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Mental Illness, Poverty, and Excess Mortality

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An abstract of
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Abstract

Mental Illness, Poverty, and Excess Mortality

By Mary Jane Mason

Objectives: To determine the extent of excess mortality in persons with mental illness from a nationally representative sample and to examine the contribution of socioeconomic status (SES) and health status to excess mortality within that population.

Methods: This prospective cohort study used data from the 1989 National Health Interview Survey and linked mortality data from the National Death Index (1989-2003) to examine the effect of self-reported mental illness on aggregate mortality using age-adjusted death rates (AADR) and years of potential life lost (YPLL). Survival analyses examined how much of this excess mortality is explained by SES and health status.

Results: Presence of a mental illness was associated with a significant risk of excess mortality, (HR=1.975, 95% CI=1.763 – 2.212). SES explained approximately 30% of the variance of the effect of mental illness on mortality and an additional 49% of the variance was explained by health status.

Conclusions: SES and health status are significant mediators of premature mortality in individuals reporting mental illness, and together explain nearly 80 percent of that excess mortality. Strategies to reduce mortality in this population should consider the relationship between mental illness, poverty, and poor health.

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INTRODUCTION

Significant clinical and research interest has focused on increased mortality rates among persons with mental illness. Examinations of mortality in psychiatric patients have observed excess mortality in this population, not only as a result of unnatural causes such as suicide, but of natural causes as well (1-6). Understanding this excess mortality is a first step towards reducing it, and is therefore a high priority for clinicians, researchers, and patients.

People diagnosed with schizophrenia have overall a 2.5 times risk of dying than the general population (1). Furthermore, the mortality gap between those with schizophrenia and the rest of the world's population continues to increase (1). Thus, while research and new preventative practices have benefited the health of the community overall, the interventions developed to improve the outcomes of many chronic medical conditions are not serving the highly vulnerable subpopulation of individuals with mental illness equally (7).

Colton and Manderscheid (3) found that public mental health clients lost up to 30 years of potential life due to the same leading causes of death as the general population. Similarly, Miller et al (5) show 32 years of potential life lost (YPLL) due to all-cause mortality among public mental health clients. Thus, recent studies investigating mortality among persons with mental illness have used data from the public mental health system. In this population, SES and poor health status, factors contributing to excess mortality regardless of mental health condition, may be confounding this relationship (8-11).

This study was undertaken to examine the extent of excess mortality in a large national population-based sample with a range of socioeconomic and health characteristics. In addition, this representative sample allows us to disaggregate factors associated with premature mortality in individuals experiencing mental illness.

METHODS

Study Population

The National Health Interview Survey (NHIS) is administered annually to a nationally representative sample of U.S. households. The 1989 NHIS was linked to National Death Index mortality data covering the subsequent 13-14 year period to produce a dataset capable of analyzing any relationship between mortality and mental health status. The 1989 NHIS includes demographic data, self-reported mental health status, as well as extensive information about health status and behavioral risk factors for 116,929 respondents.

Respondents under the age of 18 were excluded from analysis. The characteristics of the remaining sample (n=84,572) are summarized in Table 1. The sample was then divided into two groups; individuals that self-reported a mental disorder (n=1,454) and individuals that did not report a mental disorder (n=83,118). Mental disorders included major depression, manic episodes, bipolar disorder, schizophrenia, paranoid or delusional disorder, personality disorder, or other mental disorder, such as anxiety disorder. These were further categorized into affective disorders (n=903), psychotic disorders (n=223), and other mental disorders (n=328), according to ICD-9 Mental Disorders disability categories.

Mortality Measures

Mortality rate was calculated by dividing the total number of deaths during the study follow-up period by the total population. The mortality rate for individuals with a reported mental disorder was divided by the mortality rate for individuals with no reported mental disorder. Age, sex-adjusted mortality rates were calculated for exposure groups. The mean age at time of death was obtained for groups categorized by age and exposure status. For a

given age group at the beginning of the study period, mean age of death is calculated for individuals who die within the follow-up period.

Years of potential life is equivalent to the average number of years of life remaining at a given age, or the current life expectancy. Average years of potential life lost (YPLL) was calculated for the group reporting mental illness using the difference between age at death of each person and life expectancy for the cohort of the same age and sex. The life expectancy data was obtained using U.S. population life expectancy tables published by the CDC in 1989. A linear regression model was used to measure YPLL due to mental illness.

Potential Mediators and Moderators

Socioeconomic factors studied were total family income, education, and type of insurance (private versus public). Health status was analyzed as an ordinal variable from a 5-category scale classified as excellent, very good, good, fair, and poor self-rated health. In addition, the number of major chronic medical conditions of each respondent in the previous 12 months was included as a control variable in multivariate models.

Previous research has shown several demographic variables to be related to socioeconomic factors, health status and risk behaviors, and mortality (10, 12, 13). Therefore, these variables were included in analyses to control for potential confounding. Age was grouped into 8 categories that corresponded with the US 1940 standard population for adjusting 1997 and earlier years. Sex (male vs female), race (nonwhite vs white) and ethnicity (nonhispanic vs hispanic) were also studied.

Statistical Analysis

Analyses were performed using SAS version 9.0 (SAS Institute, Cary, North Carolina). Baseline differences in characteristics between individuals with and without mental illness were compared and examined for significance using logistic regression. Descriptive statistics included frequency distributions of all variables being studied, cross tabulations of mortality and mental illness, and cross tabulations of mental illness and potential mediators. In creating contingency tables regarding the relationship between mortality and mental illness, direct age and sex standardization was used to account for the strong association of age and gender with mortality.

Cox proportional hazards models were used to estimate the relative risk of mortality associated with mental illness, while allowing for the confounding effects of age, gender, and race. We first estimated the relative hazard rate of mortality for respondents with reported mental illness, adjusted for age, gender, and race. Next, the socioeconomic factors being studied were added to the base model to examine how much of the mental illness differentials in mortality could be attributed to these factors. Controls for baseline health status were then included to determine additional attributable mortality risk. Log-minus-log survival plots were used to verify the proportional hazards assumption of the above models.

To evaluate whether a covariate changed the strength of association between mental illness and mortality, we calculated the percentage change in the effect size for mental illness before and after adjustment for the potential mediator. All variables that resulted in at least a 5% change in effect size for mental illness were considered potential mediators and included in the final multivariate model. Likelihood ratio tests were used in both the initial and inclusive models to explore possible interactive effects of mental illness with age, gender, race, income, education, insurance, health status, and comorbidity.

RESULTS

Study Population

Of the 84,572 individuals included in the study, 1,454 (1.7%) had at least one self-reported mental disorder. Compared with individuals that did not report a mental illness, those with a mental disorder were more likely to be female (Table 1). Participants with a mental illness were younger and from non-white racial groups, though these differences were not significant. Persons that reported a mental illness had a lower mean income and fewer years of education. Having public insurance was associated with mental illness (OR=2.72; 95% CI, 2.45-3.02), as was reporting a comorbid medical condition (OR=7.29; 95% CI, 6.31-8.43). Poorer overall health status was also associated with having a mental illness (OR, 2.14; 95% CI, 2.05-2.23). Of the study participants with a mental illness, 226 (15%) people reported having a psychotic disorder, 903 (62%) people reported having an affective disorder, and 328 (23%) individuals reported a mental illness not included in the first two categories (Table 2).

Mortality

Primary outcome measures (mean age at death, adjusted death rate, YPLL) were compared for both groups and among mental disorder categories (Table 2). Overall, persons with mental illness were 1.5 times more likely to die than persons that did not report mental illness. Respondents with a mental disorder had a greater risk of dying in every age group consisting of individuals ages 18-84, according to age-stratified mortality rates (Figure 1). Though the highest additive difference in mortality was observed in individuals older than 55, individuals ages 25-54 had the highest proportional difference in mortality compared to individuals that did not report a mental illness, as shown by Figure 1. The age,

sex-adjusted mortality rate for respondents with mental illness is 0.238, 8.4% higher than individuals that did not report a mental illness (Table 2).

Life Expectancy

Participants with mental illness died at younger ages and lost several years of potential life compared to their general population cohorts (Table 2). The mean years potential life lost (YPLL) for all causes of death among persons self-reporting mental illness is 14.8 years, adjusted for age and gender (Table 2). Respondents with psychotic disorders lost nearly 20 years of potential life and persons with affective disorders experienced 15.7 YPLL. Individuals that did not report any mental illness lost only 9.1 years of potential life, an overall 5.7 years difference from the mental illness group.

Potential Mediators

The relationship between mental illness, socioeconomic status, health, and mortality was explored by conducting a series of Cox proportional hazards models. Age, race, and sex were statistically controlled for possible confounding effects in all models, with age being the strongest confounder. Education explained 9% of the variance, while adding income explained 22%, and adding insurance type gave a total effect for combined SES (30%). An additional 49% of the variance of the effect of mental illness on mortality was explained by health status. The controls for health status included the number of chronic medical conditions and respondent self-report, which independently explained 51% and 61% of the variance.

DISCUSSION

This is the first study of which we are aware to examine the issue of excess mortality in a representative US sample. Consistent with previous work, we found that persons with mental illness were 1.5 times more likely to die than persons that did not report mental illness. They also lose 15 years of potential life compared to their living cohorts. This result is consistent with other studies that have examined excess mortality among public mental health clients, and furthermore confirms excess mortality is observed not only individuals that receive mental health treatment in the public sector, but among all individuals with mental illness. These results highlight the serious public health problem presented by the excess mortality in this vulnerable population.

This is also one of the first studies to attempt to disaggregate the role of health status and socioeconomic factors in determining excess mortality. We found that physical health status is a critical determinant of mortality in this population. High rates of medical comorbidities among persons with mental illness have been documented in previous research (4, 5, 11, 14, 15). Osborn et al. found an increased risk of death from coronary heart disease and stroke among persons with mental illness, even after controlling for lifestyle factors among a community sample in the United Kingdom (16). Heart disease is the leading cause of death in the US, as well as among public mental health consumers, as reported by Miller et al. The same study documented hypertension and obesity as the most common comorbid conditions, much like the general population (5).

In addition to the existence of comorbid conditions, our study verifies that they actually attribute to persons with mental illness dying at younger ages. Even after controlling for access to care through SES, we found a mortality gap between persons with serious mental illness and the general population that is attributable to health status. Disparities in

medical care among this population have been documented (7, 16-18). In one study in Australia and Canada, procedures used to treat circulatory disorders, such as cardiac catheterization, were used relatively less often for psychiatric patients (16). Frayne et al. found that medical providers failed to meet standards of diabetes care at a higher rate in patients with comorbid mental disorders than controls, even after adjusting for number of primary care visits (7).

Efforts to prevent comorbid medical conditions and improve physical health status of people experiencing mental illness are needed to reduce the mortality gap. It is problematic that individuals with serious mental illness form a population with high health risks yet a low frequency of physical health checks when compared to the general population (19). Roberts et al. also noted that psychiatric patients were willing to engage in health promotion and medical evaluation activities when specifically invited to do so by the provider. In this case, health status in the mentally ill seems in large part the responsibility of the health care system. Efforts must be made to prioritize chronic disease detection and management, and to provide the high standard of medical care needed in this population.

In agreement with prior research (20-22), we also found that SES is a critical factor determining this excess mortality. It has been understood for many decades that mental illness and SES share a strong inverse relationship (23), but the causal factor in this relationship has not been determined. Persons with mental disorders may be at risk for “downward drift” into low SES groups; at the same time, low SES may be a risk factor for the development of mental disorders. Though recent studies looking at this relationship have had mixed conclusions regarding directionality (24), interventions need to work on breaking this cycle. Mental health screening and follow-up should be prioritized for

individuals in low SES groups, and persons with mental illness should be targeted by community interventions that help retain housing and employment.

SES is also strongly related to disparities in healthcare among certain populations. The Institute of Medicine (IOM) defines health disparities as “differences in the quality of healthcare that are not due access-related factors or clinical needs, preferences, or appropriateness of intervention.” The IOM report *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* examined racial and ethnic differences in healthcare that are not otherwise attributable to factors such as the ability to pay for services or type of insurance. Our study looked at mental illness in this same context, with the apparent conclusion being disparities in healthcare among persons with mental illness exist. As is recommended with other disparaged populations, both the general public and healthcare providers should be made aware of this situation. This study shows that the doubly disadvantaged group of individuals with mental illness and low SES die at disproportionately high rates and lose many years of potential life.

A public health approach, focusing coordinating and integrating physical and mental health care, should be used to reduce the mortality gap in this population. Furthermore, interventions to improve physical health of this population also need to account for low SES and lack of access to healthcare (15, 25, 26). Health disparities have been the focus of much government and public attention, especially in the last decade, as one of two overarching goals of Healthy People 2010. Therefore, formal consideration of persons with mental illness as a disparaged population may help raise awareness and support for these interventions.

This study should be understood in the context of several limitations. The NHIS 1989 dataset was characterized by a low reported prevalence of mental disorders. This likely

made our data very specific, but may have threatened sensitivity. Low sensitivity could cause an underestimation of the effects, with the true excess mortality due to mental illness even larger than our calculation. In addition, we did not have access to cause of death data; although, other studies have documented that nearly all of this excess death is due to medical rather than unnatural causes (5, 9). For this reason, we used all-cause mortality in our calculations. Finally, missing from our dataset were some lifestyle risk factors, such as smoking status, which we were unable to control for. One could speculate that some of the excess mortality not explained by SES and health status, is attributable to such factors. Other studies, as well as the 13th NASMHPD technical report, have documented this relationship (27, 28).

In spite of these limitations, the findings indicate 1. Excess mortality in persons with mental illness is a major public health problem. 2. Addressing it will require a public health approach that includes both medical interventions and broader societal interventions to address both health and public health context.

REFERENCES

1. Saha S, Chant D, McGrath J. A systematic review of mortality in schizophrenia: is the differential mortality gap worsening over time? *Arch Gen Psychiatry* 2007;64(10):1123-31.
2. Lawrence D, Holman D, Jablensky A. Re: mortality and mental illness. *Aust N Z J Psychiatry* 2005;39(11-12):1048.
3. Colton CW, Manderscheid RW. Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. *Prev Chronic Dis* 2006;3(2):A42.
4. Dembling BP, Chen DT, Vachon L. Life Expectancy and Causes of Death in a Population Treated for Serious Mental Illness. *Psychiatr Serv* 1999;50(8):1036-1042.
5. Miller BJ, Paschall CB, 3rd, Svendsen DP. Mortality and medical comorbidity among patients with serious mental illness. *Psychiatr Serv* 2006;57(10):1482-7.
6. Brown AS, Birthwhistle J. Excess mortality of mental illness. *Br J Psychiatry* 1996;169(3):383-4.
7. Frayne SM, Halanych JH, Miller DR, Wang F, Lin H, Pogach L, et al. Disparities in diabetes care: impact of mental illness. *Arch Intern Med* 2005;165(22):2631-8.
8. Hwang S. Mental illness and mortality among homeless people. *Acta Psychiatr Scand* 2001;103(2):81-2.
9. Manderscheid RW. Premature death among state mental health agency consumers: assessing progress in addressing a quiet tragedy. *Int J Public Health* 2009.
10. Sterling T, Rosenbaum W, Weinkam J. Income, race, and mortality. *J Natl Med Assoc* 1993;85(12):906-11.
11. Lyketsos CG, Dunn G, Kaminsky MJ, Breakey WR. Medical comorbidity in psychiatric inpatients: relation to clinical outcomes and hospital length of stay. *Psychosomatics* 2002;43(1):24-30.
12. Bertakis KD, Azari R, Helms LJ, Callahan EJ, Robbins JA. Gender differences in the utilization of health care services. *J Fam Pract* 2000;49(2):147-52.

13. Braveman PA, Cubbin C, Egerter S, Chideya S, Marchi KS, Metzler M, et al. Socioeconomic status in health research: one size does not fit all. *JAMA* 2005;294(22):2879-88.
14. Felker B, Yazel JJ, Short D. Mortality and medical comorbidity among psychiatric patients: a review. *Psychiatr Serv* 1996;47(12):1356-63.
15. Goldman LS. Comorbid medical illness in psychiatric patients. *Curr Psychiatry Rep* 2000;2(3):256-63.
16. Osborn DP, Levy G, Nazareth I, Petersen I, Islam A, King MB. Relative risk of cardiovascular and cancer mortality in people with severe mental illness from the United Kingdom's General Practice Research Database. *Arch Gen Psychiatry* 2007;64(2):242-9.
17. Goldbloom DS, Kurdyak P. Mental illness and cardiovascular mortality: searching for the links. *CMAJ* 2007;176(6):787-8.
18. Kisely S, Smith M, Lawrence D, Cox M, Campbell LA, Maaten S. Inequitable access for mentally ill patients to some medically necessary procedures. *CMAJ* 2007;176(6):779-84.
19. Roberts L, Roalfe A, Wilson S, Lester H. Physical health care of patients with schizophrenia in primary care: a comparative study. *Fam Pract* 2007;24(1):34-40.
20. Hadley J, Osei A. Does income affect mortality? An analysis of the effects of different types of income on age/sex/race-specific mortality rates in the United States. *Med Care* 1982;20(9):901-14.
21. Lantz PM, House JS, Lepkowski JM, Williams DR, Mero RP, Chen J. Socioeconomic factors, health behaviors, and mortality: results from a nationally representative prospective study of US adults. *JAMA* 1998;279(21):1703-8.
22. Rodgers GB. Income and inequality as determinants of mortality: an international cross-section analysis. 1979. *Int J Epidemiol* 2002;31(3):533-8.
23. Hollingshead AB, Redlich FC. Social class and mental illness: a community study. 1958. *Am J Public Health* 2007;97(10):1756-7.
24. Hudson CG. Socioeconomic status and mental illness: tests of the social causation and selection hypotheses. *Am J Orthopsychiatry* 2005;75(1):3-18.

25. Saraceno B, Barbui C. Poverty and mental illness. *Can J Psychiatry* 1997;42(3):285-90.
26. Wang PS, Demler O, Kessler RC. Adequacy of treatment for serious mental illness in the United States. *Am J Public Health* 2002;92(1):92-8.
27. Brown S, Inskip H, Barraclough B. Causes of the excess mortality of schizophrenia. *Br J Psychiatry* 2000;177:212-217.
28. Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. Smoking and mental illness: A population-based prevalence study. *JAMA* 2000;284(20):2606-10.

TABLES & FIGURES

Table 1. Characteristics of the study population. Odds ratio shows the odds that individuals of one demographic group have a mental illness versus the odds of mental illness in the other group.

Demographic Variable	Overall	<u>Mental Illness</u>		OR	95% CI
		Yes	No		
Age, yrs, Mean (SD)	44.2 (17.8)	43.7 (16.0)	44.2 (17.9)	1.002	(0.999, 1.005)
Sex, N (%)					
<i>Male</i>	39100 (46.2)	562 (38.6)	38538 (46.4)	1.372	(1.233, 1.526)
<i>Female</i>	45472 (54.8)	892 (61.4)	44580 (53.6)		
Race, N (%)					
<i>White</i>	70567 (83.4)	1205 (82.9)	69362 (83.5)	0.960	(0.836, 1.101)
<i>Non-white</i>	14005 (16.6)	249 (17.1)	13756 (16.5)		
Income, \$, Mean (SD)	20500 (6,800)	16700 (8,400)	20600 (6,800)	1.078	(1.070, 1.085)
Education, yrs, Mean (SD)	12.5 (3.1)	11.7 (3.3)	12.5 (3.1)	1.077	(1.061, 1.094)
Insurance, N (%)					
<i>Public</i>	17397 (20.6)	593 (40.8)	16804 (20.2)	2.718	(2.445, 3.022)
Comorbidity, N (%)					
<i>Medical Condition</i>	37704 (44.6)	1237 (85.1)	36467 (43.9)	7.292	(6.308, 8.429)
Health Status, N (%)					
<i>Excellent</i>	28728 (34.1)	155 (10.7)	28573 (34.5)	2.137	(2.047, 2.232)
<i>Very Good</i>	23882 (28.4)	275 (19.0)	23607 (28.5)		
<i>Good</i>	20842 (24.8)	368 (25.4)	20474 (24.7)		
<i>Fair</i>	7648 (9.1)	331 (22.8)	7317 (8.8)		
<i>Poor</i>	3090 (3.7)	321 (22.1)	2769 (3.4)		

Table 2. The effect of having a mental disorder on multiple mortality measures.

Mental Health Condition	N (%)	Mean Age at the Time of Death	Adjusted Mortality Rate	Years of Potential Life Lost
Mental Disorder	1,454 (1.7)	66.06	0.2380	14.82
Psychotic	223 (15.3)	62.05		19.92
Affective	903 (62.1)	65.41		15.65
Other	328 (22.6)	70.82		10.94
None	83,118 (98.3)	73.12	0.1539	9.07
Difference		-7.06	0.0841	5.75

Figure 1. Age-specific mortality rate by presence of mental illness (Yes, individual reported at least one mental illness; No, individual did not report any mental illness.)

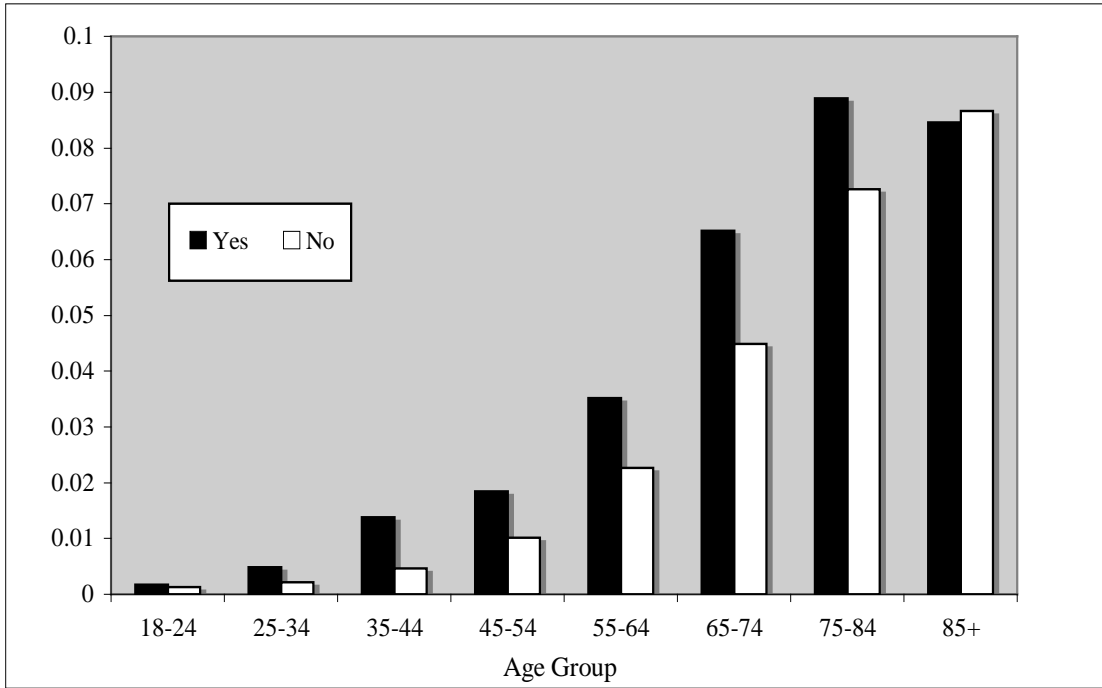


Table 3. Mediating effects of socioeconomic status (SES) and general health status. All hazard ratios are controlled for age, gender, and race.

Covariates Included in Cox Proportional Hazard Model	Hazard Ratio (95% Confidence Interval)	Amount of Effect Explained
Mental illness only	1.975 (1.763, 2.212)	----
Mental illness socioeconomic status	1.684 (1.483, 1.913)	29.85%
Mental illness and health status	1.272 (1.133, 1.428)	72.10%
Mental illness, SES, and health status	1.207 (1.060, 1.374)	78.77%