these respondents were hired as of period t .

Measuring Terminations

We similarly leverage this longitudinal structure of the SIPP to create a measure of terminations. We first determine a separation: moving from employment to unemployment or nonemployment, and then we refine this to measure terminations by counting involuntary separations only.

Based on the definitions for employment described above, we coded separations as occurring when a respondent transitions from being employed in the previous month (time $t - 1$)

to being 1) unemployed, 2) self-employed, or 3) changing employers in the reference month. The focus is on the respondents who are employed at period $t - 1$: models are estimated for whether these individuals separated from their employer as of period t .

We then differentiated between voluntary and involuntary separations, including only involuntary separations to generate our measure of termination. Respondents who were separated were asked about the reason for this separation. We coded the separation as voluntary if the individual stated that the main reason they stopped working for their employer was that they quit to take another job, or that they quit for some other reason. The separation was coded as involuntary if the reason was layoff, discharged/fired, employer bankruptcy, or employer sold the business.

Disability Measures in the SIPP

Over the past two and a half decades, courts, states, and the federal government have wrestled with the issue of who is covered by the ADA. Amidst this evolving definition of disability is the unfortunate fact that most large survey data sets have very limited measures of those potentially covered by the ADA. The most common measure—the “work disability” or “work limited” measure—based on a reported “physical or mental health condition limiting the kind or amount of work” one can do—has been the nearly exclusive measure of disability used in economic analyses of the labor market effects of the ADA. However, this measure suffers from multiple drawbacks: it is clearly not the legislative definition of disability under the ADA, it groups together a highly heterogeneous population, and it applies only to perceived limitations in working, whereas many ADA plaintiffs specifically allege discrimination based on a condition that limits other major life activities but not work capacity. Most importantly, this disability measure could be endogenous to employment or to employer accommodations of health conditions, where this

accommodation removes their interference with work (Kruse and Schur 2003). Burkhauser et al. (2002) show that for individuals with a reported impairment (e.g., blind in both eyes), those that report being work limited are more likely to be employed than those who do not. This suggests that individuals who have an impairment but are sufficiently integrated into the workforce do not report a work limitation and that those with more attachment to the labor force are more likely to report a work limitation.

To address these issues, we expand on the traditional “work limited” measure in two ways. First, we define *disability* instead as “any Activity of Daily Living (ADL) or functional limitation” or “severe ADL or functional limitation” as developed in the SIPP by Kruse and Schur (2003). Second, we introduce a set of new, specific-condition-based metrics, based on what conditions an individual identifies as being the source of their work limitation.¹³

Activities of Daily Living (ADL) disability categorization

We follow Kruse and Schur's (2003) methodology in defining an ADL or functional limitation. We agree with Kruse and Schur that this approach to categorizing disability is better tied to the definition of disability under the ADA, which requires a substantial limitation to a “major life activity.” While major life activities were in flux and not always defined (see Appendix Table B2), many of them overlap with ADL or functional limitations, leading to a disability categorization that is more closely tied to the ADA definition.

SIPP respondents were asked to report on any difficulty with a variety of functional activities (seeing, hearing, speaking, lifting, climbing stairs, and walking) and activities of daily living (ADLs, which include activities such as dressing, preparing meals, and eating). We classify respondents who answer “yes” to having difficulty with any of these activities as having “any ADL

¹³ See Wittenburg and Nelson (2006) for a thorough discussion of disability-question design in the SIPP.

or functional limitation.” For those who reported having difficulty with any activity, the survey asked whether they could do that activity at all (for the functional activities) or needed help in doing the activity (for the ADLs). We classify those who responded “yes” to these additional questions as having “severe ADL or functional limitations.”

New type of work-limited disability categorizations

In addition to using the ADL limitation categorization, we construct a new specific-condition-based categorization of individuals with disabilities that better captures the heterogeneity in this population. If respondents answer “yes” to the work-limitation disability question asked in the Work Disability History Topical Module (“Do you have a physical, mental, or other health condition that limits the kind or amount of work you can do at a job or business?”), they are then asked, “Which of these conditions cause your work limitation?” and are provided with a list of approximately 30 common work-limiting conditions (see Table 1 for a list of these conditions across our SIPP panels).

We group these conditions into one of four categories:

- 1) Salient physical conditions, which include mobility and sensory conditions likely salient to a potential employer (e.g., missing limbs, blindness)
- 2) Nonsalient physical conditions, which include medical conditions that may not be apparent to a potential employer (e.g., diabetes, high blood pressure)
- 3) Mental retardation or developmental disability
- 4) Other mental conditions (e.g., alcohol/drug abuse, learning disability, mental or emotional conditions, or other mental conditions)

We supplement these four categorizations of work-limiting disability conditions with the corresponding adult functional impairment Topical Module, which asks all individuals whether

they use a wheelchair, walker, or cane, as well as whether they have one of four mental conditions: 1) mental retardation, 2) developmental disability, 3) learning disability, or 4) some other mental condition (see Table 1).

Although previous research estimating a general effect for the entire work-limited population found mixed results, the actual impact of the law is likely to vary substantially across subgroups of this population, especially when considering the hiring margin, where potential employers may have different knowledge of future workers' health conditions. For example, previous research has shown large wage penalties for obese workers (Baum and Ford 2004), most notably among employers offering health insurance (Bhattacharya and Bundorf 2009). Although the sample sizes in the SIPP prevent the estimation of condition-specific effects, this research suggests a role for separately estimating treatment effects by physical condition, based on the information available to an employer.

We also separate out mental retardation and developmental disability from other mental conditions that are due to the systematic disability program participation differences across these groups. Autor and Duggan (2006) note that those with nonretardation, nondevelopmental mental disabilities were the fastest-growing group of Social Security Disability Insurance beneficiaries since the early 1980s, while per-capita beneficiary rates of individuals with mental retardation or developmental disabilities have remained flat during this time period. Additionally, this latter group has traditionally been the target of supported employment programs with distinct labor market opportunities, challenges, and policy interventions (Nord et al. 2013).

Conducting these subanalyses by either ADL/functional limitation or health-condition category allows for a further understanding of the mechanisms and margins of effect of disability discrimination laws. And, as discussed above, there has been substantial reinterpretation and

definition of who should be protected by disability discrimination legislation; these subanalyses, on the other hand, help to measure a different question, which is how to determine which groups of individuals are, de facto, affected by such laws.

METHODOLOGY

We use a difference-in-differences regression model to estimate the effects of the ADAAA on hiring and termination. This approach compares outcomes for individuals with disabilities (the treatment group), before and after the ADAAA, with individuals without disabilities (the control group) over the same time period, controlling for additional factors.

Effects by “Work Limited” Disability Measure

We start by defining disability using the common work-limited measure. Our regression equation is as follows:

$$Y_{ist} = \beta_1(ADAAA_t * DIS_i) + X_i\beta_2 + T_{dt}\beta_3 + \theta_{st}\beta_4 + \delta_{ds}\beta_5 + Z_{dst}\beta_6 + \varepsilon_{ist} \quad (1)$$

where Y_{ist} is either an indicator variable for being hired or an indicator variable for being fired; i indexes individuals, s indexes states, d indexes disability status, and t indexes time (monthly); DIS_i is an indicator variable for being an individual with a disability (for now, using the “work limited” definition); and $ADAAA_t$ is an indicator variable for the ADAAA being active (January 2009 and onward). X_i is a vector of individual socioeconomic characteristics;¹⁴ θ_{st} are state-by-time fixed effects; δ_{ds} are disabled-by-state fixed effects; T_{dt} are group-specific time trends (discussed below); and ε is the error term. The state-by-time fixed effects (θ_{st}) control for any factors that vary by state over time and affect individuals with and without disabilities similarly. The disabled-

¹⁴ For the SIPP, these are indicator variables for each age in years, sex, level of education, marital status, and race (Black, Asian, White, other race), Hispanic ancestry, metro status, and being “on-seam.”

by-state fixed effects (δ_{ds}) control for any time-invariant factors at the state level by disability-status level, such as lower employment for individuals with disabilities in certain states. The coefficient of interest is β_1 , which captures the effect of the ADAAA on individuals with disabilities relative to those without disabilities. This and all other regressions are weighted using population weights, and all standard errors are clustered at the state level (Bertrand, Duflo, and Mullainathan 2004).¹⁵

Z_{dst} are controls that vary by disability status, state, and time. These include the state unemployment rate, which is also included interacted with DIS_i , and which controls for economic shocks that may have hit different states differentially over time, and may have affected individuals with disabilities differently. We also control for some Supreme Court cases on the ADA leading up to the ADAAA.¹⁶ And we include controls for policies enacted in some states over time, also interacted with DIS_i . These are the weeks of extra unemployment insurance that were available (from Farber and Valletta 2015), tax credits for hiring individuals with disabilities (from Neumark and Grijalva 2017), and changes in state-level disability discrimination laws. We also add an “on-seam” control to control for seam bias.¹⁷

Group-specific time trends are represented by the variable T_{dt} in the model. A fundamental issue in the literature estimating the impacts of the ADA is that of time trends: were outcomes trending in parallel for individuals with and without disabilities? This is a real concern in this

¹⁵ To the extent that individuals are not nested within state, there is also serial correlation within individuals for the SIPP data when hiring is used as the outcome. This occurs for those individuals that move to a new state. This occurs infrequently (about 5 percent of the time), so that standard errors with multiway clustering (individual and state), which are difficult to calculate, are very similar to those just clustered on state.

¹⁶ This includes indicator variables, interacted with DIS_i , for the *Bragdon*, *Toyota*, and *Sutton* Trilogy of Supreme Court cases, which we discuss in Online Appendix A. Because many of these cases happened around the same time, it is hard to disentangle the effect of each case individually, so we refrain from attempting to do so.

¹⁷ Seam bias is a tendency for individuals to report the same value within a four-month interview period. This overstates the changes in employment between waves and understates the changes within each four-month reference period of waves (Ham, Li, and Shore-Sheppard 2009). To address this seam bias, we include an indicator variable for being on a seam between two interview waves.

literature. Houtenville and Burkhauser (2004) question the negative employment effects of the ADA estimated in Acemoglu and Angrist (2001) and DeLeire (2000), arguing that the employment decline for individuals with disabilities after the ADA was due to decreasing labor force participation for other reasons, a trend that was apparent even before the ADA. Thus, this suggests that time trends should be included. A model with linear time trends is also more appealing because it relies on a weaker assumption (“Parallel Growth”) than the model without these trends (“Parallel Paths”) (Mora and Reggio 2019). However, including time trends when there are no differential trends decreases precision by removing a significant amount of treatment variation. Including time trends can also attenuate estimates if treatment effects occur, at least in part, as an increase in the growth rate (e.g., there is a nonzero growth rate in hiring), rather than simply an increase in levels (e.g., a hiring-rate jump) (Meer and West 2016). For these reasons, we consider regressions with and without group-specific time trends.

Effects by Category of Work Limitation

We leverage the more detailed disability measures that we generated using the SIPP data to measure effects of the ADAAA by disability type. In addition to estimating Equation (1) using the work-limited definition of disability, we explore two other sets of disability designations. First, we split the heterogeneous work-limited population into four groups. We replace the work limited disability indicator variable (DIS_i) from Equation (1) with four different indicator variables for disability types: 1) physical disabilities that are likely salient to employers (PHY_i^S), 2) physical disabilities that are likely *not* salient (PHY_i), 3) mental retardation or developmental disability ($MRDD_i$), and 4) any other mental disability (MEN_i). This regression equation is

$$Y_{ist} = \beta_1(ADAAA_t * PHY_i^S) + \beta_2(ADA_t * PHY_i) + \beta_3(ADA_t * MRDD_i) + \beta_4(ADA_t * MEN_i) + X_i\beta_5 + T_{dt}\beta_6 + \theta_{st}\beta_7 + \delta_{ds}\beta_8 + Z_{dst}\beta_9 + \varepsilon_{ist} \quad (2)$$

where the disability-status-by-state fixed effects (δ_{ds}) are specific to each of the four possible work-limited groups. T_{dt} are, similarly, group time trends that are specific to each group, and the controls in Z_{dst} are interacted with each disability group.

Effects by Activities of Daily Living (ADL) Limitations Disability Measure

We now follow Kruse and Schur (2003) and estimate the effects of the ADAAA on two different populations of individuals with disabilities: 1) those with any ADL or functional limitation and 2) those with a severe ADL or functional limitation. This regression equation is

$$Y_{ist} = \beta_1(ADAAA_t * anyADL_i) + \beta_2(ADA_t * severeADL_i) + X_i\beta_3 + T_{dt}\beta_4 + \theta_{st}\beta_5 + \delta_{ds}\beta_6 + Z_{dst}\beta_7 + \varepsilon_{ist} \quad (3)$$

where we replace the disability indicator variables (DIS_i) from Equation (1) with two different indicator variables: 1) $anyADL_i$, corresponding to an individual reporting any ADL or functional impairment, and 2) $severeADL_i$, corresponding to an individual reporting a severe ADL or functional impairment. The coefficient β_1 then corresponds to the effect of the ADAAA on the outcome variable among those reporting any ADL or functional impairment, while β_2 is the *additional* impact of the ADAAA if that ADL or functional impairment is severe. The overall effect of the ADAAA on a severely impaired individual is therefore the sum of these two coefficients. T_{dt} are again specific to each disability status, and δ_{ds} are disability-type-by-state fixed effects.

DESCRIPTIVE STATISTICS

Before showing regression results, we provide descriptive statistics in Table 2. We divide the sample by respondents who are not work limited and the three distinct methods we use to classify the population potentially affected by the ADA and ADAAA: 1) those reporting a work

limitation, 2) those reporting any ADL or functional impairment or a severe ADL or functional impairment, and 3) each of the four groups based on the work-limiting health condition in question (physical salient; physical nonsalient; mental retardation/developmental disability; and other mental condition). All estimates are population-representative through weighting by the provided population weights.

Table 2 shows that an individual falling into any one of these disability categories has a substantially lower monthly hiring rate than those who are not work limited (6.13 percent) or who do not report any ADL limitation (5.92 percent). Those reporting physical disabilities have the lowest hiring rate (1.47 percent), and those with mental conditions other than mental retardation or developmental disability have the highest (2.19 percent). Broadly, individuals with disabilities are older, are less likely to have at least some college education, are less likely to be married, are less likely to live in a metro area, and are more likely to be Black.

RESULTS

Effects of the ADAAA on Hiring

We start by presenting, in Table 3, Panel (a), the estimated effects of the ADAAA on hiring, using the work-limited measure of disability (Equation (1)). For the regression without linear trends (column (3)), there is a 0.46 percentage point increase in the hiring rate, statistically significant at the 5 percent level. This is a fairly large increase in the hiring rate of 25.7 percent, compared to the mean rate of 1.79 percentage points. Adding disability-status-specific linear time trends (column (2)) reduces this estimate to an insignificant 0.08 percentage point increase.

In Table 3, Panel (b), we now break down the work-limited definition of disability into the four categories we constructed based on SIPP modules: 1) physical disabilities that are salient, 2)

physical disabilities that are not salient, 3) mental retardation and developmental disability, and 4) other mental disabilities (Equation (2)). Without linear trends (column (1)), there are positive and statistically significant increases in hiring for all work-limited categorizations except those with mental retardation or developmental disabilities. These coefficients range from a 0.95 (salient physical) to a 1.19 (other mental) percentage point increase in the hiring rate, or a 54.3 percent increase (other mental) to a 73.5 percent increase (nonsalient physical), compared to mean hiring rates.

Mirroring the results for the entire work-limited category (Panel (a)), when we add disability-by-type linear time trends, it makes most of the positive coefficients insignificant. The exception is that the coefficient for nonsalient physical stays significant at the 1 percent level but is now a 0.77 percentage point increase (a 52.4 percent increase) instead of a 1.08 percentage point increase (a 74.5 percent increase).

In Table 3, Panel (c), we estimate the effects of the ADAAA on individuals with and without an ADL limitation. Note that for individuals with a severe ADL limitation, the combined effect for them is the sum of the coefficients on any ADL limitation and severe ADL limitation. Thus, the coefficient on severe ADL limitation presents the difference in effects between those with nonsevere and those with at least one severe ADL limitations. Without including disability-status/severity-specific linear time trends (column (1)), we find that the ADAAA is associated with a large increase in hiring of 1.28 percentage points, statistically significant at the 5 percent level, and that this effect does not seem to differ by ADL severity. However, this effect goes away and somewhat flips once we add linear time trends (column (2)). For individuals with a nonsevere ADL limitation, we no longer find any effect on the hiring rate. However, for those with a severe

ADL limitation, there is now a decrease in the relative hiring rate of 1.54 percentage points, significant at the 5 percent level.

Effects of the ADAAA on Terminations

Table 4 presents the estimated effects of the ADAAA on terminations (involuntary separations). With the binary work-limited definition of disability (Panel (a)), there is no statistically significant impact on terminations, and the estimates are quite small. However, we again find heterogeneous effects once we break apart this broad work-limited definition (Panel (b)). Without disability-by-type-specific linear time trends (column (1)), all estimates are negative and statistically significant at the 1 percent level except for other mental health conditions, which are insignificant and near zero. For the three significant estimates, they range from a 0.08 percentage point decrease in the termination rate (for physical, nonsalient) up to a 0.24 percentage point decrease (for mental retardation and developmental disability). While these effects look small, they are large compared to the mean termination rates, meaning that this 0.08 to 0.24 percentage point decrease is equivalent to a 40 percent to 114 percent decrease compared to the mean termination rate for each corresponding work-limited categorization group.

When we add in disability-by-type-specific linear time trends (column (2)), we again get that the estimates become insignificant, although this time it is more driven by increases in the standard error estimates than by decreases in the coefficient estimates. With these trends included, the only statistically significant effect, still at the 1 percent level, is a 0.23 percentage point decrease in the termination rate for individuals with salient physical disabilities.

Panel (c) presents our estimates using the ADL limitations measure of disability, but as with the binary work-limited measure, we do not find any statistically significant estimates either with or without ADL-severity-specific linear time trends.

DISCUSSION

Explaining the Different Effects by Disability Saliency

Here we discuss why our results tend to differ by disability type, categorization, saliency, or severity. Starting with our result that the ADAAA increased hiring for individuals with non-salient physical work limitations more than for individuals with salient physical work limitations, we first note that the ADAAA improved protections more for those with nonsalient physical conditions than for those with salient physical conditions. The ADAAA essentially made the ADA broader,¹⁸ by covering more individuals with disabilities. The ADAAA affected those with nonsalient physical conditions more than salient physical conditions, since salient physical conditions (see Table 1) were more likely to have already been covered by the ADA. Nonsalient conditions were more likely to be conditions with a more mixed record of ADA coverage, so that the ADAAA differentially improved legal protections for this group more than it did for those with salient conditions. This may explain why the magnitude of the effects is larger for those with nonsalient physical conditions compared to those with salient physical conditions.

Second, the ADAAA could have also increased hiring more for those with nonsalient conditions by differentially increasing access to accommodations for this group. Since the ADAAA differentially improved coverage more for individuals with nonsalient conditions, those individuals could have been more likely to seek work and accept job offers, since accommodations would be more likely for them. Employers could have also been more proactive at offering accommodations or having an independent process for requesting accommodations, rather than

¹⁸ The ADAAA broadened covering by reducing the burden of proof for plaintiffs to provide that their condition “substantially limits,” by explicitly adding more conditions as disabilities—such as episodic conditions, conditions in remission, conditions that limit a broader list of major life activities or bodily functions—and by including conditions that benefit from “mitigating measures” such as assistive devices, medication, or lifestyle changes. For more details, see the background section above on the ADAAA and Online Appendices A and B.

only discussing those points when the prospective employee brought them up, or when they noticed a salient disability and decided to bring up accommodations.

Why did the ADAAA decrease terminations for those with salient physical conditions more than for those with nonsalient physical conditions and other conditions? At first blush, this may seem inconsistent with the hiring results, in which those with nonsalient physical conditions had a larger increase in hiring. However, there is a reasonable explanation. Suppose that employers never know about the disability status of job applicants and employees with nonsalient physical conditions or nonsalient mental conditions (which applies to nearly all the conditions under “other mental”; see Table 1). The ADAAA could still boost hiring for these individuals with nonsalient conditions for the reasons mentioned above (i.e., increased access to accommodations), and it would have no effect on terminations, since the employer is not aware of nonsalient disabilities and how terminating employees with those disabilities incurs legal risk, which increases after the ADAAA. Of course, not all employers would be unaware of these “nonsalient” conditions, but some portion would be, which would still generate a difference by disability saliency, and would explain why the ADAAA is associated with a larger decrease in termination rates for those with salient compared to nonsalient conditions.

Explaining the Different Effects for Physical and Mental Disabilities

These are also explanations for why the effects of the ADAAA differ for physical work-limiting conditions and mental work-limiting conditions. We rarely find effects of the ADAAA on those with mental conditions. The fact that we find little evidence of effects on those with mental retardation and developmental disability is more easily explained by the fact that these conditions were largely already covered by the ADA, so the ADAAA did not affect legal protections and accommodations very much. However, another explanation comes from the fact that these

estimates are noisier, and thus our results are more inconclusive as to whether the ADAAA affects individuals with mental retardation or developmental disabilities.

For other mental conditions, these are conditions (see Table 1) that certainly experienced a differentially larger increase in coverage by the ADAAA and are generally not salient to the employer. This may suggest similar increases in hiring as with nonsalient physical conditions, although we see less evidence of an increase in hiring for other mental conditions. This may be because these other mental conditions are less likely to require or benefit from accommodations. Thus, the argument made above—that hiring may have differentially increased more for those with nonsalient conditions due to increased access to accommodations—applies less here, thus explaining why the hiring effect is smaller and less robust for other mental conditions compared to nonsalient physical conditions.

CONCLUSION

Recent increases in long-term federal disability programs have led to increased interest in policies aimed at improving the labor market outcomes of currently or potentially disabled individuals. Disability discrimination laws are one approach used to try to improve these outcomes. However, recent measures of disability discrimination indicate that it continues to be persistent in the American workforce (Ameri et al. 2018), despite the influence of over 25 years of Title I of the Americans with Disabilities Act of 1990.

One explanation for the continued discriminatory barriers faced by disabled individuals in the labor market is that these disability discrimination laws have ambiguous theoretical impacts. Theory suggests that the laws cause decreases in both terminations and hiring, with the net effects on employment being ambiguous. The empirical evidence of the effects of disability

discrimination laws on the labor market outcomes of individuals with disabilities is also mixed. However, that evidence is lacking because it tends to focus on one potentially problematic way to define individuals with disabilities, which is just as one broad grouping of those with self-reported “work-limiting” conditions.

Given the lack of consensus on how disability discrimination laws affect labor market outcomes for individuals with disabilities, we probe this question further in three ways. First, we study the effects of the ADA Amendments Act (ADAAA), which introduced new variation in disability discrimination laws by broadening and strengthening the ADA, but which has had less research devoted to it. Second, we focus on measuring the effects on hiring and termination. This avoids conflating the effects of the laws with unrelated movements into and out of the labor force for other reasons, which others have noted to be a problem (Hotchkiss 2004; Houtenville and Burkhauser 2004). This also allows us to directly measure the predicted effects of discrimination law on hiring and termination, testing the theory on the data. Third, we measure the effects of these laws by using several classifications of disability. Although these classifications continue to include heterogeneous individuals, we argue they more accurately represent the populations likely to be affected by disability discrimination laws, namely by splitting physical work-limiting disabilities into those that are likely salient and not salient to the employer. We also hope that our disability categorizations provide clearer estimates of the mechanisms of these laws’ effects and the fact that they affect individuals differently based on the nature and severity of their disability.

Our results show that the effect of the ADAAA on hiring differs by disability type or categorization and leans towards being non-negative—that is, having either increases in hiring or no effect on hiring. Our clearest result is that we find a positive increase in hiring for individuals with nonsalient physical work-limiting disabilities; this positive effect is significant at the 1 percent

level and is robust to the inclusion or exclusion of disability-type-specific linear time trends. We also find evidence of possible increases in hiring for those with salient physical conditions, those with other mental conditions, those with ADL limitations, and for the overall work-limited category, but only when we do not include disability-type-specific linear time trends. We do not find statistically significant effects on those with mental retardation or developmental disability, although those coefficients are positive. We find negative effects on hiring in only one instance: it's negative for those with severe ADL limitations when we include trends, but there are positive effects for them without trends.

For effects of the ADAAA on termination, we find that the effects also differ by disability type and categorization but are either always negative (reductions in terminations) or show no effect. We find a robust decrease in terminations for those with salient physical disabilities; nonrobust evidence of a decrease in terminations for those with nonsalient physical disabilities, mental retardation, and developmental disability; and no effects on those with ADL limitations.

On the overall question of whether disability discrimination laws improve labor market outcomes for individuals with disabilities, our results confirm the theoretical prediction that laws reduce terminations. However, because we only find effects for some disability categorizations, it seems that only some individuals with disabilities benefit from this. For hiring, our results lean non-negative, with most of the effects being positive or showing no effect. This suggests that the predicted negative effects of laws on hiring may be overemphasized, although we cannot rule out such effects definitively since, for individuals with severe ADL limitations, we find effects on hiring that flip between positive and negative. Overall, our results have more evidence in favor of discrimination laws having either positive or no effects on labor market outcomes for individuals with disabilities, rather than negative effects.

Our results also suggest that it is important to consider different definitions of disability and to consider how policies and laws affect individuals with different types of disabilities. Using aggregate categorizations, such as the common “work limited” binary categorization, obscures important heterogeneity. By breaking this “work limited” population into subcategories based on whether the condition is salient to the employer and whether it is physical or mental, we find heterogeneous effects of disability discrimination laws. We hope that our new categorizations of work-limiting disabilities are useful to future researchers, and we suggest that future research continue to explore this heterogeneity in disability.

Table 1 New Type of Work Disability Classifications from SIPP Data

	Work-limiting conditions— work-disability-history topical module	Stand-alone condition questions— adult-functional-impairment topical module
Salient physical	Blindness or vision problems Broken bone/fracture Cerebral palsy Deafness Head or spinal cord injury Missing limbs Paralysis of any kind Stiff/deformed foot/hand/finger Stroke Thyroid trouble or goiter Tumor, cyst, or growth	Use a wheelchair, walker, or cane
Nonsalient physical	AIDS Arthritis or rheumatism Back or spine problems Cancer Carpal tunnel syndrome Diabetes Epilepsy or seizures Heart trouble Hernia High blood pressure Kidney stones/kidney trouble Lung or respiratory trouble Multiple sclerosis (MS) Stomach trouble	
MR/DD mental	Mental retardation	Mental retardation Developmental disability
Other mental	Alcohol/drug abuse Learning disability Mental or emotional conditions	Learning disability Other mental condition

NOTE: Condition classifications are not mutually exclusive and are assigned from the most recent corresponding topical module interview.

Table 2 Descriptive Statistics by Disability Categorization

	Work-limiting condition						ADL-limiting condition		
	Not work-limited	Work-limited	Physical, salient	Physical, non-salient	Mental retard. / dev. disability	Mental, other	No ADL limitation	Any	Severe
Hiring	0.0613	0.0179	0.0147	0.0147	0.0156	0.0219	0.0592	0.0172	0.0173
Terminations	0.0027	0.0025	0.0021	0.0020	0.0021	0.0034	0.0027	0.0024	0.0024
Employed	0.8100	0.4016	0.3860	0.3405	0.4161	0.3949	0.8014	0.4560	0.4594
Unemployed	0.0333	0.0345	0.0277	0.0297	0.0265	0.0479	0.0335	0.0330	0.0327
Age	40.25	45.54	47.31	48.19	45.47	41.41	40.11	46.96	46.97
Male	0.4881	0.4785	0.4578	0.4621	0.4513	0.4961	0.4946	0.4241	0.4258
High school only	0.2587	0.3205	0.3102	0.3161	0.3246	0.3181	0.2594	0.3174	0.3154
Some college	0.3414	0.3362	0.3556	0.3479	0.3330	0.3288	0.3413	0.3369	0.3423
College	0.3014	0.1232	0.1305	0.1024	0.1138	0.1365	0.2989	0.1365	0.1369
Married	0.6275	0.4633	0.4930	0.5161	0.4362	0.3636	0.6204	0.5154	0.5173
Widowed	0.0135	0.0376	0.0416	0.0489	0.0339	0.0267	0.013	0.0428	0.0420
Divorced	0.1275	0.2215	0.2306	0.2430	0.2033	0.2340	0.1274	0.2265	0.2246
Black	0.1142	0.1669	0.1784	0.1675	0.1345	0.1571	0.1152	0.1606	0.1571
Asian	0.0359	0.0384	0.0423	0.0357	0.0468	0.0404	0.0357	0.0401	0.0404
Other race	0.0282	0.0199	0.0195	0.0171	0.0225	0.0200	0.028	0.0215	0.0210
Hispanic	0.1355	0.1105	0.1151	0.1094	0.1209	0.0962	0.1344	0.1186	0.1156
Metro	0.8235	0.7722	0.7775	0.7510	0.7728	0.7881	0.8236	0.7694	0.7700
On-seam	0.2500	0.2502	0.2509	0.2503	0.2514	0.2490	0.25	0.2501	0.2503
<i>N</i>	5,914,034	813,912	395,455	347,761	255,703	180,514	5,939,845	788,101	709,523

NOTE: Monthly weighted averages from 1996–2008 Survey of Income and Program Participation (SIPP) panels. Sample limited to ages 21 to 61. Hiring rates are calculated from those who are currently employed but were self-employed, unemployed, or not in the labor force in the previous month. ADLs are activities of daily living limitations and include getting around inside the home, getting in and out of bed or a chair, taking a bath or shower, dressing, eating, using the toilet, using the telephone, keeping track of money and bills, preparing meals, and doing housework. Severe limitations correspond to those unable to do these activities or requiring assistance. Terminations are defined as involuntary separations. Seam bias and on-seam are defined in footnote 17. Other disability categories are defined in Table 1

Table 3: Effects of the ADAAA on Hiring by Disability Categorization

	(1)	(2)
Panel (a): Work limited		
ADAAA × Work limited	0.0046** (0.0021)	0.0008 (0.0021)
Panel (b): Work limited by type		
ADAAA × Physical, salient	0.0095*** (0.0033)	0.0023 (0.0028)
ADAAA × Physical, nonsalient	0.0108*** (0.0022)	0.0077*** (0.0024)
ADAAA × Mental r. / dev. dis.	0.0054 (0.0052)	0.0084 (0.0069)
ADAAA × Other mental	0.0119*** (0.0032)	0.0023 (0.0032)
Panel (c): ADL limitations		
ADAAA × Any ADL limitation	0.0128** (0.0052)	0.0011 (0.0054)
ADAAA × Severe ADL limitation	−0.0024 (0.0053)	−0.0154** (0.0062)
Disability-by-type linear time trends:	No	Yes
<i>N</i>	2,095,609	

NOTE: The SIPP sample is described in Table 1. Each panel and column represent a distinct regression. Note that for individuals with a severe ADL limitation, the combined effect for them is the sum of the coefficients on any ADL limitation and severe ADL limitation. Thus, the coefficient on severe ADL limitation presents the difference in effects between those with nonsevere and those with at least one severe ADL limitation. Regressions include indicator variables for each possible value of age in years, sex, level of education, marital status, race, Hispanic ancestry, metro status, and being “on-seam,” as well as state-by-time and disability status by state fixed effects. In addition, these regressions include controls for the state unemployment rate, weeks of extra unemployment insurance available (from Farber and Valletta 2015), tax credits for hiring individuals with disabilities (from Neumark and Grijalva 2017), and indicator variables for the *Bragdon*, *Toyota*, and *Sutton* Trilogy of cases, all interacted with disability status. Regressions are weighted using population weights. Standard errors are clustered at the state level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 4: Effects of the ADAAA on Terminations by Disability Categorization

	(1)	(2)
Panel (a): Work limited		
ADAAA x Work limited	-0.0007 (0.0008)	-0.0015 (0.0010)
Panel (b): Work limited by type		
ADAAA x Physical, salient	-0.0013*** (0.0005)	-0.0023*** (0.0008)
ADAAA x Physical, nonsalient	-0.0008*** (0.0003)	-0.0009 (0.0007)
ADAAA x Mental r. / dev. dis.	-0.0024*** (0.0006)	-0.0016 (0.0011)
ADAAA x Other mental	0.0005 (0.0007)	-0.0003 (0.0013)
Panel (c): ADL limitations		
ADAAA x Any ADL limitation	-0.0000 (0.0006)	0.0003 (0.0018)
ADAAA x Severe ADL limitation	-0.0008 (0.0006)	-0.0013 (0.0018)
Disability-by-type linear time trends:	No	Yes
<i>N</i>	2,095,609	

NOTE: See the notes to Tables 1 and 2. Each panel and column represents a distinct regression. Note that for individuals with a severe ADL limitation, the combined effect for them is the sum of the coefficients on any ADL limitation and severe ADL limitation. Thus, the coefficient on severe ADL limitation presents the difference in effects between those with nonsevere and at least one severe ADL limitation. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

ONLINE APPENDIX A: ADDITIONAL DETAILS AND HISTORY OF THE ADA

THE AMERICANS WITH DISABILITIES ACT OF 1990

The most notable federal employment discrimination law is Title I of the Americans with Disabilities Act of 1990 (ADA), effective July 1992. In addition to forbidding discrimination in hiring, terminations, promotion, and wages based on disability, Title I of the ADA requires employers to reasonably accommodate employees with disabilities. This can be done by providing physical aids or some job restructuring, so long as this accommodation is reasonable, given the nature of the job and the size of the firm (Cooper 1991). The ADA applies to firms with at least 15 employees. The ADA provides three routes for an individual to be considered disabled:

“The term ‘disability’ means, with respect to an individual: (A) a physical or mental impairment that substantially limits one or more major life activities of such individual; (B) a record of such an impairment; or (C) being regarded as having such an impairment” (42 U.S. Code §12102 (1)).

Just who was considered disabled under the ADA was difficult to determine, because the definition was not explicit. But because disabilities differ by type, severity, and duration, there was no way for the definition of disability to have been constructed under the ADA in a way that was clear for every circumstance. The Equal Employment Opportunity Commission (EEOC) then took on the role of providing guidance on the definition of disability under the ADA.

The EEOC’s main clarification was discussing what constituted “major life activities.” The Commission defined the first set of major life activities in its regulations. In these regulations, the EEOC stated that major life activities were basic activities that the average person could perform with little or no difficulty, such as “caring for oneself, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning and working” (29 C.F.R. 1630.2(i)). Other major life

activities were defined elsewhere. In the appendix to its regulations, the EEOC also identified sitting, standing, lifting, and reaching (29 C.F.R. 1630, appendix to Part 1630.2(i)). The EEOC mentioned mental and emotional processes, such as thinking, concentrating, and interacting with others, in its *Compliance Manual* (EEOC 1995). After that, the EEOC also identified sleeping as a major life activity (EEOC 1997; Taylor 2009). And while the EEOC continued to add to the list of major life activities over the years, such as when it filed amicus briefs, it was always clear that any list of major life activities was illustrative, not exclusive (Taylor 2009).

However, even if the EEOC mentioned that many activities constituted “major life activities,” courts did not always agree with the EEOC¹⁹ and could be strict in their standards of what constituted a “substantial limitation” for certain major life activities.²⁰ The ability of the EEOC to even specify which activities were “major life activities” was questioned by the Supreme Court in the Sutton Trilogy of cases, discussed below. However, the list of major life activities from the EEOC was never meant to be interpreted as exhaustive.²¹ Thus, some courts determined that some activities not mentioned by the EEOC were in fact major life activities (e.g., reading).²² So by no means did the EEOC set out a strict standard for the determination of major life activities. Appendix Tables A2 and A3 summarize some cases supporting or denying that certain activities

¹⁹ For “lifting”, for example, two cases did not consider it to be a major life activity: *Lehman v. United Parcel Service Inc.*, WL 603085 (W.D. Mo. Feb. 22, 2007) and *Maples v. American Greetings Corp.*, 2007 WL 1089701 (E.D. Ark. Apr. 10, 2007).

²⁰ Courts were particularly picky about what constituted a substantial limitation in sleeping or working (Taylor 2009). For sleeping, see *Brown v. Principi*, 2007 WL 959375 (S.D.N.Y., Mar. 29, 2007), *DeJesse v. First Judicial District of Pennsylvania*, 2007 WL 4336225 (E.D. Pa., Dec. 12, 2007), and *Boerst v. General Mills Operations Inc.*, 2002 WL 59637 (6th Cir., Jan. 15, 2002). “Working” as a major life activity was subject to the so-called single job rule. Under this rule, it is not enough for plaintiffs to argue that their impairment precludes them from a single job or narrow range of jobs; they must argue that it precludes them from a class of jobs or a broader range of jobs (Long 2008).

²¹ The EEOC appendix states explicitly that “this list is not exhaustive” (29 C.F.R. App. § 1630.2(i)) and that major life activities are “those basic activities that the average person in the general population can perform with little or no difficulty.” (29 C.F.R. App. § 1630.2(i)) (see Zucker 2003).

²² Reading was deemed a major life activity in *Head v. Glacier Northwest Inc.*, 413 F.3d 1053 (9th Cir., 2005); *Shaffer v. Spherion Corp.*, 2007 WL 4557778 (D. Col., Dec. 20, 2007); and *Szmaj v. AT&T*, 291 F.3d 955 (7th Cir., 2002) (but in *Szmaj*, “reading all day” is not a major life activity).

or biological processes were “major life activities.” These cases are not meant to be an exhaustive summary, but rather they highlight how the list of major life activities, over time, has always been in question. The list of approved major life activities was clarified in the ADA Amendments Act of 2008, as we discuss later.

SCOTUS Reinterpretations of Definition of Disability under the ADA

Here we summarize the major U.S. Supreme Court cases that restricted the ADA’s definition of disability in a significant way, providing a more detailed discussion of the individual cases below. The key cases that narrowed the definition of disability under the ADA were the “Sutton Trilogy”²³ of U.S. Supreme Court cases in 1999 and *Toyota v. Williams*²⁴ in 2002. Some of the restrictions imposed in the Sutton Trilogy and in *Toyota v. Williams* were removed by the ADA Amendments Act of 2008, and we will also discuss these later.

The “Sutton Trilogy” refers to three related Supreme Court cases in 1999 that narrowed the interpretation of the definition of disability under the ADA. The Trilogy led to the exclusion of individuals with “mitigating measures” such as glasses, medication, or assistive devices from being considered disabled if the mitigating measures made it so that their conditions no longer “substantially limited” a major life activity. In *Sutton v. United Airlines*, the plaintiffs were not considered disabled, because their vision was deemed to no longer “substantially limit” the major life activity of “seeing” when they used glasses. In *Murphy v. United Parcel Service*, the condition was high blood pressure, which was mitigated by medication. In *Albertsons v. Kirkingburg*, the term “mitigating measures” was even extended to include “measures undertaken, whether consciously or not, with the body’s own systems” (527 U.S. 555 [1999], p. 565–566). In this case,

²³ *Sutton v. United Airlines* (119 S. Ct. 2139 [1999]), *Murphy v. United Parcel Service, Inc.* (119 S. Ct. 2133 [1999]), and *Albertson's, Inc. v. Kirkingburg* (119 S. Ct. 2162 [1999]), all decided on June 22, 1999.

²⁴ *Toyota Motor Mfg., KY., Inc. v. Williams* (534 U.S. 184 [2002]), decided on January 8, 2002.

it was the plaintiff's monocular vision. The Supreme Court argued that he could compensate for this condition adequately on his own. This trilogy of cases had a large effect on the definition of *disability* under the ADA by narrowing that definition substantially.

Toyota v. Williams established that an individual with a condition (in this case, carpal tunnel syndrome) had to prove that the condition prevented or restricted him or her from performing tasks that were of central importance in most people's daily lives. This ruling overturned the interpretation of the case by the Court of Appeals, which sided with the defendant and argued that she was substantially limited in the major life activity of performing manual tasks. The unanimous opinion of the Supreme Court was that the Court of Appeals applied a standard of major life activity that was too job-specific and, because of this, it deviated from that in *Sutton v. United Airlines* (Anfang 2003). The implication of this case was a strengthening of the standard to determine whether an individual with a condition is "substantially limited." The case made limitations that are job-specific not eligible to be used to provide disability status under the ADA. Thus, this case further narrowed the definition of disability under the ADA. More broadly, this case indicated that the definition of disability must "be interpreted strictly to create a demanding standard for qualifying as disabled,"²⁵ setting a precedent for the ADA to be interpreted more narrowly going forward.

ADDITIONAL DETAILS ON OTHER SCOTUS CASES

Bragdon v. Abbott

In *Bragdon v. Abbott*, the Supreme Court deemed an individual with asymptomatic HIV to be disabled under the ADA. This was because HIV "substantially limits" the major life activity of

²⁵ See <https://www.law.cornell.edu/supct/html/00-1089.ZO.html> (accessed Sept. 14, 2016).

reproduction. This was important because the EEOC did not mention reproduction as a major life activity. Thus, the Supreme Court's willingness to deem it a major life activity affirms the fact that the EEOC's lists of major life activities were not exhaustive. This case also clarified that a major life activity can be an internal, autonomous activity and that there was no required link between a major life activity and the alleged discrimination.²⁶

The case also raised the question of whether the ADA covered other asymptomatic conditions.²⁷ The dissent in the case argued that the decision, "taken to its logical extreme would render every individual with a genetic marker for some debilitating disease 'disabled' here and now because of some possible future effects" (*Bragdon*, 524 U.S. at 661). Thus, this case was one of the few that expanded the definition of disability under the ADA.

Cleveland v. Policy Management Systems Corp.

In *Cleveland v. Policy Management Systems Corp.*, the Supreme Court decided that receipt of Social Security Disability Insurance (SSDI) or an application for SSDI did not automatically deem the individual to no longer be covered by the ADA. At issue was whether receipt of SSDI rendered the plaintiff no longer able to qualify as disabled under the ADA, because receipt of SSDI might suggest that she could no longer "perform the essential functions" of her job, a requirement for the ADA to apply. Thus, this case expanded the definition of disability by not precluding those who had received or applied for SSDI from the protections of the ADA. However, SSDI receipt or application was not ignored: "To survive a summary judgment motion, an ADA plaintiff cannot ignore her SSDI contention that she was too disabled to work, but must explain why that contention

²⁶ See http://adagreatlakes.com/Resources/Anniversary/25thAnniversary/ADA_Major_Cases.asp (accessed Dec. 30, 2015) for a summary.

²⁷ For example, this could lead to the coverage of genetic alterations that predispose a person to a disease but do not currently impose an impairment. See Liu (2000) for a detailed discussion.

is consistent with her ADA claim that she can perform the essential functions of her job, at least with reasonable accommodation.”²⁸

In addition to this expansion, this case had additional implications for the labor supply of individuals with disabilities. Individuals with disabilities who were on the margins of being in the workforce or using SSDI would no longer need to be as worried that an SSDI application, or an SSDI receipt, would disqualify them from ADA protection. Thus, this might encourage more SSDI applications. This is important, as we eventually examine the effects of changes in the ADA on SSDI application and use. But otherwise, this SCOTUS case is overshadowed in magnitude by the “Sutton Trilogy” of cases that occurred one month later.

²⁸ See <https://www.law.cornell.edu/supct/html/97-1008.ZS.html> (accessed Sept. 14, 2016).

ONLINE APPENDIX B: ADDITIONAL TABLES

Appendix Table B1: Summary of the Literature on the Effects of Disability Discrimination Laws on Individuals with Disabilities

Study	Law(s) studied	Measures of disability	Outcomes studied and results
DeLeire (2000)	Adoption of the ADA	Work limitation	Employment (–), wages (–)
Acemoglu and Angrist (2001)	Adoption of the ADA	Work limitation	Employment (–), earnings (–)
Beegle and Stock (2003)	Adoption of pre-ADA state laws	Work limitation	Employment (null), earnings (–), labor force participation (–)
Kruse and Schur (2003)	Adoption of the ADA	Work limitation, ADL limitation	Employment (+ or – depending on measure of disability)
Houtenville and Burkhauser (2004)	Adoption of the ADA	Work limited; 2-period Work limited	Employment (– or null, depending on measure of disability)
Hotchkiss (2004)	Adoption of the ADA	Work limitation	Employment (null)
Jolls and Prescott (2004)	Adoption of the ADA, given existing state laws	Work limitation	Employment (– only in states without pre-existing reasonable accommodation law, otherwise null)
Carpenter (2006)	Cook v. Rhode Island	Obese v. not (via BMI)	Employment (+)
Bell and Heitmueller (2009)	UK’s 1996 Disability Discrimination Act	Work limited, ADL limitation, long-standing illnesses	Employment (– or null)
Thompkins (2015)	ADA, some post-ADA SCOTUS cases, and the adoption of the ADAAA (2009)	Work limitation	Employment (–, ADA; null, SCOTUS; null, ADAAA)
Ameri et al. (2018)	ADA (post ADAAA), state laws	Resume-correspondence study with spinal cord injury or Asperger’s	Callbacks for interviews (+ if covered by ADA, null for state laws)
Button (2018)	CA’s Prudence Kay Poppink Act (2001)	Work limitation	Employment (+)
Button, Khan, and Penn (2022)	State laws broader or stronger than the ADA	Work limitation, ADL limitation	SSDI application and receipt (–, medical definition of disability, larger damages; null otherwise)

Appendix Table B2: Major Life Activities over Time

Major life activity:	Defined by EEOC	Supporting cases	Opposing cases	Added by ADAAA
Bending	No		<i>Parkinson v. Anne Arundel Medical Center Inc.</i> , 214 F. Supp. 2d 511 (D. Md. 2002), <i>Petty v. Freightliner Corp.</i> , 123 F. Supp. 2d 979, 982 (W.D.N.C. 2000)	Yes
Breathing	Yes			Yes
Caring for oneself	Yes			Yes
Communicating	No	<i>DeMar v. Car-Freshner Corp.</i> , 1999 WL 34973, *4 (N.D.N.Y. Jan. 14, 1999)		Yes
Concentrating	Yes†	<i>Emerson v. Northern States Power Co.</i> , 256 F.3d 506 (7th Cir. 2001), <i>Battle v. United Parcel Service</i> , 438 F.3d 856 (8th Cir. 2006) See <i>Lawson v. CSX Transportation Inc.</i> , 245 F. 3d 916 (7th Cir. 2001); <i>Fraser v. Goodale</i> , 342 F.3d 1032 (9th Cir. 2003); <i>Miller v. Verizon Communications</i> , 2007 WL 542146 (D. Mass. Feb. 7, 2007)	<i>Pack v. Kmart Corp.</i> , 166 F.3d 1300 (10th Cir. 1999)	Yes
Eating				Yes
Hearing				Yes
Interacting with others	Yes†	<i>McAlindon v. County of San Diego</i> , 192 F. 3d 1226 (9th Cir. 1999), <i>Jacques v. DiMarzio Inc.</i> , 386 F. 3d 192, 202 (2d Cir. 2004)	<i>Soileau v. Guilford of Maine</i> , 105 F.3d 12, 15 (1st Cir. 1997)	Yes*
Learning	Yes			Yes
Lifting	Yes‡	<i>Jacoby v. Arkema Inc.</i> , 2007 WL 2955593 (E.D. Pa., Oct. 9, 2007)	<i>Lehman v. United Parcel Service Inc.</i> , WL 603085 (W.D. Mo., Feb. 22, 2007) and <i>Maples v. American Greetings Corp.</i> , 2007 WL 1089701 (E.D. Ark., Apr. 10, 2007)	Yes
Performing manual tasks	Yes	<i>Toyota v. Williams</i> (Supported but had to establish that the tasks were of “central importance to most people’s daily lives”)		Yes

Major life activity:	Defined by EEOC	Supporting cases	Opposing cases	Added by ADAAA
Reaching	Yes‡			Yes*
Reading	No	<i>Head v. Glacier Northwest Inc.</i> , 413 F.3d 1053 (9th Cir. 2005); <i>Shaffer v. Spherion Corp.</i> , 2007 WL 4557778 (D. Col. Dec. 20, 2007)	<i>Szmaj v. AT&T</i> , 291 F.3d 955 (7th Cir. 2002) (but “reading all day” is not a major life activity)	Yes
Seeing				Yes
Sitting				Yes*
Yes			<i>Brown v. Principi</i> , 2007 WL 959375 (S.D.N.Y. Mar. 29, 2007), <i>DeJesse v. First Judicial District of Pennsylvania</i> , 2007 WL 4336225 (E.D. Pa. Dec. 12, 2007) 33., <i>Boerst v. General Mills Operations Inc.</i> , 2002 WL 59637 (6th Cir. Jan. 15, 2002) (suggesting that the standard for being “substantially limited” in sleep is high)	Yes
Sleeping	Yes‡	<i>Desmond v. Mukasey</i> , 530 F. 3d 944 (D.C. Cir. 2008) 30.		
Speaking	Yes			Yes
Standing	Yes‡			Yes
Thinking	Yes†			Yes
Walking	Yes			Yes
Working		<i>Rodriguez v. Conagra Grocery Products Co.</i> , 436 F.3d 468 (5th Cir. 2006) 59.		Yes

NOTE: Unless otherwise noted by one of the following symbols, “defined by the EEOC” means that the major life activity was defined in the EEOC regulations (29 C.F.R. § 1630.2(i).) † means defined by the compliance manual (EEOC,); ‡ means defined by the appendix (29 C.F.R. 1630, Appendix to Part 1630—Interpretive Guidance on Title I of the Americans with Disabilities Act); ¶ means defined by the EEOC Instructions for Field Offices: Analyzing ADA Charges after Supreme Court Decisions Addressing “Disability” and “Qualified,” located at <http://www.eeoc.gov/policy/docs/field-ada.htm>; || means defined by EEOC Enforcement Guidance on the ADA and Psychiatric Disabilities. *While not explicitly listed in the ADAAA’s nonexhaustive list, these are mentioned in the EEOC’s proposal regulation (<https://www.gpo.gov/fdsys/pkg/FR-2009-09-23/pdf/E9-22840.pdf>).

Appendix Table B3: Major Bodily Functions over Time

Major bodily functions:	Defined by EEOC	Supporting cases	Opposing cases	Added by ADAAA
Immune system	No			Yes
Neurological system	No			Yes
Normal cell growth	No			Yes
Brain	No			Yes
Digestive system	No			Yes
Respiratory system	No			Yes
Bowels	No			Yes
Circulatory system	No	<i>Snyder v. Norfolk Southern Railway Corp.</i> , 463 F.Supp.2d 528 (E.D. Pa. Nov. 15, 2006)	<i>Taylor v. Nimock's Oil Company</i> , 214 F.3d 957 (8th Cir. 2000)	Yes
Bladder	No	<i>Fiscus v. Wal Mart Stores Inc.</i> , 385 F. 3d 378, 384 (3d Cir. 2004), <i>Heiko v. Colombo Savings Bank</i> , 434 F.3d 249 (4th Cir. 2006) (both end-stage renal disease)		Yes
Endocrine functions	No			Yes
Reproductive functions	No	<i>Bragdon v. Abbott</i> 524 U.S. 624 (1998), <i>Lederer v. BP Prods. N. Am</i> , 2006 WL 3486787 (S.D.N.Y. Nov. 20, 2006); <i>Yindee v. CCH Inc.</i> , 458 F.3d 599 (7th Cir. Aug. 11, 2006)		Yes

NOTE: No major bodily functions were mentioned by the EEOC as being major life activities, although some cases argued that they were or were not. All these listed major bodily functions were added by the ADAAA.

REFERENCES

- Acemoglu, Daron, and Joshua D. Angrist. 2001. "Consequences of Employment Protection? The Case of the Americans with Disabilities Act." *Journal of Political Economy* 109(5): 915–957. <https://doi.org/10.1086/322836>.
- Adams, Scott J. 2004. "Age Discrimination Legislation and the Employment of Older Workers." *Labour Economics* 11(2): 219–241. <https://doi.org/10.1016/j.labeco.2003.06.001>.
- Ameri, Mason, Lisa Schur, Meera Adya, F. Scott Bentley, Patrick McKay, and Douglas Kruse. 2018. "The Disability Employment Puzzle: A Field Experiment on Employer Hiring Behavior." *ILR Review* 71(2): 329–364. <https://doi.org/10.1177/0019793917717474>.
- Anfang, Stuart A. 2003. "Toyota v. Williams: Determining Disability under the ADA." *Journal of the American Academy of Psychiatry and the Law* 31(1): 97–100.
<http://www.ncbi.nlm.nih.gov/pubmed/12817849> (accessed November 8, 2022).
- Angrist, Joshua D., and Alan B. Krueger. 2001. "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments." *Journal of Economic Perspectives* 15(4): 69–85. <https://doi.org/10.1257/jep.15.4.69>.
- Autor, David H., and Mark G. Duggan. 2006. "The Growth in the Social Security Disability Rolls: A Fiscal Crisis Unfolding." *Journal of Economic Perspectives* 20(3): 71–96. <https://doi.org/10.1257/jep.20.3.71>.
- Baldwin, Marjorie L., and Chung Choe. 2014a. "Re-Examining the Models Used to Estimate Disability-Related Wage Discrimination." *Applied Economics* 46(12): 1393–1408. <https://doi.org/10.1080/00036846.2013.872762>.

- . 2014b. “Wage Discrimination against Workers with Sensory Disabilities.” *Industrial Relations* 53(1): 101–124. <https://doi.org/10.1111/irel.12048>.
- Baum, Charles L., and William F. Ford. 2004. “The Wage Effects of Obesity: A Longitudinal Study.” *Health Economics* 13(9): 885–899. <https://doi.org/10.1002/hec.881>.
- Beegle, Kathleen, and Wendy A. Stock. 2003. “The Labor Market Effects of Disability Discrimination Laws.” *Journal of Human Resources* 38(4): 806–859. <https://doi.org/10.3368/jhr.XXXVIII.4.806>.
- Bell, David, and Axel Heitmueller. 2009. “The Disability Discrimination Act in the UK: Helping or Hindering Employment among the Disabled?” *Journal of Health Economics* 28(2): 465–480. <https://doi.org/10.1016/j.jhealeco.2008.10.006>.
- Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. “How Much Should We Trust Differences-in-Differences Estimates?” *Quarterly Journal of Economics* 119(1): 249–275. <https://doi.org/10.1162/003355304772839588>.
- Bhattacharya, Jay, and M. Kate Bundorf. 2009. “The Incidence of the Healthcare Costs of Obesity.” *Journal of Health Economics* 28(3): 649–658. <https://doi.org/10.1016/j.jhealeco.2009.02.009>.
- Bloch, Farrell. 1994. *Antidiscrimination Law and Minority Employment: Recruitment Practices and Regulatory Constraints*. Chicago: University of Chicago Press.
- Burn, Ian, Patrick Button, Theodore F Figinski, and Joanne Song McLaughlin. 2020. “Why Retirement, Social Security, and Age Discrimination Policies Need to Consider the Intersectional Experiences of Older Women.” *Public Policy and Aging Report* 30(3): 101–106. <https://doi.org/10.1093/ppar/praa017>.

- Burn, Ian. 2018. "Not All Laws Are Created Equal: Legal Differences in State Non-Discrimination Laws and the Impact of LGBT Employment Protections." *Journal of Labor Research* 39(4): 462–497. <https://doi.org/https://doi.org/10.1007/s12122-018-9272-0>.
- Button, Patrick. 2018. "Expanding Employment Discrimination Protections for Individuals with Disabilities: Evidence from California." *ILR Review* 71(2): 365–393. <https://doi.org/10.1177/0019793917716633>.
- Button, Patrick, Mashfiqu R. Khan, and Mary Penn. 2022. "Do Stronger Employment Discrimination Protections Decrease Reliance on Social Security Disability Insurance? Evidence from the U.S. Social Security Reforms." *Journal of the Economics of Ageing* 22(June): 100370. <https://doi.org/10.1016/j.jeoa.2022.100370>.
- Carpenter, Christopher S. 2006. "The Effects of Employment Protection for Obese People." *Industrial Relations* 45(3): 393–415. <https://doi.org/10.1111/j.1468-232X.2006.00430.x>.
- Cooper, Jeffrey O. 1991. "Overcoming Barriers to Employment: The Meaning of Reasonable Accommodation and Undue Hardship in the Americans with Disabilities Act." *University of Pennsylvania Law Review* 139(5): 1423–1468.
- DeLeire, Thomas. 2000. "The Wage and Employment Effects of the Americans with Disabilities Act." *Journal of Human Resources* 35(4): 693–715. <https://doi.org/10.2307/146368>.
- Donohue, John J. III. 2007. "The Law and Economics of Antidiscrimination Law." In *Handbook of Law and Economics*, Vol. 2, A. Mitch Polinsky and Steven Shavell, eds. Amsterdam: Elsevier, pp. 1387–1472.

- Donohue, John J. III, and James J. Heckman. 1991. "Continuous versus Episodic Change: The Impact of Civil Rights Policy on the Economic Status of Blacks." *Journal of Economic Literature* 29(4): 1603–1643. <https://doi.org/10.3386/w3894>.
- Farber, Henry S., and Robert G. Valletta. 2015. "Do Extended Unemployment Benefits Lengthen Unemployment Spells? Evidence from Recent Cycles in the U.S. Labor Market." *Journal of Human Resources* 50(4): 873–909.
- Ham, John C., Xianghong Li, and Lara Shore-Sheppard. 2009. "Seam Bias, Multiple-State, Multiple-Spell Duration Models, and the Employment Dynamics of Disadvantaged Women." NBER Working Paper No. 15151. Cambridge, MA: National Bureau of Economic Research. <http://www.nber.org/papers/w15151> (accessed November 9, 2022).
- Hotchkiss, Julie L. 2004. "A Closer Look at the Employment Impact of the Americans with Disabilities Act." *Journal of Human Resources* 39(4): 887–911.
- Houtenville, Andrew J., Debra L. Brucker, and Eric A. Lauer. 2014. *Annual Disability Statistics Compendium: 2014*. Durham, NH: University of New Hampshire, Institute on Disability.
- Houtenville, Andrew J., and Richard V. Burkhauser. 2004. "Did the Employment of People with Disabilities Decline in the 1990s, and Was the ADA Responsible? A Replication and Robustness Check of Acemoglu and Angrist (2001)." Research brief. Ithaca, NY: Cornell Rehabilitation Research and Training Center for Economic Research on Employment Policy for Persons with Disabilities..
- Jolls, Christine, and J. J. Prescott. 2004. "Disaggregating Employment Protection: The Case of Disability Discrimination." NBER Working Paper No. 10740. Cambridge, MA: National Bureau of Economic Research. <https://doi.org/10.3386/w10740>.

- Kruse, Douglas, and Lisa Schur. 2003. "Employment of People with Disabilities Following the ADA." *Industrial Relations* 42(1): 31–66. <https://doi.org/10.1111/1468-232X.00275>.
- Kruse, Douglas, Lisa Schur, Sean Rogers, and Mason Ameri. 2018. "Why Do Workers with Disabilities Earn Less? Occupational Job Requirements and Disability Discrimination." *British Journal of Industrial Relations* 56(4): 798–834. <https://doi.org/10.1111/bjir.12257>.
- Lahey, Joanna N. 2008. "State Age Protection Laws and the Age Discrimination in Employment Act." *Journal of Law and Economics* 51(3): 433–460. <https://doi.org/10.1086/589670>.
- Liu, Eugenia. 2000. "Bragdon v. Abbott: Extending the Americans with Disabilities Act to Asymptomatic Individuals." *Journal of Health Care Law and Policy* 3(2): 382–408.
- Long, Alex B. 2004. "State Anti-Discrimination Law as a Model for Amending the Americans with Disabilities Act." *University of Pittsburgh Law Review* 65(3): 597–653.
- . 2008. "Introducing the New and Improved Americans with Disabilities Act: Assessing the ADA Amendments Act of 2008." *Northwestern University Law Review* 103(2008): 217–229. <https://doi.org/10.2139/ssrn.1273922>.
- Mann, Samuel. 2021. "Transgender Employment and Gender Marker Laws." *Labour Economics* 73(4): 102072. <https://doi.org/10.1016/j.labeco.2021.102072>.
- Martell, Michael E. 2013. "Do ENDAs End Discrimination for Behaviorally Gay Men?" *Journal of Labor Research* 34(2): 147–169. <https://doi.org/10.1007/s12122-012-9154-9>.
- McLaughlin, Joanne Song. 2019. "Limited Legal Recourse for Older Women's Intersectional Discrimination under the Age Discrimination in Employment Act." *Elder Law Journal* 26(2): 287–321.

- . 2020. “Falling between the Cracks: Discrimination Laws and Older Women.” *Labour* 34(2): 215–238. <https://doi.org/10.1111/labr.12175>.
- Meer, Jonathan, and Jeremy West. 2016. “Effects of the Minimum Wage on Employment Dynamics.” *Journal of Human Resources* 51(2): 500–522. <https://doi.org/10.3368/jhr.51.2.0414-6298R1>.
- Mora, Ricardo, and Iliana Reggio. 2019. “Alternative Diff-in-Diffs Estimators with Several Pretreatment Periods.” *Econometric Reviews* 38(5): 465–486. <https://doi.org/10.1080/07474938.2017.1348683>.
- Neumark, David. 2009. “The Age Discrimination in Employment Act and the Challenge of Population Aging.” *Research on Aging* 31(1): 41–68. <https://doi.org/10.1177/0164027508324640>.
- Neumark, David, Ian Burn, Patrick Button, and Nanneh Chehras. 2019. “Do State Laws Protecting Older Workers from Discrimination Reduce Age Discrimination in Hiring? Evidence from a Field Experiment.” *Journal of Law and Economics* 62(2): 373–402. <https://doi.org/10.1086/704008>.
- Neumark, David, and Patrick Button. 2014. “Did Age Discrimination Protections Help Older Workers Weather the Great Recession?” *Journal of Policy Analysis and Management* 33(3): 566–601. <https://doi.org/10.1002/pam.21762>.
- Neumark, David, and Diego Grijalva. 2017. “The Employment Effects of State Hiring Credits.” *ILR Review* 70(5): 1111–1145.
- Neumark, David, and Joanne Song. 2013. “Do Stronger Age Discrimination Laws Make Social Security Reforms More Effective?” *Journal of Public Economics* 108(December): 1–16. <https://doi.org/10.1016/j.jpubeco.2013.09.006>.

- Neumark, David, Joanne Song, and Patrick Button. 2017. "Does Protecting Older Workers from Discrimination Make It Harder to Get Hired? Evidence from Disability Discrimination Laws." *Research on Aging* 39(1): 29–63. <https://doi.org/10.1177/0164027516656142>.
- Neumark, David, and Wendy A. Stock. 1999. "Age Discrimination Laws and Labor Market Efficiency." *Journal of Political Economy* 107(5): 1081–1125. <https://doi.org/10.1086/250091>.
- . 2006. "The Labor Market Effects of Sex and Race Discrimination Laws." *Economic Inquiry* 44(3): 385–419.
- Nord, Derek, Richard Luecking, David Mank, William Kiernan, and Christina Wray. 2013. "The State of the Science of Employment and Economic Self-Sufficiency for People with Intellectual and Developmental Disabilities." *Intellectual and Developmental Disabilities* 51(5): 376–384.
- Ryscavage, Paul. 1988. "The Survey of Income and Program Participation: Measuring Spells of Unemployment and Their Outcomes." Working Paper No. 84. Washington, DC: Department of Commerce, Bureau of the Census.
- Taylor, Barry C. 2009. "Court Interpretations of Major Life Activities under the ADA: What Will Change after the ADA Amendments Act?" *Legal Briefings*, Brief No. 10. Chicago: DBTAC Great Lakes ADA Center.
- Thompkins, Allison V. 2015. "Did the ADA Evolve into Our Ramp to Full Employment ? An Analysis of 18 Years of the Americans with Disabilities Act." *Journal of Contemporary Management* 4(1): 13–32.
- U.S. Equal Employment Opportunity Commission (EEOC). 1995. "EEOC COMPLIANCE MANUAL: Disability Discrimination." March 14, 1995.

http://www.nalcbayarea.com/EEO/EEO%20Guide%202007/EEOC_2007/disability_secc.pdf (accessed January 24, 2023).

_____. 1997. "EEOC Enforcement Guidance on the Americans with Disabilities Act and Psychiatric Disabilities." March 24, 1997.

<https://www.eeoc.gov/laws/guidance/enforcement-guidance-ada-and-psychiatric-disabilities> (accessed January 24, 2023).

Wittenburg, David, and Sandi Nelson. 2006. "A Guide to Disability Statistics from the Survey of Income and Program Participation." Disability Statistics User Guide Series. Ithaca, NY: Cornell University, Rehabilitation Research and Training Center on Disability Demographics and Statistics.

https://ecommons.cornell.edu/bitstream/handle/1813/89955/DE85_PDF2.pdf?sequence=1&isAllowed=y (accessed November 10, 2022).

Zucker, Kiren Dosanjh. 2003. "The Meaning of Life: Defining 'Major Life Activities' under the Americans with Disabilities Act." *Marquette Law Review* 86(5): 957–976.

<http://scholarship.law.marquette.edu/mulr/vol86/iss5/3> (accessed January 25, 2023).