Extended Abstract—2005 PAA Submission

Title: Marriage, Health and Later-Life Mortality: Results from a Sample of Union Army Veterans

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Conceptual Background

Empirically, marital status is strongly associated with health. This association is found using a variety of health measures (mortality, disease, disability, mental health) and in a variety of population sand population subgroups. Although correlations are robust, we still know little about the causal mechanisms. Though some evidence exists for a causal link between marriage and health, critics maintain that selection—healthier people are more likely to be selected into marriage—is the primary cause of the correlation. Most research in this area has not exploited longitudinal data in order to address the selection question.

Data

This research exploits a rich historical data collection drawn from the veterans of the Union Army who served in the U.S. civil war in the 1860s.   Extensive data has been drawn from a sample of over 35,000 soldiers recruited into the Union Army, and military records from the war have been linked to individual census records from all available census records from 1850-1910 and, most importantly, to the extensive records kept by the US Pension Bureau. Pension records contain detailed medical examinations that were used to determine the pension applicants' eligibility for financial support, and they contain a rich source of medical and demographic data from the veterans' middle and later life experiences.

The Pension Bureau devoted considerable efforts to obtaining accurate vital data, particularly birth and death dates. In 1890 the pension laws were liberalized to allow most veterans into the sample, and by the early 1900s, over 90% of veterans had become part of the pension system. Therefore, the Union Army records are an excellent source for studying the determinants of mortality in later life among northern white men in the United States. Linkages to the census manuscripts of 1900 and 1910 allow family structure variables, including marital status to be indentified.

Methods

Using the data from the Union Army data, this paper investigates the effect of different marital states on the hazard rate of mortality from a baseline of 12/31/1900. Key variables are as follows:

Mortality:
> * Mortality is measured as the number of days lived past 12/31/1900.
> * Only those with death dates known are used
> * A small portion of cases have only year of death known—months and days are imputed at the midpoint of the period.

Health Status:
> * The health information comes primarily from the most recent (prior to 12/31/1900) physical exam
> * These are physician recorded, not self-reported.
> * Two indicators of health status at the study baseline are used:
> > BMI: Body Mass Index.
> > Disabling conditions: These are chronic conditions noted by the physicians to be severe enough to merit disability support.
> * Those alive at 1900 who are not in pension system are assumed to be healthy.

Marital Status
> * Marital status is reported or inferred from the 1900 census as married, single, divorced/separated or widowed.
> * In some cases, veterans who were not head of household could not be assigned

Demographics
> * Age, occupation, state of residence in 1900

Of the 35,570 recruits in the entire Union Army sample, over 17,000 enter the pension system at some point in their lives, and over 12,000 of these veterans were alive in 1900 and linked to the US pensions schedules. The analysis sample used here costs of those aged 50-69 at baseline, which comprises 9,571 cases. Of these, 79.5% were married in 1900, 9.4% were widowed, 3.5% were divorced or separated, 4.9% had never married, and 2.7% are of unknown status.

Results

The table provides descriptive statistics in the form of 10-year survival rates following the 1900 baseline. These statistics show a modest but significant difference in survival between married and unmarried veterans.

10-Year Survival Rates

Age	Married	Unmarried
50-54	84.5%	79.2%
55-59	78.3%	74.2%
60-64	70.3%	66.5%
65-69	58.1%	53.1%

The next results come from two Cox proportional hazard models. The following table shows the effect of different marital status states on the probability of survival, controlling for baseline health

Dependent Variable: Survival

Indep. Var.	Hazard Ratio	T-stat
Widowed	*1.137*	3.45
Divorced/Separated	1.055	0.87
Never Married	1.097	1.72
Unknown (not H.H. head)	0.925	-1.20
Household Size	0.995	-0.92
Number of Conditions	*1.015*	2.42
BMI Percentiles		
0-1	1.105	0.90
1-5	*1.250*	3.91
5-10	1.044	0.83
10-25	1.051	1.46
25-50	reference	
50-75	*1.070*	2.25
75-90	1.064	1.82
90-95	*1.210*	3.81
95-99	*1.325*	5.10
99-100	*2.014*	6.70

We see above that all marital states other than marriage lead to a higher hazard of mortality, even after controlling for health and other demographic characteristics (not shown), though only the widowers are statistically significant.

Finally, to allow for the possibility that the effect of marriage varies by health status, we estimate the mortality hazard separately for those with normal BMI (20-25) and those with "poor" BMI (<20 or >25). These results are shown in Table 3 below.

Indep. Var.	"Normal" BMI: 20-25 Hazard Ratio	T-stat	Poor BMI: <20, >25 Hazard Ratio	T-stat
Unmarried	1.052	1.35	*1.144*	2.09

Indep. Var.	Hazard Ratio	T-stat	Hazard Ratio	T-stat
Widowed	*1.111*	2.09	*1.225*	3.26
Divorced/Separated	0.953	-0.56	1.209	1.83
Never Married	1.138	1.80	1.078	0.79
Unknown (not H.H. head)	*0.829*	-1.98	0.948	-0.52

Estimates above are given using a simple married/unmarried dichotomy in the upper portion of the table and, in the bottom portion, more differentiation of marital status is employed. In general, the effect of marital status is minimal for those with normal BMI, but significant effects are found for those with poor BMI. Both the widowed and the divorced/separated category have over 20% higher mortality rates than do the married reference group.

Preliminary Conclusions

The preliminary results reported above confirm a protective role for marriage. This historical study is novel in that it contains detailed health information at baseline to mitigate the strength of the selection argument. Furthermore, a pure selection story would imply that the never married and divorced men should have higher mortality than widowed, an implication that is not supported by the evidence. The effects for widowhood and divorce might suggest that bereavement is an important determinant of mortality among older men. However, the finding that the marriage effects are concentrated among those in poor health indicate that the loss of a caregiver may be the primary mechanism leading to increased mortality risk.