

# How Do Working-Age People With Disabilities Spend Their Time? New Evidence From the American Time Use Survey

Priyanka Anand · Yonatan Ben-Shalom

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**Abstract** We use the American Time Use Survey to examine the extent to which adults with disabilities—defined using both the new six-question sequence on disability and the traditional work-limitation question—spend more time on health-related activities and less time on other activities than those without disabilities. We find that men and women who both reported a work limitation and responded “yes” to any of the questions in the six-question disability sequence spend approximately 40 to 50 more minutes per week, respectively, on health-related activities. We also find that most working-age men and women who report a disability work fewer hours per day than men and women without disabilities. The largest difference is for men and women who report both types of disability; these individuals spend, on average, 5 fewer hours per day in paid work than men and women without disabilities. On average, most of the decrease in paid work time is offset by more time spent on leisure activities (defined as activities that provide direct utility, such as entertainment, social activities, attending recreational events, and general relaxation) and sleeping, which is likely due to these being default activities for individuals whose medical issues and environment constrain them from participating in other activities.

**Keywords** Disability · Time use · Paid work · Leisure · Health-related activities

## Introduction

Not surprisingly, many people with disabilities need more time than those without disabilities to meet their health needs and conduct routine activities. Walter Oi, a well-known economist who is also blind, has even suggested that “disability steals time,” leaving people with disabilities with less time for vital activities, such as work and social engagement (Oi 1991). If we consider time devoted to education and training as an input into the production of human capital (Grossman 2000), then people with disabilities may also have less time for developing human capital than those without

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P. Anand · Y. Ben-Shalom (✉)  
Mathematica Policy Research, 1100 First Street, N.E., 12th Floor, Washington, DC 20002, USA  
e-mail: yben-shalom@mathematica-mpr.com

disabilities. However, the extent to which disability increases the time working-age adults spend on health-related and routine activities, thus leaving less time to participate in major life activities and in developing human capital, is not well understood.

Knowledge of how people with disabilities use their time is limited because most relevant studies use small samples or narrowly defined disability populations. For example, in a study that compared 99 older individuals having neurodegenerative disorders with a matched control sample of 40 individuals without such disorders, Lomax et al. (2004) found that the former spent more time on self-care and less time in every other activity domain, including paid and domestic work. A larger study of disability and time use that used data from the Canadian General Social Survey to compare men with spinal cord injuries with men without such injuries found that men with injuries spent more time on leisure, personal care, and sleeping, and less time in paid work than men without injuries (Pentland et al. 1999). Winkler et al. (2005) found similar results in a comparison of individuals with severe traumatic brain injury with the general Australian population. Whether the findings from these studies would generalize to individuals with a more broadly defined disability is unclear.

Our study uses the American Time Use Survey (ATUS) to gain a better understanding of the association between disability and how individuals use their time. More specifically, we examine the extent to which adults with disabilities (broadly defined) require more time than those without disabilities to take care of their health needs and complete everyday activities—such as personal care, housework, and shopping—and hence have less time for paid work. We also look at other time-use categories, including sleeping, eating, personal care, and leisure (defined as activities that provide direct utility, such as entertainment, social activities, attending recreational events, and general relaxation), for people with and without disabilities. Table 1 provides a complete list of the time-use categories we examine, including examples of activities that fall under each category. It is unclear, *a priori*, whether people with disabilities would spend more or less time than those without disabilities in activities other than those related to health needs and paid work. A person with disabilities who works fewer hours than a person with similar characteristics but without disabilities will have more time available for these other activities, unless the time spent taking care of health needs is greater than the relative reduction in work hours. Thus, it seems perfectly plausible that we would find people with disabilities spending more time in leisure activities or in housework, for example, than their counterparts without disability who spend more time in paid work.

Several studies have used ATUS data to examine time spent by individuals on health-related self-care activities either for themselves or others. Russell et al. (2007) found that 11.3 % of adults spent a significant part of the day (an average of almost 2 hours) engaged in health-related self-care activities for themselves or others, but they did not distinguish between those with and without disability. Jonas et al. (2011) found that 6.6 % of Americans age 25 or older engaged in health-related self-care activities each day and that nonworking people with disabilities reported health-related self-care four times as often as employed individuals, with a mean reported time of 3.2 hours per week. In a review of 22 studies about time use by people with chronic illness, their caregivers, or both (two of which used ATUS data), Jowsey et al. (2012) concluded that patients and their informal caregivers may be spending more than 2 hours per day on health-related activities. In a study of older Australians, Jowsey et al. (2013) found that time spent on health-related activities increased with the number of chronic conditions.

**Table 1** Grouping scheme for time-use categories

Category	Subcategory	Activity Codes	Examples
Sleeping		0101	Sleeping, falling asleep, waking up
	Eating and Drinking	11 1811	Taking a lunch break, waiting for a table
Personal Care	Grooming	0102	Bathing, shaving, brushing hair
		0104	Having sex, cuddling partner in bed
	0105	Being involved in a personal accident	
	0199		
	0805 1801 180805	Getting a haircut, having nails done	
Health-Related Activities	Personal care emergencies	0103	Taking medicine, exercising or therapy for medical reasons, dressing a wound
		0804 180804	Having inpatient or outpatient treatment, talking to/with a doctor
	Health-related self-care	1301 130301 130401 181301	Playing baseball, dancing, travel related to sports, exercise or recreation
Participating in Sports, Exercise, or Recreation	Medical and care services	0501 1805	At main job or other job, attending conferences for main job or other job
		0502	Attending social event with coworkers, talking with clients at social event
Paid Work	Working	0503	Preparing food or drink for sale, singing for pay, babysitting for pay
		0599	
Housework	Other income-generating activities	02 1802	Interior cleaning, laundry, food and drink preparation
		07 1807 160104	Grocery shopping, purchasing gas, buying/ordering clothes
Purchasing Goods and Services	Consumer purchases	08 excluding 0804 0805	Doing banking, meeting with a lawyer, using veterinary services, purchasing house
	Professional services	1808 excluding 180804 180805	

Table 1 (continued)

Category	Subcategory	Activity Codes	Examples
Child Care Activities	Household services	160105 09 1809 160106	Hiring a cleaning service, dropping off clothes at the dry cleaners
	Government services	1001 100381 1099 181081 160108	Talking to police officer, meeting social worker
	Household children	0301 0302 0303 180381	Bathing household children, helping household children with homework
Adult Care Activities	Nonhousehold children	0401 0402 0403 180481	Bathing nonhousehold children, helping nonhousehold children with homework
	Household adults	0304 0305 180382	Bathing household adult, helping household adult with the computer
	Nonhousehold adults	0404 0405 180482	Bathing nonhousehold adult, helping nonhousehold adult with the computer
Volunteer Activities		15 1815	Volunteering for fundraising, making phone calls, editing newsletters
Education		06 1806 160103	Attending class, listening to a lecture, taking an on-line course
Job Search		0504	Contacting employer, sending out resumes, preparing for an interview
Leisure Activities	Socializing, relaxing, and leisure	12 1812	Visiting with family or friends, watching TV, smoking, attending a party
	Attending sports/recreational events	1302 130302 130402 181302	Watching a sporting event, waiting related to attending a sporting event
Other Activities		All remaining codes not included above	

Notes: NEC = not elsewhere classified. Activities cover 24 hours of the day. All categories apart from sleeping include related travel (activity codes that begin with 18). Certain categories also include related telephone calls (activity codes than begin with 16). Examples are from the American Time Use Survey Activity Lexicon 2012 (Bureau of Labor Statistics 2012a).

Among recent studies, the two that are most similar to our study are Pagán (2013) and Meyer and Mok (2013). Pagán (2013) compared the time use of people with and without disabilities using a large sample (more than 32,000 observations) of individuals age 16 to 64 who responded to the Spanish Time Use Survey (conducted in the last quarter of 2002 and the first three quarters of 2003). Respondents were identified as having “disability” if they answered “yes” to the question, “Do you suffer from any chronic physical or mental illness or any chronic disability or problem?” The author found that people with disabilities spend less time than those without disabilities on market work and more time on household production, personal care, and leisure. Meyer and Mok (2013), whose analysis was part of an examination of the consequences of preretirement disability, used ATUS data and found that American male heads of household age 22 to 61 with disabilities spend less time than those without disabilities in paid work and more time using medical services, watching television, relaxing, and sleeping. The authors identified ATUS respondents as having “disability” if they responded positively to the work-limitation question in their matched record from the Annual Social and Economic Supplement of the Current Population Survey (CPS-ASEC): “(Do you/Does anyone in the household) have a health problem or disability which prevents (you/them) from working or which limits the kind or amount of work (you/they) can do?”

Our study is different in important ways from Pagán (2013) and Meyer and Mok (2013). First, we identify disability using the U.S. Census Bureau new six-question sequence on disability, which was first used in the 2008 American Community Survey (ACS), in combination with the traditional work-limitation question from the CPS-ASEC.<sup>1</sup> Combining the two disability measures is important: using either measure by itself would exclude many working-age people with disabilities and hence would lead to biased estimates of employment rates and other factors (Burkhauser et al. 2014a,b). As Altman (2013) argued, the two disability measures are conceptually quite different from each other. We account for these differences by differentiating, in the regression analysis, between those identified as having disabilities (1) according to both measures, (2) according to just the six-question sequence, and (3) according to just the work-limitation question. We thus highlight important differences in time-use patterns across these three groups of people with disabilities.

A second difference between our study and those of Pagán (2013) and Meyer and Mok (2013) concerns our sample population. Unlike Meyer and Mok, we examine time use by women as well as men. Pagán (2013) included both men and women but used a disability definition that focused (albeit quite vaguely) on chronic medical conditions, whereas our study distinguishes three different groups of people with disabilities, as explained earlier. Our study also uses different time-use categories: Pagán included broad categories (market work, household production, tertiary activities, and leisure), whereas the categories we include provide detail on health-related and daily routine

<sup>1</sup> The six-question disability sequence as it appears in the CPS is as follows: (1) Is anyone deaf or does anyone have serious difficulty hearing? (2) Is anyone blind or does anyone have serious difficulty seeing even when wearing glasses? (3) Because of a physical, mental, or emotional condition, does anyone have serious difficulty concentrating, remembering, or making decisions? (4) Does anyone have serious difficulty walking or climbing stairs? (5) Does anyone have difficulty dressing or bathing? (6) Because of a physical, mental, or emotional condition, does anyone have difficulty doing errands alone such as visiting a doctor's office or shopping? (Bureau of Labor Statistics 2012b).

activities. Finally, our study and Pagán's are also likely to reflect important differences between time use in Spain and in the United States.

## Data and Methods

### Defining Disability

Research on people with disabilities must start by defining what is meant by "disability." We use the International Classification of Functioning, Disability and Health (ICF) as a conceptual framework for defining disability. According to the ICF, which is emerging as an established conceptual framework for much disability research, an individual has a disability if she experiences a functional limitation as a result of the interaction between her health, personal characteristics, and environment (Jette 2009). A disability exists if the person has a decrease in the functionality of a body function or structure (an impairment), a decrease in the ability to perform an activity (an activity limitation), or a decrease in the ability to participate in basic social roles (a participation restriction). However, this is a very broad definition of disability that does not clearly distinguish those with disabilities from those without.

For practical purposes, we are constrained by the disability measures available for ATUS respondents. The disability measures available in ATUS data come from CPS interviews that were completed prior to the ATUS survey. As we describe in further detail later in the article, ATUS households are a subsample of CPS households. Since June 2008, the CPS Basic Monthly Survey component (CPS-BMS) has included a six-question disability sequence, which is primarily based on the ICF conceptual framework and was first introduced in the ACS; see Brault (2009). The six disability questions ask about physical, mental, or emotional conditions that cause serious difficulty with daily activities, including hearing; vision; concentrating, remembering, or making decisions; walking or climbing stairs; dressing or bathing; and doing errands alone, such as visiting a doctor's office or shopping (Bureau of Labor Statistics 2012b).

The CPS-BMS data, which are available for all ATUS respondents, do not include responses to the traditional work-limitation question. However, information on work limitations can be retrieved for those ATUS respondents who also completed the CPS-ASEC (also known as the "March CPS"). Because the work-limitation question has been included in CPS-ASEC since 1981, responses to this question can be retrieved for all years of the ATUS, starting in 2003 (the first year that the ATUS was administered) for ATUS respondents who completed CPS-ASEC.

As mentioned earlier, using either the six-question disability sequence or the work-limitation question by itself would exclude many working-age people with disabilities. Using CPS-ASEC data from 2010, Burkhauser et al. (2014b) estimated that 5.6 million noninstitutionalized civilians age 25 to 61 would be identified by the six-question disability sequence but not the work-limitation question, and that 5.0 million would be identified by the work-limitation question but not the six-question disability sequence. The authors also found that these two subsets of the population with disabilities (assuming the ICF-based conceptualization) differ substantially from each other in terms of employment and program participation.

To avoid dropping either of these important disability subsets, we identify ATUS respondents as having a disability if they responded “yes” to any of the questions in the six-question disability sequence *or* to the work-limitation question. To be able to use both measures of disability, we limit our analysis to ATUS respondents who completed the CPS-ASEC in the period 2009 to 2012.<sup>2</sup> An additional advantage of this approach is that it allows us to examine differences in time-use patterns for the three disability groups: those identified as having disability according to both measures, and those identified as having disability according to just one of the measures.

### Matched ATUS and CPS-ASEC Data

ATUS, sponsored by the Bureau of Labor Statistics (BLS) and conducted by the U.S. Census Bureau, is a cross-sectional survey representative of all persons age 15 or older living in U.S. households, not including active military personnel and institutionalized individuals (Bureau of Labor Statistics 2013a). The ATUS sample is drawn from CPS respondents, with CPS households becoming eligible for selection into the ATUS sample two months after completing their eighth and final CPS interview.<sup>3</sup> Of each CPS household selected for inclusion in the ATUS sample, one ATUS respondent is randomly selected from household members age 15 or older. ATUS respondents are then asked by telephone to recall how they spent their time from 4 a.m. of the previous day until 4 a.m. of the interview day. For each activity mentioned, the duration is recorded, and the activity itself is coded using a three-tier categorization system, resulting in a six-digit classification code for each activity. In addition, the ATUS data include the most recent CPS variables (which date from two to five months prior to the ATUS interview) for all members of the ATUS respondent’s household.

CPS-ASEC data, including responses to the work-limitation question, are available for those ATUS respondents who also completed the ASEC. The ATUS user’s guide (Bureau of Labor Statistics 2013a) provides detailed instructions on how to link the ATUS and CPS-ASEC data. Following these instructions, we were able to link CPS-ASEC data for about one-third of ATUS households; this match rate is expected given that only one-third of CPS households complete the CPS-ASEC. ATUS respondents with linked CPS-ASEC data completed the ATUS survey in months May–October. Thus, to the extent that seasonal effects exist, any time-use differences found between people with and without disability using the matched CPS-ASEC data accurately represent only the differences seen during those months.

Following Burkhauser et al. (2014b), we restrict the study population to working-age (25 to 61) civilians in order to mitigate the effects of schooling and retirement. Overall, 51,315 individuals responded to the ATUS in years 2009–2012. Of those, 10,580 were age 25 to 61 and had completed CPS-ASEC interviews that included both the work-limitation question and the six-question disability sequence. After excluding 167 respondents who completed the survey on a holiday and 8 who completed the

<sup>2</sup> The ACS six-question disability sequence was first added to the CPS-BMS in June 2008; the CPS-ASEC administered in March 2009 is, therefore, the first to include individuals for which responses to the six-question disability sequence are available.

<sup>3</sup> The CPS follows each housing unit for 16 months. A housing unit is in the sample for four consecutive months, then leaves the sample for eight months, and then returns for another four consecutive months (Bureau of Labor Statistics 2003).

survey in November, our final sample included 10,405 individuals (4,645 men and 5,760 women).

### Time-Use Categories

The three-tier categorization system of ATUS includes more than 400 activity codes, fully covering the period in question (the 24 hours between 4 a.m. of the previous day and 4 a.m. of the interview day) and the vast array of possible activities. There is no single correct way to classify these activities into meaningful categories. In their documentation of trends in the allocation of time in the United States from 1965 to 2003, Aguiar and Hurst (2007) classified time use into the four broad categories: market work, nonmarket work, child care, and leisure. Notably, they documented trends in four alternative measures of leisure, arguing that the definition of leisure is particularly subjective. Their narrowest measure of leisure captured “direct utility” activities, such as entertainment, social activities, and general relaxation. Their broadest measure of leisure included all time not spent in market or nonmarket production.

We use the narrow definition of leisure for the purposes of this study. Overall, we aggregated ATUS activity codes into 15 categories that would allow us to identify meaningful differences between people with and without a disability: sleeping; eating and drinking; personal care; health-related care; participating in sports, exercise, or recreation; paid work; housework; purchasing goods and services; child care; adult care; volunteering; education; job search; leisure (as defined earlier); and other activities (Table 1). The 15 categories account for all 24 hours of the day, with the “other” category capturing seldom-reported activities, such as religious activities and civic obligations.

### Analytic Methods

We first calculate the disability prevalence for our study population according to three alternative measures that are available in the matched ATUS and CPS-ASEC data: a work limitation, a disability defined by the ACS six-question sequence, or a work limitation or disability defined by the ACS six-question sequence. Using the combined measure, which is our preferred definition of disability, we then provide descriptive statistics on differences in time use for working-age people with disabilities and those without disabilities, separately for males and females. We calculate three statistics for each time-use category: the percentage reporting the activity, the mean number of minutes spent on the activity conditional on reported activity, and the unconditional mean number of minutes spent on the activity. We calculate standard errors for these estimates using the replicate weights provided in the ATUS data, and use *t* tests to determine whether significant differences exist between those with and those without disabilities.

We use zero-inflated negative binomial (ZINB) regressions (Greene 1994) to estimate the association between having a disability and time use for each of the time-use categories. In these regressions, we further distinguish between those identified as having disabilities (1) according to both measures, (2) according to just the ACS six-question sequence, and (3) according to just the work-limitation question. For each time-use category, the ZINB regression jointly estimates two regressions: (1) a binary

logit model estimating the association between having a disability and the likelihood of spending zero minutes on the activity, and (2) a negative binomial count model estimating the association between having a disability and the number of minutes spent on the activity.

As Kalil and Ziol-Guest (2013) noted, the ZINB method is preferred to ordinary least squares (OLS), which does not account for the large number of zeroes found in time-use data. ZINB is also preferred to the Tobit model, which assumes that the zeroes represent censored values of a latent variable that could, in theory, include negative values. Zeroes may arise in time-use data for two reasons (Brown and Dunn 2011). The first is that certain individuals never perform the activity (for example, a childless individual is likely to spend and report zero minutes spent on child care). The second reason for reporting zero minutes is that the individual did not happen to perform the activity on the interview day (for example, a part-time worker who does not typically work that day of the week). The ZINB model accounts for both types of zeroes in reported time spent on a given activity.<sup>4</sup>

We estimate a separate ZINB model for each time-use category and for each sex. In addition to the three disability indicators, each of the regressions include the following explanatory variables: age; age squared; race/ethnicity dummy variables; educational attainment dummy variables; the number of household members; the number of children in each of four age categories (0–2, 3–5, 6–12, and 13–18); marital status; and dummy variables for being interviewed over the weekend, for the interview year, for the interview month, and for U.S. region. Robust standard errors are calculated for all estimated parameters, clustered at the state level.

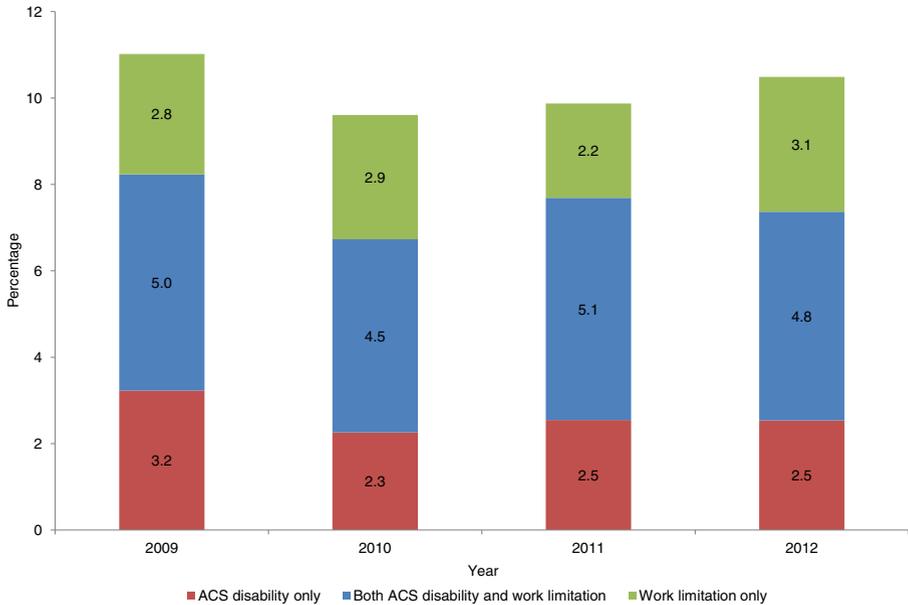
We present the ZINB regression results in terms of the marginal effect for each of the three disability categories versus those without disabilities, with all other control variables set at their sample means. For example, the estimated marginal effect for females reporting both a work limitation and ACS disability represents the change in the number of minutes per day that is associated with having both disability types, as compared with not having a disability, for a female with average characteristics in terms of age, education, and so on. These marginal effects incorporate both the extensive margin (changes in time use attributable to changes in the proportion of individuals who report nonzero minutes spent on the activity) and the intensive margin (changes in time use attributable to changes in the amount of time spent in the activity among those who spent greater than zero minutes).

## Results

### Disability Prevalence

Figure 1 shows the percentage of working-age adults with disabilities, by disability definition, for each year included in the analysis. In the years 2009 to 2012, the percentage of individuals reporting a work limitation (including those that also reported

<sup>4</sup> See Cornwell (2011), Pagán (2012) and Muñiz et al. (2014) for recent implementations of ZINB models in time-use analyses.



**Fig. 1** ATUS respondents ages 25 to 61 with disabilities, by year and disability definition (percentages). Data are from 2009–2012 ATUS files matched to 2009–2012 CPS-ASEC files

an ACS disability) ranged from 7.3 % to 8.0 %. The percentage of individuals reporting an ACS-defined disability is roughly similar to the work-limitation question, ranging from 6.7 % to 8.2 %. The work-limitation question and ACS sequence capture different populations of working-age people with disabilities, although there is considerable overlap. The percentage of individuals identified as disabled by either the work-limitation question or the ACS six-question sequence ranges from 9.7 % to 11.0 % during the period, and the percentage identified according to both measures ranges from 4.5 % to 5.1 %.<sup>5</sup>

### Time-Use Statistics

Table 2 provides descriptive statistics on time-use differences for working-age people with and those without disabilities, separately for males and females. For each time-use category, we show the percentage reporting the activity, the mean number of minutes spent on the activity conditional on reporting the activity, and the unconditional mean number of minutes spent on the activity.

The two major differences between working-age adults with and those without disabilities are in the time spent in paid work and leisure activities, which we define as activities that provide direct utility, such as entertainment, social activities, attending recreational events, and general relaxation. Both men and women with disabilities work fewer hours per day, on average, than men and women without disabilities; men with

<sup>5</sup> Houtenville and Brucker (2014) also used a disability definition that combines the ACS six-question sequence and the work-limitation question; they reported that 11.8 % of individuals ages 25 to 61 have disability according to 2009 CPS-ASEC data. This is slightly higher than our 11.0 % estimate for 2009, which is limited to the subsample that also responded to the ATUS.

**Table 2** Time-use statistics for ATUS respondents ages 25 to 61 with and without disabilities, 2009–2012

Time-Use Category	Males			Females		
	Disabilities	No Disabilities	Difference	Disabilities	No Disabilities	Difference
Sample Size	481	4,164		691	5,069	
Sleeping						
Percentage with minutes > 0	98.9	99.9	-1.0	99.9	100.0	-0.1
Total minutes   minutes > 0	548	490	58*	569	507	62*
Total minutes	542	490	52*	568	507	62*
Leisure Activities						
Percentage with minutes > 0	96.8	93.4	3.4*	94.6	93.7	0.9
Total minutes   minutes > 0	461	270	191*	383	243	141*
Total minutes	446	252	194*	363	227	135*
Paid Work						
Percentage with minutes > 0	25.2	67.4	-42.2*	16.4	51.4	-35.1*
Total minutes   minutes > 0	459	526	-67*	428	469	-41
Total minutes	116	355	-239*	70	241	-171*
Housework						
Percentage with minutes > 0	69.4	69.1	0.3	84.2	87.6	-3.4
Total minutes   minutes > 0	115	125	-10	171	164	7
Total minutes	80	87	-6	144	143	1
Eating and Drinking						
Percentage with minutes > 0	94.4	95.9	-1.5	92.9	95.4	-2.5
Total minutes   minutes > 0	75	81	-5	63	76	-13*
Total minutes	71	77	-6	58	72	-14*
Purchasing Goods and Services						
Percentage with minutes > 0	34.1	37.9	-3.8	39.3	48.6	-9.3*
Total minutes   minutes > 0	87	84	3	95	99	-4
Total minutes	30	32	-2	37	48	-11*
Sports, Exercise, or Recreation						
Percentage with minutes > 0	18.2	21.6	-3.5	10.4	19.6	-9.2*
Total minutes   minutes > 0	164	129	35	75	94	-19*
Total minutes	30	28	2	8	18	-11*
Personal Care						
Percentage with minutes > 0	62.1	79.0	-16.9*	70.9	83.9	-13.0*
Total minutes   minutes > 0	46	47	-1	59	60	-1
Total minutes	29	37	-9*	42	50	-8*
Health-Related Activities						
Percentage with minutes > 0	20.3	3.5	16.8*	26.9	6.5	20.4*
Total minutes   minutes > 0	120	97	23	149	105	44
Total minutes	24	3	21*	40	7	33*

**Table 2** (continued)

Time-Use Category	Males			Females		
	Disabilities	No Disabilities	Difference	Disabilities	No Disabilities	Difference
<b>Child Care</b>						
Percentage with minutes > 0	14.0	23.5	-9.6*	24.7	40.0	-15.3*
Total minutes   minutes > 0	106	113	-8	153	147	6
Total minutes	15	27	-12*	38	59	-21*
<b>Volunteer Activities</b>						
Percentage with minutes > 0	4.1	4.7	-0.6	6.7	7.0	-0.3
Total minutes   minutes > 0	262	145	117*	104	147	-43*
Total minutes	11	7	4	7	10	-3*
<b>Job Search</b>						
Percentage with minutes > 0	3.1	2.8	0.3	2.1	1.7	0.4
Total minutes   minutes > 0	266	124	142	89	124	-35
Total minutes	8	4	5	2	2	0
<b>Adult Care</b>						
Percentage with minutes > 0	10.5	11.5	-0.9	12.9	12.5	0.5
Total minutes   minutes > 0	61	100	-39*	104	88	16
Total minutes	6	11	-5*	13	11	2
<b>Education</b>						
Percentage with minutes > 0	2.6	2.5	0.1	3.2	3.9	-0.7
Total minutes   minutes > 0	226	296	-70	358	237	121
Total minutes	6	7	-1	11	9	2
<b>Other Activities</b>						
Percentage with minutes > 0	26.6	24.6	2.0	40.2	35.1	5.0*
Total minutes   minutes > 0	99	94	5	95	98	-3
Total minutes	26	23	3	38	34	4

*Notes:* Time use is measured in minutes. The 15 categories account for all 24 hours of the day and are ordered from smallest to largest according to the unconditional mean for men with disabilities. Data are from 2009–2012 ATUS files matched to 2009–2012 CPS-ASEC files.

\*Difference is statistically significant at  $p < .05$ .

disabilities spend 4 fewer hours (239 minutes) working than men without disabilities, and women with disabilities spend close to 3 fewer hours working (171 minutes) than women without disabilities. These large differences can be partially attributed to the large percentage of individuals with disabilities who do not work at all and therefore report zero minutes of work. For example, only 25 % of men with disabilities report positive minutes working, compared with 67 % of men without disabilities. Similarly, only 16 % of women with disabilities report positive minutes working, compared with 51 % without disabilities. Among those who report positive minutes working, men with disabilities work only 67 fewer minutes (approximately 1 hour) per day than men without disabilities, and the difference between time spent working for women with and women without disabilities is not statistically significant.

Table 2 also suggests that among individuals with disabilities, there is a large substitution of time spent in leisure activities for time spent in paid work. Men with disabilities spend, on average, over 3 hours (194 minutes) more per day in leisure activities than men without disabilities, and women with disabilities spend over 2 hours (135 minutes) more per day than women without disabilities.

Four other time-use categories show smaller, but still significant, differences among men and women with and without disability: health-related care, sleeping, child care, and personal care. We find that both women and men with disabilities spend more time on health-related activities than their counterparts without disabilities; women with disabilities spend, on average, 33 more minutes per day on their health than women without disabilities, and this difference for men is 21 minutes. The differences between those with and those without disabilities are driven mostly by differences in participation rates: men and women with disabilities are substantially more likely than those without disabilities to spend time on health-related activities in a given day.

In addition, individuals with disabilities spend more time sleeping than their counterparts without disabilities: men with disabilities sleep an average of 52 more minutes per day, and women with disabilities sleep 62 more minutes. Men and women with disabilities also tend to spend less time on child care than their counterparts without disabilities; however, the results suggest that they are also less likely to have children. Fourteen percent of men with disabilities report positive time spent on child care, compared with 23 % of men without disabilities; only 24 % of women with disabilities report positive time, compared with 40 % of women without disabilities. When results are conditioned on spending positive time on child care, the difference in time spent on child care by individuals with and those without disabilities is no longer statistically significant. Differences in participation rates can also explain the findings regarding time spent on personal care.

Several time-use categories show a significant difference for women with and women without disabilities, but not for men. For example, women with disabilities spend an average of 11 fewer minutes per day participating in sports, exercise, or recreation, and this difference increases to 19 minutes when the results are conditional on spending any positive time on sports. This increase can partially be explained by the difference in the percentage of women who spend positive time on sports; only 10 % of women with disabilities reported positive time spent on sports, compared with 20 % of women without disabilities. Women with disabilities also spend slightly less time than women without disabilities on eating and drinking, purchasing goods and services, and participating in volunteer activities.

There are no statistically significant differences between those with and those without disabilities in time spent on housework, education, or job search for either men or women. The lack of differences detected in education or job search may be due to the small number of individuals who report positive time spent on these activities.

### Regression Analysis

The regression analysis allows us to control for the characteristics of the individual when comparing time use by adults with disabilities and those without. This control is important because the population of individuals with disabilities may have characteristics that are highly correlated with certain time-use activities. For example, people

who have children will spend more time on child care than those who do not. Table 3 presents means for the characteristics controlled for in the regression analysis, by disability status. Compared with individuals without disabilities, those with disabilities are, on average, somewhat older, more likely to be black, less likely to have graduated from college, less likely to have more children in each of the age categories, and less likely to be married. Men with disabilities are also less likely to be Hispanic than men without. In addition to controlling for demographic characteristics, we estimate separate coefficients for three mutually exclusive groups of individuals with disabilities in each of the regressions: those who have a disability as defined only by the work-limitation question, those who have a disability as defined only by the ACS disability sequence, and those who have a disability according to both definitions.

The results of the regressions for men can be seen in Table 4. The most notable differences in time use for men with disabilities (in all three disability groups) and men without disabilities involve paid work and leisure activities. There is considerable variation across the three disability definitions, however. Men with disabilities according to both the work-limitation question and the ACS disability sequence spend on average about 321 fewer minutes (5 hours and 21 minutes) per day in paid work and 142 more minutes (2 hours and 22 minutes) on leisure activities than those without any disability. The magnitude of these differences is large compared with the average time spent on paid work by men without disabilities (355 minutes, or about 6 hours per day) and the average time spent on leisure activities by men without disabilities (252 minutes, or just more than 4 hours per day). These differences are smaller for men who have disabilities according to only one definition; compared with men without any disability, those with only a work limitation spend 222 fewer minutes (3 hours and 42 minutes) per day in paid work and 120 more minutes (2 hours) in leisure activities, but those with only an ACS disability have 54 more minutes of leisure time and the 48-minute difference in time spent on paid work is not statistically significant. Because men with only an ACS disability do not report a work limitation, it is not surprising that there is no statistically significant difference in time spent in paid work compared with men without disabilities. Comparing the coefficients for each disability group shows us that the difference in time spent on paid time compared with men without disabilities is different for each disability group.

Men with disabilities according to both the work-limitation question and the ACS disability sequence also spend an average of 48 more minutes per day sleeping, 5.5 more minutes on their health, and 26 fewer minutes on housework. These are sizable differences when compared with the average time spent by men without disabilities on sleeping (490 minutes, or about 8 hours), health-related activities (3 minutes), and housework (87 minutes). Additional time spent on health-related activities is also seen for men with only a work limitation and those with only an ACS disability, and additional time spent sleeping is also seen for men with only a work limitation; no differences in time spent on housework are seen for men with a disability defined by only one measure. Men with only an ACS disability also tend to spend slightly more time per day on job search activities and education than men without disabilities.

It is likely that men who report a disability as defined by both measures have the most severe disabilities, which may explain why they, of the three groups with disabilities, have the largest differences in time use compared with men without any disability. However, all three groups tend primarily to substitute time spent on leisure

**Table 3** Summary statistics for ATUS respondents ages 25 to 61 with and without disabilities, 2009–2012

	Males			Females		
	Disabilities	No Disabilities	Difference	Disabilities	No Disabilities	Difference
Sample Size	481	4,164		691	5,069	
Age	47.82	42.35	5.47*	48.32	42.52	5.80*
White (%)	69.37	69.46	-0.09	63.69	65.88	-2.19
Black (%)	16.01	9.74	6.27*	18.55	12.19	6.36*
Hispanic (%)	9.87	15.43	-5.56*	12.89	14.89	-2.00
Other (%)	4.76	5.36	-0.60	4.88	7.05	-2.17
Less Than High School Education (%)	23.12	10.32	12.80*	19.67	7.99	11.68*
High School Education (%)	35.27	30.01	5.26	39.53	27.03	12.50*
Some College (%)	27.36	24.86	2.50	27.18	26.81	0.37
College Graduate (%)	14.25	34.81	-20.56*	13.61	38.17	-24.56*
Number of Children Ages 0–2	0.03	0.14	-0.11*	0.08	0.15	-0.08*
Number of Children Ages 3–5	0.06	0.15	-0.09*	0.09	0.17	-0.08*
Number of Children Ages 6–12	0.22	0.36	-0.14*	0.25	0.42	-0.17*
Number of Children Ages 13–18	0.21	0.29	-0.09*	0.24	0.33	-0.08*
Married (%)	54.51	70.24	-15.73*	45.43	69.84	-24.41*
Surveyed on a Weekend (%)	32.31	27.98	4.33	29.01	29.29	-0.28
Work Limitation Only (%)	25.16			29.81		
ACS Disability Only (%)	29.52			28.08		

Source: Data are from 2009–2012 ATUS files matched to 2009–2012 CPS-ASEC files.

\*Difference is statistically significant at  $p < .05$ .

**Table 4** Regression results for differences in time use (in minutes) between male ATUS respondents ages 25 to 61 with and without disabilities

	Sleeping [SE]	Leisure [SE]	Paid Work [SE]	Housework [SE]	Eating/ Drinking [SE]	Purchasing [SE]	Sports [SE]	Personal Care [SE]	Health [SE]	Child Care [SE]	Volunteering [SE]	Job Search [SE]	Adult Care [SE]	Education [SE]	Other [SE]	
<b>Marginal Effects</b>																
Both disability types	48.39** [8.72]	141.55** [12.05]	-321.07** [39.89]	-26.17* [10.46]	-3.10 [4.63]	1.45 [6.07]	-6.21 [5.87]	-2.85 [2.53]	5.46* [2.66]	2.30 [4.41]	2.88 [2.55]	0.37 [1.39]	-6.88 [4.34]	0.56 [0.46]	6.73 [4.45]	
Work limitation only	44.46** [11.90]	119.53** [20.16]	-222.23** [51.53]	-4.32 [12.08]	-9.25 [5.07]	-6.85 [6.45]	3.00 [10.01]	-4.47 [4.78]	4.83* [2.26]	-1.77 [5.85]	-2.88 [4.13]	0.26 [1.46]	-2.07 [3.39]	0.83 [0.80]	3.53 [5.10]	
ACS disability only	11.96 [13.12]	53.64** [13.96]	-47.61 [33.18]	-9.55 [9.83]	-7.49 [6.18]	-10.66 [6.28]	-1.86 [7.47]	-1.18 [3.41]	4.69** [1.79]	9.19 [7.41]	-1.42 [3.55]	2.43** [1.17]	-2.66 [4.08]	1.21* [0.50]	0.67 [7.17]	
<b>Difference in Marginal Effects</b>																
Both disability types vs. work limitation only	3.93 [14.50]	22.02 [20.34]	-98.84* [45.74]	-21.85 [16.73]	6.15 [6.43]	8.29 [8.44]	-9.2 [11.27]	1.62 [5.57]	0.63 [1.76]	4.08 [8.11]	5.76 [4.27]	0.10 [1.91]	-4.81 [5.31]	-0.27 [0.90]	3.20 [6.46]	
Both disability types vs. ACS disability only	36.43* [15.43]	87.91** [18.48]	-273.46** [55.44]	-16.62 [12]	4.39 [5.56]	12.11 [8.35]	-4.35 [10.61]	-1.68 [3.99]	0.76 [3.38]	-6.88 [8.61]	4.29 [4.25]	-2.06 [2.04]	-4.22 [5.78]	-0.64 [0.73]	6.06 [8.86]	
Work limitation only vs. ACS disability only	32.50* [15.19]	65.90** [22.71]	-174.62** [66.62]	5.23 [14.88]	-1.76 [8.27]	3.81 [8.66]	4.85 [14.10]	-3.3 [6.13]	0.14 [2.88]	-10.96 [8.77]	-1.47 [5.46]	-2.16 [2.01]	0.59 [5.28]	-0.37 [0.98]	2.86 [9.71]	
<i>N</i>	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645	

*Notes:* Standard errors are shown in brackets and are clustered at the state level. Time use is measured in minutes. Marginal effect estimates are based on results from a zero-inflated negative binomial regression in which we jointly estimated, for each time-use category, (1) the relationship between disability status and the likelihood of spending zero minutes on the activity, and (2) the relationship between disability status and the number of minutes spent on the activity. The reference group is a male with no disabilities and all other control variables set at their sample means. All regressions include the following control variables: age, age squared, race, education, region, number in household, marital status, number of children, weekend indicator, year, and month. Data are from 2009–2012 ATUS files matched to 2009–2012 CPS-ASEC files.

\*Estimate is significantly different from zero at  $p < .05$ .

\*\*Estimate is significantly different from zero at  $p < .01$ .

activities for time spent in paid work. Overall, the regression results do not provide strong evidence that having a disability increases time spent by men on everyday activities other than sleeping, leisure activities, and health-related activities. Apart from the few exceptions mentioned earlier, there are no statistically significant differences between men with and without disabilities in the time spent on everyday activities, such as eating, personal care, housework, shopping, sports, or child and adult care.

The results of the regressions for women are shown in Table 5. The main findings are similar to those for men; women in all three disability groups tend to spend less time in paid work and more time in leisure activities than women without disabilities, and these differences are larger for women who have a disability according to both definitions than for women who have a disability according to only one definition. For example, on an average day, women who report both a work limitation and ACS disability work 289 fewer minutes (4 hours and 49 minutes) and spend 83 more minutes (1 hour and 23 minutes) in leisure activities than women who do not report any disability, and women who have only a work limitation work 133 fewer minutes (2 hours and 13 minutes) and have 66 more minutes (1 hour and 6 minutes) of leisure time than those without disabilities. These differences are large when compared with the average time spent on paid work (241 minutes, or 4 hours per day) and leisure activities (227 minutes, or almost 4 hours) by women without disabilities. Women with only an ACS disability have the smallest differences compared with those without disabilities; they work 70 fewer minutes (1 hour and 10 minutes) per day and spend 38 more minutes in leisure activities. This result is expected given that these women do not report a work-limiting disability. Comparing between the coefficients for each disability group shows us that the difference in time spent on paid work time compared with women without disabilities is different for each disability group.

As seen for men, women who report both a work limitation and ACS disability also spend more time per day sleeping (60 minutes, or 1 hour) and on their health (7 minutes) than women without disabilities. Unlike men, these women do not spend less time on housework than women without disabilities, but instead spend less time on sports (16 minutes), eating (11 minutes), and personal care (8 minutes), and more time on child care (19 minutes). We find differences in the same time-use categories for women who only have an ACS disability (compared with those without disabilities), except for time spent on personal care and child care; we find differences for women who only have a work limitation in time spent sleeping (46 more minutes) and personal care (9 fewer minutes), but also in time spent on housework (21 more minutes) and shopping (12 fewer minutes). We do not find a statistically significant difference for any of the three groups in the time spent on education, adult care, job search, or volunteering between women with and without disabilities.

Like their male counterparts, women who report disabilities according to both measures probably have the most severe disabilities, which may explain why the largest differences in time use are between this group and women without disabilities. Also for women, all three disability groups tend primarily to substitute time spent in leisure activities and sleeping for time spent in paid work.

**Table 5** Regression results for differences in time use (in minutes) between female ATUS respondents ages 25 to 61 with and without disabilities

	Sleeping [SE]	Leisure [SE]	Paid Work [SE]	Housework [SE]	Eating/ Drinking [SE]	Purchasing [SE]	Sports [SE]	Personal Care [SE]	Health [SE]	Child Care [SE]	Volunteering [SE]	Job Search [SE]	Adult Care [SE]	Education [SE]	Other [SE]	
<b>Marginal Effects</b>																
Both disability types	59.73** [9.01]	82.71** [10.87]	-289.14** [40.16]	-4.05 [9.94]	-11.32** [3.47]	-10.17 [6.58]	-16.21** [5.62]	-7.80** [3.01]	6.87** [0.96]	19.33** [7.35]	-1.98 [2.98]	-0.78 [0.97]	-4.37 [2.82]	0.07 [0.80]	13.45** [4.15]	
Work limitation only	46.46** [9.25]	65.99** [12.72]	-133.30** [27.58]	20.66* [9.42]	-1.86 [3.64]	-11.61* [4.91]	-4.86 [4.67]	-8.57** [3.11]	2.62 [1.64]	6.89 [7.79]	0.17 [3.61]	0.57 [0.65]	-1.21 [2.73]	-0.14 [1.22]	-1.07 [4.52]	
ACS disability only	22.37* [9.06]	38.32** [13.32]	-69.70** [22.66]	6.34 [8.82]	-15.38** [5.69]	0.35 [5.80]	-11.26* [4.71]	0.94 [3.22]	2.85** [0.87]	13.63 [11.77]	-0.50 [2.90]	-2.97* [1.39]	-2.00 [2.75]	0.23 [0.82]	-0.16 [5.48]	
<b>Difference in Marginal Effects</b>																
Both disability types vs. work limitation only	13.27 [12.62]	16.72 [13.05]	-155.84** [39.23]	-24.71* [12.60]	-9.46* [4.63]	1.44 [6.34]	-11.35* [4.59]	0.77 [4.29]	4.25* [1.81]	12.44 [10.78]	-2.15 [4.18]	-1.35 [0.93]	-3.15 [3.49]	0.22 [1.30]	14.52 [6.61]	
Both disability types vs. ACS disability only	37.36** [11.14]	44.39** [11.49]	-219.44** [44.27]	-10.39 [11.70]	4.06 [5.82]	-10.52 [9.26]	-4.95 [7.32]	-8.74* [3.84]	4.02** [1.24]	5.70 [12.81]	-1.48 [4.47]	2.18 [1.52]	-2.37 [4.07]	-0.15 [1.01]	13.62 [6.23]	
Work limitation only vs. ACS disability only	24.09 [13.97]	27.66 [15.01]	-63.60* [29.14]	14.32 [13.11]	13.52 [6.99]	-11.96 [7.47]	6.40 [5.86]	-9.51* [3.95]	-0.23 [1.79]	-6.74 [12.37]	0.67 [4.56]	3.53* [1.48]	0.79 [3.99]	-0.37 [1.57]	-0.91 [6.81]	
<i>N</i>	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	

*Notes:* Standard errors are shown in brackets and are clustered at the state level. Time use is measured in minutes. Marginal effect estimates are based on results from a zero-inflated negative binomial regression in which we jointly estimated, for each time-use category, (1) the relationship between disability status and the likelihood of spending zero minutes on the activity, and (2) the relationship between disability status and the number of minutes spent on the activity. The reference group is a female with no disabilities and all other control variables set at their sample means. All regressions include the following control variables: age, age squared, race, education, region, number in household, marital status, number of children, weekend indicator, year, and month. Data are from 2009–2012 ATUS files matched to 2009–2012 CPS-ASEC files.

\*Estimate is significantly different from zero at  $p < .05$ .

\*\*Estimate is significantly different from zero at  $p < .01$ .

## Conclusion

Using ATUS data matched to CPS-ASEC data, we show that most working-age men and women with disabilities, on average, work fewer hours per day than men and women without disabilities. This finding is expected: according to BLS statistics (Bureau of Labor Statistics 2013b), the employment-population ratio among people age 16 to 64 with disabilities (according to the ACS disability sequence) is less than one-half the ratio among those without disabilities. The most interesting findings concern the increase in time spent on other activities, in substitution for less time spent working. On average, more than one-half of the decreased time in paid work is balanced by an increase in time spent in leisure activities (defined as activities that provide direct utility, such as entertainment, social activities, attending recreational events, and general relaxation); sleep and health-related activities also increase, in diminishing order of magnitude.

The reduction in paid work time is largest for individuals who report both a work limitation and an ACS disability, and next largest for those who report only a work limitation. Perhaps not surprisingly, individuals who report ACS disability but no work limitation appear to have the smallest substitution of leisure activities for paid work, with men with only an ACS disability showing no statistically significant difference in the time spent on paid work compared with those without a disability. These findings reinforce the finding by Burkhauser et al. (2014a) that the work-limitation question and the ACS six-question disability sequence capture substantially different populations if each definition is used without the other. They also provide a strong case for putting the work-limitation question back into the ACS and CPS-BMS, as advocated by Burkhauser and his coauthors.

The fact that more time spent in leisure activities and sleep accounts for more than one-half of the lower amount of time spent working for pay does not, of course, imply that people with disabilities are simply relaxing and enjoying themselves instead of working. It seems more likely that these are the default activities for those who, because of health or impairments, find it extremely challenging or even impossible to participate in other activities. Note that, in contrast to the bulk of the literature on labor supply, we were able to define leisure so that it excludes activities such as unpaid work, health-related self-care, personal care, and other activities. Thus, our definition of leisure activities is more consistent with the common meaning of leisure as “free time” or “time at one’s convenience.” The definition includes ATUS activities as diverse as “socializing and communicating with others,” “television and movies,” and “tobacco and drug use” (the latter two are listed under the “relaxing and leisure” category in the ATUS). The fact that those with disabilities who spend little time in paid work spend much of that time in leisure and sleeping does not imply that this is their preference; more likely, most are constrained by their medical issues and environment from choosing options that would otherwise be preferred—including paid work. This interpretation is further reinforced by Pagán (2014), who found that people with disabilities are more likely to allocate their time to passive leisure (such as reading, watching television, and listening to the radio) and less likely to spend their time on social entertainment (such as going to the theater, concerts, and other cultural events) compared with those without disabilities. This difference in types of leisure activities could be due to medical constraints that prevent people with disabilities from participating in more active events.

All three categories of individuals with disabilities spend more time on health-related activities compared with those without disabilities. The largest difference is for men and women who reported both a work limitation and ACS disability, who spend an average of 5.5 and 6.9 more minutes per day, for men and women, respectively; these differences amount to almost 40 to 50 more minutes per week. We find no conclusive evidence that disability “steals time” beyond the increase for health-related activities. People with and without disabilities tend to spend similar amounts of time (or less time) in everyday activities such as housework, education, and shopping. Taken together, the findings suggest that “stolen time” might be a minor reason for not working compared with, for example, impairments or health issues that make it difficult to work or find work in the first place. There are a few important caveats to this finding, however. A person with disabilities might be accomplishing less than a person without disabilities when conducting an activity for a given length of time. Because we cannot measure what is being accomplished, we are not able to capture this aspect of “stolen time.” Further, inability to accomplish more in a given amount of time might explain the limited amount of time spent in paid work.

The limited size of our sample constrains meaningful analysis of more detailed categories of time use as well as time use by smaller subgroups of those with disabilities. Because the ACS six-question disability sequence is available in the CPS-ASEC only from 2009 onward and because only one-third of ATUS respondents also complete the CPS-ASEC, our sample is limited to only 481 men and 691 women with disabilities (from a total sample of 4,645 men and 5,760 women). A larger sample size may have revealed additional differences, particularly for the less-frequently reported time-use categories or for important subgroups. Another limitation of our study is that our sample excludes working-age people with disabilities living in institutions because the CPS excludes all people living in institutions, such as correctional and nursing facilities. As Stapleton et al. (2012) noted, because a disproportionately large number of people with disabilities live in institutions, statistics that exclude this population are biased as estimates of total population statistics. It is important to note, therefore, that our findings are restricted to the noninstitutionalized working-age population with disabilities.

Our findings suggest that individuals who report both a work limitation and an ACS disability have the most severe disabilities. Compared with those who report only a work limitation or only an ACS disability, they spend the fewest minutes in paid work and the most minutes in health-related activities. One area of future research would be to explicitly test whether those who report both a work limitation and an ACS disability have the most severe disabilities by examining how various measures of functional status differ for the two disability definitions. The necessary information for such research could be found in the National Health Interview Survey’s Disability Questions Test files (see, e.g., Centers for Disease Control and Prevention 2013), which contain person-level data collected via a field test of the ACS six-question disability sequence (in addition to the work-limitation question already included in the survey). One could also examine time use separately for each of the six ACS disability categories. Another interesting avenue of research would be to use the location information in ATUS (where the activity took place) and other contextual information (such as who was with the respondent while the activity took place) to explore the extent to which adults with disabilities may be more or less socially isolated than are other adults.

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