



New Findings On Gender: The Effects Of Employment Status On Suicide

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Background and objectives: The purpose of the study was to evaluate the impact of gender and employment on suicide with the use of expanded unemployment statuses as covariates.

Methods: Data were obtained from release 5 of the National Longitudinal Mortality Study, a prospective study of deaths in the United States. Proportional hazards regression models were fitted to the data based on follow-up from 1990 to 2011.

Results: Unemployment was significantly associated with suicide (ARR=1.628, 95% CI=1.356, 1.954), and men had suicide deaths that were five times greater than women (ARR=5.104, 95% CI=4.565, 5.707), however when the sample was stratified by sex, the impact of unemployment on suicide was much higher among women (ARR=2.988, 95% CI=2.045, 4.366) than among men (ARR=1.393, 95% CI=1.131, 1.717).

Conclusion: Contrary to many findings and gender assumptions, unemployed women in the U.S. have higher deaths from suicide than unemployed men. Discussion focused on explanations for gender disparities in unemployment.

Keywords: suicide, unemployment, gender

Introduction

After a period of consistent decline in suicide in the United States between 1986 and 1999, suicide rates increased steadily from 1999 to 2014, from 10.5 to 13.0 per 100,000 population, an age-adjusted increase of 24 percent.¹ As the 10th leading cause of death in the U.S., 45,000 Americans die from suicide every year.² Moreover, more than a half-million people are seen in emergency rooms yearly for injuries due to self-harm, and it is estimated 1.3 million adults in the U.S. attempt suicide annually.^{1,2}

Longitudinal individual-level studies of unemployment have with rare exception found that unemployment increases the risk for suicide. Also, the finding that men have higher suicide deaths than women is well understood. Thus, for the year 2016 in the U.S., the suicide rate for males was 13.9 per 100,000, while the rate for women was 4.0 per 100,000. Similarly, longitudinal studies outside of the U.S. generally find that unemployed men have higher suicide than unemployed women.³⁻⁶ One exception to this pattern is based on U.S. data where unemployed women had higher suicide deaths than unemployed men, but these data involved relatively few female suicides and limited unemployment statuses.⁷

Many studies on the relationship between unemployment and suicide do not include the employment status of the disabled (unable to work), and those not

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looking for work, or who have been discouraged from finding work. One important advantage of using additional categories of employment status is that it helps to reduce the “self-selection” problem. It has been suggested that the association between unemployment and suicide may be spurious because unemployed people are more likely to be mentally ill.^{8,9} The use of these other categories has the effect of moving more of the mentally ill out of the unemployed (looking for work) category, thus reducing the self-selection problem.¹⁰

Thus, the purpose of this study was to use longitudinal individual-level research to revisit U.S. data by stratifying the analysis by gender, including a much larger sample of suicides, and by using an expanded number of unemployment statuses as covariates. We studied the years 1990–2011 covering almost 1.5 million persons of whom 2,013 died of suicide, including 414 women, the largest U.S. sample available.

Methods

Data

Data were obtained from version 5 of the National Longitudinal Mortality Study (NLMS) released in October 2015.¹¹ The NLMS is a prospective study of mortality in the United States, and is sponsored by the National Heart, Lung, and Blood Institute, the National Cancer Institute, the National Institute on Aging, the National Center for Health Statistics, and the U.S. Bureau of the Census. The full NLMS comprises a database developed for the purpose of studying the effects of demographic and socio-economic attributes on disparities in U.S. mortality. It is based on a multistage stratified sample of the non-institutionalized population and includes information from the Current Population Surveys. The full study, which is restricted, currently has approximately 3.8 million records with 550,000 identified mortality cases. The NLMS Public Use Microdata Sample used in the present study is an extract of the full NLMS designed to provide easy access to the main study while protecting the confidentiality of those who have responded to the original surveys. Data from deaths occurring from April 1, 1990 to April 30, 2011 were obtained from death certificates by linking individuals in the Current Population Surveys to a mortality database through the National Death Index (NDI). Created in 1979 and maintained by the National Center for Health Statistics, the NDI is a computerized and centralized index of deaths occurring in the United States. It was designed to provide researchers with a simplified method of

obtaining mortality information in prospective studies. Detailed information about the NLMS and NDI, including data linkage and obtaining death records, is available at the U.S. Bureau of the Census^{12,13} and the National Center for Health Statistics.¹⁴ Mortality experiences of cohort members were studied until 2011, and individuals alive at the end of the study received the maximum follow-up period of 4,018 days or 11 years. Analyses in the present study were limited to persons 15 years old and above, 1,477,743 individuals at the beginning of the study. To estimate suicide mortality risk, all individuals surviving beyond the 4,018 days of follow-up, and persons dying from other causes were treated as right censored observations.

Variables And Measurement

The dependent variable was completed suicide (intentional self-harm), identified by codes X60-X84, Y87.0 from the International Statistical Classification of Diseases, 10th revision. All covariates in the analyses were measured at baseline, and their effects on suicide risk during follow-up were assessed. The key independent variable was employment status, comprising those who were employed; unemployed, but looking for work; disabled, unable to work; retired, housekeeping, student or others doing something else not classified in previous categories of employment status; and those for whom employment status was unknown/missing. For data analysis, each was measured as series of dummy variables with 1, and individuals employed at baseline were the reference group for the other employment categories. Other variables were similarly based on the longitudinal literature when available in the NLMS and measured as dummy variables: sex; marital status; race/ethnicity; place of residence; housing tenure; educational attainment; family income; age; and region of residence as identified by the U.S. Bureau of the Census. Women, the married, non-Hispanic African Americans, those living in urban areas, homeowners, those with some education, and income from US\$40,000–59,999 were the comparison groups. Age at baseline was left in its interval format.

Statistical Estimation

Proportional hazards regression models were fitted to the NLMS data to compare the risk of suicides during follow-up while controlling for potential confounders.¹⁵ The model may be specified as:

$$h(t) = h_0(t)\exp(\sum_k \beta_k X_k) \quad (1)$$

where $h(t)$ is the hazard or risk of suicide at time t , β_k s are a set of unknown parameters to be estimated and X_k s are k covariates. $h_0(t)$ is a baseline hazard function and is defined when all the covariates in the model are set to zero. The survival distribution function, defined as the probability of surviving from start of follow-up to at least time t , is given by

$$S(t) = [S_0(t)] \exp^{(\sum_k \beta_k X_k)} \quad (2)$$

where $S_0(t)$ is the baseline survivor function representing the reference categories of the covariates. The proportionality of hazards, an assumption in the Cox model, is tested by inspecting the plots of $\ln[-\ln\{S(t)\}]$ against survival time t for the various covariate categories. If the resulting plots are found to be approximately parallel, the proportionality assumption is assumed to be satisfied by the data.

Estimated relative risks (hazard ratios) were obtained by exponentiating the hazard coefficients (β_k 's) in Equation 1. Thus, relative risk (RR) = $\exp(\beta_k$'s). The statistical significance of the effects of each covariate in the above model (Equation 1) was assessed via the t-statistic, obtained as a ratio of the parameter estimate to its corresponding asymptotic standard error. Parameters were estimated by the method of partial maximum likelihood using the PHREG procedure.¹⁶ Proportional hazards model was selected over the logistic model because the latter fails to account for differences in survival from start of follow-up until event occurrence.

Results

As may be seen in Table 1, the unemployed (looking for work) were 63 percent more likely to have higher suicide deaths than their employed counterparts (ARR=1.628, [95%] CI=1.356, 1.954). The disabled and those unable to work were nearly 2.4 times more likely to have higher suicide deaths than the employed (ARR=2.374, 95% CI=1.904, 2.296). Individuals who were retired, doing housekeeping, students, or others had a suicide risk that was 1.5 times more elevated than that of the employed (ARR=1.513, 95% CI=1.343, 1.704).

Men were over 5 times more likely to have higher suicide deaths than women. The unmarried were 42% more likely have higher suicide than the married. Non-Hispanic whites had a suicide risk that was 2.5 times that of non-Hispanic African Americans. Likewise, non-Hispanic Native Americans experienced suicide mortality risks that were 3.2 times those of non-Hispanic African Americans.

Due to the reduced number of suicides because of stratification by sex some variables were collapsed to reduce the risk of deriving unstable estimates (see Table 2).

As seen, unemployed men had nearly 1.4 times more suicide deaths than employed men (ARR=1.393, 95% CI=1.131, 1.717). However, unemployed women had nearly 3 times more suicide than employed women (ARR=2.988, 95% CI=2.045, 4.366), the strongest covariate in the sample. The strongest covariate for men was disabled (ARR=2.247, 95% CI=1.762, 2.865).

Among other findings, being unmarried was significant in explaining suicide risk for both sexes, but the effect was stronger in men (ARR=1.509, 95% CI=1.343, 1.696) than in women (ARR=1.274, 95% CI=1.017, 1.595), and non-Hispanic white men had nearly 1.9 times more suicide deaths than other racial/ethnic groups (ARR=1.877, 95% CI=1.632, 2.162), but non-Hispanic white women experienced risk of death that was over 2.4 times that of other racial/ethnic groups (ARR=2.396, 95% CI=1.790, 3.207). While the educational attainment variables were significant for men, importantly that was not the case for women. In addition, having a family income of less than \$20,000 was stronger for women than men (APR=1.444 versus 1.274), but women did not significantly benefit from higher family income as men did. Finally, in every age category women's risk for suicide was significantly greater than that for men with the exception of those 60 years or older.

Discussion

We expanded the category of employment status to move more of the mentally ill out of the unemployed status. This is important because of the self-selection problem that suggests unemployed people have higher risks for suicide because they are mentally ill. The main limitation of the study is that the NLMS does not include psychiatric morbidity as a covariate, and the effects of unemployment may be modified as a result. Unfortunately, this is true for all U. S. data. Another limitation is that, ideally, more work is needed to separate out the category of retired, homemakers, students and others. The problem here as in much suicide research is that sample size is a limiting factor. Finally, two other variables not available in the NLMS, job demoralization and demotion, might alter the effects of employment on suicide as they may potentially lead to suicide.

The strong relationship between female unemployment and suicide shown in this study is generally contrary to long standing notions about gender and suicide. Because men are at higher risk for suicide, the general

Table 1 Hazards Regression Results Of The Effects Of Employment Status On Suicide: The National Longitudinal Mortality Study, 1990–2011

Covariate	Event	Population At Risk	β	ARR	95% CI
Employment status					
Employed	1106	881,369	Reference	1.000	Reference
Unemployed, looking for work	135	63,157	0.487***	1.628	1.356, 1.954
Disabled, unable to work	94	30,976	0.864***	2.374	1.904, 2.960
Retired, housekeeping, student, other	670	492,465	0.414***	1.513	1.343, 1.704
Unknown/Missing	8	9776	−0.591	0.554	0.236, 1.301
Marital Status					
Married	1085	862,222	Reference	1.000	Reference
Not married	924	611,624	0.357***	1.429	1.291, 1.582
Sex					
Female	414	779,666	Reference	1.000	Reference
Male	1599	698,077	1.630***	5.104	4.565, 5.707
Race/Ethnicity					
Non-Hispanic African American	93	130,295	Reference	1.000	Reference
Non-Hispanic White	1703	1,125,121	0.917***	2.504	2.024, 3.098
Non-Hispanic Native American	29	12,311	1.163***	3.201	2.105, 4.868
Non-Hispanic Asian, Pacific Islander	32	32,713	0.462*	1.588	1.061, 2.377
Hispanic	150	170,316	0.252	1.288	0.992, 1.672
Non-Hispanic Other race	6	6987	0.234	1.264	0.553, 2.886
Place of Residence					
Urban	1364	1,029,013	Reference	1.000	Reference
Rural	649	448,730	−0.065	0.937	0.850, 1.033
Housing Tenure					
Own home	1375	1,033,446	Reference	1.000	Reference
Rent	638	444,297	0.106*	1.112	1.002, 1.235
Educational Attainment					
Some College	535	436,121	Reference	1.000	Reference
Less High School	657	431,795	0.139 *	1.150	1.018, 1.299
High School Completed	716	517,822	0.166**	1.181	1.058, 1.318
Graduate or professional school	18	18,829	−0.287	0.750	0.469, 1.198
Family Income (US\$)					
\$40,000 - \$49,999	152	121,883	Reference	1.000	Reference
Less than \$20,000	597	365,224	0.253***	1.288	1.131, 1.466
\$20,000 - \$29,999	369	271,075	0.024	1.025	0.897, 1.170
\$30,000 - \$39,999	271	208,651	−0.016	0.984	0.850, 1.138
\$50,000 - \$59,999	201	173,986	−0.224*	0.799	0.670, 0.953
\$60,000+	227	215,489	−0.209**	0.812	0.694, 0.950
Unknown/Missing	36	29,774	−0.377*	0.686	0.482, 0.975
Age					
15–28	386	332,174	Reference	1.000	Reference
29–39	451	331,877	0.441***	1.554	1.353, 1.785
40–49	314	230,640	0.492 ***	1.635	1.403, 1.905
50–59	269	188,336	0.509***	1.663	1.417, 1.953
60+	478	301,480	0.547***	1.728	1.493, 1.999
LRS	1393.64***				
df	25				
Suicides	2013				
Population at Risk	1,477,743				

Notes: *Significant at $\alpha=0.05$; **Significant at $\alpha=0.01$; ***Significant at $\alpha=0.001$.

Abbreviations: ARR, adjusted relative risk; CI, 95% confidence interval.

Table 2 Employment Status On Suicide By Sex, 1990–2011

Covariate	Male			Female		
	β	ARR	95% CI	β	ARR	95% CI
Employment status						
Unemployed, looking for work	0.332***	1.393	1.131, 1.717	1.095***	2.988	2.045, 4.366
Employed	Reference	1.000	Reference	Reference	1.000	Reference
Disabled, unable to work	0.810***	2.247	1.762, 2.865	1.031***	2.803	1.649, 4.763
Retired, housekeeping, student, other	0.398***	1.489	1.297, 1.710	0.378***	1.459	1.156, 1.841
Unknown/Missing	−0.423	0.655	0.282, 1.522	−0.580	0.560	0.050, 6.291
Marital Status						
Married	Reference	1.000	Reference	Reference	1.000	Reference
Not married	0.411***	1.509	1.343, 1.696	0.242*	1.274	1.017, 1.595
Race/Ethnicity						
Non-Hispanic White	0.630***	1.877	1.631, 2.162	0.874***	2.396	1.790, 3.207
Other Races	Reference	1.000	Reference	Reference	1.000	Reference
Place of Residence						
Rural	0.001	1.000	0.897, 1.114	−0.121	0.886	0.710, 1.105
Urban	Reference	1.000	Reference	Reference	1.000	Reference
Housing Tenure						
Own home	Reference	1.000	Reference	Reference	1.000	Reference
Rent	0.121*	1.129	1.004, 1.270	0.057	1.058	0.840, 1.333
Educational Attainment						
Less High School	0.185**	1.204	1.051, 1.378	−0.088	0.916	0.694, 1.208
High School Completed	0.205***	1.228	1.084, 1.391	−0.011	0.989	0.783, 1.249
Some College	Reference	1.000	Reference	Reference	1.000	Reference
Graduate or Professional School	−0.375	0.687	0.396, 1.192	0.002	1.002	0.410, 2.449
Family Income (US\$)						
\$40,000 - \$49,999	Reference	1.000	Reference	Reference	1.000	Reference
Less than \$20,000	0.242***	1.274	1.103, 1.473	0.368**	1.444	1.077, 1.938
\$20,000 - \$29,999	−0.019	0.981	0.846, 1.138	0.183	1.201	0.890, 1.621
\$30,000 - \$39,999	−0.043	0.958	0.815, 1.126	0.095	1.100	0.789, 1.532
\$50,000 - \$59,999	−0.207*	0.813	0.669, 0.988	−0.193	0.825	0.546, 1.246
\$60,000+	−0.218**	0.804	0.675, 0.958	−0.159	0.853	0.594, 1.223
Unknown/Missing	−0.340	0.711	0.482, 1.049	−0.473	0.623	0.280, 1.388
Age						
15–28	Reference	1.000	Reference	Reference	1.000	Reference
29–39	0.376***	1.457	1.247, 1.703	0.773***	2.167	1.590, 2.952
40–49	0.377***	1.459	1.223, 1.739	0.980***	2.664	1.925, 3.686
50–59	0.482***	1.620	1.352, 1.942	0.732***	2.080	1.458, 2.967
60+	0.645***	1.906	1.614, 2.250	0.369*	1.446	1.032, 2.027
LRS	409.70***			125.68***		
df	21			21		
Suicides	1599			414		
Population at Risk	698,077			779,666		

Notes: *Significant at $\alpha=0.05$; **Significant at $\alpha=0.01$; ***Significant at $\alpha=0.001$.

understanding was that unemployed men would be at higher risk than unemployed women. Traditionally seen as holding the primary role in the family, socialized to be

the major breadwinners, and viewed as expecting gainful employment, it was assumed that unemployment would affect men more strongly than women.^{17–19}

Four factors may help to explain the greater risk for suicide among unemployed women. One explanation is unemployed women are more likely to have higher rates of depression. While we expanded the category of unemployment status in an attempt to reduce the number of mentally ill among the unemployed, it is likely some depressed individuals remained in the unemployed category. Depression is a major risk factor for suicide, and women are more likely to be diagnosed, 4.0% compared to 2.7% for men (a 48% difference).^{20,21} In addition, a survey of 235,067 people in the U.S. found 6.4% of employed persons had depression compared to 39.1% who were unable to work, 21.3% of the unemployed, 9.2% of homemakers and students, and 6.3% of the retired.²⁰ Even though gender disparities in depression require more investigation, these studies may suggest part of the suicide risk affecting unemployed women may be the result of depression. There is also evidence that for some of the unemployed the pathway from mental illness to suicide begins with unemployment,^{22–24} thus a better understanding of the causal directions concerning unemployment and depression is needed.

Another factor is gender discrimination. In an environment where women's occupational chances are blocked for reasons of discrimination, it is reasonable to think unemployed women will have higher suicide than men. Despite evidence that discrimination in employment on the basis of sex has not gone away, rates of female labor force participation show it is considerably less common today in the U.S. than in the past.²⁵ However, this does not mean women have benefited equally. Members of the LGBT community are of special concern because they experience high levels of employment discrimination²⁶ and suicide.²⁷

Another approach to the linkage between unemployed women and suicide is a Durkheimian one.²⁸ Both men and women lack for income and status during unemployment, but they also lose social integration, the connectiveness between themselves and the workplace, and others in the workplace. But many women today maybe more bonded to and see themselves as more connected with the workplace than men. They may also be more strongly connected to the shared values of the workplace, and perhaps more likely to react negatively when those bonds are severed. In a recent study covering nearly 500 men and women, the negative impact on life satisfaction during unemployment was higher in women than men for those who had stronger work identity.²⁹ This study also showed

women with egalitarian gender attitudes experienced higher loss of life satisfaction during unemployment.

On the other hand, while some women may see the workplace as a source of social integration, others have found it to be an environment rife with the risk of harassment. In a recent study of 64,000 employees across 279 companies, 35% of women had been sexually harassed, including 55% of women in senior management.³⁰ Job loss is a common effect of sexual harassment in the workplace.³¹ The link between the harassment of women physicians, and suicide has been discussed in several reports.^{32,33} In a study of 290 women firefighters sexual harassment was significantly related to suicide ideation.³⁴ A study of sexual harassment in the U.S. military found in a sample of 12,567 soldiers, those who experienced harassment were five times more likely to commit suicide.³⁵

Conclusion

Contrary to many findings and gender assumptions, this paper shows that while men have higher suicide deaths than women, in the U.S. unemployed women have higher suicide risks than unemployed men. Understanding the pathways in women's lives from unemployment to suicide is an important next step, perhaps one with greater urgency now.

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Disclosure

The authors report no conflicts of interest in this work.

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