

Impact of Disability on Household Services: A Comment

Thomas R. Ireland

This short comment responds to Joseph Crouse's 2014 paper in this journal, "The Impact on Household Services: Evidence from the American Time Use Survey." The Crouse paper depends on the assumption that the amount of time spent providing household services is a measure of an individual's capacity to provide household services. Crouse points out that the productivity of time spent providing household services after an injury is "impossible to measure" and suggests that "data from the ATUS (American Time Use Survey) are available to measure the reduction in hours spent on household services." Crouse goes on to suggest that: "This number should serve as a lower bound for the reduction in household services for the statistically average disable person that suffers from a particular impairment."

The amount of time an individual spends on household services depends at least in part on voluntary choices of that individual. Regardless of disability, some individuals spend a great deal of time providing household services. Other individuals spend very little time. However, the choice depends on many other variables than the capacity of individuals to spend time providing household services. Everyone's week contains 168 hours that is divided between "Household Production," "Caring and Helping," "Personal Time," "Leisure," and "Work and Education" in the *Dollar Value of a Day: 2013 Dollar Valuation* (DVD 13) cited by Crouse. As is shown in DVD, time amounts must sum to 168 hours per week. Thus, if an individual is shown to spend less time on household production, it must follow that the individual is spending more time in some other fashion.

To use a simple example, Table 5 from DVD 13 indicates that, on average, "Married males, that work full time, spouse employed, youngest child ages 13 to 17" spent 14.39 hours per week providing household services. They also spent 3.90 hours per week on "Caring and Helping," 70.12 hours per week on "Personal Time," 34.24 hours per week on "Leisure" and 45.36 hours per week on "Work and Education," with the total amount of time each week summing to 168.00 hours. If it is assumed that the number of hours spent disabled individuals on household services, however, the disability category was defined, was 10.00 hours per week, Crouse's method would treat the reduction of 4.39 hours as reflecting a reduction in the capacity of the average person in that disability category to provide household services.

It is not self-evident that a reduction of 4.39 hours represents anything other than a changed number of hours providing household services. One must ask what those hours are now being used for. If the 4.39 hours per week are now being used to obtain medical treatments that were not needed before a person's injury (which would fall into Personal Time), there is a reasonable likelihood that 4.39 hours might represent the individual's loss of capacity to provide household services. However, if the 4.39 hours per week are now being spent on additional Leisure, or on Caring and Helping or on Work and Education, treating the 4.39 hours as a measure of loss of capacity to provide household services is less likely to be correct.

DVD 13 provides a total of 244 tables regarding time use from the American Community Survey, 200 of which are for specific categories of persons such as "Married males, that work full time, spouse employed, youngest child ages 13 to 17." Crouse's tables provide comparisons based on just three categories other than disability status: All persons, all males, and all females. His regression equations include influences of age, sex, whether or not employed, existence of spouse and children under age 18, but his conclusions are generic for persons of both sexes, males and females. For each disability classification, he finds differences in time amounts spent providing household services. However, the time amounts are generic to all persons, all males and all females who fall into those disability classifications in his Tables 2, 3 and 4. Thus, he finds, using his example, that an average male with a cognitive impairment "is likely to experience a reduction of 21.91 minutes of household services per day when compared to their counterparts without such an impairment."

It is not clear to this reader whether Crouse's comparison is between males with a cognitive impairment and males without a cognitive impairment *even if they have some other impairment* or between males with a cognitive impairment and males with no impairments of any kind. The difference between these two potential comparisons is important, but it will be assumed for current purposes that the comparison is between males with a cognitive impairment and all males without a cognitive impairment, even if they have other impairments. Thus, the 21.91 minute daily reduction in household services is assumed to apply to all males with a cognitive impairment in comparison

with all males, regardless of other impairments, who have a cognitive impairment.

DVD 13 does not provide a table for persons of both sexes, all males, or all females. It provides approximately 100 tables for males and 100 tables for females. The closest category to “all males” is Table 184 for all males over the age of 18. The closest category to “all females” is Table 193 for all females over the age of 18. Crouse does not make it clear what ages he is using in his comparisons, but Crouse also does not provide base values from which time reduction amounts are calculated. In other words, the reader can determine that Crouse is saying that a cognitive impairment results in a 21.91 minute reduction in daily time spent providing household services, but cannot determine from what starting time amount that reduction for males without a cognitive impairment the comparison is being made. Thus, based on Crouse’s paper standing alone, the reader cannot determine what type of percentage reduction is implied by the 21.91 minute daily reduction.

While it is dangerous to use two studies without knowing precisely what methods were used in each study, it may be instructive to look at the time amount for household production from DVD 13 for all males over the age of 18 from Table 184 of that source. The amount shown is 14.01 hours per week, which implies 2.00 hours per day. 21.91 minutes is 0.37 of an hour. Thus, the reduction ratio is $0.37/2.00 = 0.18$, or 18%. Based on this comparison, Crouse’s paper would imply a reduction of 18% in the amount of household services provided by an average male without a cognitive impairment. To use the other tables provided in DVD 13, one would have to make 18% reductions from amounts shown in each of the other 99 tables for males in DVD 13. For example, Table 1, which is for “Married males that work full-time, youngest child under age 13,” shows a weekly hours at 12.82 hours. A reduction of 18 percent would reduce that number from 12.82 to 10.59 hours (12.82×0.82) and would reduce the dollar value of a day shown in Table 1 of DVD 13 from \$24.74 per day to \$20.29 per day.

For reasons beyond the purview of this comment, using the category developed by Crouse for “males with a cognitive disability” is very questionable. However even if one accepts that assumption, to apply the Crouse study to values in DVD 13, which Crouse identifies as reliable, one must assume that the 18% reduction applies equally to all 99 other tables for household production by males in DVD 13. This is a very questionable assumption.

Earlier in his paper, Crouse sets out three methods for determining the value of lost household services for cases involving partial disability. The first method entails gathering information about the disabled person allowing a vocational expert to “approximate” the percentage reduction in household services over a life-

time. The second method is to project the value of an individual’s pre-injury capacity to provide household services over a lifetime and let the jury determine how much of the value has been lost. Crouse then goes on to advocate his “data based approach that utilizes information gathered about the disabled individual and how individuals most like the disabled individual being considered fare on average.” Crouse’s Tables 2, 3 and 4 provide his “data based approach.” The questions raised above make it clear that Crouse’s “data based approach” requires an analyst to make extraordinary assumptions. The discussion above also makes it clear that an analyst must take a number of questionable steps to apply Crouse’s paper to any real world report setting forth a dollar value for lost household services when a person retains residual capacity to provide household services.

This comment does not address other problems that are involved with any attempt to measure net lost capacity to provide household services following an injury. Those problems are not unique to the Crouse approach and will not be discussed here.

References

- Crouse, J. T. (2014). The impact of disability on household services: Evidence from the American Time Use Survey. *The Rehabilitation Professional*, 22(4), 217–222.
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Author Notes

Please address correspondence to Thomas R. Ireland, 408 SSB, University of Missouri at St. Louis, One University Boulevard, St. Louis, Missouri 63121-4400, Tel: 314/516-5558; E-mail: ireland@umsl.edu; Web: www.umsl.edu/~ireland

Rebuttal: Clarifying Multiple Regression Analysis and a Reply to Ireland's Critique

Joseph T. Crouse

This reply addresses Thomas Ireland's comments on my paper "The Impact of Disability on Household Services: Evidence from the American Time Use Survey". The original article sought to provide a data-based approach to measuring the impact of partial disability on household services. It concludes by stating that it "represents the first contribution" in doing so. Ireland does not provide a better approach to measuring the impact of disability on household services, and instead, merely criticizes the first contribution to this important measurement while making misrepresentations about the interpretations available from multiple regression analysis.

It is noteworthy before addressing specific issues in Ireland's comment to mention that Dollar Value of a Day (DVD) is based upon cross-tabulations while the Crouse paper is based upon multiple regression analysis. This point alone addresses many of Ireland's comments.

It is unnecessary to provide a few hundred tables as in DVD because the goal of the analysis in the Crouse paper is to explore the partial effect of disability on the time spent performing household services. Multiple regression analysis is best suited in this particular instance for the several reasons, the most compelling of which is the sample size limitations that would preclude cross-tabulations as in DVD. The regression equations provided in the Crouse paper provide the answer to many of Ireland's critiques.

Ireland is incorrect in stating "Crouse's tables provide comparisons based on just three categories other than disability status: All persons, all males, and all females". The tables provided lend themselves to hundreds of possible comparisons. For instance, if an expert was interested in comparing the time spent on household services for a 40 year-old non-disabled female with no children who is employed and has a spouse, the regression equation in Table 4 could be utilized and solved to find:

$$\text{HHS} = 3.66(40) - 0.030(40^2) - 68.52(1) + 43.39(1) + 114.52(0) + 57.35 - 26.63(0)$$

$$\text{HHS} = 130.62 \text{ minutes per day}$$

It would imply that the average 40 year-old female with the aforementioned characteristics would spend 2.18 hours, or 130.62 minutes, per day performing

household services. This number is 15.24 hours per week which is a bit lower than the 17.14 hours that DVD 2013 shows for the closest grouping in Table 70 (Married females, under age 45, that work full-time, spouse-employed, no children under age 18). Comparisons cannot be made between the two numbers, however, since the Crouse study is based on multiple regressions and takes disability status into account and DVD is based on cross-tabulations. In this regard, the Crouse study is more specific as it pinpoints the likely number of hours performing household services by age rather than lumping all ages under 45 together. Multiple regression analysis is more amenable to *ceteris paribus* analysis because it allows one to explicitly control for many factors that simultaneously affect the dependent variable (Wooldridge, 2009).

Now if we assume the same female suffers from a severe mobility disability, the regression equation would be:

$$\text{HHS} = 3.65(40) - 0.030(40^2) - 67.66(1) + 44.24(1) + 4.54(0) + 56.43 - 52.27(1)$$

$$\text{HHS} = 78.74 \text{ minutes per day}$$

These numbers are only pertinent to age 40. As this female progresses throughout her lifespan, assumptions would have to be made as to whether she is currently employed, whether she still has a spouse, etc. All of these factors will affect the level of household services in a given year. This analysis is best completed utilizing an Excel spreadsheet.

Furthermore, Ireland neglects the paragraph in the Crouse paper that explains how regression analysis can be used in this manner. The Crouse paper states that "The regression equations can be used to determine both the pre- and post-injury values of household services over time . . . It may be preferable to use a statistical average across the lifespan". It is apparent that Ireland prefers not to use the statistical average across the lifespan, but he fails to realize that the three tables provided in the Crouse paper allow him to perform an analysis based on assumptions about the individual's employment, children, and spouse.

The "base values from which time reduction amounts are calculated" can be easily found by plugging the relevant values into the regression equations. For instance, one would plug in the individual's age, employ-

ment status indicator variable (=1 if employed, 0 otherwise), spouse indicator variable (=1 if spouse, 0 otherwise), kid(s) under 18 indicator variable (=1 if present, 0 otherwise), and disability dummy variable (=0 since we are interested in base values i.e. no disability). Once plugged into the regression equation and multiplied by the relevant regression coefficients, the constant is added and a base value can then be easily obtained for any analysis based on these variables. The percentage reduction is then straightforward to calculate.

An analyst would certainly not apply an 18% reduction to “all 99 other tables for household production by males in DVD 13” as Ireland suggests. If the analyst is not pleased with using the statistical average across the lifespan (as in Case Studies #1 and #2 in the Crouse paper), the analyst can easily use the regression equations provided in Tables 3 and 4 to be more specific and make assumptions about the individual.

While this author agrees with Ireland’s comment that “the amount of time an individual spends on household services depends at least in part on voluntary choices of that individual”, he disagrees with the notion that the reduction in hours providing household services is merely a numerical change without significance. It is obvious that the reduced hours must be expended in some other way if they are not utilized for household services. Nonetheless, it is most probable that the reduction in hours expended is due to a reduced capacity to provide household services. This, however, is a conservative estimate since it does not consider the likely productivity decline.

The three tables provided in the Crouse paper allow for hundreds of possible scenarios and comparisons. This approach requires neither extraordinary assumptions nor questionable steps unless applied inappropriately. A basic understanding of multiple regression analysis is necessary in order to properly apply and critique Tables 2-4 in the Crouse Paper. Chapter 3 from Wooldridge’s *Introduction to Econometrics* will help in this matter.

References

- Crouse, J. T. (2014). The impact of disability on household services: Evidence from the American Time Use Survey. *The Rehabilitation Professional*, 22(4), 217–222.
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Author Notes

For further information, please contact Joseph T. Crouse, Vocational Economics, Inc., 325 W. Main Street, Suite 310, Louisville, KY 40202, Tel: 502-589-0995; Email: josephc@vocecon.com