

THE DISABILITY EMPLOYMENT PUZZLE: A FIELD EXPERIMENT ON EMPLOYER HIRING BEHAVIOR

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The authors investigate potential discrimination against people with disabilities through a field experiment that sent job applications to 6,016 accounting positions for which the applicants' disabilities are unlikely to affect productivity. One-third of the cover letters disclosed that the applicant had a spinal cord injury, one-third disclosed the presence of Asperger's syndrome, and one-third did not mention disability. The disability applications received 26% fewer expressions of employer interest. This gap was concentrated among experienced applicants and small private companies that are not covered by the Americans with Disabilities Act (ADA). Tests suggest possible positive effects of the ADA, but not of state laws, in reducing the disability gap. Results indicate there may be substantial room for employer and policy initiatives to improve employment opportunities for people with disabilities.

Employment disparities faced by people with disabilities affect not only their economic well-being but also their social inclusion. People with disabilities have low employment rates, both in the United States and

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globally (Stapleton and Burkhauser 2003; Kaye 2010; OECD 2010; Schur, Kruse, and Blanck 2013; Lauer and Houtenville 2017), which is a major contributor to their low income levels and high poverty rates (OECD 2010; WHO/World Bank 2011). Among working-age people with disabilities in the United States, only 35% were employed in 2015, compared to 76% of working-age people without disabilities (Lauer and Houtenville 2017). The employment gap between people with and without disabilities (hereafter, “the disability gap”) has not narrowed since the Americans with Disabilities Act (ADA) was passed in 1990 (Stapleton and Burkhauser 2003). Among labor force participants, the unemployment rate of people with disabilities (10.7% in 2015) is twice that of people without disabilities (5.1%), indicating that the low employment rate for people with disabilities is not simply attributable to lack of interest in finding a job (U.S. Bureau of Labor Statistics 2016). In addition, a wide range of studies find that employed people with disabilities receive lower pay (Baldwin and Johnson 2006) and face disparities in job training, security, and other important employment outcomes (reviewed in Schur et al. 2013: 64–72). Improving employment opportunities for people with disabilities has been identified as an important policy goal in the United States and around the world, as evidenced by the 1990 ADA, the 2008 ADA Amendments Act, and the 2006 UN Convention on the Rights of Persons with Disabilities, which has been signed by 160 nations.

Non-discriminatory factors may contribute to these disparities, such as work disincentives from disability income, higher employment-related costs (e.g., for transportation), and lower education and skill levels that lead to lower market wages for people with disabilities. Employer discrimination may also play a role, as employers engage in taste-based discrimination stemming from the stigma of disability and/or statistical discrimination based on employer uncertainty and perceptions of lower productivity among people with disabilities. Discrimination is suggested by statistical evidence that pay rates are lower among people with more stigmatized disabilities (Baldwin and Johnson 2006), by psychological experiments on the attitudes of employers and coworkers (Ren, Paetzold, and Colella 2008), and by survey evidence from employers (Bruyere 2000; Dixon, Kruse, and Van Horn 2003; Domzal, Houtenville, and Sharma 2008). Non-experimental field evidence, however, is subject to selection and other biases, and psychological laboratory experiments may not generalize to real-world settings.

Our study presents the first field experiment on disability and hiring in the United States. It fits into the growing literature on field experiments in economics (Harrison and List 2004; Levitt and List 2009; Neumark 2016; Baert 2017). The experimental design helps eliminate not only selection biases but also other non-discriminatory factors that may lead to differences in outcomes between people with and without disabilities (e.g., job mismatch). In this experiment, 6,016 job applications were submitted to advertised openings for accounting positions using fictional résumés and cover letters, split evenly among applications that did not mention disability, those

that disclosed the applicant has a spinal cord injury, and those that disclosed the applicant has Asperger's syndrome. These disabilities were chosen because they would not be expected to limit productivity in accounting positions. In fact, Asperger's may sometimes help enhance productivity in occupations such as accounting (Cowen 2011). Although our method removes many threats to internal validity, we acknowledge there may be limits in generalizing the results to other types of jobs and disabilities.

To preview the key findings, job applicants with disabilities received fewer expressions of employer interest than did applicants without disabilities, with particularly low interest in the disability applications for which the applicant was experienced (rather than a novice) and the employer had fewer than 15 employees. The gaps did not vary by type of disability. Comparisons by firm size within and across states suggest that the ADA may have a positive effect on employer responses, but do not clearly indicate effects of state laws. The results indicate there may be substantial room for employer and policy initiatives to improve employer responses and employment opportunities for people with disabilities.

Prior Literature

From an economic perspective, low employment levels can be viewed as the result of high reservation wages and/or low offer wages from employers. Reservation wages may be high among people with disabilities in response to disability income availability. Studies have shown that the work disincentives associated with disability income affect the employment decisions of many people with disabilities (e.g., Mashaw, Reno, Burkhauser, and Berkowitz 1996; Bound and Burkhauser 1999; Chen and van der Klaauw 2008; Maestas, Mullen, and Strand 2013; French and Song 2014). Employment rates remain low, however, among people with disabilities who do not receive disability income.¹ Reservation wages are also high for some people with disabilities because of the extra costs of working, such as the expense of modified transportation or adaptive technologies needed for employment (Berkowitz, O'Leary, Kruse, and Harvey 1998) and difficulties with accessible public transportation. Reservation wages may also be increased by medical issues (e.g., doctor's appointments) that raise the time and energy costs of employment, particularly for positions that require standard work schedules (Schur 2003).

Wages offered by employers may be lower for people with disabilities partly because they tend to have lower levels of education compared to people without disabilities (Schur et al. 2013). The wages for people with disabilities remain lower after controlling for education, however, which may be attributable to otherwise-unobserved skill limitations. A need for

¹Analysis of the 2014 American Community Survey shows that among working-age people who did not receive any disability income in the past 12 months, 49.7% of people with disabilities were employed compared to 76.9% of people without disabilities (calculations available on request).

accommodations may cause some employers to offer lower wages to people with disabilities to offset their costs (Gunderson and Hyatt 1996), though this is prohibited by the ADA. Because the ADA requires that employers absorb the costs of reasonable accommodations, some studies blame this mandate for a decline in employment of people with disabilities at the time the law was ratified or took effect (DeLeire 2000; Acemoglu and Angrist 2001). Later studies found no decline when other measures and techniques were used (Beegle and Stock 2003; Hotchkiss 2003, 2004; Kruse and Schur 2003; Houtenville and Burkhauser 2004; Donahue, Stein, Griffin, and Becker 2011), and that any ADA-related decline in employment was temporary (Jolls and Prescott 2004). A recent study of state disability discrimination laws found that such laws do not appear to decrease the hiring of disabled older workers or of non-disabled older workers who are likely to develop disabilities (Neumark, Song, and Button 2015). Additional positive results can be observed in California, where a broader definition of disability in 2001 resulted in expanded state law coverage and improved employment for people with disabilities relative to the trend in other states (Button 2017).

Employer discrimination may also lower the wages offered to workers. Whereas some workers may accept lower wages, others may decide to stay out of the labor market or to spend time searching for better wages from non-discriminatory employers (helping explain their higher unemployment rates). Becker's model of taste-based discrimination may apply given the well-documented history of stigma and prejudice against people with disabilities (Yuker 1988; Nowicki and Sandieson 2002; Westerholm, Radak, Keys, and Henry 2006; Muzzatti 2008; Scior 2011). Psychological studies show that stereotypical attitudes of supervisors and coworkers can affect the workplace experiences of employees with disabilities (Stone and Colella 1996; Colella, DeNisi, and Varma 1998; Marti and Blanck 2000; Colella 2001; Ren et al. 2008). For example, subjects perceived the future employment prospects and job growth of individuals with disabilities more negatively (Colella et al. 1998), and a meta-analysis of experiments revealed negative effects of disability on performance expectations and hiring decisions (Ren et al. 2008). Support for this model also comes from studies that found lower wages for people who have disabilities with lower social acceptability rankings after controlling for productive characteristics (Baldwin and Johnson 2006).

The statistical discrimination model may also apply to people with disabilities: employers may believe that people with disabilities are generally less productive and base employment decisions on this belief. The uncertainty that many employers express about the future performance of people with disabilities and potential costs of accommodations increases the likelihood of statistical discrimination.

Studies conducted in France and Belgium provide experimental evidence that supports the discrimination models. In the French study, fictitious job applications were 1.78 times more likely to receive positive employer

responses if they were from highly qualified able-bodied applicants compared to otherwise-similar applicants with paraplegia; the equivalent ratio was 3.2 among moderately qualified applicants (Ravaud, Madiot, and Ville 1992). In the Belgium study, fictitious applications disclosing a disability (blindness, deafness, or autism) received a 47% lower response rate than did applications that did not indicate a disability (Baert 2016). Although these articles provide valuable evidence on employer reluctance to hire people with disabilities, they did not examine the effects of anti-discrimination laws on hiring decisions.

Direct evidence from employer surveys and interviews point to employer and coworker attitudes as barriers to hiring people with disabilities (Bruyere 2000; Dixon et al. 2003; Lengnick-Hall 2007; Domzal et al. 2008; Kaye, Jans, and Jones 2011). In addition, people with disabilities may face indirect discrimination through uninviting corporate cultures that discourage accommodations and personalized treatment for employees with disabilities and others with individualized needs (Stone and Colella 1996; Schur, Kruse, and Blanck 2005; Schur, Kruse, Blasi, and Blanck 2009).

Improved education and qualifications may help overcome real or perceived skill deficits associated with disability, thereby reducing employer reluctance to hire people with disabilities. One study found higher wage returns to education for men with disabilities than for those without disabilities (Hollenbeck and Kimmel 2008), and another study found that for workers with a spinal cord injury a college degree was associated with faster earnings recovery (Krueger and Kruse 1995).

In the current study we focus on two disabilities—spinal cord injury (SCI) and Asperger's syndrome—that are unlikely to impair productivity in the accounting profession. An SCI results from damage to spinal cord nerves, which impairs functioning and sensation below the level of the injury. The injury may be in the back, resulting in paraplegia that restricts lower body use, or in the neck, resulting in quadriplegia that may also restrict use of hands and arms. Almost all people with SCI use a wheelchair (DeVivo, Whiteneck, and Charles 1995). The employment rate falls sharply among people who experience an SCI, and earnings and weekly hours are generally lower among those who have post-injury employment (DeVivo et al. 1995; Krueger and Kruse 1995; Berkowitz et al. 1998). Their employment rate of 27 to 30% is close to that of other people with severe disabilities, and lower than that of all working-age people with and without disabilities (35% and 76%, in 2015, respectively) (Krueger and Kruse 1995; Berkowitz et al. 1998; McNeil 2001: 15; Lauer and Houtenville 2017). A key factor in our study is that an SCI does not limit productivity in all jobs, given that employed computer users with SCIs have similar hourly and weekly earnings as computer users without SCIs (Krueger and Kruse 1995).

Asperger's syndrome is an Autism Spectrum Disorder (ASD) and is defined as an impairment in social interaction. According to the *Diagnostic and Statistical Manual of Mental Disorders* (fifth edition) (DSM-V), Asperger's

can impair social, professional, and other leisure activities (APA 2012). Individuals with Asperger's may have difficulties in expressing compassion and social and emotional reciprocity (Mawhood and Howlin 1999). A review of six studies found that among "more able adults within the autism spectrum," the proportion employed ranged from 5 to 44% (Howlin 2000: 63). Studies also found that people on the autism spectrum are generally better than others at visual-attentional tasks that require focusing (Milne, Dunn, Freeth, and Rosas-Martinez 2013; Blaser, Eglington, Carter, and Kaldy 2014; Kaldy, Giserman, Carter, and Blaser 2016), and some possess heightened abilities in mathematics (Howlin and Mawhood 1996). Being more focused and less susceptible to distraction, and having better math skills, may give people with autism a productivity advantage in some jobs and work settings (Cowen 2011; Cook 2012), including professions in which they work primarily alone, such as accounting. The Bureau of Labor Statistics O*Net data show that three of the four core tasks for accountants are technical ones involving preparing and analyzing accounting records and systems, and the fourth ("report to management regarding the finances of establishments") may involve face-to-face interaction but may also be done in writing in many cases.² The six most important work activities are technical in nature.³ Consistent with the O*Net data, a survey of practitioners, educators, and consumers of accounting services found that the most important traits for success in forensic accounting are analytical skills, attention to detail, and being ethical (Davis, Farrell, and Ogilby 2010). Some level of social interaction is necessary of course, but the bulk of accountants' work can be done independently, and the social interaction may primarily involve exchanging technical information, with little social and emotional exchange required. In short, accounting may be particularly suitable for many people with Asperger's. The results differ little between applicants with SCI—which does not impair technical or social interaction skills—and applicants with Asperger's. This finding points to employers' general reluctance to hire people with disabilities rather than specific concerns of how potential social interaction deficits might affect the productivity of people with Asperger's.

In sum, employer attitudes can limit the hiring of people with disabilities in several ways. And though some studies suggest that discrimination plays a role, little of the global evidence (and none in the United States) is based

²The other three core tasks are 1) prepare, examine, or analyze accounting records, financial statements, or other financial reports to assess accuracy, completeness, and conformance to reporting and procedural standards; 2) establish tables of accounts and assign entries to proper accounts; and 3) develop, implement, modify, and document recordkeeping and accounting systems, making use of current computer technology (accessed at <http://www.onetonline.org/link/details/13-2011.01> [June 4, 2016]).

³The six activities are interacting with computers; processing information; getting information; evaluating information to determine compliance with standards; organizing, planning, and prioritizing work; and analyzing data or information (accessed at <http://www.onetonline.org/link/details/13-2011.01> [June 4, 2016]).

on field experiments that control for potential selection biases reflecting unobservable differences in the types of individuals who seek employment, or the types of jobs they obtain. A field experiment that examines the experiences of applicants with SCI or Asperger's for accounting positions can shed valuable light on the potential role of discrimination.

Method

This study evaluates employer interest in hypothetical applicants for actual job openings, using methods similar to Bertrand and Mullainathan (2004), who tested for race discrimination by manipulating the names above otherwise-identical résumés. Our study comparably tests for disability discrimination by manipulating information on disability in cover letters, with résumés designed for, and sent in response to, job openings for accounting positions. Applications were restricted to accounting positions to ensure that the two disabilities being examined—spinal cord injury (SCI) and Asperger's syndrome—would not inherently limit productivity in the applied-for position. People with SCI or Asperger's are covered by the ADA.⁴ State laws generally mirror the ADA or apply broader standards, and a review of state disability definitions indicates that all of the state laws (summarized in Table 5 and Neumark et al. 2015) prohibit discrimination against people with SCI or Asperger's. Accounting appears to be representative of other white-collar occupations with respect to the proportion of employees who have disabilities and to the disability pay gap among full-time employees.⁵

To test the effect of qualifications on the relative demand for applicants with disabilities, this study constructed two résumé templates—one for a novice applicant just out of college, and the other for an experienced applicant who is a Certified Public Accountant (CPA) with six years of experience and an exemplary record following college graduation. We chose to use both novice and experienced applicants to examine whether greater experience and credentials help overcome labor market disadvantages faced by people with disabilities, as suggested by the results of Hollenbeck and Kimmel (2008). The résumés were evaluated by university career counselors, agency recruiters, and hiring managers who work in financial services

⁴This coverage is particularly clear given the more stringent standards of the ADA Amendments Act of 2008, which includes a "major bodily function" as a "major life activity" for purposes of determining whether an individual qualifies for ADA coverage based on being substantially limited in a major life activity (<http://www.eeoc.gov/laws/statutes/adaaa.cfm>). Courts have generally recognized Asperger's as a covered disability, as exemplified in *Jakubowski v. Christ Hosp. Inc.*, 627 F.3d 195 (2010), which cited the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM-IV) (2000) to indicate coverage.

⁵Calculations from the 2014 American Community Survey show that 4.04% of full-time accountants have disabilities, compared to 4.29% of full-time employees in all management, management-related, and professional occupations. The estimated disability gap in *ln(pay)* is $-.170$ in accounting compared to $-.173$ in these other occupations.

to ensure they appeared legitimate and included specific skills needed for accountant positions. Material for the résumés was drawn from actual résumés supplied by agency recruiters, the academic degrees were listed as from Rutgers University, and the employers listed were fictitious employers in New Jersey.

The study design created six cells, reflecting the permutations of disability status portrayed in the cover letters (no disability, SCI, or Asperger's syndrome) and experience level (novice or experienced). The cover letters and résumés are in the online Appendix (available at <http://journals.sagepub.com/doi/suppl/10.1177/0019793917717474>). Twelve male names were used in the applications—six were always associated with novice résumés and six were always associated with experienced résumés, and disability status was randomly rotated through each of the names (to eliminate any bias associated with particular names).⁶ The names were assigned randomly to experience levels, but template bias in experience level comparisons is possible, since the experience level remained fixed for each name. This factor should not, however, affect comparisons by disability status, which was rotated through names. Disability status was revealed in the cover letters in the context of the applicant's volunteer work. Cover letters for all applicants (including those without a disability) mentioned the applicant's volunteer work for a disability organization (the fictitious New Jersey Paraplegia Foundation or the Life Development Institute's Asperger's Syndrome Program), noting that such work helped build the applicant's ability to "work effectively with others in a supervisory capacity." The letters from the applicants with disabilities added the wording "As an individual with [a spinal cord injury/Asperger's syndrome], I am committed to providing my time and energy to those similar to myself." The practitioners who reviewed the submission material agreed that revealing disability in the context of a skill-building activity was a plausible rationale for disclosing a disability, which was critical for the experimental manipulation. To increase the likelihood that the disability status would be noticed, these letters went on to say, "Please be advised that my disability does not interfere with my ability to perform the skills needed in a finance environment. I would be happy to answer any questions that you may have concerning this matter."⁷

The study team used Indeed.com—an employment search engine for job listings that gathers advertisements from websites, job boards, staffing firms,

⁶The names used for novice applicants were Adam Lewis, Jack Anderson, Jayden Johnson, Josiah Washington, Kayden Jones, and Luke Mathews; the names used for experienced applicants were Connor Ericson, Easton Carter, Hunter Richardson, Isaiah Booker, Jacob Rubinstein, and Jaxon Jones. These names were chosen from a list of the top male baby names of 1990 from <https://www.ssa.gov/oact/baby-names/decades/names1990s.html>, and <http://www.babycenter.com/top-baby-names-1990.htm>, with surnames from <http://names.mongabay.com>, selected and tested to represent the most common white-sounding and black-sounding names. We did not find significant interactions between disability status and whether the names were black- or white-sounding.

⁷The 1989 study in France used a similar approach by identifying disability in the cover letter, using the sentence "As the result of an accident in 1982, I am confined to a wheelchair" (Ravaud et al. 1992).

associations, and company career pages—to randomly submit applicant profiles. Between June 1 and August 31, 2013, applications were submitted to employers who advertised a US-based accounting position, totaling 6,016 applications. Job openings that did not allow cover letters to be submitted were excluded. Applications were submitted randomly across name, disability status, and experience level. Rather than sending paired applications to each employer (disability and non-disability), we chose to send each employer only one application, so that we could keep all application credentials identical by disability status without having the experimental design be detected. As a result, the presented findings are based on between-employer rather than within-employer comparisons and rely on randomization to control for any unobserved employer heterogeneity. E-mail accounts and prepaid phones were acquired for the twelve hypothetical applicants, so that employers could respond either by e-mail or telephone. Employers had up to four months to respond upon application submission. All applicants were given a New Jersey address, with the willingness to relocate implied in applying to jobs in other states. Although response rates were slightly higher in New Jersey, New York, and Pennsylvania relative to the rest of the country, there was no difference in relative responses by disability status, so we have no reason to think that more-distant employers were more concerned about the relocation of applicants with disabilities.

For analytical purposes, employer responses were divided into three categories: 1) those expressing desire for an interview; 2) those expressing another form of active employer interest (asking the applicant for further documents or credentials, inviting the applicant to apply for another position in the company, checking that the applicant was aware that the job was in another state, or requesting the applicant to also apply through the company website); and 3) those not expressing any interest (including no response and explicit rejections). In the results presented here, categories 1 and 2 are combined to represent “any employer interest” and category 1 represents the more restrictive measure of “callback for interview.”

Employer characteristics were coded using information from ReferenceUSA, and from the Manta.com website, or from company websites when ReferenceUSA information was not available. The coded characteristics include state of operation; number of employees; whether the employer is closely held (without publicly traded stock), publicly traded, or a government agency; industry (NAICS code); and federal contractor status.⁸ This final variable is potentially important since the federal government requires contractors to take affirmative action to hire individuals with disabilities.⁹

⁸Both ReferenceUSA (<http://resource.referenceusa.com/>, available through our university library) and Manta.com (<http://www.manta.com/>, available online) provide basic company information for researchers, consumers, businesses, advertisers, and market analysts. The establishment address was used to identify state of operation for multi-establishment companies, and employment was coded for the overall company since that location determines ADA and state law coverage.

⁹Accessed at <http://www.dol.gov/odep/topics/FederalContractorRequirements.htm> (June 4, 2016).

The detailed employer information helps us to control for differences not captured by randomization and to investigate differences in response by type of employer.

As pointed out by both Heckman (1998) and Neumark (2012), a potential problem in field experiments based on audits or correspondence is that differences in unobserved variance between two groups can lead to upward or downward bias in estimated mean differences in employer responses. For example, higher unobserved variance among people with disabilities (stemming from variation in types and severity of disability) may increase or decrease the perceived likelihood that an applicant will exceed the hiring threshold, depending on whether the standards are set high or low. We use Neumark's method to sign the potential bias, based on heteroskedastic probits that compute unobserved variance for each group. These tests (in online Appendix Table A.1) indicate that people with disabilities do have higher unobserved variance, and this higher variance in itself increases the likelihood that people with disabilities will exceed the hiring threshold (since the fatter "tails" of the distribution put a higher percentage at high perceived values). This outcome may be attributable to, for example, the perception that people who achieve strong credentials despite the obstacles associated with disability may be "stars" who deserve a closer look. Controlling for the effect of this higher variance, the mean disability gap in employer responses to applicants with disabilities is shown to be more negative than in non-heteroskedastic probits. Therefore, the differences we report here are more likely to be understated than overstated because of differences in unobserved variance.

Results

The applicants with disabilities were less likely than were the applicants without disabilities to receive any expressions of employer interest, as shown in Table 1. The disability applications received any expressions of interest from 4.87% of employers compared to 6.58% for the non-disability applications (columns (1) and (2)). The 1.71 percentage point gap represents a 26% lower likelihood of employer interest for the applicants with disabilities, and the null hypothesis of a zero gap is strongly rejected at the 99% level. A gap is also evident when we restrict the measure to employer callbacks for interviews (0.28, representing an 11% lower callback rate, in column (7)), but it is not large enough to statistically reject a zero gap.

Employers were especially unlikely to express interest in the more-experienced applicants with disabilities. The 2.57 percentage point gap (column (3)) represents a 34% lower likelihood of employer interest for experienced applicants with disabilities compared to those without disabilities, which is three times the size of the 0.86 point gap between novice applicants with and without disabilities. This finding contradicts the idea that increased

Table 1. Employer Responses to Résumés by Disability Status

Type of application	Any employer interest				Callback for interview				Sample size	
	No disability (%)	Disability (%)	Gap	(p value)	No disability (%)	Disability (%)	Gap	(p value)	No disability	Disability
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any disability vs. no disability										
Overall	6.58	4.87	-1.71	(0.006)***	2.53	2.25	-0.28	(0.483)	2,052	3,964
Novice résumés	5.56	4.70	-0.86	(0.310)	1.56	1.97	0.41	(0.423)	1,026	1,977
Experienced résumés	7.60	5.03	-2.57	(0.005)***	3.51	2.52	-0.99	(0.121)	1,026	1,987
SCI vs. no disability										
Overall	6.58	4.80	-1.78	(0.015)**	2.53	2.13	-0.40	(0.393)	2,052	2,019
Novice résumés	5.56	4.97	-0.59	(0.535)	1.56	1.99	0.43	(0.464)	1,026	1,006
Experienced résumés	7.60	4.64	-2.96	(0.005)***	3.51	2.27	-1.24	(0.095)*	1,026	1,013
Asperger's vs. no disability										
Overall	6.58	4.94	-1.64	(0.026)**	2.53	2.37	-0.16	(0.730)	2,052	1,945
Novice résumés	5.56	4.43	-1.13	(0.248)	1.56	1.96	0.40	(0.499)	1,026	971
Experienced résumés	7.60	5.44	-2.16	(0.051)*	3.51	2.77	-0.74	(0.346)	1,026	974

* $p < .10$; ** $p < .05$; *** $p < .01$.

training, qualifications, and successful labor market experience will help erase the disadvantages faced by people with disabilities.

The specific type of disability made little difference in relative employer interest. The disability gaps are 1.78 percentage points for people with SCIs and 1.64 points for people with Asperger's syndrome—both are strong enough to reject a zero gap at the 95% level. For both disability types the lower employer interest is concentrated among the more-experienced applicants.

Employer Characteristics

Table 2 provides breakdowns by employer size, ownership, federal contractor status, and broad industry. The employment size breakdown creates four groups of roughly equal size among the private-sector employers. As shown in columns (1) through (4), the disability gap in any expressions of employer interest is largest among the smallest private-sector employers (fewer than 15 employees), and this result carries over to the more restrictive measure of a callback for an interview (columns (5) through (8)). Private-sector employers with fewer than 15 employees are not covered by the ADA, although many such employers are subject to state disability discrimination laws (as we will later explore).

A breakdown by ownership shows that the disability gap is concentrated among closely held employers (−2.3 points). The gap is smaller among government employers (−1.3 points), but the sample is small and a zero gap cannot be rejected. Publicly held employers were slightly more likely to express interest in the applicants with disabilities compared to those without disabilities (0.9 points, although a zero gap cannot be rejected). In addition, the disability gap is largest among employers who are not federal contractors, for which a zero effect can be rejected for any employer interest but not for the more restrictive measure of a callback for interview. Although the small sample sizes within industries do not permit strong comparisons within or across industries, the disability gap does not appear to vary in a noteworthy way by industry.

To explore which employment characteristics are the key drivers of the differences in Table 2, probit regressions are presented in Tables 3A and 3B using “any employer interest” and “callback for interview” as the dependent variables, respectively. These tables present the results of interactions between disability status and employer characteristics, using employer characteristics and applicant name dummies as controls to adjust for any differences not captured by randomization.¹⁰ In regressions on the full sample

¹⁰Descriptive statistics for all variables are in online Appendix Table A.2 (see <http://journals.sagepub.com/doi/suppl/10.1177/0019793917717474>). In further regressions not reported here, we controlled for firm size with linear and squared terms in addition to the size category dummies, with no noteworthy difference in results. The estimated changes in probability are calculated as average marginal effects using Stata's “margins” command based on Williams (2012).

Table 2. Employer Responses by Employer Characteristics

Employer characteristics	Any employer interest				Callback for interview				Sample size	
	No disability (%)	Disability (%)	Gap	(p value)	No disability (%)	Disability (%)	Gap	(p value)	No disability	Disability
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Employment size, private sector										
Employment < 15	8.5	5.0	-0.035	(0.013)**	5.2	1.8	-0.034	(0.001)***	426	906
Employment 15-99	6.7	5.2	-0.015	(0.231)	1.6	3.0	0.013	(0.107)	553	979
Employment 100-499	6.5	5.0	-0.015	(0.254)	2.8	2.6	-0.003	(0.782)	461	935
Employment 500 +	5.3	4.1	-0.012	(0.307)	1.4	1.6	0.002	(0.749)	510	945
Ownership										
Closely held	7.1	4.8	-0.023	(0.001)***	2.9	2.3	-0.006	(0.186)	1,649	3,194
Publicly held	4.0	4.9	0.009	(0.529)	1.1	1.8	0.007	(0.409)	350	657
Government	7.5	6.3	-0.013	(0.755)	0.0	3.6	0.036	(0.164)	53	112
Federal contractor										
No	7.1	4.4	-0.027	(0.000)***	2.7	2.3	-0.003	(0.525)	1,355	2,578
Yes	5.6	5.7	0.001	(0.928)	2.3	2.1	-0.002	(0.760)	696	1,386
Industry										
Agriculture, mining, construction	7.9	5.0	-0.029	(0.276)	4.8	1.8	-0.029	(0.118)	126	219
Manufacturing	5.4	3.9	-0.015	(0.409)	2.5	1.7	-0.008	(0.521)	204	359
Trade	6.4	4.6	-0.018	(0.259)	1.3	2.7	0.014	(0.190)	298	547
Finance/insurance	6.1	5.6	-0.006	(0.802)	1.8	2.5	0.006	(0.656)	163	323
Professional services	7.5	5.2	-0.023	(0.122)	3.3	2.7	-0.007	(0.510)	389	754
Health care	5.3	4.4	-0.009	(0.596)	1.6	1.5	-0.002	(0.869)	245	475
Other	6.8	4.9	-0.019	(0.111)	3.0	2.1	-0.008	(0.285)	574	1,175

* $p < .10$; ** $p < .05$; *** $p < .01$.

(Table 3A, column (1)), the disability gap in any employer interest remains largest among small firms, but noteworthy disability gaps are also evident for the other firm sizes. In addition, column (1) shows that there appears to be more interest in applicants with disabilities among publicly held firms relative to closely held firms, and by federal contractors relative to non-contractors.

To probe the results, regressions were run separately in columns (2) to (7) for closely held firms, publicly held firms, firms that are and are not federal contractors, and closely held firms that are and are not federal contractors. Focusing on closely held firms (column (2)) shows the largest disability gap among small firms, although the coefficients remain sizeable for the other firm sizes, and a zero gap can be rejected for firms in the 15 to 99 and 100 to 499 size categories. A regression using only publicly held firms (column (3)) does not reveal any disability interactions strong enough to reject a zero gap. Focusing on whether firms are federal contractors subject to affirmative action requirements, column (4) shows that non-contractors have disability gaps for which a zero gap can be rejected for three of the size categories (all except 15 to 99 employees). By contrast, the disability gaps for federal contractors in column (5) are smaller and within the margin of sampling error. Looking within the closely held sample only, the disability gaps for non-contractors are large and a zero gap can be rejected for three of the size categories (column (6)), and there are no strong disability gaps for closely held federal contractors (column (7)).

The pattern changes somewhat when the dependent variable is callbacks for interviews, as displayed in Table 3B, columns (8) to (14). A negative effect of disability on callbacks by small employers is evident in all the columns, and a positive effect of disability on callbacks by employers with 15 to 99 employees can be seen in three of the columns. This latter result occurs among non-contractors (columns (11) and (13)), indicating that the positive effect of disability on callbacks is not a result of the affirmative action mandate for federal contractors.

In sum, both measures of employer responses show that small-scale, closely held firms that are not federal contractors are less likely to express interest in applicants with disabilities relative to those without disabilities. The results differ for the two measures in that larger closely held firms that are not federal contractors are also less likely to express any interest in disability applications, whereas small federal contractors are less likely to respond to disability applications with callbacks for interviews.

Experience Level and Disability Type

As shown in Table 1, the disability gap in employer interest is largest among experienced applicants, and the gaps are similar for the two types of disability. Table 4 explores these results by relating them to employer characteristics using probit regressions. Columns (1), (2), (5), and (6) show that

Table 3A. Regressions Predicting Employer Response—Any Employer Interest

Independent variables	Dependent variable: Any employer interest						
	All firms (1)	Closely held (2)	Publicly held (3)	Not federal contractor (4)	Federal contractor (5)	Closely held, not federal contractor (6)	Closely held, federal contractor (7)
Disability interactions with:							
Private sector, employment < 15	-0.042** (0.020)	-0.041* (0.023)	-0.008 (0.055)	-0.040* (0.024)	-0.013 (0.022)	-0.042* (0.024)	-0.007 (0.024)
Private sector, employment 15–99	-0.024* (0.013)	-0.028** (0.014)	0.045 (0.032)	-0.015 (0.016)	-0.014 (0.019)	-0.015 (0.015)	-0.025 (0.021)
Private sector, employment 100–499	-0.029** (0.015)	-0.034** (0.016)	0.025 (0.031)	-0.039** (0.016)	0.017 (0.022)	-0.044*** (0.016)	0.019 (0.023)
Private sector, employment 500 +	-0.031** (0.015)	-0.025 (0.017)	-0.010 (0.019)	-0.048*** (0.014)	0.017 (0.022)	-0.041** (0.017)	0.027 (0.026)
Publicly held company	0.017*** (0.006)			0.021*** (0.006)	0.009 (0.026)		
Government	-0.033 (0.036)						
Federal contractor	0.018*** (0.006)	0.019** (0.008)	0.012 (0.024)				
P value for test of disability interactions:							
Joint test of all employment size categories	0.018	0.031	0.052	0.008	0.851	0.015	0.760
Employment < 15 size category	0.025	0.047	0.873	0.059	0.537	0.055	0.760
Joint test of all except smallest size category	0.008	0.019	0.041	0.004	0.801	0.006	0.610
Observations	6,016	4,843	1,005	3,869	1,961	3,352	1,483

Notes: All regressions include controls for applicant names (11 dummies), employment size (4 dummies, including one for unknown size plus disability interaction), publicly held, government, multi-establishment, and industry (7 dummies). Standard errors in parentheses, clustered at state level. Descriptive statistics are in Table A.1. Figures represent average marginal effects on probabilities from probit regressions, based on Stata's "margins" command.

* $p < .10$; ** $p < .05$; *** $p < .01$.

Table 3B. Regressions Predicting Employer Response–Callback for Interview

Independent variables	Dependent variable: Callback for interview						
	All firms (8)	Closely held (9)	Publicly held (10)	Not federal contractor (11)	Federal contractor (12)	Closely held, not federal contractor (13)	Closely held, federal contractor (14)
Disability interactions with:							
Private sector, employment < 15	−0.031** (0.014)	−0.030** (0.015)	^	−0.030* (0.015)	−0.042** (0.018)	−0.031* (0.016)	−0.042* (0.021)
Private sector, employment 15–99	0.016** (0.007)	0.013** (0.007)	^	0.020*** (0.008)	0.002 (0.010)	0.019*** (0.007)	−0.004 (0.013)
Private sector, employment 100–499	−0.002 (0.010)	−0.001 (0.011)	0.021 (0.040)	−0.012 (0.011)	0.009 (0.012)	−0.014 (0.013)	0.023 (0.015)
Private sector, employment 500 +	0.003 (0.006)	0.003 (0.009)	0.018 (0.021)	0.001 (0.006)	−0.000 (0.015)	0.005 (0.008)	−0.005 (0.026)
Publicly held company	0.007 (0.005)			0.007** (0.003)	0.002 (0.011)		
Federal contractor	−0.005 (0.011)	−0.006 (0.013)	^				
P value for test of disability interactions:							
Joint test of all employment size categories	0.155	0.269	0.072	0.079	0.072	0.115	0.330
Employment < 15 size category	0.025	0.042	^	0.041	0.014	0.044	0.039
Joint test of all except smallest size category	0.191	0.276	0.072	0.044	0.223	0.070	0.684
Observations	5,851	4,843	502	3,869	1,608	3,352	1,212

Notes: All regressions include controls for applicant names (11 dummies), employment size (4 dummies, including one for unknown size plus disability interaction), publicly held, government, multi-establishment, and industry (7 dummies). Standard errors in parentheses, clustered at state level. Regressions exclude government employers due to insufficient positive responses for probit estimation. Descriptive statistics are in Table A.1. Figures represent average marginal effects on probabilities from probit regressions, based on Stata's "margins" command.

^Insufficient positive responses in these categories for probit estimation.

* $p < .10$; ** $p < .05$; *** $p < .01$.

Table 4. Predicting the Employer Response by Disability Type and Experience Level

Independent variables	Dependent variable: Any employer interest				Dependent variable: Callback for interview			
	Experience level		Disability type [^]		Experience level		Disability type [^]	
	Novice (1)	Experienced (2)	SCI (3)	Asperger's (4)	Novice (5)	Experienced (6)	SCI (7)	Asperger's (8)
Disability interactions with:								
Private sector, employment < 15	0.005 (0.016)	-0.083** (0.036)	-0.059*** (0.019)	-0.024 (0.023)	-0.005 (0.011)	-0.055** (0.022)	-0.039*** (0.013)	-0.024 (0.015)
Private sector, employment 15-99	-0.025 (0.022)	-0.023* (0.013)	-0.022 (0.014)	-0.025 (0.015)	0.015* (0.009)	0.017** (0.009)	0.015 (0.010)	0.018* (0.010)
Private sector, employment 100-499	-0.036* (0.021)	-0.022 (0.018)	-0.034** (0.014)	-0.024 (0.016)	-0.002 (0.011)	-0.000 (0.014)	-0.007 (0.010)	0.004 (0.012)
Private sector, employment 500 +	-0.032 (0.022)	-0.034* (0.018)	-0.010 (0.016)	-0.054*** (0.016)	0.011 (0.008)	-0.007 (0.010)	0.008 (0.009)	-0.004 (0.006)
Publicly held company	0.015 (0.011)	0.019*** (0.007)	0.012** (0.006)	0.024*** (0.009)	0.006 (0.009)	0.006 (0.005)	0.007 (0.005)	0.008 (0.007)
Government	0.034 (0.035)	-0.203** (0.099)	-0.036 (0.035)	-0.030 (0.044)	^^ (0.015)	^^ (0.018)	^^ (0.013)	^^ (0.014)
Federal contractor	0.020*** (0.006)	0.016 (0.011)	0.020*** (0.006)	0.015* (0.009)	-0.007 (0.015)	-0.006 (0.018)	-0.007 (0.013)	-0.008 (0.014)
P value for test of disability interactions:								
Joint test of all employment size categories								
Employment < 15 size category	0.900	0.001	0.003	0.000	0.836	0.012	0.035	0.111
Joint test of all except smallest size category	0.783	0.000	0.000	0.210	0.665	0.001	0.002	0.075
Observations	0.849	0.001	0.008	0.000	0.926	0.035	0.322	0.103
	3,003	2,938	4,071	3,997	2,835	2,880	3,875	3,790

Notes: All regressions include controls for applicant names (11 dummies), employment size (4 dummies, including one for unknown size plus disability interaction), publicly held, government, multi-establishment, and industry (7 dummies). Standard errors in parentheses, clustered at state level. Descriptive statistics are in Appendix Table A.1. Figures represent average marginal effects on probabilities from probit regressions, based on Stata's "margins" command.

[^]Regressions by disability type include applicants without disabilities as control group.

^{^^}Too few callbacks by government employers to estimate probit effects.

* $p < .10$; ** $p < .05$; *** $p < .01$.

disability gaps are concentrated among experienced applicants who apply to small private-sector employers, with no strong disability gaps for novice applicants. Columns (3) and (7) show that small private-sector employers were the least likely to express interest in applicants with SCI, and column (4) shows that the largest private-sector employers (those with 500 or more employees) were the least likely to express any type of interest in applicants with Asperger's syndrome.

Disability Discrimination Laws

Our results so far indicate that disability gaps in employer interest may be especially large among employers who have fewer than 15 employees and who are, therefore, not covered by the ADA. Does coverage by the ADA or a state disability discrimination law (DDL) make a difference? As shown in Table 5, 48 states and the District of Columbia have DDLs that prohibit discrimination by private employers against employees and job applicants with disabilities, with variation in the minimum size threshold for employer coverage. Also, the DDLs in 43 states require employers to make reasonable accommodations for workers with disabilities (either explicitly or by state court interpretation). Table 5 also reports that of the 5,880 employers with necessary employment information, our sample contains 4,891 (83.2%) that are subject to a state DDL requiring reasonable accommodations, 266 (4.5%) that are subject to a state DDL not requiring accommodations, and the remaining 723 (12.3%) are not subject to a state DDL. Focusing on the 1,333 small employers that are not subject to the ADA, 657 (49.3%) are subject to a state DDL requiring accommodations, 6 (0.5%) are subject to a state DDL not requiring reasonable accommodations, and the remaining 670 (50.3%) are not subject to a state DDL (either because they are in the two states without a DDL or their small number of employees places them beneath the employment threshold for a state DDL).

We estimate the possible effects of the ADA and the state DDLs using three approaches:

1. Probit regressions across the entire sample examine variation in ADA and state DDL coverage, both within and between states.
2. A within-state difference-in-difference (DD) design compares the disability/non-disability difference in employer interest among employers that are and are not covered by the ADA or a state DDL.
3. Regression discontinuity (RD) designs examine how the disability/non-disability difference in employer interest changes as firm size grows and a firm becomes covered by a state DDL or the ADA.

Because the disability gap is concentrated among experienced applicants, we estimate the DD and RD designs both for the full sample and for experienced applicants only.

Table 5. State Disability Discrimination Laws

<i>DDL coverage</i>	<i>Accommodations not required</i>	<i>Accommodations required</i>
DDL covers only public employers	AL, MS	
DDL covers private employers with 1 + employees	SD	AK, CO, DC, HI, IL, ME, MI, MN, MT, ND, NJ, VA, VT, WI
2 or more employees		WY
3 or more employees		CT
4 or more employees		IA, KS, NM, NY, OH, PA, RI
5 or more employees		CA, ID
6 or more employees		MA, MO, NH, OR
8 or more employees	TN	WA
9 or more employees	AR	
12 or more employees		WV
15 or more employees	GA, NV	AZ, DE, FL, IN, KY, MD, NC, NE, OK, SC, TX, UT
20 or more employees		LA
Number of job applications to employers:	<i>All employers</i>	<i>Small employers (not covered by ADA)</i>
Not covered by state DDL	723	670
Covered by state DDL not requiring accommodations	266	6
Covered by state DDL requiring accommodations	4,891	657

Note: DDL, disability discrimination law.

Results from the first approach are presented in Table 6, using the full sample with separate variables for ADA and state DDL coverage (allowing state DDLs to have an effect in addition to the ADA in cases in which employers are covered by both).¹¹ Column (1) shows an overall disability effect of -0.015 . Column (2) shows that ADA coverage is linked to a positive effect on employer interest in applicants with disabilities that is strong enough to reject a zero effect at the 95% level, and the interaction effect of state DDL coverage with disability status is negative but not strong enough to reject a zero effect. In column (3), the disability interactions with DDLs not requiring accommodations, and with DDLs requiring accommodations, are also negative but neither is strong enough to reject a zero effect.

The estimate of most relevance to our study is in column (4), which is restricted to small employers who are not covered by the ADA. Here the disability interaction with state DDL coverage is negative, but again it is not strong enough to reject a zero effect.

The estimated effects of ADA coverage are stronger when predicting a callback for an interview, as indicated in columns (5) to (8). Column (6) shows that the interaction effect of disability and ADA coverage is positive

¹¹In further regressions not reported here, we controlled for firm size with linear and squared terms in addition to the size category dummies, with little difference in results.

Table 6. Employer Responses and Disability Discrimination Laws

Independent variables	Dependent variable: Any employer interest				Dependent variable: Callback for interview				Means (s.d.)	
	All firms (1)	All firms (2)	All firms (3)	Small firms covered by ADA (4)	All firms (5)	All firms (6)	All firms (7)	Small firms covered by ADA (8)	All firms (9)	Small firms (10)
Disability	-0.015** (0.006)	-0.011 (0.016)	-0.011 (0.016)	-0.023 (0.016)	-0.002 (0.004)	-0.033*** (0.010)	-0.033*** (0.010)	-0.040*** (0.010)	0.659 (0.474)	0.680 (0.466)
Disability interactions with: ADA coverage										
		0.021** (0.008)	0.022** (0.010)			0.007*** (0.002)	0.007*** (0.002)		0.505 (0.500)	0.000 (0.000)
State DDL coverage		-0.043 (0.032)		-0.029 (0.031)		0.007 (0.004)		0.009 (0.007)	0.578 (0.494)	0.347 (0.476)
State DDL coverage not requiring accommodations			-0.032 (0.052)	[^] (0.031)			-0.001 (0.016)	[^] (0.007)	0.032 (0.176)	0.003 (0.055)
State DDL coverage requiring accommodations			-0.043 (0.032)	[^] (0.031)			0.007 (0.004)	[^] (0.007)	0.546 (0.498)	0.344 (0.475)
State DDL coverage		0.021*** (0.006)		0.023* (0.013)		0.008** (0.004)		0.011* (0.007)	0.878 (0.328)	0.497 (0.500)
State DDL coverage not requiring accommodations			0.014 (0.022)			0.013* (0.008)			0.045 (0.207)	0.005 (0.067)
State DDL coverage requiring accommodations			0.021*** (0.006)			0.008** (0.004)			0.833 (0.373)	0.493 (0.500)
Observations	6,016	5,880	5,880	1,333	5,851	5,715	5,715	1,125	6,016	1,333

Notes: All regressions include controls for applicant names (11 dummies), employment size (4 dummies), publicly held, government, federal contractor, multi-establishment, and industry (7 dummies). Standard errors in parentheses, clustered at state level. Figures represent average marginal effects on probabilities from probit regressions, based on Stata's "margins" command. DDL, disability discrimination law.

[^]State DDLs could not be broken out by accommodation requirements for small firms due to insufficient observations.

* $p < .10$; ** $p < .05$; *** $p < .01$.

and strong enough to reject a zero effect at the 99% level. Unlike the results for “any employer interest” (columns (2) and (3)), the disability interaction with state DDL coverage is positive in column (6), and positive for state DDL coverage requiring accommodations in column (7), but neither is strong enough to reject a zero effect. When focusing on small firms in column (8), the effect of state DDL coverage interacted with disability is positive (in contrast to the column (4) estimate predicting any employer interest) but is also not strong enough to reject a zero effect.

Whether the ADA and state DDLs have an effect on employer behavior can be tested more rigorously with DD and RD designs (Angrist and Pischke 2009; Lee and Lemieux 2010). To compare the responses of covered and uncovered employers that are otherwise as similar as possible, these regressions are restricted to private employers with no more than 100 employees, and, alternatively, no more than 30 employees.¹² The DD design is based on the following equation:

$$(1) \quad \text{Response}_{is} = a + b1*\text{Disab}*\text{ADAcov}_i + b2*\text{StateDDLcov}_{is} + b3*\text{Disab}*\text{StateDDLcov}_{is} + b4*\text{Empdum}_i + b5*\text{State}_s + b6*\text{Disab}*\text{State}_s + b7*\text{Controls} + e_{is}$$

where:

Response_{is} = Any employer response, or callback for interview, by employer i in state s

Disab = dummy for disability noted in cover letter

ADAcov_i = employer i is covered by ADA (having 15 or more employees)

StateDDLcov_{is} = employer i in state s is covered by state DDL, not by ADA

Empdum_i = Dummies for number of employees

State_s = State dummies

Controls = Dummies for publicly held, federal contractor, 7 industries, and 11 applicant names

i subscripts denote employer

s subscripts denote state

The key coefficients of interest are $b1$ and $b3$. The $b1$ coefficient measures the difference between ADA-covered employers, and those not covered by the ADA or a state DDL, in the relative likelihood of responding to disability and non-disability applications. The $b3$ coefficient makes a similar comparison between employers covered by a state DDL and those not covered by the ADA or a state DDL. The comparisons are made within-state by the inclusion of state dummies and interactions between disability and state dummies.¹³ The main effect of the ADA is subsumed by the full set of

¹²Results are nonetheless very similar when all employers are included (available on request).

¹³The state dummies fully capture the effects of state DDLs in states that cover all employers, so the $b2$ and $b3$ coefficients reflect estimated effects of state DDLs in states with observations both above and below the coverage threshold.

dummies for number of employees (since all employers with 15 or more employees are covered).

The DD results in Table 7 show an apparent positive effect of the ADA on callbacks for disability applicants, as indicated by the *b1* coefficients on the interaction between disability and ADA coverage for all applicants (columns (3) and (4)) and for experienced applicants only (columns (7) and (8)). By contrast, coverage by a state DDL only (not by the ADA) is not linked to significantly higher or lower employer responses to applicants with disabilities, as shown by coefficients on the interaction of disability with “employer covered by state law, not by ADA.”

The RD design provides a closer comparison of responses between employers just above and just below the disability law threshold, testing whether changes in responses occur when employer size exceeds the threshold. In examining the ADA threshold, we restrict the sample to employers with 30 or fewer employees. In examining state DDL thresholds, we restrict the sample to employers with no more than 15 employees above the threshold and to states that have at least 5 disability and 5 non-disability observations both above and below the threshold (we eliminate states in which the DDL covers all private employers).¹⁴

We test three RD models, the first of which is based on a polynomial design run separately for disability and non-disability applicants.¹⁵

$$(2) \quad \text{Response}_i = a + b1 * \text{Coverage}_i + b2 * \text{Emp}_i + b3 * \text{Emp}_i^2 + b4 * \text{Emp}_i^3 \\ + b5 * \text{Empspline}_i + b6 * \text{Empspline}_i^2 + b7 * \text{Empspline}_i^3 + e_i$$

where:

Response = Any employer response, or callback for interview

Coverage = Coverage by ADA, or alternatively by state DDL

Emp = Number of employees

Empspline = Number of employees minus coverage threshold, 0 if below threshold

The estimates for coefficient *b1*, representing the change in employer response at the point of the threshold, are presented in columns (1) and (5) of Table 8 for all applicants and for experienced applicants only. Almost all of these estimates are exceeded by their standard error, providing no clear indication that employer responses change at the ADA or state DDL coverage thresholds.

The second RD model estimates local linear regressions on each side of the threshold, using Stata’s “rd” program and a triangular kernel from Nichols (2011), which bases optimal bandwidth choice on Imbens and Kalyanaraman (2012). Table 8 presents results using alternative bandwidths in columns (2) to (4) and columns (6) to (8). Although significant

¹⁴Results were similar when including larger employers (available on request).

¹⁵Results were similar when eliminating the cubed terms, or cubed and squared terms.

Table 7. Within-State Difference-in-Difference Comparisons on Disability Discrimination Law Thresholds

	All applicants				Experienced applicants				Means (s.d.)			
	Dep. var.: Any employer interest		Dep. var.: Callback for interview		Dep. var.: Any employer interest		Dep. var.: Callback for interview		All		Experienced	
	< 100 (1)	< 30 (2)	< 100 (3)	< 30 (4)	< 100 (5)	< 30 (6)	< 100 (7)	< 30 (8)	< 100 (9)	< 30 (10)	< 100 (11)	< 30 (12)
Employer size (< 100 or < 30 employees)												
Disability interaction with:												
Employer covered by ADA	0.0037 (0.0211)	0.0100 (0.0299)	0.0423*** (0.0149)	0.0511** (0.0200)	0.0346 (0.0406)	0.0537 (0.0510)	0.0556** (0.0258)	0.0646** (0.0289)	0.341 (0.471)	0.180 (0.384)	0.342 (0.475)	0.171 (0.377)
Employer covered by state law, not by ADA	-0.0391 (0.0268)	-0.0386 (0.0325)	-0.0150 (0.0251)	-0.0021 (0.0292)	-0.0332 (0.0436)	-0.0243 (0.0492)	-0.0312 (0.0439)	-0.0018 (0.0488)	0.161 (0.368)	0.250 (0.433)	0.160 (0.367)	0.248 (0.432)
Main effect ^a												
Employer covered by state law, not by ADA	0.0347 (0.0292)	0.0429 (0.0353)	0.0225 (0.0213)	0.0333 (0.0257)	0.0158 (0.0404)	0.0189 (0.0482)	0.0251 (0.0360)	0.0253 (0.0445)	0.232 (0.422)	0.358 (0.480)	0.231 (0.421)	0.357 (0.479)
N	2,864	1,850	2,864	1,850	1,514	977	1,514	977	2,864	1,850	1,514	977
R-squared	0.0921	0.0972	0.0877	0.0836	0.1443	0.1548	0.1638	0.1462				

Notes: Restricted to private companies. All regressions include state dummies with disability interactions, dummies for each employment size, and controls for applicant names (11 dummies), publicly held, federal contractor, and industry (7 dummies). Robust standard errors in parentheses, accounting for clustering at state level. Dep. var., dependent variable.

^aThe main effect of the ADA is subsumed in the employment size dummies, since the 15-employee threshold applies to all employers.

*** $p < .01$; ** $p < .05$; * $p < .1$.

Table 8. Regression Discontinuity Designs for Testing Effects of ADA and State Laws

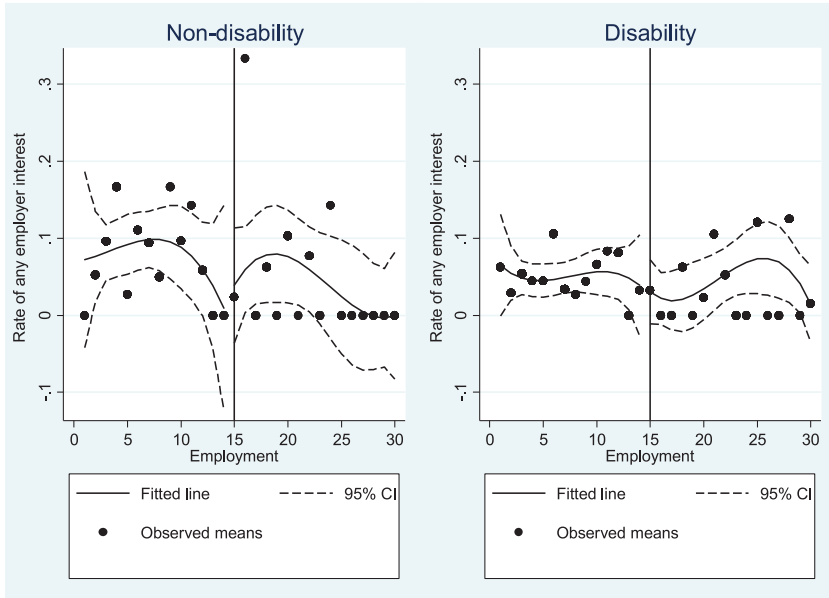
Independent variables	Dependent variable: Any employer interest				Dependent variable: Callback				n (9)
	Polynomial models^ (1)	Local linear models^^			Polynomial models^ (5)	Local linear models^^			
		Optimal bandwidth (2)	Half bandwidth (3)	Double bandwidth (4)		Optimal bandwidth (6)	Half bandwidth (7)	Double bandwidth (8)	
Change at ADA threshold									
All applicants									
No disability	0.065 (0.116)	0.000	0.000	0.121** (0.051)	0.011 (0.039)	0.000	0.000	0.080 (0.081)	644
Disability	0.005 (0.058)	0.000	0.000	0.139** (0.056)	0.030 (0.037)	0.000	0.000	0.023 (0.016)	1,304
Experienced applicants									
No disability	0.080 (0.198)	0.013 (0.015)	0.000	0.123 (0.063)	0.038 (0.153)	-0.001 (0.001)	0.000	0.066 (0.049)	353
Disability	0.098 (0.078)	0.000	0.000	0.060 (0.060)	0.051 (0.053)	0.000	0.000	0.084 (0.065)	679
Change at state law threshold									
All applicants									
No disability	-0.056 (0.085)	0.006 (0.013)	0.000	0.021 (0.021)	-0.059 (0.069)	0.006 (0.013)	0.000	0.021 (0.021)	320
Disability	0.008 (0.065)	0.000	0.000	0.047 (0.074)	-0.022 (0.043)	0.000	0.000	0.041 (0.025)	638
Experienced applicants									
No disability	-0.140 (0.138)	-0.013 (0.009)	0.000	0.010 (0.016)	-0.135 (0.112)	-0.013 (0.009)	0.000	0.010 (0.016)	180
Disability	-0.030 (0.088)	0.062 (0.181)	0.000	0.048 (0.091)	-0.088 (0.060)	0.000	0.000	0.045 (0.038)	337

Notes: Figures represent estimated changes in employer interest at the ADA or state law thresholds for group at left. Each figure is from a separate model for group at left, limited to employers with no more than 15 employees above the threshold. State threshold estimates are limited to states with at least 5 disability and 5 non-disability observations above and below the threshold. Standard errors in parentheses.

[^]Polynomial models control for employment, employment squared, and employment cubed, estimated separately on each side of the threshold. Results are illustrated in Figure 1A and 1B and Figure 2A and 2B.

^{^^}Tests using local linear models are done with Stata's "rd" command.

** $p < .05$.

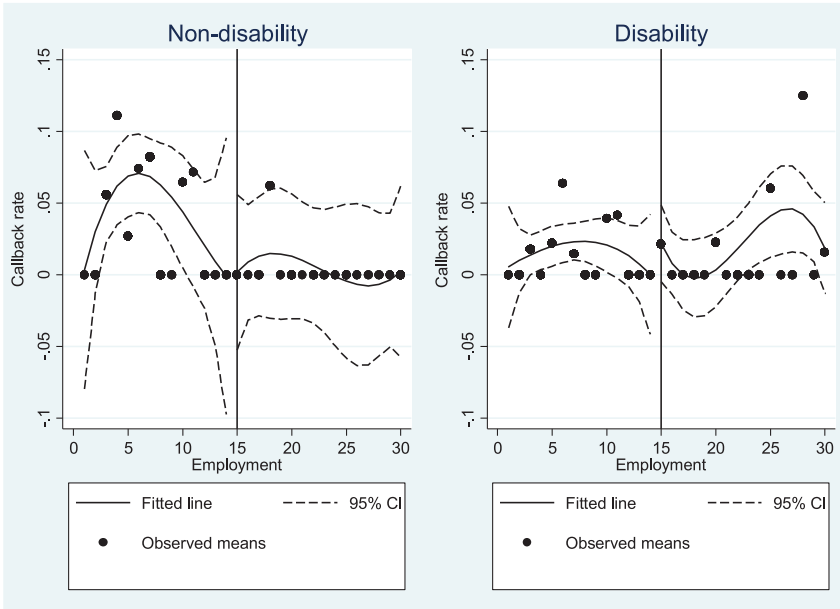
Figure 1A. Rate of Employer Interest Relative to ADA Threshold

increases in employer interest at the ADA threshold can be observed when we double the optimal bandwidth (column (4)), the change is similar for disability and non-disability applicants, and no other changes indicate noteworthy effects of either the ADA or state DDLs at the coverage thresholds.

We ran a third RD model that includes both the ADA and state thresholds with employment splines at each threshold, plus disability interactions with the law and employment variables, and controls for employer characteristics. The disability interaction with ADA or state DDL coverage directly tests whether the change in employer response at the coverage threshold differs between disability and non-disability applicants. The results for this specification (not presented but available from the authors) show that the coefficients on interactions of disability with ADA or DDL coverage are small and none are strong enough to reject a zero effect. This outcome indicates no clear change in employer behavior with respect to disability applicants at the point of the coverage threshold.

Therefore, the RD results do not show a change in employer responses at the point of the coverage thresholds, and the DD results indicate more callbacks for disability applicants among ADA-covered employers. These results can be visualized in Figures 1A and 1B and Figures 2A and 2B, which show the patterns of response by number of employees, based on specification (2) above with the addition of observed means at each level of employment. As shown in Figures 1A and 1B, the fitted lines indicate high response to non-disability applicants among very small-scale

Figure 1B. Callback Rate Relative to ADA Threshold



Note: Based on polynomial models reported in Table 8, columns (1) and (5).

employers, but the response declines as the number of employees approaches the ADA threshold of 15 employees. By contrast, the fitted lines for disability applicants are fairly flat below the threshold. Taken together, these results indicate that very small-scale employers are especially likely to favor non-disability applicants relative to disability applicants, but the likelihood of a response converges for disability and non-disability applicants for employers near the coverage threshold. It is possible that employers just under the threshold anticipate ADA coverage with further growth, which would obscure the effects of the ADA under the RD design.¹⁶

The patterns of response around the state DDL thresholds in Figures 2A and 2B do not point to any effects of the state DDLs on employer response for either disability or non-disability applicants, which is consistent with the results on state DDLs in Tables 6 to 8.

Overall, the results from our analysis of the laws suggest a possible positive effect of ADA coverage on the relative likelihood of callbacks for applicants with disabilities, but no clear effects of state DDLs.

¹⁶The RD tests will be biased if some employers decide to remain under the ADA threshold to avoid coverage, resulting in an uneven density of firms around the threshold (McCrary 2008). The density pattern in these data goes against that possibility, as fewer firms are just under the ADA threshold ($n = 65$ with 13 or 14 employees) than right at the ADA threshold ($n = 135$ with 15 employees).

Figure 2A. Rate of Employer Interest Relative to State Law Threshold

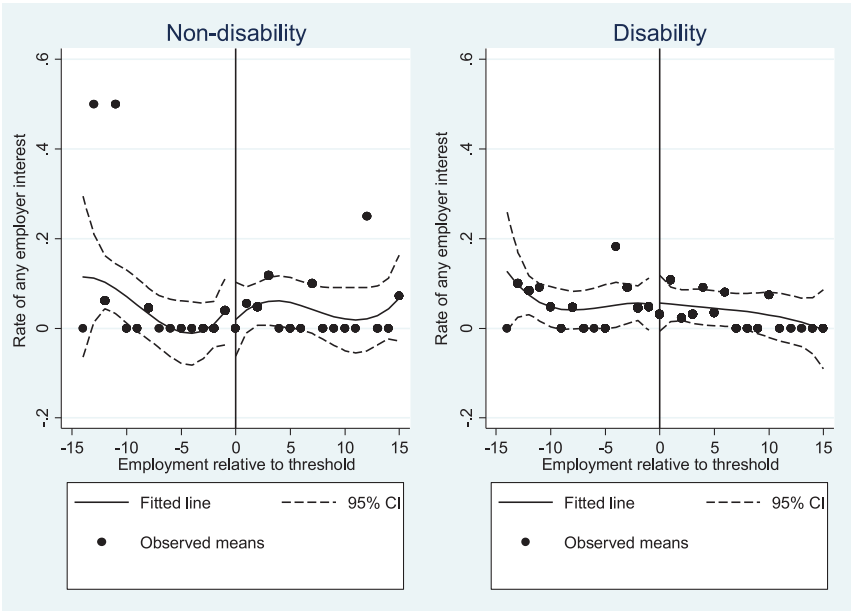
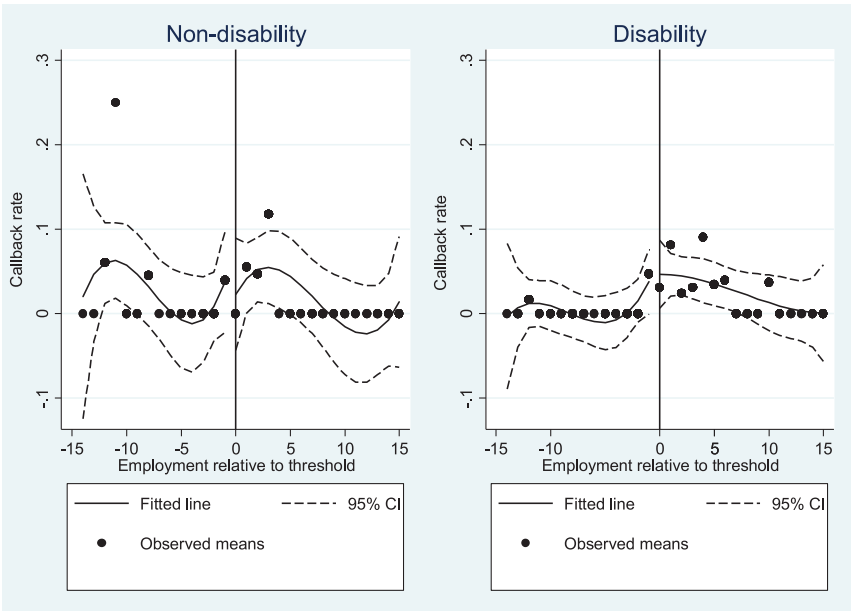


Figure 2B. Callback Rate Relative to State Law Threshold



Note: Based on polynomial models reported in Table 8, columns (1) and (5).

Discussion

Applicants with SCI and applicants with Asperger's both received fewer expressions of employer interest than did applicants without disabilities. Since the résumés indicated that the applicants were well qualified and the applications were identical in every way except for disability disclosure, this finding strongly indicates that disability status affects employer hiring intent.

The disability gap was concentrated among experienced applicants. One possible explanation is that employers paid closer attention to applications that indicated more experience, since these applicants would receive higher pay and have more responsibilities, and employers may expect or envision longer-term commitments. The employers may have been more likely to read the cover letters of the experienced applicants and consequently be aware of their disability status. The much smaller disability gap among novice applicants may result from fewer employers spotting the mention of a disability in the application material.

It is also possible, however, that employers were equally aware of the disability status of novice and experienced applicants, and that disability played a stronger role in employer decisions regarding experienced applicants. Employers may have viewed experienced applicants with disabilities as "riskier" because of concerns over absenteeism, productivity, health, insurance costs, or customer or coworker reactions. These concerns could also exist for novice applicants, but be magnified for experienced ones because of the higher pay, greater work responsibilities, and tenure expected with more-experienced applicants. This result ultimately casts doubt on the idea that higher qualifications can overcome the disadvantages of disability (in contrast to the findings on returns to education in Hollenbeck and Kimmel [2008]).

The finding that employers with fewer than 15 employees are less likely than larger-scale employers to express interest in applicants with disabilities raises important questions about disability accommodations and anti-discrimination laws. Given that small employers are not subject to the ADA, one possible inference is that small employers are engaging in discrimination and that the ADA constrains similar discriminatory behavior by medium and large employers. The story is complicated, however, by the lack of clear changes in employer responses at the ADA employment threshold (although the ADA may be affecting behavior of those just under the threshold), and by consideration of state DDLs since there is little difference in employer responses between small employers that are and are not covered by state laws. This latter result may be caused by a lack of knowledge of state laws among small employers, whereas the federal ADA is much better known.¹⁷ Large employers are more likely to have robust HR departments that will be aware of the ADA and state requirements, and may be

¹⁷Lack of knowledge about state DDL thresholds is very plausible given that in searching through state laws, we found several states in which the employment coverage threshold was difficult to ascertain. In fact, we found conflicting information among websites.

more likely to have prior experience in hiring and working with people with disabilities, so they are more comfortable in considering applicants with disabilities.

Concern over accommodation costs is another possible reason for small employers' lower interest in applicants with disabilities. Other survey evidence indicates that small employers are slightly more likely than medium or large employers to cite actual accommodation costs (although not uncertainty over accommodation costs) as a challenge in employing people with disabilities (Domzal et al. 2008: 13). It is unlikely, however, that concern over accommodation costs is an important factor in our results. Employers would have to make similar accommodations for novice and experienced employees (e.g., installing a wheelchair ramp for people with SCI). If accommodation costs were an important factor, lower interest in novice as well as experienced applicants with disabilities would have been evident. In addition, there was not a strong difference between small employers in states with DDLs requiring accommodations and those in states without such laws. To the extent that concerns over accommodation costs nonetheless play a role in employer decisions, small employers may be less aware of resources on how to make disability accommodations and how to access available government subsidies.

Although our results point to the potential role of discrimination in hiring decisions, we are very limited in identifying whether it is likely to be taste-based or statistical discrimination. Consistent with the interpretation by Bertrand and Mullainathan (2004: 1010) in their study of racial differences, our findings that advanced credentials are less beneficial for applicants with disabilities does not fit well with models that use group membership as a proxy for unobservable skills, since added credentials should be an especially valuable signal of skills for a disadvantaged group. Whereas other statistical discrimination models explain the lower returns to credentials based on the idea that employers' perceptions of observable signals may be less precise for disadvantaged groups, the credentials we establish in this study are easily verifiable. A finding that lends some support to taste-based discrimination is the similarity of results for people with SCI and Asperger's, which could be explained by statistical discrimination only in the unlikely case that the perceived levels of unobservable skills were the same for both disabilities.

Several other results warrant discussion. First, note that the disability gap is concentrated among closely held companies and does not appear to exist among publicly held companies. This finding may reflect greater visibility of publicly held companies, which makes them more sensitive to publicity and outside pressure, and, consequently, less likely to engage in discrimination.

Second, note that federal contractor status appears to have a positive effect on any expression of employer interest—although not callbacks for interviews—for applicants with disabilities. This finding may reflect the effect of federal government guidelines on hiring people with disabilities,

which stipulate that federal contractors provide affirmative action for workers with disabilities.¹⁸ To the extent that the federal guidelines are having an effect, they appear to be merely erasing the disability gap in employer interest displayed by other closely held companies, rather than causing contractors to display greater interest in applicants with disabilities than in those without disabilities.

Our third finding of note regards government employers. Government is often encouraged to be a model employer in hiring from disadvantaged groups. The disability gap is smaller among government employers than among private employers—and a zero gap cannot be statistically rejected—but no clear evidence supports the idea that government is leading the way in encouraging applicants with disabilities.

Finally, note that our results are consistent with an experimental study that found that accounting firms discriminate in favor of physically attractive candidates for internship positions (Kantor, Shapir, and Shtudiner 2015). The attractive candidates were perceived as more likely to possess essential traits for success in accounting, even in small firms in which accounting interns do not deal regularly with clients and “beauty plays no functional role” (*ibid.*: 5). This finding is consistent with earlier work on beauty in the labor market (e.g., Hamermesh and Biddle 1994). A similar dynamic could be at work with regard to disability, in which accounting firms devalue or minimize potential success of applicants based on personal characteristics that do not in fact reflect productivity.

There are several potential limitations to our study. We do not know how many employers read the cover letters and were aware of the disability status of the applicant. To the extent that employers failed to read the cover letters, attributable perhaps to reliance on software that screens out some applicants (Weber 2012), their oversight will decrease the role of disability in the decision process and the estimated effects of disability, so our estimated gaps may be seen as lower bound estimates.

In addition, note that ours is a study of the effect of revealing a disability in an initial application to a potential employer. The revelation does not reflect the effects of disability that are either disclosed or learned by the employer in another way later in the hiring process.

Furthermore, though we can confidently say that applicants with disabilities are less likely to attract employer interest, we cannot clearly ascribe this outcome to discrimination. Even though the applicants were well qualified and the cover letters stated that the disability does not interfere with job performance as an accountant, employers may have been concerned about the productivity of the applicants with disabilities, perhaps especially for more senior positions in which accountants would be expected to engage with clients. This view might be explained by, for example, concerns about physical accessibility when people with SCIs have to travel to client offices,

¹⁸Accessed at <http://www.dol.gov/odep/topics/FederalContractorRequirements.htm> (June 4, 2016).

or concerns over the ability of people with Asperger's to consistently have positive social interaction with clients. Apart from the issue of productivity, employers may have been concerned about accommodation costs and/or difficulty in terminating employees with disabilities under the ADA and state DDLs. It may be that many smaller employers were not already accessible and would have needed to install a ramp and make other renovations for applicants with spinal cord injuries. The same pattern of lower interest among small employers, however, exists for applicants with Asperger's, who would not require such accommodations. It is also noteworthy that legal accommodation mandates and employment protections do not seem to be a deterrent since employer interest is not clearly affected by state laws and is, if anything, slightly higher among those covered by the ADA's accommodation mandate and employment protections.

It is possible that the comparisons by experience level are affected by the names chosen for experienced and novice applications, since experience level remained fixed for each name. Experience level was, however, assigned randomly to the names, and we have no reason to suspect any bias, particularly in the disability comparisons, because disability status was rotated through the names.

A final caveat is that the sample design was restricted to well-qualified male applicants for accounting positions, and the results may not be fully generalizable to other groups, including women, people with other types of disabilities, people without advanced degrees, and those applying for other occupations (e.g., service and blue-collar jobs in which people with disabilities are overrepresented). As noted earlier, however, accounting is similar to other white-collar occupations in the prevalence of disability and the size of disability pay gaps, making it likely that our results can be generalized to other white-collar jobs, at least.

Conclusion

The main result of our study is that employers express less interest in job applicants with disabilities than in otherwise-similar job applicants without disabilities, even for positions for which the disability should not affect the ability to do the job. Combined with similar experimental evidence from France and Belgium (Ravaud et al. 1992; Baert 2016), the pattern of results points to employer bias in hiring as an important piece of the disability employment puzzle and helps to explain the low employment rate of people with disabilities. In particular, our similar findings for applicants with two distinct types of disabilities support the idea that bias—and not the productivity or accommodation concerns that differ by disability type—accounts for lower employer interest in applicants with disabilities.

A second key result is that the disability gap in employer interest is concentrated among experienced applicants, indicating that higher qualifications do not erase the labor market disadvantages associated with disability.

A third key result is that the disability gap is concentrated among small private firms that are not covered by the ADA, which points to positive effects of the ADA on the recruitment of employees with disabilities. It is not certain that the ADA is responsible for helping close the gap among covered employers (since there is no relative improvement at the point of the coverage threshold, and there may be other productivity- or accommodation-related reasons for the reluctance of small employers to pursue applicants with disabilities). We can draw a clear causal connection only if firm size and ADA coverage are randomly assigned, which obviously is not possible (this problem also bedevils studies of minimum wage effects). Nonetheless, the evidence indicates, at a minimum, that the ADA does not appear to discourage employers from hiring people with disabilities. This finding goes against arguments that the accommodations mandates in the ADA and state laws contribute to lower hiring of people with disabilities.

Our results suggest there is potential for public policies and private initiatives to reduce employer reluctance to hire people with disabilities. The lack of strong effects for state DDLs may reflect that employers are not sufficiently aware of state laws, particularly small employers without HR infrastructure. Efforts to publicize these laws and educate employers may make a difference.

Our findings also point to the value of further research into employer behavior regarding employees and job applicants with disabilities. Such research should include additional field experiments that help draw stronger causal links between disability and employment outcomes. This study is focused on two disabilities and the accounting profession, and though we have minimized threats to internal validity, an open question remains as to whether and how these results apply to other types of disabilities and jobs. Extending this research would be particularly valuable because, unlike the profiles constructed here, most people with disabilities do not have college degrees, and they are overrepresented in service and blue-collar jobs. It would also be valuable to explore differences across jobs by the levels of communication, teamwork, and customer interaction that are required. Such a focus could shed light on the potential roles played by customer discrimination, employee discrimination, and communication difficulties that may impair productivity (depending on the nature of the disability). Further research could also assess types of social cognition in hiring behavior, which can help explain the lower interest in applicants with disabilities and identify specific policies or practices that can reduce this problem. Questions that might be addressed include: How do employers react when they are confronted with an application from a person with a disability? What are the steps in their reaction? What are the relationships among their beliefs, values, attitudes, and hiring behaviors? What is the role of written disability policies, training, and support from top management? What policies and practices can reduce inequities and inefficiencies stemming from disparities attributable to labor market discrimination? Such research

not only helps us to understand the barriers faced by people with disabilities but also helps to identify the most effective policies and practices to increase their employment opportunities.

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