

How Disability Shapes Labor Force Participation and Employment Differentially by
Educational Attainment & Disability Type

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Abstract

Objective: I conducted a descriptive analysis of how disability shapes labor force participation and employment differentially by educational attainment and disability type.

Methods: I used the American Community Survey, 2015 ($N=1,504,947$) to conduct linear probability models exploring the relationship between disability and labor force participation and disability and employment, including interaction effects for education and age.

Results: I found that having a disability is associated with a decrease in the probability of labor force participation ($b = -0.34$) and employment ($b = -0.05$) when controlling for gender, race/ethnicity, family income, and age. This relationship is moderated by education and age, where higher levels of education are associated with increased probabilities of labor force participation and employment. When differentiated by disability type, education moderates the relationship between disability and labor force participation for all disability types, but education only moderates the relationship between disability and employment for those with cognitive, physical, and mobility related disabilities.

Conclusion: Having a bachelor's degree is associated with a 30.68% higher probability of labor force participation and a 26.84% higher probability of employment among those in the labor force than having some college, which may make higher education a pivotal intervention point. Additionally, the relationship between disability and labor force participation, and disability and employment varies by disability type, as does the role of education. Future research and interventions should therefore differentiate by disability type as well.

How Disability Shapes Labor Force Participation Differentially by Educational Attainment & Disability Type

Employment is considered a key predictor of happiness and independence for those with disabilities and is increasingly linked to well-being. Employment has far reaching benefits including psychosocial benefits (such as self-esteem increases, and reductions in hospital admissions) and important implications for identity development for those with cognitive or emotional disabilities (Becan et al., 2013; Bal et al. 2017; Saavedra, López, & Cubero, 2015a; Saavedra, López, & Cubero, 2015b). Compared to their non-working counter parts, those with disabilities who are employed are less likely to receive governmental assistance and more likely to report high attachment (Mattila-Holappa et al., 2016). Employment is also considered an important determinant of health for those with disabilities (Benach et al., 2014).

Despite the important benefits of employment, individuals with disabilities often struggle to find or keep employment (Kelly, 2013; Langley, Muller-Schwefe, Nicolaou, Liedgens, Pergolizzi, & Varrassi, 2010; Lastuka & Cottingham, 2016; Stern, 1989). The Americans with Disabilities Act (ADA) of 1990 protects the fundamental civil rights of those with disabilities—specifically prohibiting employment discrimination (United States Department of Justice Civil Rights Division). However, in the more than 20 years since the implementation of the ADA there has been little change in the low employment rate among those with disabilities (Bjelland, Burkhauser, von Schrader, & Houtenville, 2011). The employment rate for those with disabilities is 33.5%, compared to 76.3% for those without disabilities (Erickson, Lee, & von Schrader, 2012). For those with physical disabilities, capability, supervisor attitudes, self-efficacy, and assertiveness influence their capacity to work (Bal et al., 2017). Individuals with visual impairments are also less likely than the general population to participate in the labor

force, and those who do are far more likely to be unemployed (Kelly, 2013). For individuals with disabilities, both education and duration of disability are positive predictors of employment (Lastuka & Cottingham, 2016).

For both those who have a disability during their education process, and those who become disabled after entering the work force, education may play a key role in their ability to work. Therefore, developing education-based interventions for those who become disabled after entering the work force to increase their education and thereby the depth and variety of their employment possibilities may hold promise. Furthermore, a descriptive understanding of how education and labor force participation are associated may provide evidence to support increased funding to break down barriers to education that those with disabilities face and have policy implications for the public-school system in the United States. The literature strongly suggests that people with disabilities achieve lower levels of education than those without (Blackorby & Wagner, 1996). If providing additional support and resources to students with disabilities could lead to higher levels of labor force participation (and therefore less government assistance), education may be an important intervention point.

The literature on the positive benefits of employment for individuals with disabilities is comprehensive, as is the understanding of the overall relationship between education and employment opportunities for the general population. Despite the apparent importance of both education *and* ability to work for those with disabilities, few existing studies look descriptively at how the relationship between disability and ability to work differs by educational attainment. With changes to the American healthcare system on the horizon, as well as looming budgetary changes for many sectors of the government, there is a pressing need to address this gap in the literature. Furthermore, demographic changes in the population in addition to increased return of

veterans who may suffer from non-apparent disabilities, indicate that the share of the U.S. work force with disabilities will increase seriously in the coming years (von Schrader, Malzer, & Bryère, 2014). Gaining a deeper understanding of how the association between disability and labor force participation differs by educational attainment level could be crucial in informing policies regarding the barriers to education that people with disabilities face throughout the education process and the potential effectiveness of developing education-based interventions for those who become disabled after completing their education. This study seeks to explore how the relationship between disability and labor force participation varies for those with different levels of educational attainment.

Research Objectives

1. How does disability shape labor force participation differentially by education?
2. How does disability shape labor force participation differently across disability types (difficulties with hearing, vision, cognition, ambulatory, self-care, and independence)?
3. How does disability shape employment for those in the labor force differentially by education?
4. How does disability shape employment among those in the labor force differently across disability types?
5. How are the relationships between disability and labor force participation, and between disability and employment, moderated by age?

Background

The literature has found that those with disabilities are less likely to participate in the work force, and that for those who do participate in the workforce they are more likely than their able-bodied counterparts to be unemployed. Those with disabilities face discrimination during hiring,

as well as numerous barriers to keeping employment (such as transportation for those with sensory or physical disabilities or inconsistent attendance for those with emotional or mental disabilities). I hypothesize that the relationship between disability and labor force participation will vary based on educational attainment. Literature has found that in the general population the relationship between education and ability to work is positive, whereby higher levels of educational attainment are associated with higher levels of income and increased probability of labor force participation. Some previous studies have found this to be true for those with disabilities as well. One study found that educational attainment, as well as length of time with disability, is a strong predictor of labor force status among those with disabilities (Lastuka & Cottingham, 2016).

There are several hypothesized mechanisms through which increased educational attainment is believed to influence the relationship between disability and ability to work—including increased access to resources, and greater job variety and feasibility of career change. One study found that higher levels of education are associated with greater levels of resource access for those with disabilities—including healthcare, legal recourse, and adaptive services (Zimmerman, Woolf, & Haley, 2015). These resources allow people with disabilities to be higher functioning in society (for example through assistive technology), defend their right to work, and increase ease of transportation and other key processes necessary for employment.

In the general population, people with higher levels of education have greater variety in possible employment paths and higher wages (Carnevale, 2009). For people with disabilities, I hypothesize that the increased variety of employment options associated with higher education can be particularly important as it allows people to find work not requiring high physical demands. Furthermore, the increased access to resources and variety of possible employment

increases the feasibility of career change for those who become disabled after joining the workforce. This is particularly true in the current information economy, where lower wage jobs that require less education tend to involve more physical labor and higher wage jobs that require more education tend to involve less physical labor.

Methods

To explore how the relationship between disability and labor force participation is differentiated by educational attainment, I used data from the 2015 reporting of the American Community Survey (ACS). The ACS is measured at the household level, with the primary householder completing information on all persons residing in the household ($N=2,305,707$). The sample has a 95.8% response rate, partly due to legal mandates to complete the survey. The ACS is collected by the United States Census Bureau annually. This analysis focused on a subset of working aged participants (aged 25-65) ($n=1,504,947$). This age selection was chosen because most people have completed their education by age 25 and the average retirement age in the United States is 65. This age range targets those who are of “working age” because I am interested in how disability shapes work ability. The ACS has a large sample size, includes a dynamic definition of disability that includes disability type, and reports on my focal variables.

My focal variables are labor market activity, disability, and education. Labor market activity is operationalized through variables on labor force status and employment. Employment status refers to those who are in the labor force, whereas those who are absent from the labor force are not employed and are not seeking employment. The primary predictor variable is disability. Instead of a dichotomous yes/no disability question, the ACS uses a series of questions focusing on disability type. If a respondent responded in the affirmative to any of the six disability types they are considered to have a disability. Disability types are hearing, vision,

cognition, ambulation, self-care, and independent living. Educational attainment is measured by highest grade attained. Individual grade-level attainments were collapsed into groups and coded as dummy variables (middle, some high school, high school, some college, bachelors, and graduate/professional degree). Statistical controls include race, gender, age and family income. Race categories are non-Hispanic Whites, non-Hispanic Blacks, non-Hispanic Asians, and Hispanics. Gender was coded as male or female. Age is measured in years. Last, family income is measured in thousands of dollars.

Analytic Strategy

To describe how disability shapes work ability differentially by educational attainment I ran linear probability regression models. The analysis was also conducted using a logit model, and the outcomes were substantively the same, therefore the linear probability model results will be presented here for ease of interpretation. My analysis uses the equation $p(\text{labor force}) = \beta_0 + \beta_1(\text{disability}) + \beta_2(\text{educational attainment}) + \beta_3(\text{Black}) + \beta_4(\text{Asian}) + \beta_5(\text{Hispanic}) + \beta_6(\text{male}) + \beta_7(\text{family income}) + \beta_8(\text{age}) + \beta_8(\text{disability} * \text{educational attainment})$. This analysis was run with several sub-population groups—this allows me to describe how the estimate of the disability effect on labor force participation changes across educational groups. The analysis was then run with employment as the outcome variable instead of labor force participation.

At first, the initial model explores the bivariate relationship between disability and labor force status in Table 2. I subsequently introduced both educational attainment (as a series of dummy variables with high school degree as the reference category) and demographic characteristics as control variables to see how the relationship between disability and labor force status persisted. Table 3 re-estimates the coefficient for disability based on the educational

attainment of participants maintaining the demographic controls. Next, I used linear probability models to explore how the relationship between disability and labor force participation varies by disability type in Table 4, comparing the coefficient for disability by disability type. For example, Model 1 will compare those with disabilities to those without, whereas Model 2 will compare those with cognitive disabilities to those without disabilities and Model 3 will compare those with self-care disabilities to those without disabilities. Table 5 through Table 7 will run the same models as Table 2 through Table 4 predicting employment among those in the labor force in place of labor force participation.

Results

I begin my analysis with a discussion of the demographic characteristics of the sample, as seen in Table 1. Ten percent of the sample has a disability, of those who have a disability 39% have a cognitive disability, 18% have self-care related disabilities, 35% have a mobility disability, 53% have a physical disability, 18% have a vision disability, and 21% have a hearing disability. For the entire sample 78% of participants participate in the labor force, compared to 39% of those with disabilities. Furthermore, for those who are in the labor force 74% of the sample are employed compared to 34% of those with disabilities. Deep inequality in both labor force participation and employment for those in the labor force exist for those with disabilities. This inequality varies by race, as seen in Figure 1. While Blacks and Whites without disabilities have the same proportion participating in the labor force, for those with disabilities there is a six-percentage point gap in labor force participation. On the other hand, Asians have the lowest labor force participation among those without disabilities (79%) and the highest labor force participation among those with disabilities (45%). The gap in labor market participation exists

for all races between abled bodied and disabled individuals, however for Blacks the gap is particularly large.

Educational attainment varies between the sample and those with disabilities, with the sample having higher educational attainment than those with disabilities. A greater share of those with disabilities have lower levels of education, while a greater share of those who are able-bodied have higher levels of education. Both the sample and those with disabilities are 49% male, however the racial/ethnic breakdown varies between the sample and those with disabilities, as seen in Table 1. Those with disabilities are, on average, slightly older than the sample (50.12 compared to 44.96) and come from families with less money.

Labor Force Participation

Having a disability is associated with, on average, a 0.43 decrease in the probability of labor force participation, as seen in Model 1 of Table 2. Even after controlling for demographic characteristics this decrease in probability persists, as seen in Model 2 of Table 2. Having a disability is associated with, on average, a 0.34 decrease in the probability of labor force participation net of race, gender, family income, and age. Model 3 of Table 2 shows that the decrease in the probability of labor force participation among those with disabilities is 0.48 when including an interaction effect between disability and educational attainment. The interaction term ($b_{disability*education} = 0.06$) shows that the effect of disability on the probability of reporting labor force participation is significantly different at different levels of education. Each increase in educational attainment level is associated with a 0.06 increase in the probability of reporting labor force participation for those with disabilities. When including an interaction effect for age, the coefficient for disability is -0.22, and the interaction effect shows that for every additional year of age the decrease in the probability of reporting labor force participation

decreases by -0.0025, meaning that older people with disabilities are less likely to report labor force participation than those at younger ages. The relationship between disability and labor force participation remained highly significant (at more than 99.9% confidence).

The coefficient for disability varied by educational attainment, as seen in Table 3. For those whose highest grade-level attainment is less than a high school degree and for those whose highest grade-level attainment is having a high school degree having a disability is associated with (on average) a decrease of 0.38 in the probability of labor force participation net of demographic characteristics. For those with some college having a disability is associated with a decrease of 0.33 in the probability of labor force participation (on average, net of gender, race, income, and age). For those with higher levels of education, the reduction in the probability of labor force participation is smaller. Having a bachelor's degree is associated with a decrease in the probability of labor force participation of 0.23, and having a graduate or professional degree is associated with a decrease of 0.19. For those with lower levels of education the decrease in the probability of labor force participation is higher than those with higher levels of education, as seen in Figure 3.

The probability of labor force participation varied by disability type as well, as seen in Table 4. Having a mobility ($b = 0.50$), physical ($b = 0.46$), or cognitive ($b = 0.43$) related disability is associated with a larger decrease in the probability of labor force participation. Having a vision ($b = 0.17$) or hearing ($b = 0.11$) related disability is associated with a lowest decrease in the probability of labor force participation on average net of controls. The interaction effect terms for disability and education remained significant across all models, indicating that the relationship between disability and labor force participation was differentiated by education all disability types.

Employment Status

Among those who do participate in the labor force having a disability is associated with a decrease of 0.08 in the probability of reporting employment, as seen in Table 5. After introducing controls for educational attainment, gender, race/ethnicity, family income and age the effect persists, with having a disability being associated with a decrease of 0.05 in the probability of reporting employment. After including an interaction effect examining the interaction between disability and education the decrease in the probability of reporting employment increases to 0.09, as seen in Model 3 of Table 5. The effect of having a disability on the probability of reporting employment is different for different levels of education, similar to the effect of having a disability on the probability of reporting labor force participation. Including an interaction effect for age and disability, the coefficient for disability is -0.16, and the interaction term is 0.002, meaning that for each additional year of age the decrease in the probability of reporting employment decreases by 0.002.

Table 6 explores how the relationship between disability and reporting employment varies by educational attainment. Having lower levels of education is associated with larger decreases in the probability of reporting employment for those with disabilities ($b_{less\ than\ HS} = -0.08$, $b_{HS\ degree} = -0.06$, $b_{some\ college} = -0.05$). Having higher education degrees is associated with a lower decrease in the probability of reporting employment for those with disabilities ($b_{bachelors\ degree} = 0.04$, $b_{grad/professional} = 0.03$). Last, Table 7 explores how the relationship between disability and employment is different for different disability types. Having mobility or cognitive related disabilities is associated with larger decreases in the probability of reporting employment among those in the labor force ($b_{cognitive} = -0.20$, $b_{mobility} = -0.12$) compared to those with physical and self-care ($b_{physical} = -0.07$,

$b_{self-care} = -0.06$). Having vision or hearing related disabilities is associated with the lowest decrease in the probability of reporting employment for those with disabilities who are in the labor force ($b_{vision} = -0.02$, $b_{hearing} = -0.01$). The significance of the coefficient for disability, as well as the effect size, is smaller for vision, hearing, and self-care related disabilities than for cognitive, physical, or mobility related difficulties—although having a disability was associated with a significant decreased probability of employment among those in the labor force for all types of disabilities. The interaction effect for disability and education was significant for those with cognitive, physical, and mobility related difficulties (with an increase in educational attainment being associated with an increase in the probability of reporting employment) but not for those with self-care, vision, and hearing related difficulties.

Discussion

Having a disability was associated with a decrease in the probability of labor force participation ($b_{disability} = -0.48$), and for those who are in the labor force, having a disability was associated with a decrease in the probability of reporting employment ($b_{disability} = -0.09$). The decrease in the probability of labor force participation for those with disabilities varied by educational attainment—with little difference between those with some high school, a high school degree, or some college. Compared to those with a high school degree, those with a bachelor's degree were 42.06% more likely to participate in the labor force. The coefficient for disability varied by disability type as well; having a vision or hearing difficulty was associated with the smallest decrease in both the probability of labor force participation and the probability of employment for those in the labor force. Having a physical, mobility, or cognitive related disability was associated with the largest decrease in the probability of labor force participation and having a cognitive or mobility related disability was associated with the largest decrease in

the probability of reporting employment among those in the labor force. The relationship between disability and labor force participation was significantly moderated by educational attainment, where an increase in educational attainment is associated with an increase in the probability of labor force participation for all disability types. However, when looking at the probability of employment the interaction term for disability and education was only significant for cognitive, physical, and mobility related disabilities—meaning an increase in educational attainment is not significantly associated with the probability of employment for those who have a disability among those in the labor force.

This study provides three key contributions to the literature. First, I found that having a bachelor's degree is associated with a 30.68% increase in the probability of reporting labor force participation compared to having some college. This indicates that a pivotal area for future research and possible intervention to improve the probability of labor force participation for those with disabilities is during college. For those with lower levels of education there is not a large change in the coefficient for disability between educational attainment groups. Furthermore, among those in the labor force those who have a college degree are 26.84% more likely to report employment than those with some college. This descriptive analysis suggests promise for policy reforms aimed at increasing resources to support those with disabilities in achieving higher levels of education, such as improved support networks on university campuses and college counseling specifically for those with disabilities at the high school level.

Second, this study illustrates how different disabilities are associated with labor force participation differently. This strongly indicates that future research on the relationship between disability and labor force participation should differentiate by disability type. For all types of disability, having a disability is associated with a significant decrease in the probability of labor

force participation and employment among those in the labor force. Education moderates the relationship between disability and labor force participation for all disability types, where increases in educational attainment is associated with a higher probability of labor force participation among those with disabilities. Surprisingly, for those with self-care, vision, and hearing related disabilities an increase in educational attainment was not associated with the probability of employment for those who have disabilities in the work force. The differences in the decrease in the probability of labor force participation associated with different disabilities and the differing role of education in moderating that relationship indicates that different mechanisms may be at play, which indicate different interventions and policy changes may be needed to help support the integration of those with disabilities into the work force.

Third, having a disability is associated with a far larger decrease in the probability of reporting labor force participation than in the probability of reporting employment among those in the labor force. The difference in this “disability penalty” between labor force participation and employment supports the theory of involuntary labor market exit—where vulnerable populations are more likely to exit the labor market after long periods of employment due to lack of opportunity or options (Flippen & Tienda, 2000). Perhaps, those with disabilities who cannot find employment may drop out of the labor force, suppressing the effect of having a disability on reporting employment. If researchers or policy makers are looking merely at employment, not at labor force participation *and* employment, they may underestimate the effect of having a disability on ability to work and underestimate social and economic inequality.

Limitations

Despite these important implications, this study has several limitations. First, there is an issue of selection, where perhaps those who attain higher levels of education may be different

from those who attain lower levels of education. Those who attain higher levels of education may have more resources, more support, more educational access, or less severe symptoms for their disability. This study captures both the direct and indirect effects of educational attainment on labor force participation for those with disabilities. While this study's findings cannot imply causation, they still paint a more in-depth descriptive portrayal of these different subpopulations (by educational attainment and disability type) that are often ignored and collapsed into one group. While gaining a deeper understanding of how labor force participation is associated with disability for different disability types and those with different educational attainment levels can inform interventions and policies, and probe for areas of continued research, future causal studies are needed to determine how disability causes decreased labor force participation. This can be accomplished by using a study design that minimizes the selection threat—such as randomizing participation into an educational intervention. Second, the ACS relies on self-reporting data, which is vulnerable to threats to interval validity. If participants underreported absence from the labor force or mis-reported disability these estimates may be conservative. Third, this study does not account for disability severity or length of disability due to data limitations, which have been proven to influence labor force participation status.

While limitations on these findings exist, this study suggests the promise of educational interventions for those with disabilities—particularly for those with high school degrees and some college. Future research should further explore who is most likely to benefit from educational interventions—specifically looking at disability severity and length of disability. Furthermore, causal studies should be conducted to evaluate educational interventions for those with disabilities and evaluate policy reforms aimed at increasing resources and support for the pursuit of higher levels of educational attainment. Increasing labor force participation for those

with disabilities remains a difficult and complex task, but one with great promise. Developing education-based interventions for those who become disabled after entering the work force to increase their education and thereby the depth and variety of their employment possibilities is a key next step. Furthermore, a deeper understanding of how education and labor force participation are associated may provide evidence to support increased funding to break down barriers to education that those with disabilities face and have policy implications for the public-school system in the United States. People with disabilities achieve lower levels of education than those without. If providing additional support and resources to students with disabilities could lead to higher levels of labor force participation (and therefore less government assistance), education may be a pivotal intervention point. Educational interventions for those with disabilities have the potential to reduce the financial burden of the Social Security Administration's SSI and SSDI benefit programs by increasing the probability of labor force participation, and increase independence and self-sufficiency for those with disabilities.

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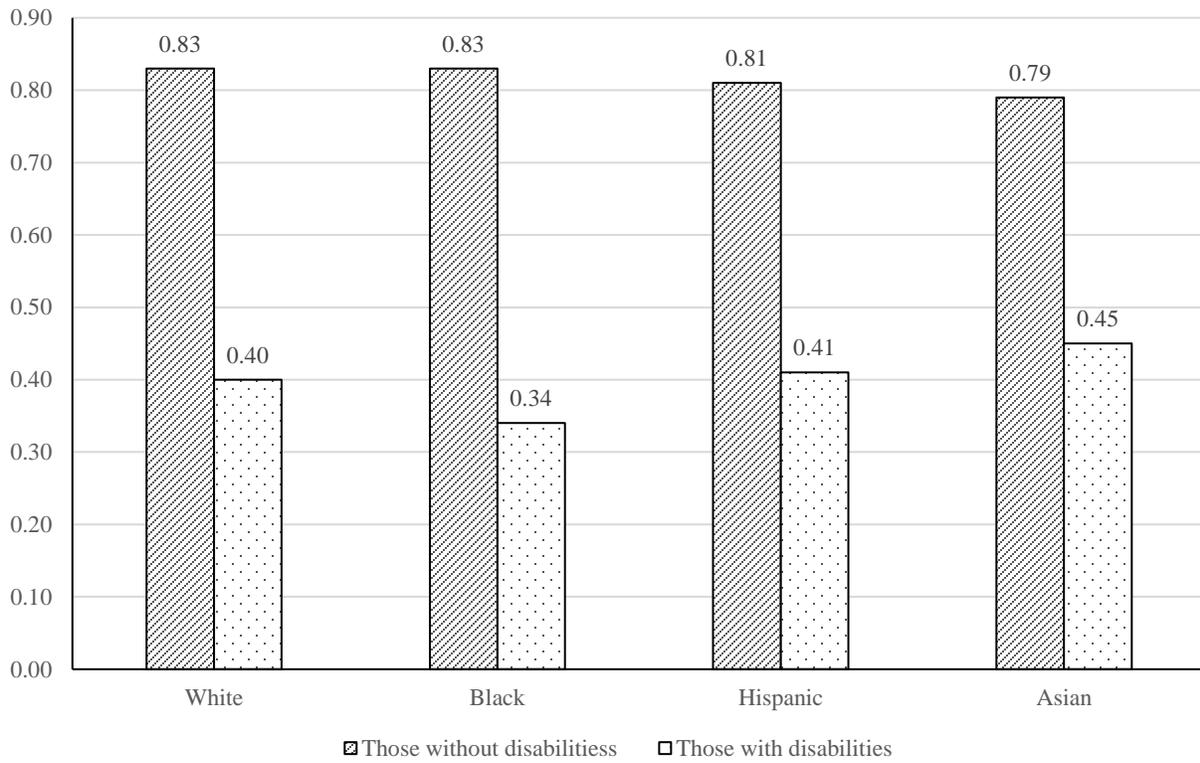
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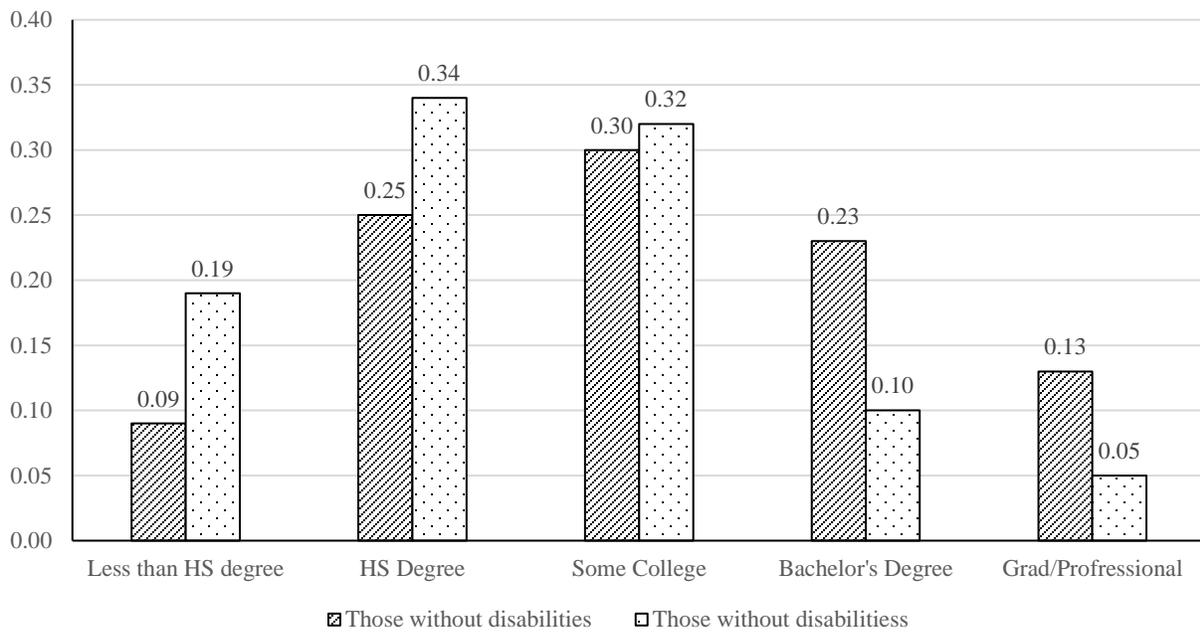
Figures

Figure 1. Proportion of those with and without disabilities who participate in the labor force.



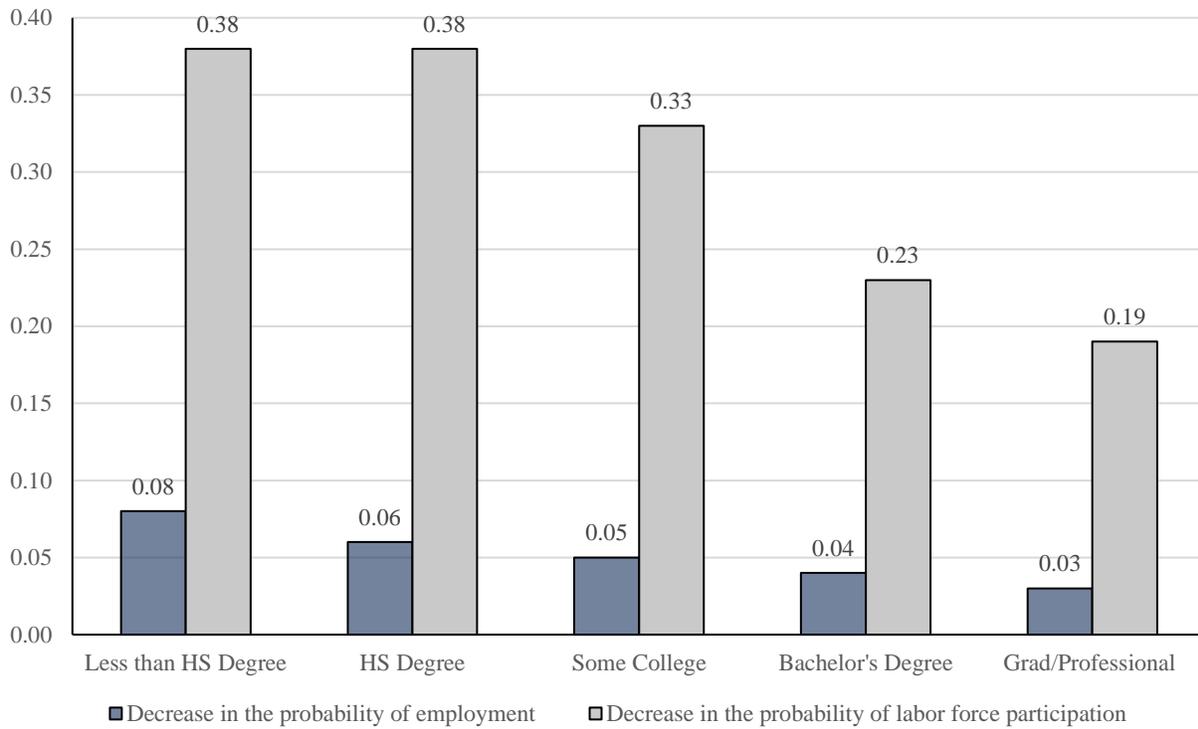
Notes. Data from American Community Survey, 2015. All observed differences are significant at the 95% level.

Figure 2. Proportion of those with and without disabilities by educational attainment.



Notes. Data from American Community Survey, 2015.

Figure 3. Decrease in the probability of labor force participation for those with disabilities controlling race, gender, age, and family income differentiated by educational attainment.



Notes. Data from American Community Survey, 2015. Differences significant at the 95% level, except between “Some High School” and “High School Degree”.