

Young Adults, Mortality, and Employment

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Objective: This study assessed the relationship between employment status and mortality over a 2-year period among a nationally representative sample of young adults aged 18 to 24 years ($n = 121,478$, representing more than 21 million US young adults). **Methods:** By using data from the 1986–2000 National Health Interview Survey and its public-use mortality follow-up through 2002, mortality after 2-year follow-up (for each individual) was regressed on employment status at baseline, controlling for gender, race, education, season, and survey design. **Results:** Having been employed was associated with significantly lower risks of all-cause, homicide, and “other-cause” mortality (adjusted odds ratios range: 0.51 to 0.60). **Conclusion:** Working appears to be a factor that may prevent premature mortality among young adults; increasing unemployment may result in increased mortality risks among young adults in the future.

On-the-job mortality rates among adolescent workers (those less than 18 years of age) in the United States (US) have been consistently high compared to all other ages of workers.^{1–4} In addition to risks related to lack of experience, young adult workers may have additional vulnerabilities related to the transition to adulthood that put them at increased risk.⁵ These transitional factors may be societal, physiological, and/or behavioral.^{4–6} Nevertheless, there is limited research on morbidity and mortality among young adult workers between the ages of 18 and 24 years. Because this age group is not protected by child labor laws but may still evidence the same characteristics of younger workers of increased mortality risk,⁷ they may be at even greater risk of injuries and consequently mortality. For example, according to national estimates from 1999, young workers between the ages of 18 and 19 had the highest non-fatal occupational injury rates; the second highest injury rates were among workers between the ages of 15 and 17, followed by workers aged 20 to 24 years.⁸

Among employed individuals, young workers display higher risk for injury and mortality while at work than older workers. Nevertheless, it is now known whether employment itself, during young adulthood influences the risk of morbidity and mortality. Therefore, we examined the association between mortality risk and

employment using a nationally representative sample of 18 to 24 year olds in the United States.

MATERIALS AND METHODS

The National Health Interview Survey (NHIS) is conducted by the National Center for Health Statistics (NCHS), and utilizes a complex sample survey design to obtain population-based samples that are representative of the US civilian non-institutionalized population.^{9,10} The NHIS sample is drawn continuously throughout the year, and includes non-institutionalized group quarters such as college dormitories. Therefore, this NHIS sample randomly selected young adults across academic and non-academic (summer) weeks. A mortality linkage was performed by the NCHS for the 1986–2000 NHIS survey participants with the National Death Index, with follow up through 2002. The public use NHIS mortality file was used, which has been found to provide very similar analyses results when compared with the restricted data files.¹¹ For the purposes of this study, data on all young adults aged 18 to 24 years from the 1986–2000 NHIS with mortality follow-up through 2002 were pooled and analyzed.

The cause of death was based on an NCHS-recoded version of the 10th revision of the International Classification of Diseases (ie, UCOD_113). Death after 2 years of follow-up from all-causes, homicide [UCOD_113 = 128–129], suicide [UCOD_113 = 125–126], motor vehicle accident [UCOD_113 = 114], and “other cause” (ie, any cause other than suicide, motor vehicle accident, or homicide) were the outcome variables; these cause of death categories were chosen because these were the most prevalent for this age group. Our study definition of “young adult workers” (ie. 18 to 24 years) was based on the youth labor definition utilized by the Bureau of Labor Statistics, which is defined as those employed between the ages of 16 to 24 years.¹² The NHIS employment status was the main independent dichotomous variable and was based on the self-report of any employment in the 2 weeks before (1986–1996) and 1 week before (1997–2000) to the NHIS interview.

Logistic regression analyses adjusting for race (black, white, other), gender, educational attainment (<12 years, 12 years, and >12 years), and the complex survey design were conducted using SAS software. Age was included as a continuous variable in the analyses because of the significant societal, psychological, and physiologic changes which take place between the ages of 18 to 24.¹³ The sample weights are adjusted so that the data that were pooled over multiple years represent a 1-year sample.¹⁴ Interaction terms that are often found to be significant in the literature related to employment, such as race-by-gender and gender-by-employment, were tested.

The NHIS questionnaire does not ask the individual whether he or she works only during the summer period or whether the individual is attending college, which may be a reason for only working during certain periods. Many young adults work during the summer periods only, therefore it is possible that workers interviewed during the summer months may have different mortality risk levels compared to workers interviewed during other seasons. We created a variable based on time of employment (summer vs

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non-summer), and tested the interaction of employment status and time of interview. This study was approved by the University of Miami's Institutional Review Board.

RESULTS

The sample demographics of young US adults aged 18 to 24 years (*n* = 121,477; representing an estimated 21 million young

adults) with employment data are shown in Table 1. There was relatively equal representation of men and women. The majority of the sample was white (80.5%). Over half had at least a high school education. The leading causes of death among all young adults between the ages of 18 to 24 years were motor vehicle accidents (24.0%), followed by homicide (16.6%) and suicide (13.1%).

Table 2 displays the logistic regression results for mortality risk adjusted for age, gender, race, education, and employment status. Among all young adults age 18 to 24, employment was associated with statistically significant lower risks of all-cause mortality (adjusted odds ratio = 0.60 [95% confidence interval = 0.47 to 0.77]), homicide (0.54 [0.29 to 0.99]), and "other-cause" mortality (0.51 [0.35 to 0.74]). Although not statistically significant, employment also appeared to be protective for suicide mortality, but of a similar risk to unemployment for motor vehicle accident mortality. Regardless of employment status, lower educational attainment and male gender were associated with increased mortality risks for all the causes of mortality. Young Black adults also had significantly increased risks for all but suicide and motor vehicle accident mortality, whereas young "other race" adults had a significantly increased risk for motor vehicle accident mortality. None of our a priori interaction tests were statistically significant, including summer versus non-summer workers.

DISCUSSION

To our knowledge, this is the first study to indicate that employment status may reduce the risk of early mortality among young US adults aged 18 to 24 years. Specifically, being employed was associated with reduced mortality risk from all-causes, homicide, and all other causes of death, after controlling for gender, race, and education.

Research has demonstrated that the association between employment and health is a complex one with sometimes contradictory results, particularly for younger age groups.^{6,15} For example, unemployment has been linked with increased mortality,^{16–18} possibly through mediators such as poor psychological well-being (eg, depression) and unhealthy behaviors (eg, increased substance abuse).^{15,18} On the other hand, employment has been associated with positive personality characteristics such as better self-esteem

TABLE 1. Demographic and Other Characteristics: NHIS 1986–2000 Adults 18–24 yr (*n* = 121,478)

	<i>N</i>	Estimated US Population	Population Percent
Gender			
Male	57,892	10,412,484	48.9
Female	63,585	10,881,237	51.1
Race			
White	95,338	17,141,281	80.5
Black	20,055	3,017,469	14.2
Other	6084	1,134,971	5.3
Education			
Below high school	25,945	4,214,313	19.9
High school	48,796	8,426,566	39.9
Some college	45,872	8,503,806	40.2
Employment status			
Unemployed	42,729	7,271,649	34.2
Employed	78,748	14,022,072	65.9
Cause of death (2-yr follow-up)			
All cause	367	63,022	
Motor vehicle accident	88	14,724	24.0
Homicide	61	9897	16.6
Suicide	48	8410	13.1
Other	170	29,991	46.3
			Mean (SE)
Age (yr)	121,478	21,293,721	21.1 (0.01)

TABLE 2. Adjusted Logistic Regression for Employment on All Cause and Cause Specific Mortality (After 2-yr Follow-Up) Among All Young Adults (18–24 yr), NHIS 1986–2000

	All Cause Mortality (<i>n</i> = 367) Odds Ratio (95% CI)	Motor Vehicle Accident Mortality (<i>n</i> = 88) Odds Ratio (95% CI)	Homicide Mortality (<i>n</i> = 61) Odds Ratio (95% CI)	Suicide Mortality (<i>n</i> = 48) Odds Ratio (95% CI)	All Other Causes Mortality (<i>n</i> = 170) Odds Ratio (95% CI)
Age	1.04 (0.99–1.10)	0.99 (0.89–1.11)	0.95 (0.83–1.09)	1.15 (0.97–1.36)	1.07 (0.98–1.16)
Gender					
Female	1.00	1.00	1.00	1.00	1.00
Male	2.25 (1.78–2.85)	2.35 (1.45–3.83)	3.60 (1.76–7.38)	5.85 (2.20–15.60)	1.57 (1.11–2.20)
Race					
White	1.00	1.00	1.00	1.00	1.00
Black	1.55 (1.16–2.09)	0.51 (0.22–1.16)	4.77 (2.55–8.94)	0.42 (0.15–1.17)	1.79 (1.19–2.69)
Other	1.30 (0.80–2.12)	2.09 (1.04–4.21)	3.48 (0.98–12.32)	0.83 (0.24–2.81)	0.66 (0.30–1.44)
Education					
Below high school	1.00	1.00	1.00	1.00	1.00
High school	0.78 (0.61–0.99)	0.77 (0.46–1.28)	0.82 (0.41–1.68)	0.81 (0.38–1.72)	0.55 (0.33–0.91)
Some college	0.45 (0.32–0.63)	0.46 (0.25–0.84)	0.22 (0.08–0.58)	0.39 (0.16–0.97)	0.76 (0.52–1.13)
Employment status					
Unemployed	1.00	1.00	1.00	1.00	1.00
Employed	0.60 (0.47–0.77)	0.97 (0.61–1.55)	0.54 (0.29–0.99)	0.56 (0.25–1.23)	0.51 (0.35–0.74)

Figures in bold have a significance of *P* < 0.05.

and independence.⁶ Research has also shown that unemployment specifically among young adults is associated with greater substance abuse, a known mortality risk factor.^{19–21} Nevertheless, other studies indicate that employment, particularly full time employment, can be a risk factor for engagement in smoking and alcohol use among adolescents.^{22,23} Thus, the relationship between employment and health among young adults is complex, and requires further study.

There are a number of potential mediators of the relationship between employment and mortality risk. It is possible that being employed is protective against mortality because of lower exposure to violence. For example, studies have shown that greater violence exists among the unemployed.²⁴ Furthermore, lack of work may decrease idle time which could promote risky behaviors such as substance abuse. It may also be that young adults who have safer and healthier habits and a more positive frame of mind and personality choose to work. In fact, being employed has been shown to be an indicator of overall, particularly psychological, well-being.^{25,26} Thus, there may be a cluster of positive characteristics that certain young adults have, including being employed and not engaging in risky activities that increase mortality risk. These hypotheses need to be studied to truly understand the mechanisms behind the protective effect of working on mortality risk.

It is also possible that being employed was protective against mortality because of the healthy worker effect, a bias that occurs because workers are generally more likely to be in better health than those not employed.²⁷ More specific to this study of mortality risk, a bias that may be distorting the results is the “healthy worker survivor effect,” a phenomenon where the duration of employment is correlated with mortality risk, and is likely because of individuals with worse health and consequently greater mortality risk leaving the workforce, either voluntarily or involuntarily, earlier than healthier individuals.^{28,29} Such bias is traditionally thought to be problematic in studies where the individuals are in the retirement age group because they have had longer exposure to work and are at a period in their lives where termination of work is most likely.^{30,31} In this study, we found that employment is associated with lower mortality risk among young adults who are not near retirement and who have not even been in the workforce very long. Thus, even in occupational studies of young adults, the possibility of the healthy worker effect and the healthy worker survivor effect biases should be considered when interpreting results.

In terms of the findings for deaths from motor vehicle accidents, there are virtually no studies that have assessed the relationship between employment and mortality from motor vehicle accidents in the US population,¹⁶ with none found specifically among young adult workers. Thus, additional research is needed to understand the possible protective relationship between motor vehicle accidents and employment in young workers.

Demographic characteristics also play a role in the increased mortality risk among young adults. Consistent with the literature regarding injury rates among young workers^{7,32,33} and mortality trends in the US among youth ages 15 to 24 years,³⁴ we found that young male adults had a greater likelihood of dying, which may be because of their more aggressive and risky behaviors, as well as the more dangerous tasks they tend to perform at work.^{35,36} Furthermore, consistent with the literature,³⁴ education was protective for mortality risk across all causes of death for young adults, again possibly related to less dangerous occupations available to the higher educated as well as the effects of working only part-time or not at all during the year due to their pursuit of higher education. In agreement with previous research,³⁴ Black young adults had greater odds of all-cause mortality relative to white young adults. Nevertheless, Blacks also had a lower mortality risk from motor vehicle

accidents, which could be due to lower car access and ownership among Blacks.³⁷

Limitations

Study limitations included the use of self-reported cross-sectional data and the lack of data on work-related factors (such as reasons for not working, job responsibilities and tasks, and the number of hours worked). In addition, factors such as lifestyle behaviors (including alcohol and drug use) and psychological well-being (ie, depression) were only intermittently assessed in the NHIS throughout this time period. Confounding by past personal risk factors not measured in this study is also a possibility, including not only previous mental health and alcohol and drug use but also suicide attempt, history of criminality, early childhood environment such as crowding, and parental poverty, all which may predict unemployment.¹⁸ No information was available on the participants' employment status during the 2-year period of follow-up after the NHIS interview at the time of death; however, analyses using differing follow-up periods (from 1 year to all available years of follow-up) demonstrated similar results. We also do not know if the participant was a student/part time worker, full-time worker, summer only worker, or winter worker only, which may create a bias if mortality rates vary by these employment factors. Nevertheless, we assumed that individuals interviewed in the winter and reporting employment was more likely to be a full-time worker compared to those interviewed in the summer and reporting employment. When we compared the mortality rates by winter versus summer interview status, there were no significant differences in the results (data not shown). Nevertheless, because this is only an assumption, it is still possible that mortality rates differed among the young workers by seasonal versus part-time versus full-time employment. Finally, we could not determine whether cause of death was directly work related.

CONCLUSIONS

In a nationally representative sample of 18 to 24 year olds, we demonstrated that employment is associated with reduced mortality risk. Our original hypothesis that employment would be a risk factor for higher mortality risk among young adults given their increased vulnerability during developmental transitions⁵ and the higher rate of injuries among youth workers when compared to adult workers was not supported by the findings from this study.⁸ Our findings provide important information regarding young adults with a higher mortality risk that would benefit from health promotion and safety education. Furthermore, given the current economic situation in which increasing numbers of young adults are losing their jobs or unable to find employment, the significantly increased risks for mortality identified in this study for the unemployed young adult become increasingly important.

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