MEASURING THE LIKELIHOOD OF DEVELOPING A WORK DISABILITY ACROSS THE LIFE COURSE*

Mark R. Rank, Ph.D.
Corresponding Author
Herbert S. Hadley Professor of Social Welfare
George Warren Brown School of Social Work
Campus Box 1196
Washington University
St. Louis, Missouri 63130
(314) 935-5694
markr@wustl.edu

Thomas A. Hirschl, Ph.D.
Professor
Department of Development Sociology
Cornell University
Ithaca, New York 14853

Timothy D. McBride, Ph.D.
Professor and Associate Dean for Public Health
Washington University
St. Louis, Missouri 63130

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ABSTRACT

BACKGROUND. To estimate the lifetime risk that a head of household in America will develop a work disability between the ages of 25 and 60.

METHODS. Forty years of longitudinal data from the nationally representative Panel Study of Income Dynamics survey data set are analyzed. Approximately 67,000 person years of information are pooled together in order to create a series of life tables estimating the likelihood and amount of time heads of households will experience a work disability. Logistic regression modeling is also used to examine the factors that increase or decrease the likelihood of developing a work disability.

RESULTS. Between the ages of 25 and 60, over half (54.6%) of all American heads of household will, at some point, report a work disability, and approximately one quarter (24.1%) will develop a severe work disability. Residing in poverty or near poverty, as well as less education, are highly associated with an increased probability of developing a work disability.

CONCLUSIONS. The prevalence and severity of the health, economic, and social costs associated with work disabilities on both an individual and a societal level make it a medical condition that physicians and health care professionals should pay particular attention to with respect to patient care across the life course.

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One of the more significant health and economic conditions that can affect the overall well-being of individuals and families is the onset of a physical or mental health condition that interferes with the ability to work. The development of a work disability has been shown to have potential ill effects upon an individual's health as well as upon their economic well-being .[1,2] It has also been shown to exert a significant cost with respect to the overall health care dollars as well as to the nation's economic productivity.[3]

The definition of a work disability is frequently defined as having a health limitation that prevents individuals either from working or limits their ability to work or to do certain jobs.[4] Of course, individuals may have a physical or mental health disability that does not interfere with their ability to work. In these cases, the individual would not be counted as having a work disability. Consequently, those with a work disability are a subset of the overall population that have any kind of a physical or mental disability. However, it is a particularly important subset because of its impact on an individual's ability to secure employment and earn a living.

Individuals between the ages of 21 and 64 that report having a disability display a wide range of health and/or mental health conditions that interfere with their ability to work. These include in order of importance, back or neck problems, arthritis, depression or anxiety, heart problems, fracture or bone injury, hypertension, diabetes, lung/breathing problems, problems with nervous system conditions, and musculoskeleton problems.[5]

Given the severity of these conditions, it would appear important for the medical and health care communities to have some idea as to the extent, likelihood, and amount of time that an American may develop a work disability during their prime earning years. Currently, information is only available with respect to the cross-sectional population

rates experiencing a work disability. For example, the U.S. Census Bureau estimated that in 2005, 11.9% of the population aged 16 to 64 had some kind of a work disability (compared with 16.5% of the population aged 21 to 64 who reported any kind of a disability), whereas 6.9% had a work disability that prevented them from working at all.[6]

Yet the question arises, what is the likelihood across the working years that an American may at some point develop a work disability? Research has shown that the dynamics of disabilities are particularly fluid. For example, Freedman and colleagues note,

> Disability depends on the health of an individual as well as the social and physical environment and the activities of interest. All of these factors can change frequently; therefore, the risk of having a disability is a highly dynamic phenomenon. The risk of disability not only changes over an individual's life course, but can also change from month to month or week to week.[5]

In this paper we examine for the first time the likelihood that an American across the life course will report having a work disability as well as a severe work disability, and we examine the amount of time that individuals experience such events as well as the factors related to the onset of a work disability. This study represents a first time look into the long term life course dynamics of work disabilities in America.

METHODS

Data Set

The analysis in this paper is based on longitudinal data taken from the Panel Study of Income Dynamics (PSID). The PSID is a nationally representative, longitudinal sample of households interviewed annually from 1968 to the present (after 1997, the PSID has been conducted on a biennial basis). It constitutes the longest running panel data set in the United States.[7] In addition, it represents the only available data set that has asked the same households a series of questions dealing with work disabilities across such an extended period of time.

The PSID initially interviewed approximately 4,800 U.S. households in 1968, collecting detailed information on roughly 18,000 individuals. As its name implies, the original focus of the PSID was on tracking income dynamics among households over time. The PSID has followed these individuals annually (biennially after 1997), including children and adults who leave their original households to form new households (for example, children leaving home, separations, divorce). Thus, the PSID is designed so that in any given year the sample is representative of the entire nonimmigrant U.S. population. The PSID interviews a primary adult (the head of household) to obtain information about each member of the family. The original response rate in 1968 was 76%. Since 1969 the response rates for subsequent waves have ranged between 96.9% and 98.5%.[8]

Throughout the analysis the sampling weights are used in order to ensure that the PSID sample accurately reflects the U.S. population. Specifically, we utilize the weights assigned to individuals for each given wave in order to take advantage of the PSID practice of periodically adjusting the weights to account for non-response bias.[9]

Information on both the household and individual level are taken from the initial wave of 1968 through 2007. This represents 40 years of longitudinal information which translates into roughly 67,000 person years embedded in the analysis for this paper.

Life Table Technique

Household, demographic, and work disability information on heads of household are used throughout this 40-year period in order to construct a series of life tables that estimate the likelihood of developing a work disability during the prime working years (ages 25 to 60 years). The life table is a technique that demographers and medical researchers often use. Although primarily found in mortality analyses, it can be applied to other areas of research as well.[10,11] The life table examines the extent to which specific events occur across intervals of time. The time intervals comprise each year an individual ages. During that year, one can calculate the probability of an event occurring (in this case, a work disability) for those who have yet to experience the event. If the event fails to occur, the individual is then allowed to enter the next year of the life table. Once a work disability is reported (or various number of years of a work disability), the individual is no longer at risk and therefore exits the life table. Based upon these age specific probabilities, the cumulative proportions of an event occurring across the life table can be calculated. These cumulative proportions represent the core of our analysis and are presented throughout the results section.

Adults may contribute anywhere from 1 to 36 person years within the life table. All adults enter the life table at age 25, and are followed accordingly until they either experience the event or age out of the analysis. For example, an adult within the PSID study who was 25 in 1990, and then in 1994 experienced a year in which they reported a work disability, would have contributed five person years within our analysis. In this case, he or she would be included in the age specific estimates for ages 25, 26, 27, 28, and 29.

One of the consequences of this approach is that period effects are smoothed out both within and across the age intervals. For example, some of the approximately 8,000 adults who are contained in our 30 year old group, are experiencing their 30th year in 1975, some in 1985, some in 1995, and so on. One of the results of this is that historical effects such as recessions will not unduly affect any particular age group or our hypothetical cohort as a whole.

In addition to the standard life table, we estimate a logistic regression model which allows us to examine the independent effects of several key variables upon the likelihood of experiencing a first time work disability and a severe work disability across the life course. Based upon findings in prior research,[12] we analyze the effects of age, race (white/nonwhite), household income (less than 150 percent of the official poverty line/greater than 150 percent of the poverty line), education (0 to 11 years/12 to 15 years/16 or more years), and gender upon the likelihood of reporting a work disability. Because of potential causality problems with respect to income, we use household income from the year before a disability has been reported or not reported.

Measurement

Our measure of a work disability is taken from a series of questions asked across the PSID waves of the household head. These questions allow us to construct a work limitation-based definition of disability. A first question asked of household heads is, "Do you have any physical or nervous condition that limits the type of work or the amount of work you can do?" For those who answer yes, two follow up questions are asked. The first asks "Does this condition keep you from doing some types of work?" A second question asks, "For work you can do, how much does it limit the amount of work you do – a lot, somewhat, or just a little?" This is a typical approach to measuring the extent of work disabilities found in other data sets. For example, the National Health Interview Survey asks people whether they have a health problem or disability that (1)

prevents them from working, or (2) limits the amount or kind of work that they can do. The Current Population Survey asks a similar type of question.

Our measure of any work disability is based upon answering "yes" to the first question – "Do you have any physical or nervous condition that limits the type of work or the amount of work you can do?" Our measure of a severe work disability is based upon respondents answering yes to the first question and responding "can do nothing" to the second question – "Does this condition keep you from doing some types of work?" Alternatively, if they answered the second question with a response other than "can do nothing" but responded "a lot" to the third question – "For work you can do, how much does it limit the amount of work you do – a lot, somewhat, or just a little?" they would also be counted as having a severe work disability.

The PSID has been shown to have somewhat higher cross-sectional percentages of individuals reporting a work disability compared to data in Current Population Survey (CPS), the National Health Interview Survey (NHIS), and the Survey of Income and Program Participation (SIPP).[13] Yet in many ways, this may be desirable. One of the critiques of analyzing work disabilities, is that they are clearly an underestimate of having any kind of physical or mental disability.[4] Therefore, the PSID is much closer to reflecting the overall prevalence of a physical or mental disability than are other data sets. Furthermore, the PSID is the only data set available that allows one to look longitudinally across the life course at the prevalence of developing a work disability. As such it provides an invaluable look into the overall prevalence of work disabilities.

RESULTS

Life Course Probabilities of Developing a Work Disability

The first column (1 or more years) in Table 1 represents the proportion of household heads who at some point during their working age years will develop a work disability. For reasons of space we only include the cumulative percentages at five year intervals, although our analysis contains these percentages for each year between 25 and 60. The cumulative percentages are 7.8% at age 25; 17.1% by age 30; 25.2% by age 35; 32.3% by age 40; 38.7% by age 45; 44.8% by age 50; 48.4% by age 55; and 54.6% by age 60 (95% confidence intervals are shown in parentheses). Consequently, over half of all American heads of household will report developing a work disability by the time they reach the age of 60.

[Table 1 about here]

The top panel of Table 1 estimates the likelihood of households heads experiencing one or more, two or more, three or more, four or more, or five or more total years of a work disability spread out across the period of ages 25 to 60. Table 1 shows that while over half of household heads will have a work disability in at least one year, 38.1% will have a work disability in two or more years, 28.1% in 3 or more years, 26.4% in four or more years, and 22.8% in five or more years. Based upon these percentages, it can be further determined that if one looks only at those adults who have had a work disability, 70% will experience at least one more additional year of a disability, while 42.2% will do so in five or more additional years by the time they reach the age of 60.

The bottom panel of Table 1 estimates the proportion of adults who experience a work disability for various consecutive number of years. For example, if an adult had a

work disability when they were 30, 31, and 32 years old, at age 31 they would be counted as having a work disability in two or more consecutive years, and at age 32 they would be counted as having had a work disability in three or more consecutive years. Table 1 indicates that by age 60, one third of adults have had a work disability in two or more consecutive years, 18.1% in three or more consecutive years, 14.8% in four or more consecutive years, and 13.9% in five or more consecutive years. From this data it can be estimated that for those adults who report a work disability at some point between the ages of 25 and 60, 25.4% of such individuals will have a disability in five or more consecutive years.

Life Course Probabilities of Developing a Severe Work Disability

Table 2 represents the proportion of American household heads who will at some point develop a severe work disability – that is, they are either unable to work because of their physical or mental condition, or that their work disability substantially interferes and reduces the type of work they are able to do.

[Table 2 about here]

The cumulative proportions found in Table 2 are obviously lower than those found in Table 1, but are far from trivial. By the age of 40, 11.3% of adults have reported having a severe disability, by age 50, 18.4%, and by age 60, nearly one quarter of household heads (24.1%) will have reported having a severe work disability at some point during their prime earning years. With respect to total years of experiencing a severe work disability, 11.5% will encounter two or more years, 9.2% three or more years, 7.1% four or more years, and 4.1% five or more years.

Interestingly, the proportion of Americans experiencing a long consecutive spell of having a severe work disability is less than one might expect given that one quarter of

Americans will at some point report a severe work disability. Consequently, 8.6% will have a severe work disability in two or more consecutive years, 6.3% in three or more consecutive years, 3.3% in four or more consecutive years, and 1.5% in five or more consecutive years.

Impact of Demographic/Economic Characteristics on Developing a Work Disability

Table 3 presents two logistic regression models that allow us to examine the impact of several key variables upon increasing or decreasing the odds of encountering a first observed work disability between the ages of 25 and 60 (in other words, we are predicting the likelihood of a work disability found in the first columns of Tables 1 and 2). The two models were estimated for developing a work disability and a severe work disability.

[Table 3 about here]

The odds of experiencing a first time work disability, as well as a severe disability, are significantly affected by several key variables. In particular, socioeconomic status as measured by residing in poverty or near poverty, as well as household heads with lower levels of education are particularly important. Consequently, those with household incomes below 1.5 of the official poverty line are 3.0 times more likely to experience a work disability across the life course, and 4.5 times more likely to experience a severe work disability compared to those above 1.5 of the poverty line. Likewise, individuals with less education are much more likely to experience a work disability than those with higher levels of education. Consequently, those with less than 12 years of education (compared to college graduates) are 1.8 times more likely to report a work disability, and 4.2 times more likely to report a severe work disability. These results are consistent with prior work looking at the impact of

socioeconomic factors upon the risk of disability and overall physical well-being in general.[12]

COMMENT

This study has provided a first time look at the overall likelihood of American heads of household developing a work disability at some point between the ages of 25 and 60. Our results indicate that over half (54.6%) of household heads will report some type of a work disability during these years, while nearly one quarter (24.1%) will report having a severe work disability. However, the percent of the population that will experience a long term work disability is relatively small. Thus, 13.9% of the population will report having a work disability in five or more consecutive years, while only 1.5% will report having a severe work disability in five or more consecutive years.

In addition, we examined the effect that several economic and demographic variables had upon increasing the likelihood of reporting a work disability. In particular, living in poverty or near poverty and having less education were highly related to increasing the odds of experiencing a work disability.

The economic impact of having a work disability can be substantial, both upon the individual and the health care system, as well as on the overall economy. For example, three work disability conditions that have been extensively analyzed have been lower back pain problems, depression, and rheumatoid arthritis. The overall direct and indirect economic costs of these upon the employee, employer, health care system, and economy have been estimated at between $84 billion to $625 billion for lower back problems,[14] $103 billion for depression,[15] and $39 billion for rheumatoid arthritis.[16] Other work disability conditions have also been shown to have substantial economic

costs associated with them.[1] Moreover, the psychological and social costs of a work disability upon an individual and their family can be substantial.[17]

Given these effects, and given the relatively high likelihood of developing a work disability at some point during the prime earning years, the health and medical communities along with the work place environment should pay particular attention to creating conditions in which those who experience a work disability are able to continue to function in their work environment if at all possible. As the National Academy of Sciences Report recommends, this would include strategies that create better assistive technologies as well as the better use of existing technologies.[3] Health care professionals should pay particular attention to the range of available medical and technological options that can allow individuals to maintain their ability to remain employed.[3]

In addition, the size and prevalence of work disabilities in the population is a critical threshold point for those eligible for Social Security Disability benefits,[18] as well as targeted vocational rehabilitation services.[19] Physicians are routinely involved in these decisions, and therefore having an understanding of the population and life course dynamics and risk factors associated with work disabilities is vital background information.

Several limitations of our study should be pointed out. First, our measurement of work disabilities is based on self-reporting. Although virtually every nationally representative study on work disabilities are also based on self-reporting, responses may nevertheless contain some amount of reporting error.[4] Second, our measure of a work disability applies to whether a respondent has experienced such a condition at any point during the prior year. However, we do not have information about the length of time during the year that a work disability was experienced. Consequently an individual may have experienced a work disability for 3 months during the year or for all 12 months, but we cannot distinguish between the two. Third, we are lacking specific information about

the medical nature of the work disability. Although we have information about the severity of the work disability, we cannot determine the exact medical condition behind the disability.

In conclusion, our findings indicate that over half of American household heads will experience some type of a work disability between the ages of 25 and 60, and one quarter will experience a severe work disability. The prevalence and severity of the health, economic, and social costs associated with a work disability make it a medical condition that health care professionals should pay particular attention to in terms of patient care.

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Table 1. Cumulative Proportions of Adults Experiencing a Work Disability

Age	Years of Experiencing a Work Disability: 1 or More Years	2 or More Years	3 or More Years	4 or More Years	5 or More Years
	Total Years Experienced				
25	.0775 (.0061)	-	-	-	-
30	.1707 (.0097)	.0900 (.0077)	.0551 (.0064)	.0311 (.0050)	.0206 (.0042)
35	.2518 (.0122)	.1489 (.0107)	.0954 (.0090)	.0739 (.0083)	.0530 (.0072)
40	.3231 (.0144)	.2080 (.0135)	.1460 (.0121)	.1102 (.0108)	.0937 (.0104)
45	.3874 (.0164)	.2597 (.0162)	.1966 (.0152)	.1666 (.0148)	.1365 (.0138)
50	.4484 (.0186)	.3091 (.0194)	.2401 (.0184)	.1942 (.0171)	.1660 (.0166)
55	.4838 (.0204)	.3667 (.0245)	.2881 (.0235)	.2231 (.0209)	.1922 (.0201)
60	.5458 (.0302)	.3814 (.0265)	.3412 (.0324)	.2816 (.0278)	.2308 (.0289)
N*	67228	63512	60461	56655	52776
	Consecutive Years Experienced				
25	.0775 (.0061)	-	-	-	-
30	.1707 (.0097)	.0760 (.0071)	.0380 (.0053)	.0245 (.0044)	.0162 (.0037)
35	.2518 (.0122)	.1152 (.0094)	.0646 (.0074)	.0520 (.0069)	.0375 (.0061)
40	.3231 (.0144)	.1591 (.0120)	.0897 (.0095)	.0703 (.0086)	.0510 (.0075)
45	.3874 (.0164)	.2155 (.0154)	.1316 (.0130)	.1097 (.0123)	.0827 (.0111)
50	.4484 (.0186)	.2644 (.0188)	.1503 (.0149)	.1400 (.0156)	.1055 (.0137)
55	.4838 (.0204)	.3026 (.0227)	.1650 (.0174)	.1476 (.0201)	.1244 (.0168)
60	.5458 (.0302)	.3342 (.0292)	.1810 (.0243)	.1476 (.0280)	.1389 (.0244)
N*	67228	65363	62509	58344	54288

± 95 percent confidence intervals shown in parentheses

*N = total number of person-years used to construct the column

Table 2. Cumulative Proportions of Adults Experiencing a Severe Work Disability

Age	Years of Experiencing a Severe Work Disability: 1 or More Years	2 or More Years	3 or More Years	4 or More Years	5 or More Years
	Total Years Experienced				
25	.0201 (.0035)	-	-	-	-
30	.0522 (.0061)	.0212 (.0040)	.0086 (.0027)	.0050 (.0021)	.0030 (.0017)
35	.0804 (.0082)	.0354 (.0057)	.0196 (.0045)	.0124 (.0037)	.0080 (.0030)
40	.1128 (.0107)	.0524 (.0077)	.0325 (.0064)	.0223 (.0055)	.0136 (.0043)
45	.1429 (.0132)	.0652 (.0094)	.0457 (.0084)	.0350 (.0078)	.0247 (.0067)
50	.1842 (.0175)	.0796 (.0117)	.0538 (.0100)	.0476 (.0103)	.0357 (.0093)
55	.2239 (.0234)	.1049 (.0173)	.0756 (.0163)	.0523 (.0120)	.0418 (.0111)
60	.2410 (.0276)	.1149 (.0227)	.0923 (.0215)	.0707 (.0302)	.0418 (.0111)
N*	67278	63772	58792	54008	49552
	Consecutive Years Experienced				
25	.0201 (.0035)	-	-	-	-
30	.0522 (.0061)	.0183 (.0037)	.0063 (.0023)	.0031 (.0016)	.0027 (.0016)
35	.0804 (.0082)	.0292 (.0052)	.0177 (.0034)	.0070 (.0027)	.0042 (.0021)
40	.1128 (.0107)	.0396 (.0066)	.0187 (.0047)	.0112 (.0038)	.0071 (.0031)
45	.1429 (.0132)	.0506 (.0083)	.0293 (.0069)	.0123 (.0042)	.0073 (.0031)
50	.1842 (.0175)	.0609 (.0103)	.0356 (.0085)	.0182 (.0064)	.0121 (.0054)
55	.2239 (.0234)	.0803 (.0154)	.0471 (.0123)	.0228 (.0089)	.0153 (.0071)
60	.2410 (.0276)	.0862 (.0173)	.0633 (.0186)	.0334 (.0180)	.0153 (.0071)
N*	67278	64215	59256	54383	49799

± 95 percent confidence intervals shown in parentheses

*N = total number of person-years used to construct the column

Table 3. Logistic Regression Model Odds Ratios Predicting First Time Occurrence of a Work Disability Between the Ages of 25 and 60.

Variables	Any Work Disability	Severe Work Disability
Age		
Age	.770**	.825**
Age^2	1.003**	1.003**
Income		
Less than 1.5 poverty level	2.958**	4.512**
Education		
Less than 12 years	1.758**	4.218**
12 to 15 years	1.548**	3.741**
Race		
Nonwhite	.813**	1.073
Gender		
Male	1.086	1.330*
Chi-square	636.02**	328.69**
N	63033	52186

*significant at the .05 level
**significant at the .001 level