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

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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 in health-related activities and less time in other activities than those without disabilities. We find that working-age men and women who report a disability on average work fewer hours per day than men and women without disabilities. On average, less paid work time is offset by more time spent in narrowly-defined leisure activities and sleeping, but a significant amount of that time is also spent in health-related activities. The increase in time spent on health-related activities by those with disabilities is substantial, especially for those who report both a work limitation and ACS disability. We also find that, on average, those with disabilities spend no more time than others in unpaid work activities, personal care, or a variety of other activities.

**Keywords** People with Disabilities, Time Use, Paid Work, Health-Related Activities

## Introduction

It is not surprising that 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 disabilities. However, the extent to which disability increases the time spent by working-age adults 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 to 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, which used data from the Canadian General Social Survey to compare men with spinal cord injuries to men without such injuries, found that the former spent more time on leisure, personal care, and sleeping, and less time in paid work, than the latter (Pentland et al. 1999). Winkler et al. (2005) found similar results in a comparison of individuals with severe traumatic brain injury to the general Australian population. It is unclear whether the findings from these studies would generalize to individuals with a more broadly defined disability.

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, for people with and without disabilities. It is unclear, a priori, whether people with disabilities 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 activities either for themselves or others. Russell et al. (2007) found that 11.3% of adults spent a significant part of their days (an average of almost two hours) engaged in health-related activities either for themselves or others, but 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 activities each day, and that nonworking people with disabilities reported self-care four times as often as employed individuals, with a mean reported time of 3.2 hours a 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 two hours per day on health-related activities.

Among recent studies, the two that are closest 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 (over 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 the 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 Census Bureau's new six-question sequence on disability, which was introduced in 2008, in combination with the traditional work-limitation question from the CPS-ASEC. Combining the two disability measures is important; using either measure by itself would exclude many working-age people with disabilities and hence lead to biased estimates of employment rates and other factors (Burkhauser et al. 2012a, 2012b). As Altman (2013) argues, 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 that of the two studies mentioned concerns our sample population. Unlike Meyer and Mok (2013), we examine time use by women as well as men. Pagán (2013) includes both men and women but uses a disability definition that focuses (albeit quite vaguely) on chronic medical conditions, whereas our study distinguishes three different groups of people with disabilities, as explained above. Our study also uses different time-use categories: Pagán includes broad categories (market work, household production, tertiary activities, and leisure), whereas the categories we include provide detail on health-related and daily routine activities. We note finally that the our study and Pagán's are also likely to reflect important differences between time use in Spain and in the U.S.

We find that working-age men and women who report a work limitation, ACS disability, or both, work fewer hours per day on average than men and women without disabilities. Less paid work time is essentially offset by more time spent in leisure activities, sleeping, and health-related activities; leisure is narrowly defined to include socializing, relaxing, and attending sports/recreational events. We also find that those with disabilities spend no more time than others in unpaid work activities, personal care, or a variety of other activities. The increase in time spent on health-related activities for those with disabilities is substantial, especially for those who report both a work limitation and ACS disability. The reduction in paid work time is largest for individuals who report both a work limitation and ACS disability, and is next-largest for those who report only a work limitation. Individuals who report ACS disability but no work

limitation, not surprisingly perhaps, appear to have the smallest substitution of leisure activities for paid work activities.

## 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). This is a very broad definition of disability, however, and does not provide a clear line between those with disabilities and 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 Current Population Survey (CPS) interviews that were completed prior to the ATUS survey (as described in further detail below, ATUS households are a subsample of CPS households.) Since 2008, the CPS Basic Monthly Survey component (CPS-BMS) includes a six-question disability sequence, which is primarily based on the ICF conceptual framework and was first introduced in the American Community Survey (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 (BLS 2012).

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 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. Burkhauser et al. (2012a) estimate, using CPS-ASEC data from 2010, 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 find that these two subsets of the population with disabilities (assuming the ICF-based conceptualization) are substantially different 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.[1] An additional advantage of this approach, however, is that it allows us to examine differences in time-use patterns for the three disability groups—those identified as

[1] The CPS-ASEC administered in March 2009 is the first to include the six-question disability sequence.

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 (BLS 2012a). The ATUS sample is drawn out of CPS respondents, with CPS households becoming eligible for selection into the ATUS sample two months after completing their eighth and final CPS interview.[2] Out 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 over the phone to recall how they spent their time from 4 AM of the previous day until 4 AM 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 (BLS 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 a third of ATUS households, as

[2] The CPS follows each housing unit for 16 months. A housing unit is in the sample for 4 consecutive months, then leaves the sample for 8 months, then returns for another 4 consecutive months (BLS 2003).

expected.[3] ATUS respondents with linked CPS-ASEC data completed the ATUS survey in months May through 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. (2012a), we restrict the study population to working-age (25 to 61) civilians, to mitigate the effects of schooling and retirement. Overall, 124,517 individuals responded to the ATUS in years 2003–2011. Of those, 26,253 were age 25 to 61 and had completed CPS-ASEC interviews in years 2003–2011, and 7,961 were age 25 to 61 and had completed CPS-ASEC interviews that included both the work-limitation question and the six-question disability sequence.

Time-Use Categories

The three-tier categorization system of ATUS includes more than 400 activity codes, fully covering both the time period in question (the 24 hours between 4 AM of the previous day and 4 AM of the interview day) and the vast array of possible activities. There is no single correct way to classify these activities into meaningful categories. For the purposes of this study, 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; 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.

[3] The 33% match rate is expected given that only a third of CPS households complete the CPS-ASEC.

[Insert Table 1 about here]

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: work limitation, ACS six-question sequence, and work limitation or 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 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 without disabilities.

We use ordinary least squares (OLS) regressions to estimate the association between disability and time use while controlling for other observable characteristics and distinguishing 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. For each time-use category, we estimate the following model:

$$Y = \alpha + \beta_1 DIS_{both} + \beta_2 DIS_{ACS\_only} + \beta_3 DIS_{work\_only} + \gamma' X + \varepsilon \quad \text{(Eq. 1)}$$

In Eq. 1, $Y$ is the number of minutes spent on the relevant activity during the interview day; $DIS_{both}$ is a dummy variable that equals 1 if the respondent has a disability according to both the ACS six-question disability sequence and the traditional work-limitation question; $DIS_{ACS\_only}$ is a dummy variable that equals 1 if the respondent has a disability according to the six-question sequence but not the work-limitation question; $DIS_{work\_only}$ is a dummy variable that equals 1 if

the respondent has a disability according to the work-limitation question but not the six-question sequence; $X$ is a vector of explanatory variables including age, age squared, race/ethnicity dummies, educational attainment dummies, 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 dummies for being interviewed over the weekend, for the interview year, and for the interview month; and $\varepsilon$ is a random disturbance.

We estimate a separate model for each time-use category and for each sex. In these models, the coefficient on $DIS_{both}$ represents the average change in the number of minutes per day that is associated with a disability, as compared to not having a disability, where "disability" is defined according to both the ACS six-question sequence and the traditional work-limitation question. The coefficient on $DIS_{ACS\_only}$ represents the change in the number of minutes per day that is associated with having a disability, as compared to not having a disability, where "disability" is defined according to the six-question sequence but not the work-limitation question,. The coefficient on $DIS_{work\_only}$ represents the change in the number of minutes per day that is associated with having a disability, as compared to not having a disability, where "disability" is defined according to the work-limitation question but not the six-question sequence. Robust standard errors are calculated for all estimated parameters, clustered at the state level.

Because respondents are asked about activities that were not performed on a given day, even though they were almost certainly performed in a given week or month (for example, house cleaning), there are a large number of zeros for the dependent variables. Some researchers have advocated using Tobit models to address the significant amount of censoring. Other time-use researchers, however, claim that Tobit regressions misclassify as nonparticipants individuals who engage in an activity on a regular basis but did not do so during the interview day; they argue that using OLS regressions is more appropriate. Two recent papers directly compared Tobit and

OLS in the context of time-use analysis. The first, using simulated data, concludes that Tobit analysis often results in significantly downward-biased marginal effects, while OLS is unbiased and robust to alternative assumptions about the data-generating process (Stewart 2009). The second, using data on parental child care from the Australian Time Use Surveys (Foster and Kalenkoski 2010), obtains qualitatively similar results for Tobit and OLS, though it concludes that Tobit is more sensitive to the length of period examined. Following these two studies, we use only OLS in our regression analysis.

**Results**

Disability Prevalence

Figure 1 shows the percentage of working-age adults with disabilities, by disability definition, for the period in which each definition is available in the data. The series for the work-limitation question starts in 2003, the first year of ATUS, because that question has been included in the CPS-ASEC since 1981. In the years 2009 to 2012, which are the focus of our analysis, the percentage reporting a work limitation ranged from 7.3% to 8.0%. The series for the ACS six-question sequence started in 2009, when it was first included in the CPS-ASEC, and suggests roughly similar disability rates as the work-limitation question, ranging from 6.7% to 8.2% in years 2009 to 2012. The work-limitation question and ACS sequence capture different populations of working-age people with disabilities, though there is considerable overlap. The series for the percentage identified by either the work-limitation question or the ACS six-question sequence ranges from 9.9% to 11.3% during the period, and the series for the percentage identified according to both measures ranges from 4.5% to 5.1%.

[Insert Fig. 1 about here]

Time-Use Statistics

Table 2 provides descriptive statistics on time-use differences for working-age people with and 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.

[Insert Table 2 about here]

The two major differences between working-age adults with and without disability are in the time spent in paid work and leisure activities. Both men and women with disabilities work fewer hours per day, on average, than men and women without disabilities; men with disabilities spend four fewer hours (239 minutes) working compared to men without disabilities, while women with disabilities spend close to three 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 to 67% of men without disabilities. Similarly, only 16% of women with disabilities report positive minutes working, compared to 51% without disabilities. Among those who report positive minutes working, men with disabilities work only 67 fewer minutes per day than men without disabilities, and the difference between time spent working for women with and 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 three hours (194 minutes) more per day in leisure activities than men without disabilities, and women with disabilities spend over two hours (136 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, while men spend 21 more minutes. The differences between those with and without disabilities are driven for the most part by differences in participations 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.

We also find that individuals with disabilities spend more time sleeping than their counterparts without disabilities: men with disabilities sleep on average 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 they are also less likely to have children. Fourteen percent of men with disabilities report positive time spent on child care, compared to 23% of men without disabilities, and only 24% of women with disabilities report positive time, compared to 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 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 without disabilities, but not for men. For example, women with disabilities spend on average 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 to 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 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 to individuals without disabilities, those with disabilities are on average somewhat older, more likely to be black, less likely to have graduated from college, 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.

[Insert Table 3 about here]

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 216 fewer minutes per day in paid work and 195 more minutes in leisure activities than those without any disability. These differences are smaller for men who have disabilities according to only one definition; compared to men without any disability, those with only a work limitation spend 167 fewer minutes per day in paid work and 136 more minutes in leisure activities, while those with only the ACS-defined disability work 53 fewer minutes per day and have 63 more minutes of leisure time. Because men with an ACS disability only do not report a work limitation, it is not surprising that they are the group to have the smallest difference in time spent in paid work compared to men without disabilities.

[Insert Table 4 about here]

Men with disabilities according to both the work-limitation question and the ACS disability sequence also spend on average 42 more minutes per day sleeping, 17 more minutes on their health, 28 fewer minutes on housework, and 8 fewer minutes on adult care than men without disabilities. None of these differences is found for men who have a disability as defined only by the ACS sequence; for men with only a work limitation, the only difference is an additional 46 minutes of sleep. Men with an ACS-defined disability also tend to spend 12 fewer minutes per day shopping 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 to men without

any disability. However, all three groups tend primarily to substitute time spent on leisure activities for time spent in paid work, which may be due to "leisure" being the most broadly defined category of time use in our analysis. As mentioned earlier, the leisure category includes activities that range from watching television to socializing with others.

With only a few exceptions, 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, education, shopping, child care, or searching for a job. The exceptions are that, compared to men without disabilities, men with a work limitation spend less time eating, men with an ACS disability spend less time shopping, and (as mentioned above) men with both a work limitation and ACS disability spend less time on housework. Overall, the regression results do not provide strong evidence that having a disability increases time spent on everyday activities.

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 under both definitions than for women who have a disability under only one definition. For example, on an average day, women who report both a work limitation and ACS disability work 172 fewer minutes and spend 108 more minutes in leisure activities than women who do not report any disability, while women who have only a work limitation work 124 fewer minutes and have 72 more minutes of leisure time than those without any disability. Women with only an ACS disability have the smallest differences compared to those without any disability; they work 67 fewer minutes per day and spend 45 more minutes in leisure activities. Women who do not report a work-limiting disability have the

smallest difference in terms of their time spent working; this result for women, as the comparable one for men, is expcted.

[Insert Table 5 about here]

Women who report both a work limitation and ACS disability also spend more time per day sleeping (62 minutes) and on their health (29 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 (10 minutes) and more time on child care (12 minutes). Among these time-use categories, we find differences for women who only have an ACS disability (compared to those without any disability) in time spent on health (6 more minutes) and on sports (8 fewer minutes); the only category in which we find a difference for women who only have a work limitation is sleeping (47 more minutes). We do not find a statistically significant difference in the time spent on housework, education, adult care, job search, or volunteering between women without disabilities and any of the female disability groups. The data suggest that women with disabilities spend less time—not more—on eating, personal care, and shopping than their counterparts 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. All three disability groups tend primarily to substitute time spent in leisure activities for time spent in paid work.

**Conclusion**

Using ATUS data matched to CPS-ASEC data, we showed that working-age men and women who report a work limitation, ACS disability, or both, work fewer hours per day on average than men and women without disabilities. This finding is expected—according to BLS statistics (BLS 2013b), the employment-population ratio among people age 16 to 64 with disabilities (according

to the ACS disability sequence) is less than 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, most of the reduction is balanced by an increase in time spent in leisure activities; 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 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. These findings reinforce the finding by Burkhauser et al. (2012a) 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 most 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 that, because of health or impairments, find it extremely challenging, if not impossible, to participate in other activities. Note that, in comparison to the bulk of the literature on labor supply, we were able to define leisure narrowly, excluding activities such as unpaid work, self 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 ones convenience." The definition includes ATUS activities as diverse as "socializing and communicating with others," "television and movies," and "tobacco and drug use." 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.

The increase in time spent on health-related activities for those with disabilities is substantial, especially for those who report both a work limitation and ACS disability. Our estimates of 17 and 29 more minutes per day for men and women, respectively, amount to about 2 more hours per week for the former and close to 3.5 more hours per week for the latter. We found no conclusive evidence that disability "steals time" beyond the increase for health-related activities, however. People with and without disabilities spent, on average, similar amounts of time (or less time) in everyday activities such as eating, personal care, housework, education, and shopping. Taken together, the findings suggest that "stolen time" might be a minor reason for not working compared to (for example) impairments or health issues that make working or finding work in the first place difficult. 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 limited meaningful analysis of more detailed categories of time use and time use by smaller subgroups of those with disabilities. The fact that the ACS six-question disability sequence is available in the CPS-ASEC only from 2009 onwards, and only a third of ATUS respondents also complete the CPS-ASEC, limits our sample to only 481 men and 691 women with disabilities (out of 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 noted by Stapleton et al. (2012), because a disproportionally 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 non-institutionalized working-age population with disabilities.

Our findings suggest that individuals who report both a work limitation and ACS disability have the most severe disabilities. Compared to those who report only a work limitation or only 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 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, for example, CDC 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). 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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**Table 1** Grouping Scheme for Time-Use Categories

| Category | Subcategory | Activity Codes |
|---|---|---|
| Sleeping | | 0101 |
| Eating and drinking | | 11 1811 |
| Personal care | Grooming | 0102 |
| | Personal activities | 0104 |
| | Personal care emergencies | 0105 |
| | Personal care NEC | 0199 |
| | Personal care services | 0805 1801 180805 |
| Health-related activities | Health-related self-care | 0103 |
| | Medical and care services | 0804 180804 |
| Participating in sports, exercise, or recreation | | 1301 130301 130401 181301 |
| Paid work | Working | 0501 1805 |
| | Work-related activities | 0502 |
| | Other income-generating activities | 0503 |
| | Work and work-related activities NEC | 0599 |
| Housework | | 02 1802 |
| Purchasing goods and services | Consumer purchases | 07 1807 160104 |
| | Professional services | 08 excluding 0804 0805<br>1808 excluding 180804 180805<br>160105 |
| | Household services | 09 1809 160106 |
| | Government services | 1001 100381 1099 181081<br>160108 |
| Child care activities | Household children | 0301 0302 0303 180381 |
| | Nonhousehold children | 0401 0402 0403 180481 |
| Adult care activities | Household adults | 0304 0305 180382 |
| | Nonhousehold adults | 0404 0405 180482 |
| Volunteer activities | | 15 1815 |
| Education | | 06 1806 160103 |
| Job search | | 0504 |
| Leisure activities | Socializing, relaxing, and leisure | 12 1812 |
| | Attending sports/recreational events | 1302 130302 130402 181302 |
| 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).

**Table 2** Time-Use Statistics for ATUS Respondents Age 25 to 61 With and Without Disabilities, 2009–2012

| | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| Time-Use Category | 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 | * |
| Child Care | | | | | | | | |
| 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 | * |

| Time-Use Category | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | Disabilities | No Disabilities | Difference | | Disabilities | No Disabilities | Difference | |
| Volunteer Activities | | | | | | | | |
| 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 | * |
| Job Search | | | | | | | | |
| 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 | |
| Adult Care | | | | | | | | |
| 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 | |
| Education | | | | | | | | |
| 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 | |
| Other Activities | | | | | | | | |
| 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, $p < .05$.

**Table 3** Summary Statistics for ATUS Respondents Age 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 | 0.69 | 0.69 | 0.00 | 0.64 | 0.66 | -0.02 |
| Black | 0.16 | 0.10 | 0.06* | 0.19 | 0.12 | 0.07* |
| Hispanic | 0.10 | 0.15 | -0.05* | 0.13 | 0.15 | -0.02 |
| Other | 0.05 | 0.05 | 0.00 | 0.05 | 0.07 | -0.02 |
| Less than high school education | 0.23 | 0.10 | 0.13* | 0.20 | 0.08 | 0.12* |
| High school education | 0.35 | 0.30 | 0.05 | 0.40 | 0.27 | 0.13* |
| Some college | 0.27 | 0.25 | 0.02 | 0.27 | 0.27 | 0.00 |
| College graduate | 0.14 | 0.35 | -0.21* | 0.14 | 0.38 | -0.24* |
| Number of children age 0–2 | 0.03 | 0.14 | -0.11* | 0.08 | 0.15 | -0.07* |
| Number of children age 3–5 | 0.06 | 0.15 | -0.09* | 0.09 | 0.17 | -0.08* |
| Number of children age 6–12 | 0.22 | 0.36 | -0.14* | 0.25 | 0.42 | -0.17* |
| Number of children age 13–18 | 0.21 | 0.29 | -0.08* | 0.24 | 0.33 | -0.09* |
| Married | 0.55 | 0.70 | -0.15* | 0.45 | 0.70 | -0.25* |
| Surveyed on a weekend | 0.32 | 0.28 | 0.04 | 0.29 | 0.29 | 0.00 |
| Perecentage with work limitation only | 0.25 | | | 0.30 | | |
| Perecentage with ACS disability only | 0.30 | | | 0.28 | | |

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

* Difference is statistically significant, $p < .05$.

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**Table 4** Regression Results for Time Use by Male ATUS Respondents Age 25 to 61

| | Sleeping | Leisure | Paid Work | House-work | Eating/ Drinking | Purchas-ing | Sports | Personal Care | Health | Child Care | Volunt-eering | Job Search | Adult Care | Educ-ation | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] |
| Both disability types | 41.76** | 195.09** | -216.33** | -28.03** | -3.26 | 0.01 | -6.51 | -3.71 | 17.39** | 1.97 | 1.31 | 0.19 | -8.11** | 2.09 | 6.15 |
| | [10.39] | [17.87] | [12.93] | [9.11] | [4.15] | [5.99] | [4.84] | [2.29] | [5.23] | [2.59] | [3.08] | [3.32] | [2.48] | [2.50] | [4.64] |
| Work limitation only | 46.13** | 136.20** | -167.05** | -9.60 | -9.85* | -5.42 | 3.29 | -5.88 | 10.33 | 1.34 | -2.73 | 1.55 | -3.51 | 1.08 | 4.10 |
| | [12.55] | [19.32] | [27.13] | [11.73] | [4.80] | [5.19] | [9.79] | [4.34] | [6.08] | [3.99] | [3.55] | [4.86] | [3.07] | [2.78] | [5.95] |
| ACS disability only | 11.73 | 63.16** | -52.70* | -13.24 | -7.95 | -12.19* | -2.42 | -1.91 | 7.53 | 5.67 | -4.47 | 4.12 | -3.89 | 6.49 | 0.08 |
| | [13.38] | [17.45] | [24.35] | [9.22] | [6.07] | [4.98] | [7.28] | [3.39] | [7.48] | [7.18] | [2.55] | [3.37] | [3.99] | [4.24] | [8.55] |
| Constant | 513.30** | 418.70** | 357.32** | 19.85 | 22.3 | 9.38 | 61.21* | 40.69** | -3.42 | -60.56** | 18.37 | 7.38 | 23.64 | 11.13 | 0.71 |
| | [36.69] | [59.90] | [82.28] | [30.43] | [25.20] | [20.47] | [23.23] | [13.05] | [9.66] | [20.75] | [20.63] | [9.96] | [22.71] | [13.38] | [29.24] |
| N | 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 |
| R-squared | 0.097 | 0.206 | 0.326 | 0.063 | 0.042 | 0.029 | 0.022 | 0.034 | 0.02 | 0.196 | 0.016 | 0.012 | 0.01 | 0.184 | 0.027 |



*Notes*: Standard errors are in parentheses and clustered at the state level. Time use is measured in minutes. The reference group is a white unmarried high school graduate in the Northeast with no children, in the month of May 2009. All regressions include the following control variables: age, age squared, race, education, 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, $p < .05$.
** Estimate is significantly different from zero, $p < .01$.
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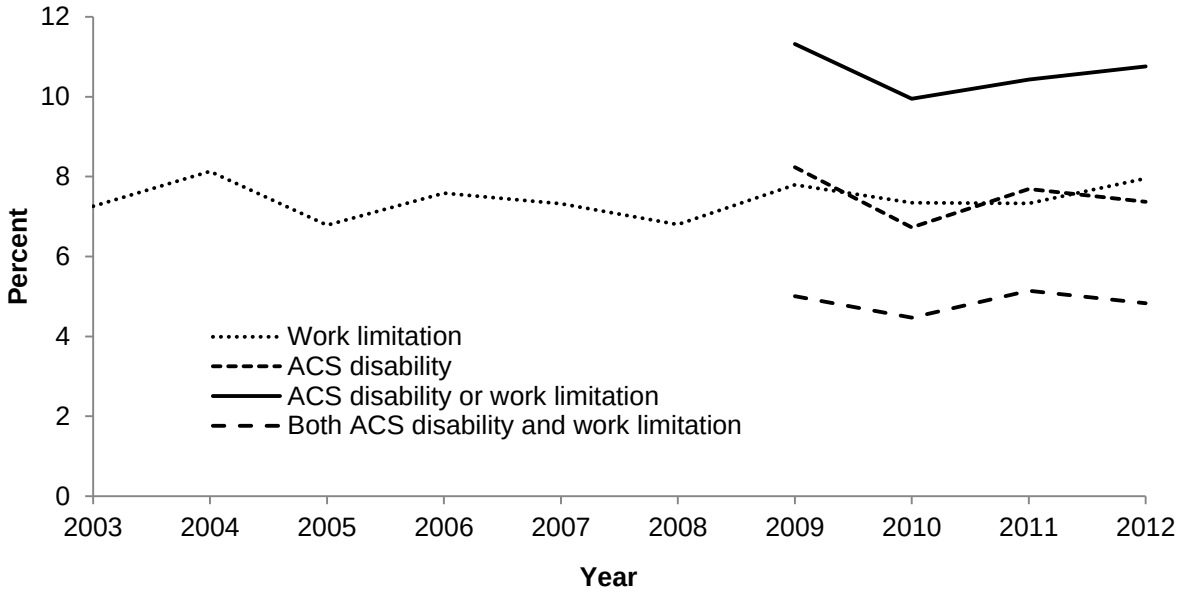
**Table 5** Regression Results for Time Use by Female ATUS Respondents Age 25 to 61

| | Sleeping | Leisure | Paid Work | House-work | Eating/ Drinking | Purchas-ing | Sports | Personal Care | Health | Child Care | Volunt-eering | Job Search | Adult Care | Educ-ation | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] | [se] |
| Both disability types | 61.98** | 107.81** | -172.01** | -10.83 | -8.77** | -11.96* | -10.27** | -8.78** | 29.14** | 12.19* | -1.83 | -1.18 | -4.49 | -0.9 | 19.92* |
| | [10.33] | [14.90] | [9.38] | [8.99] | [2.75] | [5.26] | [2.63] | [3.07] | [7.72] | [5.27] | [2.85] | [0.75] | [3.03] | [3.02] | [7.71] |
| Work limitation only | 47.16** | 71.97** | -124.52** | 15.63 | -1.40 | -12.97** | -3.58 | -8.51** | 12.95 | 5.31 | 0.49 | 1.11 | -2.23 | 1.23 | -2.63 |
| | [10.14] | [16.96] | [11.80] | [9.96] | [3.34] | [3.90] | [3.66] | [3.12] | [7.17] | [5.81] | [3.93] | [1.56] | [3.04] | [4.33] | [4.55] |
| ACS disability only | 19.60 | 44.69** | -66.94** | 3.05 | -12.14* | 0.78 | -7.90** | 0.72 | 6.47* | 14.01 | -0.09 | -1.17 | -0.18 | 0.68 | -1.58 |
| | [10.28] | [15.58] | [16.39] | [9.09] | [4.59] | [5.53] | [2.80] | [3.62] | [2.84] | [9.91] | [3.47] | [0.80] | [3.61] | [3.17] | [5.63] |
| Constant | 660.87** | 376.72** | 211.22** | -30.3 | 80.98** | 13.21 | 8.06 | 68.51** | 24.49 | -58.06* | 11.2 | 7.09 | 24.01 | -5.91 | 47.91** |
| | [37.53] | [41.88] | [69.58] | [39.11] | [21.52] | [22.86] | [17.57] | [12.26] | [12.37] | [22.64] | [16.02] | [4.46] | [14.79] | [14.86] | [17.54] |
| N | 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 |
| R-squared | 0.096 | 0.145 | 0.222 | 0.067 | 0.053 | 0.024 | 0.026 | 0.041 | 0.037 | 0.303 | 0.015 | 0.008 | 0.011 | 0.249 | 0.037 |

*Notes*: Standard errors are in parentheses and clustered at the state level. Time use is measured in minutes. The reference group is a white unmarried high school graduate in the Northeast with no children, in the month of May 2009. All regressions include the following control variables: age, age squared, race, education, 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, $p < .05$.
** Estimate is significantly different from zero, $p < .01$.

**Fig. 1** ATUS Respondents Age 25 to 61 with Disabilities, by Year and Disability Definition (percentage)




*Notes*: Percentages are shown for the years in which each definition is available in the data. Data are from 2003–2012 ATUS files matched to 2009–2012 CPS-ASEC files.