Developmental Disabilities and Socioeconomic Outcomes in Young Adulthood

Fernanda C. Queirós, PhD[a]
George L. Wehby, PhD[b,c]
Carolyn T. Halpern, PhD[d]

ABSTRACT

Objective. We assessed the associations between developmental disabilities and indicators of socioeconomic outcomes (i.e., educational attainment, employment status, occupation type, subjective perception of socioeconomic status [SES], income, and wage rate) among young U.S. adults aged 24–33 years.

Methods. We used data from the National Longitudinal Study of Adolescent Health (n=13,040), a nationally representative study of U.S. adolescents in grades 7–12 during the 1994–1995 school year. Young adult outcomes (i.e., educational attainment, employment status, income, occupation, and subjective SES) were measured in Wave IV (2008 for those aged 24–33 years). Multivariate methods controlled for sociodemographic characteristics and other relevant variables.

Results. Nearly 12% of this sample presented with a physical or cognitive disability. Respondents with physical disabilities had lower educational attainment (odds ratio [OR] = 0.69, 95% confidence interval [CI] 0.57, 0.85) and ranked themselves in lower positions on the subjective SES ladder (OR=0.71, 95% CI 0.57, 0.87) than those without a physical disability. Compared with individuals without disabilities, young adults with a cognitive disability also had lower educational attainment (OR=0.41, 95% CI 0.33, 0.52) and, when employed, were less likely to have a professional/managerial occupation (OR=0.50, 95% CI 0.39, 0.64). Young adults with disabilities also earned less annually (−$10,419.05, 95% CI −$4,954.79, −$5,883.37) and hourly (−$5.38, 95% CI −$7.64, −$3.12) than their non-disabled counterparts.

Conclusion. This study highlights the importance of considering multiple developmental experiences that may contribute to learning and work achievements through the transition from adolescence to young adulthood.

[a]Federal University of Bahia, Functional Electrical Stimulation Laboratory, Department of Biomorphology & Study Group in Neuromodulation, Department of Neurosciences, Salvador-Bahia, Brazil

[b]University of Iowa, Department of Health Management and Policy, Iowa City, IA

[c]National Bureau of Economic Research, Cambridge, MA

[d]University of North Carolina at Chapel Hill, Department of Maternal and Child Health, Chapel Hill, NC

Address correspondence to: Fernanda C. Queirós, PhD, Federal University of Bahia, Study Group in Neuromodulation, Av. Tancredo Neves, 620 - Edf. Mundo Plaza, Torre Empresarial - Sala 1905, Salvador, Bahia 41820-020 Brazil; tel. +55-71-9117-2871; e-mail <nandaqueiros@gmail.com>.

Disabilities are prevalent conditions that result from interactions among health problems, environment, and personal factors, and can impose a large burden on affected individuals, their families, and society. Developmental disabilities, which can be defined as conditions caused by physical or mental impairments occurring by age 22, are of particular interest given their potential long-term impact on well-being.[1]

Several metrics suggest that the prevalence of disabilities is increasing, by as much as 7 percentage points (11.7% to 18.7%) from 1970 to 2005.[2] The increasing trend in prevalence is similar across various age groups[1–4] and is partially explained by the aging of the U.S. population.[1,3–5] Other contributing factors include advances in neonatal and pediatric care, which have significantly improved the survival of infants at greater risk of developing a disability, such as very preterm and low birthweight children.[6,7]

Adulthood is typically characterized by the achievement of specific milestones related to human capital accumulation, such as completing one's education, getting a full-time job, and getting married or having a child.[7] The transition into adulthood can be challenging for any adolescent, but for adolescents with disabilities and their families, this transition may be more difficult.[6] Disabilities can adversely affect multiple socioeconomic outcomes, including educational achievement and attainment, employment, income, and other socioeconomic status (SES) indicators.[8]

Education is a key determinant of economic performance that also affects long-term SES and quality of life.[8] Children and adolescents with physical and cognitive disabilities typically have more limited access to formal education than their non-disabled peers.[9–11] Also, individuals with disabilities have poorer employment outcomes than their non-disabled peers, as reflected in lower-paying jobs, lower occupational status, and higher unemployment rates.[6,7,12,13]

Differences in learning and work performance for adults with disabilities compared with their non-disabled peers may be decreasing, as suggested by a 2012 review on transition to adulthood.[10] However, the performance of individuals with disabilities on these socioeconomic outcomes continues below ideal levels.[11,12] A better understanding of socioeconomic achievements around the transition to adulthood for individuals who have lived with disabilities is needed to identify policies and early life interventions that can improve the outcomes of affected individuals.[9]

Previous research on developmental disabilities has major limitations. First, adolescents and young adults are the least studied age group for any type of disability,[14] and their needs are poorly understood and not adequately considered in educational programs and policies.[15] Longitudinal studies using nationally representative samples to examine the transition of adolescents with disabilities into adulthood are few, and those that do exist have limitations, such as a focus on students in special secondary education and exclusion of individuals with severe disabilities.[2,15–17]

Using nationally representative data, we examined how early life disabilities are associated with human capital accumulation in young adulthood, focusing on educational attainment, employment status, occupation, income, wage rate, and subjective perception of social status. Given that previous studies have repeatedly reported that individuals with disabilities have worse performance on these outcomes, we hypothesized that (*1*) young adults with physical and cognitive disabilities would demonstrate lower educational and economic achievements compared with individuals without disabilities and (*2*) individuals with physical disabilities alone would perform better on these outcomes than individuals with cognitive disabilities. The second hypothesis was stated to allow the discussion on the differences of the impact of cognitive and physical disabilities on one's life.

METHODS

Data

The National Longitudinal Study of Adolescent Health (Add Health) is a nationally representative sample of U.S. adolescents in grades 7–12 (12–19 years of age) in the 1994–1995 school year. To date, four waves of in-home interviews have been completed. Add Health study design and procedures are detailed elsewhere.[18] Adolescents with disabilities were oversampled by design. We used information from in-home and parent interviews from Wave I (1994–1995) and Wave IV (2008) for participants with valid Wave IV sampling weights (n=14,800). The Figure provides a detailed breakdown of the analytical sample construction. Applying the exclusion criteria yielded a final sample size of 13,040.

Measures

Developmental disabilities. Add Health adopted the World Health Organization framework for classification of health and disability.[19] Such a framework has been recommended for research about disabilities to increase comparability across studies and improve applicability of research findings for decision makers.[7] Respondents were grouped into one of three categories depending on disability status at the Wave I interview: no disability (referent), physical disability

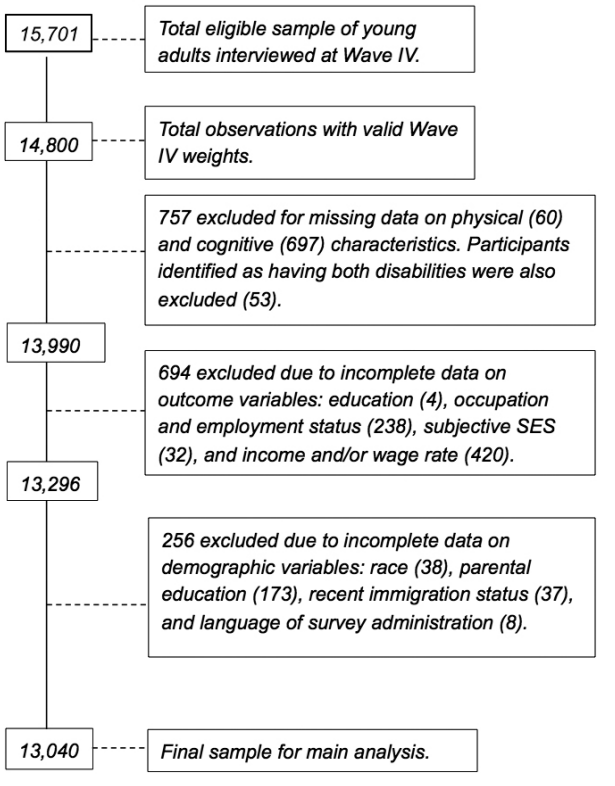
only, and cognitive disability only. All the disability group indicators were included simultaneously in the same regression model.

Physical disability. Cheng and Udry developed a Physical Disability Index (PDI) for the Add Health sample based on a combination of parents' and adolescents' responses at Wave I. For this study, we collapsed their three categories representing a physical disability into one binary category due to very small cell sizes for two of these categories. The mental ability of individuals identified by the PDI as having a physical disability was not statistically different from the average scores observed for the non-disabled group.[20]

Cognitive disability. Cognitive disability was measured in Add Health during Wave I using the Add Health Picture Vocabulary Test (AHPVT), a condensed version of the revised Peabody Picture Vocabulary Test (PPVT). The PPVT is a test of hearing vocabulary and correlates moderately with intelligence tests, such as the Stanford-Binet Intelligence scale (r=0.72) and the Weschler Intelligence Scale for Children (r=0.72).[21] AHPVT test scores are age-standardized to a mean of 100 and a standard deviation of 15, as in the PPVT. Cut points used here parallel those used in intelligent quotient classification strategies.[22]

We used AHPVT scores as a proxy for cognitive ability, consistent with previous studies. Respondents were initially assembled into five categories of scores: <70, 70–79, 80–89, 90–109, and ≥110.[23,24] The cognitive disability group included individuals with scores <80. For the same reason described for the physical disability measure, we grouped scores <80 into one disability category (1) and scores ≥80 into a non-disabled category (0). Thus the "cognitive disability" definition in this study refers to adolescents with low scores on this particular test of oral vocabulary. As acknowledged by Haydon et al., language skills influence test performance.[24] We followed their strategy to minimize this measurement bias by controlling for recent immigration status and language of survey administration.

Figure 1. Detailed construction for the 2008 National Longitudinal Study of Adolescent Health sample on socioeconomic outcomes among U.S. young adults aged 24–33 years



[a]Our sample of respondents presenting both cognitive and physical disabilities was very small (*n*=53), precluding our ability to run analytical comparisons for this sample separately.

SES = socioeconomic status

Young adult outcomes. All outcome variables were taken from Wave IV, when respondents were aged 24–33 years. Educational attainment was the highest level of education reported by respondents and was represented by an ordinal variable with four categories.[25] Employment status was a dichotomous indicator of working ≥10 hours per week. Annual earned income was measured as a continuous variable for all pretax earnings in the previous year. In the few cases where respondents answered "don't know," a follow-up question requested selection of an income range that reflected the respondent's best estimate; the midpoints of the 10 possible income ranges were used in these cases. Also, for those respondents working at the time of the Wave IV interview, the wage rate was computed by dividing total monthly earnings by the total number of hours worked in a month.

Current or most recent occupation was coded according to a variation of the Standard Occupational Classification and Coding Structure (SOC).[26] We originally planned to adopt the classification by Kirchhoff et al.,[27] which is based on the SOC. They excluded military occupations when creating three categories: professional/managerial (which includes 10 SOC groups), service/blue collar non-physical (derived from 12 SOC groups), and service/blue collar physical (derived from the same 12 SOC groups of the previous category). Add Health also asked participants to describe the level of physical activity required to perform their jobs. However, information about physical activity was missing for a large number of respondents (*n*=2,447) due to

a planned skip in the questionnaire. Thus, following the same rationale as Kirchhoff et al., but not using the subclassification of physical or nonphysical, we classified respondents into two categories, represented by the binary variable professional/managerial and service/blue collar.

Finally, we measured subjective perception of own SES (subjective SES) by asking respondents to mark where they stand relative to other people in the U.S. on a 10-step ladder, where 1 is the lowest rank and 10 is the highest rank. This measure is based on the MacArthur scale of subjective social status, which is strongly linked to several SES domains.[28,29] The variable was recoded to have three categories because categories 1, 2, 8, 9, and 10 had small cell sizes when tabulated against the disability variable.

Control variables. Covariates of interest were background variables that were both theoretically and empirically relevant to the study outcomes and may influence disability risk.[6,17,30,31] Age at Wave IV was measured in years and computed at the time of the interview. All other covariates were measured at Wave I. Gender was a dichotomous variable. We created dummy variables for four categories of race/ethnicity.[32] We based socioeconomic background of the respondent's family on highest educational attainment for either parent coded using the same categories as respondent education.[25] Recent immigration status was a dichotomous variable, as was language of survey administration.[24] Family structure was represented by dummy variables equivalent to three categories (two biological parents; two parents, ≥1 not biological; and "other" family structure, with two biological parents as the referent category).[32]

Analysis

We first examined bivariate associations among disabilities, covariates, and educational/vocational outcomes. We used Pearson's chi-square to compare frequency distributions and adjusted Wald tests to compare mean income and wage rate. We used logistic regression to model dichotomous outcomes (employment status and occupation), controlling for the aforementioned covariates. We analyzed education and subjective perception of SES as ordinal variables using ordinal logistic models.[33] Due to their positive skewed distribution, we examined income and wage rate using generalized linear models, with a gamma family and log link. All models fit the data well. We analyzed the data using Stata® version 11.2[34] and used survey commands to adjust for Add Health's complex survey design and to apply sampling weights to obtain national population estimates.

RESULTS

Characteristics of participants and bivariate associations with disability

Among the 13,040 participants in the study sample, 11.8% had some level of a developmental physical or cognitive disability. Nearly 5.9% of respondents were classified as having a physical disability and 6.0% as having a cognitive disability only. Table 1 presents sociodemographic characteristics of the study population broken down by disability category.

The socioeconomic measures of individuals with disabilities were different from those without disabilities (Table 2). When compared with individuals without disabilities, young adults with physical disabilities were less likely to have ≥college degree (23.8% vs. 33.2%), be currently employed (77.9% vs. 83.0%), work in a managerial occupation (34.5% vs. 38.1%), and rank themselves at higher levels of the SES ladder (14.3% vs. 19.0%). Their mean annual working income and wage rate were also lower than their non-disabled peers ($37,798 vs. $39,298 annually and $18.4 vs. $19.1/hour, respectively).

Respondents with cognitive disabilities, compared with those without a disability, were less likely to have ≥college degree (11.7% vs. 33.2%), be currently employed (77.9% vs. 83.0%), work in a managerial occupation (21.1% vs. 38.1%), and rank themselves at higher levels of the SES ladder (18.6% vs. 19.0%). Their mean annual working income and wage rate were lower than their non-disabled peers ($27,305 vs. $39,298 annually, and $13.4 vs. $19.1/hour, respectively). Overall bivariate tests indicate significant associations between disability status and all sociodemographic characteristics, except for age, and all human capital outcomes (Table 2).

Multivariate analysis

Table 3 presents the results for multivariate models for education, employment status, occupation, and subjective SES, and Table 4 shows the results for income and wage rate. All models were adjusted for age, biological sex, race/ethnicity, highest parental education, family structure, language of survey administration, and recent immigration status. Adjusting for all covariates, young adults with disabilities fared significantly worse on most outcomes compared with respondents without disabilities.

Table 1. Association between sociodemographic characteristics and disability status for U.S. young adults aged 24–33 years included in the 2008 National Longitudinal Study of Adolescent Health[a]

		Gender		Race/ethnicity				
	Age, in years Mean (SD)	*Male Percent*	*Female Percent*	*Non-Hispanic white Percent*	*Non-Hispanic black Percent*	*Hispanic Percent*	*Other Percent*	*Recent immigrant Percent*
Total (*n*=13,040)	28.79 (0.12)	50.1	49.9	69.8	14.0	11.4	4.8	1.9
Disability status								
None (*n*=11,497)	28.75 (0.12)	50.4	49.6	72.2	13.3	10.0	4.6	1.1
Physical (*n*=765)	28.91 (0.14)	49.2	50.8	78.2	9.2	8.5	4.1	0.8
Cognitive (*n*=778)	29.28 (0.23)	45.6	54.4	18.4	31.7	40.5	9.5	17.6
Difference *p*-value	0.10	<0.01		<0.001				<0.001

	Highest parents' education Percent				*Family structure Percent*			
	<High school	*<High school graduate/ GED*	*Some education beyond high school*	*≥College graduate*	*Two biological parents*	*Other two parents*	*Other*	*Non-English interview*
Total (*n*=13,040)	15.3	33.2	28.5	23.1	55.7	17.2	27.1	1.4
Disability status								
None (*n*=11,497)	13.3	33.8	29.1	23.8	56.9	17.1	26.0	0.9
Physical (*n*=765)	14.3	27.8	33.3	24.6	47.9	18.7	33.4	1.0
Cognitive (*n*=778)	50.8	27.6	12.2	9.5	43.0	16.4	40.6	10.6
Difference *p*-value	<0.001				<0.001			<0.001

[a]Weighted proportions and means to yield national probability estimates for individuals in grades 7–12 during the 1994–1995 school year are presented. The difference column presents results of chi-square analyses (categorical variables) or adjusted Wald test (continuous variables), both adjusted for survey design.

SD = standard deviation

GED = general educational development

Physical disability

Respondents with physical disabilities had lower educational attainment levels (adjusted odds ratio [AOR] = 0.69, 95% confidence interval [CI] 0.57, 0.85) and lower ranking on the subjective SES ladder (AOR=0.71, 95% CI 0.57, 0.87) (Table 3). However, respondents with a physical disability were not statistically significantly different from the non-disabled group regarding employment status, occupation type, average annual income, or wage rate (data not shown).

Cognitive disability

Compared with individuals without disabilities, young adults with a cognitive disability had lower educational attainment (AOR=0.41, 95% CI 0.33, 0.52) and, when employed, were less likely to have a professional/managerial occupation (AOR=0.50, 95% CI 0.39, 0.64) (Table 3). Unlike respondents with a physical disability, respondents with a cognitive disability, when employed, earned $10,419 less annually (95% CI −$14,954.73, −$5,883.37) and $5.38 less hourly (95% CI −$7.64, −$3.12) (Table 4). Individuals with cognitive disabilities were not statistically different from those without a disability in terms of employment status or subjective perception of SES (data not shown).

DISCUSSION

We found that individuals with disabilities, especially those with cognitive disabilities, were disadvantaged when compared with their non-disabled peers on several of these outcomes. Both respondents with physical and cognitive disabilities had lower education levels when compared with individuals without disabilities, consistent with findings from previous studies showing that individuals with any type of disability were less likely than their non-disabled peers to achieve age-appropriate education.[15,17,30] However, the association was more pronounced for cognitive disability ($p<0.001$). Respondents with a cognitive disability were less likely to be in professional/managerial occupations, had lower mean incomes, and had lower

Table 2. Association between educational and economic characteristics and disability status for U.S. young adults aged 24–33 years in the 2008 National Longitudinal Study of Adolescent Health[a]

		Developmental disability category			
Educational/vocational/ economic outcomes	*Overall (n=13,040) Percent or mean (SD)*	*No disability (n=11,497) Percent or mean (SD)*	*Physical (n=765) Percent or mean (SD)*	*Cognitive (n=778) Percent or mean (SD)*	*Difference p-value*
Highest personal education					<0.001
<High school	8.6	7.7	10.4	22.0	
High school graduate/GED	16.9	16.1	17.1	31.1	
Some education beyond high school	43.0	43.1	48.7	35.2	
≥College graduate	31.6	33.2	23.8	11.7	
Currently employed					<0.001
Yes	82.5	83.0	77.9	77.9	
No	17.5	17.0	22.1	22.1	
Mean income	$38,645.98 ($992.51)	$39,298.00 ($1,034.92)	$37,798.31 ($2,274.05)	$27,305.04 ($1,660.71)	<0.001
Mean wage rate/hour	$18.82 (0.47)	$19.13 (0.50)	$18.39 (1.05)	$13.35 (0.77)	<0.001
Occupation					<0.001
Managerial	37.1	38.1	34.5	21.1	
Blue collar	62.9	61.9	65.5	78.9	
Subjective SES[b]					<0.001
Steps 1–3	19.7	19.1	25.0	23.8	
Step 4–6	61.6	61.9	60.7	57.6	
Step 7–10	18.7	19.0	14.3	18.6	

[a]Weighted proportions and means to yield national probability estimates for individuals in grades 7–12 during the 1994–1995 school year are presented. The sample size for income and wage rate included only respondents currently working (n=10,801). The difference column presents results of chi-square analyses (categorical variables) or adjusted Wald test (continuous variables), both adjusted for survey design.

[b]Subject perception of own SES on a 10-step ladder, where 1 = lowest rank and 10 = highest rank.

SD = standard deviation

GED = general educational development

SES = socioeconomic status

wage rates than those without a disability. Our findings for the cognitive disability group are consistent with those seen in other studies, and also indicate that when working, individuals with cognitive disabilities occupy lower-paying jobs and are more likely to be engaged in blue-collar occupations when compared with their non-disabled peers.[12,15,35]

When compared, individuals with physical disabilities

Table 3. AORs of educational and vocational status among U.S. young adults aged 24–33 years with and without a disability included in the 2008 National Longitudinal Study of Adolescent Health[a]

Outcome	*Physical disability[b] AOR (95% CI)*	*Cognitive disability[b] AOR (95% CI)*
Highest education	0.69 (0.57, 0.85)[c]	0.41 (0.33, 0.52)[c]
Employment status	0.75 (0.54, 1.03)	0.77 (0.54, 1.08)
Occupation	0.84 (0.66, 1.09)	0.50 (0.39, 0.64)[c]
Subjective SES	0.71 (0.57, 0.87)[c]	1.01 (0.79, 1.30)

[a]Results of binary and ordered logistic regression models comparing outcomes between young adults with a disability and those without a disability (reference categories: college graduate, employed, currently working, managerial occupations, and highest position on the SES ladder), controlling for sex, age, race/ethnicity, and highest parental education.

[b]The referent group is the group with no disabilities.

[c]Statistically significant at p<0.01

AOR = adjusted odds ratio

CI = confidence interval

SES = socioeconomic status

Table 4. Effects of disabilities on mean income and wage rate for U.S. young adults aged 24–33 years participating in the 2008 National Longitudinal Study of Adolescent Health[a]

Outcomes	*Physical disability[b] Mean (95% CI)*	*Cognitive disability[b] Mean (95% CI)*
Income	−$2,030.42 (−$6,011.69, $1,950.86)	−$10,419.05 (−$14,954.73, −$5,883.37)[b]
Wage rate/hour	−$1.08 (−$3.02, $0.85)	−$5.38 (−$7.64, −$3.12)[b]

[a]Results of marginal effects estimated by generalized linear models, controlling for gender, age, race/ethnicity, highest parental education, family structure, recent immigration status, and language of survey administration using a subpopulation of workers (n=10,801).

[b]The referent group is the group with no disabilities.

[c]Statistically significant at $p<0.001$

CI = confidence interval

had better socioeconomic outcomes than those with cognitive disabilities. Respondents with physical disabilities had vocational and economic outcomes similar to those without a disability. Nonetheless, in adjusted models, educational outcomes and subjective perception of own SES were significantly worse for young adults with physical disabilities when compared with their non-disabled peers. Subjective SES does not perfectly correlate with other indicators of SES,[28,29] but its observed correlation with education in our sample indicates the important role of education in the self-perception of status in society.

Although it has been noted that, overall, individuals with disabilities are underrepresented in the workforce,[15] our findings suggest that individuals with physical disabilities may have different experiences than individuals with cognitive disabilities and, thus, may require different types of support. In contrast to other studies, neither disability group differed from the referent group in terms of employment status when other variables were controlled.[15,17] In a post-hoc sensitivity analysis, we observed that the predictors most strongly associated with employment status were family structure and parental education. The association between disability and employment was statistically significant when these controls were not included in the models. Studies have shown how family economic background is a strong predictor of economic performance later in life,[36] and our findings suggest that family characteristics may explain some of the differences in economic achievement between individuals with and without disabilities, particularly in employment status.

A study investigating labor market discrimination against women with disabilities concluded that functional limitations influence employment status but not earnings.[37] The authors speculated that those who are employed meet the requirements to be in the job. Thus, their limitations would not affect their productivity or their earnings. A similar mechanism could explain the findings for both genders in the physical disability group in our sample whose earnings were not significantly different from the referent group. Conversely, observing no differences in employment status, occupation type, average annual income, and wage rate between those with physical disabilities and the non-disabled comparison group may be partly a limitation of the sample we studied. Specifically, the group with physical disabilities was restricted to those with mobility impairments at Wave 1. We were unable to differentiate between individuals who had permanent mobility impairments and those who had mobility limitations from which they could fully recover in the long term.

In contrast with previous research using longitudinal data,[17] our sample included individuals with varying levels of impairment. The large and diverse Add Health sample was an important strength of our analyses. Combining the strengths of this dataset (i.e., prospective, longitudinal, and nationally representative) with a focus on adolescents with disabilities will help the field to better understand the impact of developmental disabilities through the life course.

Limitations

Our study was subject to several limitations. Despite the advantage of having individuals with different levels of impairment represented in our sample, we were not able to stratify our analysis by level of severity due to sample size restrictions. Second, we observed that family background variables had large effects on study outcomes. Future studies should consider using within-family analysis to investigate associations between disabilities and human capital accumulation. Our measure for cognitive disability is a proxy for intelligence. Ideally, different facets of cognitive functioning would be directly measured to accurately classify cognitive disabilities and their potential for differential impact. This limitation may explain why we

observed no differences in employment status between individuals with cognitive disabilities and those without disabilities. Finally, our measure of employment status represented individuals who were working ≥10 hours/week. Full-time status may yield different results from those observed in our multivariate analysis. Despite the limitations of our disability groups, most of our findings have been shown in previous research.

CONCLUSION

Our study makes the following contributions to understanding the transition of individuals with disabilities into adulthood: (*1*) educational outcomes are worse for individuals with disabilities, despite current policies such as the 1990s Individuals with Disabilities Education Act;[38] and (*2*) individuals with a physical disability are more similar to those without a disability in several outcomes. Hence, groups with physical disabilities should be considered separately from groups with cognitive disabilities, especially when assessing policy impact. It is necessary to identify whether, and how, existing policies are helping to reduce inequalities by improving the capability of individuals with disabilities to successfully transition into adulthood.

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