Mortality Differences in Widowhood

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Abstract

Being widowed elevates mortality risk, relative to married men or women of the same age. I investigate how risk varies by subpopulation of widows and widowers. Specifically, using data from the Health and Retirement Study, I test for differences in widowhood mortality by education, by number of children, and by how sudden or expected the death of the pre-decedent spouse was. Consistent with other studies, I find an increased hazard of mortality upon widowhood. In contrast with other studies but consistent with the larger literature on SES and mortality, education is protective in widowhood. Number of children has a u-shaped association with mortality in widowhood, with those having 3-4 children having the lowest levels of mortality after death of a spouse. Lingering deaths (deaths after a chronic condition) of the predecedent spouse are much for the surviving spouse than sudden deaths or other types of death. Important gender differences occur with each of these effects. These findings illuminate mechanisms through which mortality is affected by widowhood, and provide evidence on the power of SES and social support in vulnerable populations.

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Introduction

Death of a spouse increases the likelihood of dying for the surviving spouse, relative to married women or men of the same age (Elwert and Christakis 2008a; Johnson et al. 2000; Parkes, Benjamin and Fitzgerald 1969; Thierry 2000). Three consistent findings have emerged from studies on so-called widowhood mortality. First, the magnitude of effect peaks during first few months after spousal death and lasts for up to several years (Elwert and Christakis 2008a; Johnson et al. 2000; Lusyne, Page and Lievens 2001; Parkes et al. 1969) Second, the effect of losing a spouse seems to have a stronger negative effect on men than women (Kaprio, Koskenvu and Rita 1987; Martikainen and Valkonen 1996, 1998). And lastly, many studies find a decreasing association between age of surviving spouse and the widowhood effect (Johnson et al. 2000; Lusyne et al. 2001; Manor and Eisenbach 2003; Martikainen and Valkonen 1998). This paper looks at spousal bereavement mortality to examine differences in the magnitude and duration of the so-called "widowhood effect" by different characteristics using data from the Health and Retirement Study (HRS).

Surprisingly little research has been done on whether or how the effect of widowhood on mortality varies by subpopulations. (Elwert and Christakis 2006) The studies that have been done find gender and racial differences, but mortality could very well differ by other attributes (Elwert and Christakis 2006). Here I explain and elaborate hypotheses of why the widowhood effect may vary over SES, number of children, and type death of predecedent spouse. Finding different effects of widowhood by subpopulation may aid in the understanding of how social relations generate health and mortality (Elwert and Christakis 2006).

Those with higher SES uniformly have lower mortality than those with low SES (Christenson and Johnson 1995; Elo, Martikainen and Smith 2006; Kitagawa and Hauser 1973);

differences in SES explain much of the higher mortality of widows relative to the married (Dupre, Beck and Meadows 2009). Surprisingly, this high SES mortality advantage does not appear among the recently widowed (Stroebe and Stroebe 1993), where no SES differences in mortality appear (Manor and Eisenbach 2003; Martikainen and Valkonen 1998). In fact, higher SES is associated with increased mortality risk after the death of a spouse (Bowling 1988; Lusyne et al. 2001; Manor and Eisenbach 2003; Parkes et al. 1969). Table 1 summarizes details from each of these studies.

Little is known about how number of children may affect bereavement mortality. Generally, having a few children (2-3) results in lowest mortality for women and men (Jaffe et al. 2009; Lund, Arnesen and Borgan 1990), although a study using the HRS found no effect of children ever born on women's mortality (Henretta 2007). Most studies find loss of social support to be one of the main causes of elevated mortality after conjugal loss, especially for men (Gallagher-Thompson et al. 1993). Men who lose a wife are often losing both their caregiver and primary keeper of kin and friend relationships and are thus more vulnerable than women to experience a greater loss of social support. Children act, for both women and men, as an important source of both social support and caretaking assistance (Shanas 1979). Given this role of children, it is surprising that few studies have investigated whether children as a buffer against mortality when a spouse dies. Only one study directly measures effect of children after the loss of a spouse and found having 1-3 (versus 0 or more than 3) buffered against higher mortality for women only (Manor and Eisenbach 2003).

The strength and duration of the widowhood effect may vary by features of the decedent spouse's death, particularly whether it is sudden or prolonged. Psychiatric literature emphasizes the harmful effects of a sudden, unexpected death on the surviving spouse. These types of deaths

may be more stressful for the surviving spouse, by giving them less time to prepare emotionally for the loss of their partner (Parkes and Prigerson 2010; Sanders 1993). Sudden death of spouse is associated with higher mortality than prolonged illness (Elwert and Christakis 2008a), particularly for males (Smith and Zick 1996). On the other hand, a lengthy illness preceding death may be worse for the surviving spouse's mortality. Costs associated with the illness may drain financial resources or physically exhaust the surviving spouse if s/he is the primary caregiver. Having a spouse with a chronic, lingering illness is associated with higher mortality (Christakis and Allison 2006; Elwert and Christakis 2008a) particularly for younger (25-64 years of age) females (Smith and Zick 1996).

This paper extends the literature on the bereavement effect on mortality by investigating more thoroughly proposed mechanisms and group differences in the magnitude and duration of the widowhood effect. It compares widows to married individuals while directly controlling for divorce[2]. It also determines what characteristics are associated with better or worse widowhood survival. Understanding these factors more fully will contribute to a better understanding of how various forms of support exacerbate or mitigate health and mortality outcomes for the survivor.

Hypotheses

The size and duration of the widowhood effect varies by subpopulations as follows:

H1: More education will be associated with higher widowhood mortality, as found in previous studies.

H2: More children will be protective, as they can provide some social support.

[2] A future draft of this paper will include duration of marriage and of widowhood, and changes in magnitude of widowhood effect over time.

H3: Lingering deaths, which drain household resources, will be associated with a larger, positive mortality risk in widowhood than quicker deaths.

Data & Methods

The data are from the Health and Retirement Study (HRS)[3], a prospective panel study of older adults in the U.S. Detailed information on respondents' socio-demographic characteristics is collected biennially. The HRS interviews age-eligible respondents as well as their spouses, regardless of age, creating a detailed set of data on both spouses. This research uses follow-up information through wave 8, which was conducted in 2006[4], for a maximum 14 years of follow-up. The sample used in this analysis is limited to respondents who are married at their baseline interview.

All models control for relevant background characteristics. Basic control variables are age, sex, and race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and Other) I control for age by including it as the timescale, rather than time on study (Kom, Graubard and Midthune 1997). Separate models for widows (women) and widowers (men) are presented. Respondents' vital status is reported each survey wave based on HRS tracking efforts. Date of death is obtained from next-of-kin interviews or from the National Death Index (NDI) maintained by the National Center for Health Statistics.

Marital status is included as a time-varying variable. As noted earlier, the sample is restricted to those married at baseline. They can either die or change marital status to divorced/separated or widowed. Those who divorce are censored. Those who become widowed stay in the widowed state until death or until remarriage, at which time they are censored.

[3] More information on the HRS is available elsewhere: http://hrsonline.isr.umich.edu/
[4] A future draft will include data collected through 2008.

Key predictor variables in the HRS include SES, number of children, and type of spouse death. SES is measured using education, measured in years, ranging from 0–17+. Number of children is measured at the household level at the initial HRS interview[5]. To determine whether a decedent spouse's death was sudden or lingering, I first use information from the decedent spouse's (not the surviving individual's) HRS surveys. Sudden deaths are deaths where the decedent spouse did not report ever being diagnosed with cancer, heart disease, or stroke, as well as no nursing home stays (Lunney et al. 2003). Deaths are classified as lingering if the decedent spouse reported having been diagnosed with diabetes, COPD, or cancer (Elwert and Christakis 2008a), or reports nursing home or hospital stays.[6] All other deaths are grouped into an "unknown" category.

Approximately 2,754 people who are married at their initial HRS interview experience widowhood. 906 of them die after becoming widowed. Basic descriptive statistics are shown in Table 2. Respondents who become widows are generally older than the full HRS sample, and widows who die are older than widows in the HRS sample.

I estimate mortality risk using Cox proportional hazard models (Cleves 2008). Respondents enter the analysis at age at first interview or 50th birthday[7]. Observation continues until their age at last interview or age at death. Age, rather than time on study is the timescale (Kom et al. 1997). The model can be described thus:

$$h(t|\mathrm{x_j}) = h_0(t)\,\exp(\mathrm{x_j}\beta_x)$$

[5] A future draft will include distinctions between biological and step children, as well as distance children live from bereaved parent.
[6] Future drafts of this paper will include type of death information from both cause of death data files and HRS "exit" interviews.
[7] The sampling field of the HRS is adults over the age of 50 and their spouses, some of whom are under 50. If a respondent is not 50 at the time of their initial interview, they enter into this sample on their 50th birthday.

where h is the hazard at time t for subject j, which is equal to the baseline hazard, $h_0(t)$, multiplied by a series of regression coefficients, β_x.

I first estimate mortality for all respondents using a model with basic socio-demographic controls (gender, race/ethnicity) and time-varying marital status. The goal of this first model is to estimate the magnitude of the widowhood effect relative to staying married. I next focus on the mechanism linking mortality and widowhood. The next three models use only respondents who become widowed (that is, they enter the study married and subsequently lose their spouse) after widowhood. I test to what extent education, number of children, and type of death of predecedent spouse mitigate or strengthen the widowhood effect, controlling for age and gender and race/ethnicity.

Results

Table 3 shows results of the Cox model including both married respondents and widowed respondents (those who become widowed are in the "married" category until death of spouse). Consistent with other studies, being widowed is associated with a 17% increase in the risk of death. Model 2 shows that education does not explain the widowhood disadvantage; controlling for education barely changes the effect of widowhood on mortality. Number of children, included in Model 3, also does not affect widowhood mortality by much. Three children is associated with lowest mortality among married and widowed adults, but only having one child was associated with a significantly higher risk.

Within widows, what explains variation in survival? Table 4 shows that, not surprisingly, females have lower mortality than males. Controlling for education, few racial differences in widowhood mortality appear, with the exception of the Other/Missing category. More detailed information on who specifically is in this category is not available, but it includes groups such as American Indian/Alaskan natives, Asian/Pacific Islanders, and Brown/Others. The small racial differences in widowhood contrast with the larger racial differences seen in Table 3 (Model 2), where, even controlling for education, Blacks have higher mortality than Whites and Hispanics have lower mortality than Whites. In contrast to other studies, education is found to be protective in widowhood; each year of education is associated with a significant 3% decrease in mortality risk. Evidence points towards rejecting Hypothesis 1; education is weakly protective for this widowed sample.

Model 2 includes number of children. Here, the effect of children is much stronger than it was for all married respondents, despite a smaller sample size. The effect of number of children here roughly follows a U-shaped pattern, where 3-4 children is the most protective, and having 0

or more than 5 puts one at highest risk of mortality in widowhood. This partially confirms Hypothesis 2, children are protective in widowhood, with the important caveat that "too many" children is detrimental.

Model 3 introduces death type. Although not significant, lingering deaths are associated with a higher mortality risk than sudden deaths.[8] Other death types are also associated with higher mortality than sudden deaths. These findings weakly confirm Hypothesis 3: sudden deaths of the predecedent spouse seem to be the least harmful for the surviving spouse. A future draft of this paper will use different classifications of sudden, lingering, and "other" types of death using cause of death data to see how changing the definition of each affects the impact on surviving spouse's mortality.

Tables 5 and 6 are the same as Table 4 except the genders are separate, females in Table 4 and males in Table 5. These tables show important gender differences in determinants of widowhood mortality. Education is slightly more protective for females than for both genders combined and in fact, education does not seem to be protective for males, although it is certainly not harmful. The effect of children also seems to matter more to women than men, although some of this difference may be attributable to the smaller sample of males. Lastly, lingering deaths of the predecedent spouse seem more harmful for surviving wives than surviving husbands.

[8] A future draft will test whether differences in how deaths are coded into lingering, sudden, or other affects the magnitude and significance of this coefficient.

Conclusion

I have examined mortality among the widowed using a large and representative longitudinal dataset from the U.S. I find that widows face higher mortality by age than the married. This is not explained by race, gender, education, or number of children. I tested whether education, number of children, or type of spouse death were protective in widowhood. Hypothesis 1, education is not protective in widowhood, was rejected. Education has a weakly protective effect among the widowed, in contrast to other studies. Hypothesis 2, children are protective in widowhood, is somewhat supported, although too many children seems universally associated with higher mortality. Hypothesis 3, lingering deaths are associated with higher death rates for the surviving spouse than sudden deaths, is supported. However, these hypotheses are not consistently proven for both genders. The male sample is smaller than the female sample, but nonetheless, education does not seem to be as protective, and type of spouse death seems less important (the differences in significance of the number of children variables could very likely be due to sample size).

Why is SES protective among widows here? It could be that in the U.S., education is more important for mortality in different situations than in Europe or Israel. Manor and Eisenbach (2003) speculated that education may not be protective because more educated couples are more specialized (Becker 1991), so surviving spouses struggle more to adapt to new tasks. Specialization is decreasing over time as women increase their education and work more outside the home than in the past. Perhaps this opposite finding is because the data are newer and reflect this changing home environment. Lusyne et al. (2001) discuss several ways through which the less educated may be better equipped to cope with bereavement, including more tightly knit social networks, structural forces, or differing natures of marriage. It is unclear how

or why these explanations might not apply to the U.S. context, but certainly worth contemplating.

The effect of children in widowhood is understudied. Manor & Eisenback (2003) found that for women, having 1-3 children was somewhat protective, relative to 0 or more than 3. Interestingly, evidence here suggests children may affect widower mortality, although being childless surprisingly was not associated with elevated mortality after loss of a spouse. I had hypothesized that children would be protective because they could step in and provide extra emotional support for the bereaved parent, but that does not seem to be the mechanism operating here.

Previous studies show mixed results for the effect of predecedent spouse's type of death. Here strong evidence points toward a large caregiving burden for female widows but less so for males. This is in direct contrast to Smith and Zick (1996), who found a reduced mortality risk for widows whose husbands died after an extended illness. Elwert and Christakis (2008a) hypothesize that anticipatory grief can be protective, but that it is predictability, not duration of illness, that lowers mortality after the death of a spouse.

What matters in widowhood seems to vary by gender. Surprisingly, education matters more for females than males. Perhaps resources associated with education, particularly ability to earn high wages, affect females more than males. Having zero children is more harmful for women than men. This could be biological selection, in that women who do not have children are less healthy than those who do. Lingering deaths of the predecedent spouse seem more harmful to women than men, confirming that availability of household resources after a husband's death are important for women.

Of course, spousal death may not itself cause higher mortality rates. Some researchers have investigated whether the higher post-widowhood mortality is due to either homogamy bias or environmental bias. Homogamy bias in widowhood mortality would occur when spouse similarity increases the odds of both spouses dying within a short period of each other. For example, smokers may be more likely to marry smokers. One spouse dying within a short time of the other might be more due to tobacco use than widowhood bereavement. Widowhood effects are stronger on smoking-related causes of death and accidents (Elwert and Christakis 2008a). Environmental bias in widowhood mortality occurs when both spouses die within a short time of each other due to exposure to common environment factors, for example, living in a heavily polluted area. Most of the evidence on surviving spouse mortality after widowhood, however, points to a more causal relationship, whereby the death of a spouse causes elevated mortality risk in the survivor (Elwert and Christakis 2008b; Martikainen and Valkonen 1996).

In conclusion, becoming a widow increases risk of mortality, although not all those who lose a spouse face the same increase in level of risk. The cause of both the widowhood effect and for differences by subpopulation in the magnitude of the effect are unknown and may vary by context. Generally, however, this research once again demonstrates the importance of others on an individual's well being and mortality.

References

Becker, G.S. 1991. *A treatise on the family*. Cambridge, Mass.: Harvard University Press.

Bowling, A. 1988. "Who dies after widow(er)hood? A discriminant analysis." *Omega: Journal of Death and Dying* 19(2):135-153.

Christakis, N.A. and P.D. Allison. 2006. "Mortality after the hospitalization of a spouse." *N Engl J Med* 354(7):719-730.

Christenson, B.A. and N.E. Johnson. 1995. "Educational inequality in adult mortality: An assessment with death certificate data from Michigan." *Demography* 32(2):215-229.

Cleves, M.A. 2008. *An introduction to survival analysis using Stata*. College Station, Tex.: Stata Press.

Dupre, M.E., A.N. Beck, and S.O. Meadows. 2009. "Marital trajectories and mortality among US adults." *Am. J. Epidemiol.* 170(5):546-555.

Elo, I.T., P. Martikainen, and K.P. Smith. 2006. "Socioeconomic differentials in mortality in Finland and the United States: the role of education and income." *European Journal of Population-Revue Europeenne De Demographie* 22(2):179-203.

Elwert, F. and N.A. Christakis. 2006. "Widowhood and race." *American Sociological Review* 71(1):16-41.

—. 2008a. "The Effect of widowhood on mortality by the causes of death of both spouses." *American Journal of Public Health* 98(11):2092-2098.

—. 2008b. "Wives and ex-wives: A new test for homogamy bias in the widowhood effect." *Demography* 45(4):851-873.

Gallagher-Thompson, D., A. Futterman, N. Farberow, L.W. Thompson, and J. Peterson. 1993. "The impact of spousal bereavement on older widows and widowers." Pp. 227-239 in *Handbook of bereavement : theory, research, and intervention*, edited by M.S. Stroebe, W. Stroebe, and R.O. Hansson. Cambridge [England]; New York, NY, USA: Cambridge University Press.

Henretta, J.C. 2007. "Early childbearing, marital status, and women's health and mortality after age 50." *Journal of Health and Social Behavior* 48(3):254-266.

Jaffe, D.H., Y.D. Neumark, Z. Eisenbach, and O. Manor. 2009. "Parity-related mortality: Shape of association among middle-aged and elderly men and women." *European Journal of Epidemiology* 24(1):9-16.

Johnson, N.J., E. Backlund, P.D. Sorlie, and C.A. Loveless. 2000. "Marital status and mortality: The National Longitudinal Mortality Study." *Annals of Epidemiology* 10(4):224-238.

Kaprio, J., M. Koskenvu, and H. Rita. 1987. "Mortality after bereavement: A prospective study of 95, 647 widowed persons." *American Journal of Public Health* 77(3):283-287.

Kitagawa, E.M. and P.M. Hauser. 1973. *Differential mortality in the United States, a study in socioeconomic epidemiology*. Cambridge, Mass.: Harvard University Press.

Kom, E.L., B.I. Graubard, and D. Midthune. 1997. "Time-to-event analysis of longitudinal follow-up of a survey: Choice of the time-scale." *Am. J. Epidemiol.* 145(1):72-80.

Lund, E., E. Arnesen, and J.K. Borgan. 1990. "Pattern of childbearing and mortality in married women--a national prospective study from Norway." *Journal of Epidemiology and Community Health* 44(3):237-240.

Lunney, J.R., J. Lynn, D.J. Foley, S. Lipson, and J.M. Guralnik. 2003. "Patterns of functional decline at the end of life." *JAMA* 289(18):2387-2392.

Lusyne, P., H. Page, and J. Lievens. 2001. "Mortality following conjugal bereavement, Belgium 1991-96: The unexpected effect of education." *Population Studies* 55(3):281-289.

Manor, O. and Z. Eisenbach. 2003. "Mortality after spousal loss: are there socio-demographic differences?" *Social Science & Medicine* 56(2):405-413.

Martikainen, P. and T. Valkonen. 1996. "Mortality after death of spouse in relation to duration of bereavement in Finland." *J Epidemiol Community Health* 50(3):264-268.

—. 1998. "Do education and income buffer the effects of death of spouse on mortality?" *Epidemiology* 9(5):530-534.

Parkes, C.M., B. Benjamin, and R.G. Fitzgerald. 1969. "Broken heart: A statistical study of increased mortality among widowers." *British Medical Journal* 1:740-743.

Parkes, C.M. and H.G. Prigerson. 2010. *Bereavement : Studies of grief in adult life*. London; New York: Routledge.

Sanders, C.M. 1993. "Risk factors in bereavement outcome." Pp. 255-267 in *Handbook of bereavement : theory, research, and intervention*, edited by M.S. Stroebe, W. Stroebe, and R.O. Hansson. Cambridge [England] ; New York, NY, USA: Cambridge University Press.

Shanas, E. 1979. "Family as a social support system in old-age." *Gerontologist* 19(2):169-174.

Smith, K.R.and C.D. Zick. 1996. "Risk of mortality following widowhood: Age and sex differences by mode of death." *Social Biology* 43(1-2):59-71.

Stroebe, M.S. and W. Stroebe. 1993. "The mortality of the bereaved." Pp. 175-195 in *Handbook of bereavement: theory, research, and intervention*, edited by M.S. Stroebe, W. Stroebe, and R.O. Hansson. Cambridge [England]; New York, NY, USA: Cambridge University Press.

Thierry, X. 2000. "Risks of mortality and excess mortality during the first ten years of widowhood." *Population: An English Selection* 12:81-109.

Tables

Table 1: Previous findings on relationship between SES & conjugal bereavement mortality

Study	Location & Dates[9]	Type of data	Gender	Age	SES measure	SES relationship with mortality
Bowling 1988	Britain, 1979	Descriptive survey	Both	Decedent spouse: wives 60+, husbands 65+	Social class	positive
Manor & Eisenbach 2003	Israel, 1983-1992	Census records	Both	50-79	Education	Positive for males; none for females
Martikainen & Valkonen 1998	Finland, 1986-1991	Census records	Both	35-74	Education & income	None
Lusyne, Page & Lievens 2001	Belgium, 1991-1996	Census records	Both	39-84	Education	Positive
Parkes, Benjamin & Fitzgerald 1969	UK, 1957-1966	Medical records	Males	55+	Social class	positive

[9] Dates refer to both time and duration of follow-up after death of spouse.

Table 2: HRS Sample by Marital/Widowhood/Vital Status

	Full sample n=30,403	Married individuals n=20,707	Those who become widows n=2,755	Widows who die n=905
Male	43.4	49.8	26.9	38.6
Year of birth	1933.1 (13.1)	1934.9 (11.9)	1927.2 (10.5)	1920.3 (9.4)
White	74.1	78.1	78.7	80.9
Black	14.8	10.9	13.1	11.2
Other/Missing	2.4	2.4	1.5	1.4
Hispanic	8.7	8.6	6.8	6.5
Years of education	11.9 (3.5)	12.2 (3.1)	11.4 (3.3)	11.0 (3.5)
Number of children^	3.1 (2.2)	3.3 (2.1)	3.3 (2.3)	3.1 (2.3)

^ reported at baseline interview

Table 3, Mortality by Marital Status, Married HRS Sample

Hazard Ratios (Standard Error)

	Model 1	Model 2	Model 3
Female	0.62 (0.02)***	0.62 (0.02)***	0.62 (0.02)***
Race/Ethnicity			
White=Ref			
Black	1.33 (0.06)***	1.20 (0.06)***	1.19 (0.06)***
Hispanic	1.05 (0.07)	0.85 (0.06)*	0.86 (0.06)*
Other/Missing	1.44 (0.17)**	1.27 (0.15)*	1.29 (0.16)*
Marital Status (time varying)			
Married=Ref			
Widowed	1.17 (0.06)**	1.17 (0.06)**	1.17 (0.06)**
Years of education		0.96 (0.00)***	0.96 (0.00)***
Number of children (3-4=ref)			
0			1.03 (0.07)
1			1.13 (0.06)*
2			1.03 (0.04)
5+			1.07 (0.05)
Log likelihood	-31974	-31656	-31015

*** $p<=0.001$
** $p<=0.01$
* $p<=0.05$

Table 4, Mortality among Widows, HRS Sample

Hazard Ratios (Standard Error)

2504 subjects, 591 events

	Model 1	Model 2	Model 3
Female	0.67 (0.06)***	0.68 (0.06)***	0.67 (0.06)***
Race/Ethnicity			
White=Ref			
Black	1.08 (0.14)	0.98 (0.14)	0.99 (0.14)
Hispanic	1.04 (0.20)	0.99 (0.19)	1.00 (0.20)
Other/Missing	2.00 (0.65)*	2.04 (0.66)*	2.09 (0.68)*
Years of Education	0.97 (0.01)*	0.98 (0.01)	0.98 (0.01)
Number of children			
(3-4=ref)			
0		1.42 (0.25)*	1.42 (0.25)*
1		1.38 (0.18)*	1.37 (0.18)*
2		1.21 (0.14)	1.22 (0.14)
5+		1.47 (0.19)**	1.48 (0.19)**
Death type			
Sudden^=ref			
lingering@			1.19 (0.13)
Other/missing			1.33 (0.18)*
Log likelihood	-3169	-3055	-3052

^Sudden deaths are deaths where the spouse did not report any nursing home stays, or any diagnosis of cancer, stroke, or heart disease.

@lingering: decedent spouse reports nursing home or hospital stay or cancer diagnosis

*** $p<=0.001$
** $p<=0.01$
* $p<=0.05$

Table 5: Mortality among Widows (Female Only), HRS Sample,
Hazard Ratios (Standard Error)
1816 subjects, 358 events

	Model 1	Model 2	Model 3
Race/Ethnicity			
White=Ref			
Black	1.05 (0.18)	0.96 (0.17)	0.98 (0.18)
Hispanic	1.00 (0.25)	0.95 (0.25)	0.98 (0.25)
Other/Missing	1.12 (0.65)	1.20 (0.70)	1.28 (0.75)
Years of Education	0.96 (0.02)*	0.97 (0.02)	0.97 (0.02)
Number of children (3=ref)			
0		1.65 (0.36)*	1.64 (0.35)*
1		1.44 (0.24)*	1.46 (0.25)*
2		1.24 (0.19)	1.25 (0.19)*
5+		1.52 (0.25)*	1.53 (0.25)**
Death type			
Sudden^=ref			
lingering@			1.31 (0.20)
Other/missing			1.29 (0.24)
Log likelihood	-1817	-1750	-1748

^Sudden deaths are deaths where the spouse did not report any nursing home stays, or any diagnosis of cancer, stroke, or heart disease.

@lingering: decedent spouse reports nursing home or hospital stay or cancer diagnosis

*** $p<=0.001$
** $p<=0.01$
* $p<=0.05$

Table 6: Mortality among Male Only, HRS Sample

688 subjects, 233 failures

Hazard ratio (Standard Error)

	Model 1	Model 2	Model 3
Race/Ethnicity			
White=Ref			
Black	1.22 (0.27)	1.11 (0.26)	1.08 (0.25)
Hispanic	1.13 (0.33)	1.07 (0.32)	1.07 (0.32)
Other/Missing	3.43 (1.36)**	3.32 (1.33)**	3.35 (1.33)
Years of Education	0.99 (0.02)	0.99 (0.02)	1.00 (0.02)
Number of children			
(3-4=ref)			
0		1.01 (0.33)	1.02 (0.33)
1		1.24 (0.26)	1.21 (0.25)
2		1.13 (0.21)	1.13 (0.21)
5+		1.44 (0.29)	1.50 (0.30)*
Death type			
Sudden^=ref			
lingering@			1.08 (0.18)
Other/missing			1.51 (0.32)
Log likelihood	-957	-921	-920

^Sudden deaths are deaths where the spouse did not report any nursing home stays, or any diagnosis of cancer, stroke, or heart disease.

@lingering: decedent spouse reports nursing home or hospital stay or cancer diagnosis

*** $p<=0.001$
** $p<=0.01$
* $p<=0.05$