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Does the Context of Spousal Loss Affect the Physical Functioning of Older Widowed Persons?

A Longitudinal Analysis

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This study examines: (1) the extent to which acute and chronic stressors related to spousal loss affect the physical functioning of bereaved spouses; and (2) how these patterns differ for men and women. We use data from the Changing Lives of Older Couples (CLOC) study, which tracks older adults prior to spousal loss, and 6, 18, and 48 months after spousal loss. The results reveal that (1) widowed persons whose spouses had serious ongoing health problems before the death report more severe perceived limitation in performing daily activities 18 and 48 months after loss; (2) widowed persons who were not with their spouses when they died have greater functional limitation 18 and 48 months after loss. However, gender interaction term analyses reveal that the health effects of spousal death context hold for widowers only. Our findings suggest that the ways older adults die may have long-term physical health consequences for their surviving spouses, and these ramifications differ for widows and widowers.

Keywords: *bereavement; disability; functional limitation; longitudinal data analysis; physical functioning; stress; widowhood*

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Spousal loss is considered one of the most stressful life events (Holmes and Rahe 1967). The death of a spouse has far-reaching implications for older adults, and may affect their economic well-being (Dodge 1995), social integration and participation (Ha and Carr 2005; Neill and Kahn 1999), and health (Bisconti, Bergeman, and Boker 2004; Bradsher et al. 1992; Carey 1979; Carr et al. 2001; Fry 2001; Harlow, Goldberg, and Comstock 1991; van den Brink et al. 2004). A large literature documents that spousal loss has harmful short-term consequences for diverse indicators of mental health, including depressive symptoms and psychological well-being (Bisconti et al. 2004; Carey 1979; Carr 2004; Carr et al. 2001; Carr et al. 2000; Harlow et al. 1991).

Although a vast literature documents the psychological consequences of late-life spousal loss, few studies explore its physical health consequences, particularly for the persistent conditions of physical functioning and disability (Kaprio, Koskenvuo, and Rita 1987). Rather, research on the physical health consequences of spousal loss typically focuses either on the ultimate health consequence, mortality (e.g., Elwert and Christakis 2006) or on *temporary* symptoms that diminish over time, such as the loss of energy and lack of muscular strength (Atchley 1985). A mounting body of evidence reveals, however, that both chronic and acute stressors can carry enduring physical health consequences, including heightened morbidity and functional limitations (Lantz et al. 2005; Lundberg 2005). Studies of the physical health consequences of stress suggest that one specific psychosocial stressor—spousal loss—may have significant long-term ramifications for the physical well-being of older adults.

Spousal loss is a multifaceted stressor, however, and the extent to which it affects physical well-being may vary based on the nature and context of the loss. For example, a “good death”—one where the dying was in little pain, where loved ones and the dying spent their final moments together, and caregiving demands were modest—is associated with better psychological adjustment among widowed persons, compared to those experiencing more distressing deaths (Carr 2003; Carr et al. 2001). We propose that widowed persons whose spouse experienced aspects of a “good death” also may have better physical functioning than their counterparts who withstood a more distressing spousal death.

We also propose that the physical health consequences of specific aspects of spousal loss will be more pronounced for men than for women. Most previous research shows that spousal loss, in general, has more adverse effects on the mortality risk and psychological health of widowed men compared to widowed women (e.g., Lee et al. 2001; Lee, Willetts, and

Secombe 1998). Spousal loss is considered more stressful to men than women because older men are more likely to rely on their wives for practical, emotional, and health-regulating support; the loss of a spouse means the loss of important health-enhancing support (Umberson, Wortman, and Kessler 1992). However, few studies have explored whether specific aspects of the spouse's death affect widows' and widowers' physical functioning in different ways.

The purpose of our study is to investigate whether acute and chronic stressors related to spousal loss are associated with two dimensions of physical functioning (perceived limitation in daily activities and functional limitation) among older widowed persons, and to explore gender differences in these processes. We use multi-wave data in order to assess these relationships in both the short term (i.e., 6 months post-loss) and longer term (i.e., 18 and 48 months post-loss). Documenting the effects of spousal loss on the physical functioning of older adults is critically important because it may help practitioners to identify those bereaved persons at greatest risk for compromised quality of life, chronic illness, and, ultimately, mortality.

Background

Stress and Physical Well-Being among Older Adults

Studies based on biomarker data reveal an association between exposure to both acute and chronic stress, and negative physical health outcomes (Kelly, Hertzman, and Daniels 1997; Lundberg 2005). When individuals are exposed to both one-time and persistent stressors, stress hormones such as catecholamines and cortisol are elevated; a steep increase in these hormones may have negative physical health consequences in the long run (Kelly et al. 1997).¹ Stress also affects physical well-being by depleting stress hormones. Sustained stress is associated with a decrease in one's cortisol levels (Yehuda 2002); low levels of cortisol may, in turn, render an individual "unable to exercise because they cannot sufficiently increase blood pressure or mobilize blood glucose and thus may be chronically fatigued" (Aldwin and Gilmer 2004:265). Such physiological changes may make one susceptible to mobility limitations.

Social scientists have recently begun to explore the specific pathways linking stress to physical well-being. An emerging body of research using sample survey data documents that both stressful life events and enduring strains can have deleterious effects on physical health outcomes such as

mortality (Lantz et al. 2005; Matthews and Gump 2002), functional limitations, and self-rated health (Krause 2004; Krause, Shaw, and Cairney 2004; Lantz et al. 2005). A subset of these studies focuses specifically on spousal loss and the physical health consequences for older widows and widowers. Several recent studies have shown that spousal loss significantly elevates the risk of mortality for some older persons (Christakis and Iwashyna 2003; Elwert and Christakis 2006; Manor and Eisenbach 2003; Smith and Zick 1996). Similarly, studies document that widowed persons have a significantly higher incidence of stroke (Engström et al. 2004), cancer, and heart attack (Chen et al. 1999), as well as heightened levels of disability and compromised mobility (van den Brink et al. 2004) in the first six months to two years following their loss.

Important questions about spousal loss and physical functioning remain unanswered, however. First, most studies focus on relatively short time horizons and do not explore the *longer-term* physical health consequences of spousal bereavement. This omission is potentially problematic, because physical health problems such as functional limitation may develop only in the long term following loss; studies that focus on the initial months after loss only may fail to detect such consequences (Chen et al. 1999; Lantz et al. 2005).

Second, few studies identify the *specific features* of the bereavement process that compromise the physical well-being of survivors. Rather, most studies treat spousal loss as a monolithic event, and do not assess whether the effects of spousal loss are contingent upon characteristics such as the timing or context of the transition. We know of just one study that considers contextual factors surrounding the loss: Christakis and Iwashyna (2003) found that widows and widowers whose deceased spouses were in hospice care had a decreased risk of mortality following bereavement, compared to those whose spouses were not in hospice. Hospice care offers palliative care so that the patient may die without physical pain, and also offers ongoing social and emotional support to the dying patient's family. Thus, deaths occurring under relatively low-stress conditions may have less deleterious health consequences for surviving spouses, compared to deaths occurring under more distressing conditions.

The Stress of Spousal Loss

Stressors and strains associated with spousal loss may reflect both the *acute event* of the death and *chronic strains* associated with the dying process. Early research on stress suggests that any acute event or sudden

change to one's environment causes a "shock" to the system and may trigger alarm, resistance, and exhaustion—each of which may compromise one's physical well-being (e.g., Selye 1956). Chronic stress, by contrast, involves the repeated exposure to a stressor that may result in "wear and tear on internal organs—culminating in the development of specific acute and chronic health conditions" (Krause et al. 2004:642). For instance, chronic stress may suppress the immune system, thus impairing physical well-being in the longer run (Campbell and Cohen 1985).

An emerging body of research evaluates whether chronic or acute stressors are more deleterious to physical health; these studies yield conflicting conclusions. Several have found that chronic stressors have a more profound impact on health than acute or episodic stressors (McEwen and Lasley 2002; Campbell and Cohen 1985). This is because the stress response to a one-time acute stressor (i.e., an increase of stress hormones) decreases and returns to pre-stressor levels when the stressor is no longer present (Kelly et al. 1997). Chronic strains, by contrast, involve repeated exposure to one or more stressors, which may accumulate into harmful levels of stress hormones in the body. A second group of studies concludes, however, that both acute and chronic stressors elevate stress hormone levels (Kelly et al. 1997). A third group suggests that neither chronic nor acute strains are uniformly "worse" for one's physical well-being; rather, the effects are contingent upon the magnitude, context, timing, and concentration of the stressors (see Thoits 1995 for a review).

These studies suggest that the consequences of spousal loss may be contingent upon characteristics of the event, as well as the chronic strains accompanying the dying process. The timing of the death (that is, whether it was sudden or anticipated) and whether or not one was with their spouse at the moment of death are important aspects of the death event, at least in terms of their consequences for the survivor's psychological well-being (e.g., Carr et al. 2001). The enduring strains that persisted prior to the death also may affect the survivor's well-being: two of the most critical aspects of the dying process are the extent to which one witnessed their spouse suffering, and the degree to which one was providing care to the dying (Carr 2003; Prigerson et al. 2003; Schulz et al. 2001, 2003).

Characteristics of the death event and dying transition also may affect the physical well-being of surviving spouses. Unanticipated death, or sudden death that occurs with little prior warning, is generally believed to be the most stressful type of loss (e.g., Lindemann 1944). Classic studies of bereavement presume that widowers and widows adjust better if they had advanced warning and thus could prepare for the death and achieve closure.

However, more recent research focusing on older adults reveals that sudden deaths may not necessarily be worse than anticipated deaths (Carr et al. 2001; Carr 2003). For older adults, even "sudden" deaths are at least somewhat anticipated, given the spouse's advanced age (Carr et al. 2001).

Likewise, anticipated death may not necessarily be less distressing for the surviving spouse. Anticipated death can be highly stressful if a spouse died from a prolonged illness. Chronic illnesses among older adults often entail physical pain and discomfort; witnessing one's loved one in pain may be highly distressing to older spouses (Carr 2003). Moreover, long-term health problems compromise one's ability to work, or might require that the family pay for intensive medical or personal care; these chronic financial strains may create long-term distress for the surviving spouse (Stone 2000).

Finally, the spouses of the terminally ill frequently must provide intensive physical and personal care. A vast body of research documents that the burdens of providing direct physical care have deleterious effects on physical health (Chentsova-Dutton et al. 2000; Patterson and Grant 2003).² Caregivers show greater vulnerability to physical illness than do non-caregivers, as evidenced by their poorer self-rated health, poorer immune function, and elevated use of health care services (Schulz, Visintainer, and Williamson 1990; Vitaliano, Zhang, and Scanlan 2003). Highly stressful caregiving also has been found to increase one's risk for mortality (Schulz and Beach 1999).

The conditions under which one's spouse dies may be influenced by preexisting characteristics of the spouse or survivor, which also affect the survivor's physical adjustment to loss. For instance, socioeconomic resources may influence one's ability to pay for home health care, yet social class is also among the most powerful predictors of physical health over the life course (House et al. 1994). Thus, our analyses are adjusted for important sociodemographic and psychological characteristics that may account for an observed statistically significant association between death context and the surviving spouse's physical well-being, such as education, economic status, ethnicity, and preloss physical and emotional well-being.

Gender Differences: Are Widowed Men More Vulnerable?

The extent to which death context affects the physical well-being of surviving spouses may vary by gender, given widely documented gender differences in both mortality patterns and social roles over the life course. Previous research suggests that the death of a spouse may have more adverse effects on the psychological well-being of widowers, compared to

widows (Lee, Willetts, and Seccombe 1998; Lee et al. 2001; Umberson et al. 1992; van Grootheest et al. 1999). For example, several studies show that spousal loss is a more powerful predictor of depressive symptoms for men than for women, and that women typically adjust better in the longer term (Lee et al. 1998; van Grootheest et al. 1999). Depression, in turn, may trigger physical symptoms that impair older adults' physical functioning, including loss of appetite, disturbed sleep, fatigue, loss of energy, and pseudodementia (i.e., slowness of cognition resembling dementia) (Kermis 1986). Spousal loss also increases the risk of mortality more for men than for women (Martikainen and Valkonen 1996; Mineau, Smith, and Bean 2002), which suggests that men might be more vulnerable to spousal loss in terms of physical as well as mental health.

The gender gap in the psychological and physical consequences of spousal loss may partially reflect gender differences in the enactment of social roles over the life course. Men typically rely on their wives for practical, emotional, and health-regulating support over the life course, and often have few alternative sources of support (Umberson et al. 1992). Upon the loss of one's spouse, men may lack the support they need to function fully and to recover psychologically from the loss (Lee et al. 2001; Peters and Liefbroer 1997). For example, wives typically monitor their husbands' dietary habits and health behaviors such as smoking, drinking, and nutritional intake (Umberson et al. 1992; Zisook, Schuchter, and Mulvihill 1990). As such, upon spousal loss men may adopt negative health behaviors, which in turn compromise their health (Williams 2004).

Conversely, women typically adopt the role of caregiver over the life course, and thus have developed the skills and social networks necessary to be effective caregivers in later life. Because women are more likely than men to be widowed, older women may have peers who they can rely on for social and emotional support, as well as for advice from their peer caregivers. Moreover, because women typically enjoy closer bonds with their children over the life course than do fathers, women may be able to rely on their children for emotional and social support, as well as for help in providing physical care to their husbands. For these reasons, we anticipate that both characteristics of the death event and the dying process will have more deleterious physical health consequences for men than women.

In summary, we attempt to answer two questions: (1) Do specific aspects of the death event and dying process affect physical functioning among older widowed persons in the short and long run (that is, up to four years following loss)? (2) Do the chronic and acute strains associated with spousal loss have different effects on the physical functioning of widows

and widowers? We focus on two aspects of physical functioning in both the short and longer term following spousal loss: perceived limitations in daily activities and functional limitation in performing specific activities of daily living (i.e., disability). Physical functioning affects the quality of daily life for older adults and is strongly related to morbidity and mortality in later life. We consider a subjective assessment of functioning because it is a powerful predictor of subsequent mortality (e.g., Ferraro, Farmer, and Wybraniec 1997), yet we also assess specific manifestations of disability, to pinpoint those specific areas of functioning that may make older bereaved spouses most vulnerable and in need of assistance.

Methods

Data

We use data from the Changing Lives of Older Couples (CLOC). The CLOC is a prospective study of a two-stage area probability sample of 1,532 married persons from the Detroit Standardized Metropolitan Statistical Area (SMSA). To be eligible for the study, respondents had to be English-speaking members of a married couple where the husband was age 65 or older. All sample members were noninstitutionalized and were capable of participating in a two-hour-long interview. Women were over-sampled in order to increase the likelihood that sample members would become widowed during the study period; this decision was based on the fact that older men have a higher risk of mortality than their female counterparts. We weighted the data to adjust for unequal probabilities of selection and differential response rates at the initial interview. Approximately 65% of those contacted for an interview participated, which is consistent with response rates for other Detroit-area studies.

Baseline face-to-face interviews were conducted between 1987 and 1988, and three follow-up interviews were conducted 6 (wave 1), 18 (wave 2), and 48 months (wave 3) after spousal loss. Spousal loss was monitored by using monthly death record tapes provided by the State of Michigan and by reading the daily obituaries in Detroit-area newspapers (Carr 2006). The National Death Index (NDI) and direct ascertainment of death certificates were used to confirm deaths and to obtain causes of death. Of the 335 respondents known to have experienced spousal loss during the study period, 316 participated in at least one of the three follow-up interviews.

Our analyses focus on three separate analytic samples; each sample includes only those widowed persons who participated in a particular wave and all interviews prior to that wave. For example, all respondents included in analyses predicting wave 2 physical functioning also participated in both the baseline and wave 1 interviews. The numbers of respondents for this study are 250, 195, and 105 at waves 1 (6 months), 2 (18 months), and 3 (48 months), respectively.

The issue of selective attrition between waves deserves mention. If persons who failed to participate in the follow-up interviews are significantly different from those who did then the study findings should not be generalized to the overall population of older widowed persons. For instance, those who participate in all three waves may be in better physical health than others, thus the effects of bereavement on health may be understated. In the CLOC, the sample size declines by 46% in the 30-month period between waves 2 ($N = 195$) and 3 ($N = 105$). We used Heckman selection models to assess the potential sources of sample attrition; none of the variables we considered (i.e., gender, education, age, race, homeownership, self-rated health at wave 1, and anxiety at wave 1) were statistically significant predictors of attrition.³ Based on these analyses we presume that intrawave attrition was random. However, we are cautious in generalizing our findings to the overall widowed population because we did not assess all potential sources of sample attrition.

Measures

Dependent Variables

We use two indicators of physical functioning as our outcome variables: perceived limitation in daily activities and functional limitation. *Perceived limitation in daily activities* is measured with a single question: "How much are your daily activities limited in any way by your health or health-related problems?" Response categories are not at all (1), a little (2), some (3), quite a bit (4), or a great deal (5). This question was administered at baseline and all three follow-up interviews. *Functional limitation* is assessed with a subset of items from the Guttman Health Scale for the Aged (Rosow and Breslau 1966). Respondents are asked how much difficulty they have: (a) climbing a few flights of stairs; (b) walking several blocks; and (c) doing heavy work around the house, such as shoveling snow or washing windows. This measure focuses on tasks requiring mobility and strength and has been widely used in studies of disability (Mendes de Leon et al.

2001; Tager, Swanson, and Satiriano 1998). Response categories range from not at all (0) to cannot do (5). We summed responses to the three items, so that higher scores indicate greater functional limitation. Because the distribution of responses was skewed, we computed a log transformation of scores (after adding 1 to the original summed value).

Stressors Related to Spousal Loss

Our focal independent variables are indicators of stressors related to spousal loss. We classify loss-related stress into two categories: stressors related to the death event and chronic stressors related to the dying process. Regarding the former, we assess whether the death was sudden and whether the bereaved spouse was present at the death. *Sudden death* is assessed at the six-month follow-up, with the question "How long before your spouse's death did you realize that she/he was going to die?" Responses range from "sudden/no warning," through several years. We recoded these open-ended responses into two categories: had warning time prior to death (reference category), or sudden death, that is, had no warning time prior to death. *Absence at death* is assessed with the question: "Were you there with your [husband/wife] at the moment when [s/he] died?"

Two aspects of the dying process are considered: *serious ongoing health problems* of spouse and *caregiving* prior to death. At the six-month follow-up, respondents are asked: "Did your spouse have any serious, ongoing health problems before [s/he] died?" Response categories are no ongoing health problem (reference category) or had serious ongoing health problems. Caregiving prior to death is also measured at the six-month follow-up with the question: "Did you yourself have to provide physical care to your [husband/wife] in the six months before [he/she] died?" This is a dichotomous variable, where 1 signifies those who were caregiving.⁴

Demographic and Psychological Characteristics

Demographic variables include *race* (1 = African American; 0 = white), *gender* (1 = female; 0 = male), *age* (in years) at wave 1, and *assets* at baseline. Assets at baseline range from less than \$10,000 (1) to \$500,000 or more (7). *Depressive symptoms* are assessed with a subset of 9 negative items from the 20-item Center for Epidemiologic Studies depression (CES-D) scale (Radloff 1977). Respondents are asked to indicate how often they experienced each of the following nine symptoms in

the week prior to interview: (a) I felt depressed; (b) I felt that everything I did was an effort; (c) My sleep was restless; (d) I felt lonely; (e) People were unfriendly; (f) I did not feel like eating. My appetite was poor; (g) I felt sad; (h) I felt that people disliked me; and (i) I could not "get going." Response categories are hardly ever, some of the time, or most of the time. We summed responses to the nine items, where higher scores reflect more depressive symptoms. The alpha reliability coefficients at baseline, wave 1, and wave 2 are .76, .91, and .75, respectively. In regression models, we include an indicator of depressive symptoms assessed at the same time as the health outcome measure; we do this to ensure that subjective assessments of health are not biased by one's current affective state (see Noël et al. 2004).

We also control for the duration (in months) between the baseline and wave 1 interviews in all models. Although all wave 1 interviews were conducted six months after spousal loss, the duration between the baseline and wave 1 interviews varies across individuals because of variation in the timing of spousal loss. Descriptive statistics for all variables are presented in Table 1.⁵

Analytic Plan

We use residualized regression techniques with robust standard errors that adjust for a prior measure of each outcome. For example, in each model, we include a measure of physical functioning at the prior wave; we do this in order to distinguish the surviving spouse's physical well-being prior to the death and change in physical well-being that occurred following their spouse's death.

We first estimate residualized regression models that evaluate the effects of death event characteristics on physical well-being, net of demographic characteristics and depressive symptoms. Next, we estimate the effects of both death event and dying process characteristics on physical well-being, net of demographic characteristics and depressive symptoms. Finally, we evaluate two-way interaction terms, to assess whether death event and dying process characteristics have different consequences for the physical functioning of men and women. A significant two-way interaction term would indicate that spousal death characteristics affect men's and women's health in different ways. For each part of the analysis, we estimate three models predicting physical functioning at each of the three waves (i.e., 6-, 18-, and 48-month follow-ups).

Table 1
Means and Standard Deviations for Widowed Persons,
Changing Lives of Older Couples Study

	Total (<i>N</i> = 250) ^a		Men (<i>n</i> = 35) ^a		Women (<i>n</i> = 215) ^a	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
Dependent variables						
Perceived limitation, wave 1	1.90	1.14	2.09	1.29	1.87	1.11
Perceived limitation, wave 2	1.95	1.15	2.08	1.12	1.93	1.16
Perceived limitation, wave 3	2.06	1.20	2.20	1.14	2.04	1.21
Functional limitation, wave 1	1.00	0.86	0.91	0.96	1.01	0.85
Functional limitation, wave 2	1.07	0.86	0.97	0.87	1.09	0.86
Functional limitation, wave 3	1.18	0.84	1.07	0.69	1.19	0.85
Independent variables						
Perceived limitation, baseline	1.86	1.09	2.03	1.22	1.84	1.07
Functional limitation, baseline	0.82	0.79	0.57	0.69	0.86	0.80*
Stress indicators of spousal loss						
Acute death event						
Sudden death	0.38		0.31		0.38	
Absence at death	0.61		0.63		0.61	
Chronic death process						
Ongoing health problems of spouse	0.82		0.88		0.81	
Caregiving prior to death	0.47		0.46		0.47	
Psychological well-being						
Depressive symptoms, wave 1	13.06	3.35	13.42	3.75	13.00	3.29
Depressive symptoms, wave 2	12.23	2.77	11.91	2.14	12.27	2.84
Depressive symptoms, wave 3	11.55	2.67	10.90	2.33	11.62	2.70
Demographic characteristics						
Female	0.86					
African Americans	0.16		0.17		0.15	
Assets, baseline	3.22	1.49	3.59	1.39	3.16	1.50
Age, baseline	73.49	6.74	77.66	6.35	72.81	6.57***
Years of education	11.33	2.75	11.49	3.21	11.31	2.67
Months between baseline and wave 1 interviews	37.28	18.15	35.69	18.54	37.53	18.12

p* < .05. *p* < .01. ****p* < .001.

Notes: Means and standard deviations displayed are unweighted statistics. Standard deviations for binary variables are not presented.

a. Number of cases represents the sample size for wave 1. Number of cases for each variable varies by waves and missing cases.

Results

Sample Characteristics

Table 1 presents descriptive statistics (i.e., means and standard deviations, or proportions) for all variables used in the analysis, and results from χ^2 and t tests comparing mean differences for men and women. Men and women do not differ significantly in their reports of perceived limitation in daily activities and functional limitation at all three follow-ups. However, widowed women report significantly greater functional limitation than widowed men at the preloss (i.e., baseline) interview (.86 versus .57, $p < .05$). Men and women do not differ significantly with respect to demographic, economic, psychological, or death context characteristics. The one exception is age, where men are significantly older than women. This may reflect sample selection criteria; where husbands had to be age 65 or older, but wives were not selected on the basis of their age.

Perceived Limitation in Daily Activities

Table 2 presents the results of residualized regression models predicting perceived limitation in daily activities. Two stressors associated with the dying process, ongoing health problems of spouse and caregiving prior to death, are significant predictors of wave 1 outcome. As expected, caregiving is associated with greater perceived limitation at the six-month follow-up ($b = .54, p < .01$), yet this effect is no longer significant at subsequent waves.⁶ Surprisingly, bereaved spouses of those who had an ongoing condition prior to death reported significantly fewer limitations with daily activity in the first six months after loss. However, with the passage of time, these men and women evidenced significantly elevated health problems. Widowed persons whose spouse had a serious health problem have greater perceived limitation in daily activities than their counterparts at waves 2 ($b = .47, p < .10$) and 3 ($b = .653, p < .05$).⁷ Neither characteristic of the acute event—suddenness of death nor absence at the moment of death—affected perceived limitation at any of the three waves. Not one demographic or socioeconomic characteristic is a significant ($p < .05$) predictor of perceived limitations at wave 3.

Thus far, we have found that ongoing health problems of spouse have significant long-term effects on perceived limitation in daily activities of widowed persons. Next, we explore whether similar patterns hold for men and women. Table 3 shows the results of residualized regression models

(text continues on page 473)

Table 2
Unstandardized Coefficients of Residualized Regression Models on Perceived Limitation in Daily Activities

	Wave 1, 6 Months		Wave 2, 18 Months		Wave 3, 48 Months	
	Perceived Limitation in Daily Activity		Perceived Limitation in Daily Activity		Perceived Limitation in Daily Activity	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Stress indicators of spousal loss						
Acute death event						
Sudden death	-0.15 (0.16)	-0.17 (0.16)	-0.15 (0.18)	-0.11 (0.22)	0.28 (0.23)	0.36 (0.23)
Absence at death	0.09 (0.16)	0.07 (0.15)	0.20 (0.17)	0.19 (0.17)	0.24 (0.23)	0.26 (0.22)
Chronic death process						
Ongoing health problems of spouse		-0.66** (0.20)		0.47+ (0.27)		0.65* (0.25)
Caregiving prior to death		0.54** (0.19)		-0.22 (0.18)		-0.15 (0.26)
Psychological well-being						
Depressive symptoms, wave 1	0.03 (0.03)					
Depressive symptoms, wave 2			0.09** (0.03)	0.10** (0.03)		
Depressive symptoms, wave 3					0.08 (0.06)	0.07 (0.06)
Demographic characteristics						
Female	-0.27	-0.25	0.02	0.06	-0.03	-0.01

African American	(0.24)	(0.24)	(0.25)	(0.25)	(0.33)	(0.31)
	0.34	0.33	0.49	0.53+	0.40	0.44
	(0.22)	(0.20)	(0.30)	(0.27)	(0.28)	(0.27)
Assets	-0.07	-0.07	-0.03	-0.02	-0.01	0.01
	(0.05)	(0.05)	(0.06)	(0.06)	(0.09)	(0.09)
Age, wave 1	-0.02	-0.01	0.01	0.01	0.02	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Years of education	-0.04	-0.04	0.08*	0.07+	0.01	0.02
	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)
Months between baseline and wave 1	0.01*	0.01*	-0.01	-0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Physical limitation at previous wave	0.63***	0.60***				
Perceived limitation in daily activities, baseline	(0.08)	(0.08)	0.50***	0.51***	0.59***	0.57***
Perceived limitation in daily activities, wave 1			(0.10)	(0.09)	(0.13)	(0.13)
Perceived limitation in daily activities, wave 2					-1.93	-2.65
Constant	2.04+	2.14+	-1.75	-2.07+	(1.62)	(1.60)
	(1.14)	(1.18)	(1.22)	(1.18)	100	100
Observations	242	238	185	183	100	100
R-squared	0.40	0.44	0.37	0.38	0.49	0.51

Note: Robust standard errors in parentheses.
† $p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Unstandardized Coefficients of Residualized Regression Models on
Perceived Limitation in Daily Activities Including Interactions
Between the Stress Indicators and Gender

	Wave 1, 6 Months	Wave 2, 18 Months	Wave 3, 48 Months
	Perceived Limitation in Daily Activity	Perceived Limitation in Daily Activity	Perceived Limitation in Daily Activity
	Model 1	Model 2	Model 3
Stress indicators of spousal loss			
Acute death event			
Sudden death	-0.05 (0.63)	0.38 (1.13)	1.83** (0.47)
Absence at death	0.08 (0.16)	0.18 (0.18)	0.29 (0.21)
Chronic death process			
Ongoing health problems of spouse	-0.64 (0.59)	1.46 (1.08)	1.72** (0.54)
Caregiving prior to death	0.540** (0.19)	-0.19 (0.20)	-0.11 (0.26)
Psychological well-being			
Depressive symptoms, wave 1	0.02 (0.03)		
Depressive symptoms, wave 2		0.09** (0.03)	
Depressive symptoms, wave 3			0.06 (0.06)
Demographic characteristics			
Female	-0.21 (0.71)	1.24 (1.17)	1.66* (0.69)
African American	0.32 (0.21)	0.37 (0.23)	0.03 (0.24)
Assets, baseline	-0.07 (0.05)	-0.03 (0.06)	-0.02 (0.08)
Age, wave 1	-0.01 (0.01)	0.01 (0.01)	0.03 + (0.01)
Years of education	-0.04 (0.03)	0.07 + (0.04)	0.05 (0.05)
Months between baseline and wave 1	0.01* (0.01)	-0.00 (0.01)	0.00 (0.01)

(continued)

Table 3
(continued)

	Wave 1, 6 Months	Wave 2, 18 Months	Wave 3, 48 Months
	Perceived Limitation in Daily Activity	Perceived Limitation in Daily Activity	Perceived Limitation in Daily Activity
	Model 1	Model 2	Model 3
Physical Limitation at Previous Wave			
Perceived limitation in daily activities, baseline	0.61** (0.08)		
Perceived limitation in daily activities, wave 1		0.54** (0.10)	
Perceived limitation in daily activities, wave 2			0.55** (0.13)
Interaction Terms			
Female* Sudden death	-0.16 (0.67)	- 0.49 (1.13)	-1.70** (0.52)
Female* Ongoing health problems of spouse	-0.00 (0.67)	-1.27 (1.16)	-1.23* (0.61)
Constant	2.05 (1.54)	-3.11+ (1.85)	-4.42** (1.58)
Observations	238	183	100
R-squared	0.44	0.40	0.55

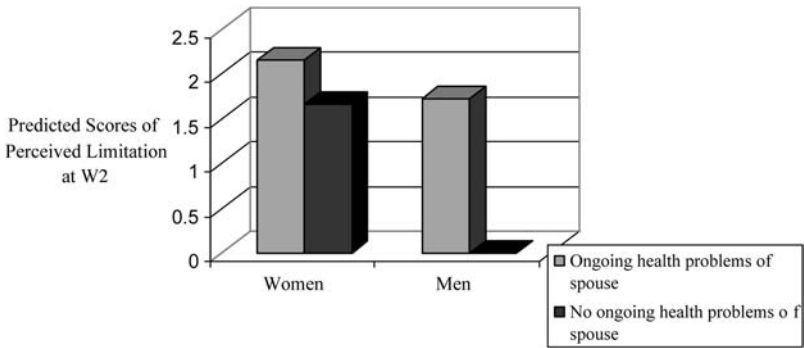
Robust standard errors in parentheses.

† $p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$.

including interaction terms between gender and two indicators of loss-related stress, sudden death and ongoing health problems of spouse, for each wave. We find significant gender interaction terms only in our models predicting perceived limitation at the 48-month (wave 3) follow-up.⁸ For ease of interpretation, we plotted the significant interaction terms in Figures 1 and 2, after controlling for all other variables in the models.⁹

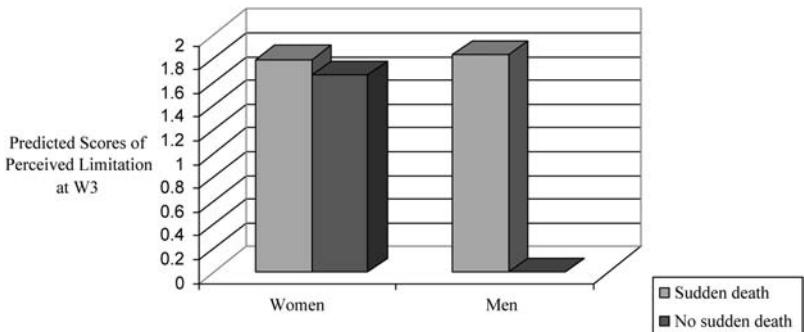
Figure 1 reveals that spouse's ongoing health problems is associated with heightened perceived limitations for men and women, yet this effect is much larger for men than for women. Men whose spouse died without having long-term health problems report far less limitation in their daily

Figure 1
Perceived Limitation in Daily Activities (Wave 2) by Gender and Ongoing Health Problems of Spouse. (Note: all other independent variables are controlled.)



activities than do men whose spouse had an enduring condition, as did all women. Similarly, Figure 2 shows that men who experienced the sudden death of their wives report far fewer perceived limitations than any of the other three categories. Taken together, these findings suggest that the nature of a spouse's death has profound implications for the physical well-being

Figure 2
Perceived Limitation in Daily Activities (Wave 3) by Gender and Sudden Death. (Note: all other independent variables are controlled.)



of men. For women, by contrast, the effect of death conditions on their perceived limitation is negligible.

Physical Functional Limitation

Table 4 presents the results of residualized regression models predicting functional limitation. Not one of the death characteristics affects functional limitation at the six-month follow-up. Only one characteristic of the death had longer-term consequences: persons who were not physically with their spouse at the moment of death report significantly elevated functional limitation at both the 18- and 48-month follow-ups, and these effects are significant even when prior levels of limitation are controlled. Among demographic factors, age is positively associated with functional limitation at waves 2 and 3, and assets at baseline and education are significantly associated with functional limitation at wave 3. Depressive symptoms are positively associated with functional limitation at wave 2 only.

Table 5 shows the results of the gender interaction term analyses. We find that absence at the moment of spouse's death has significantly different health consequences for men and women. Significant interaction terms, adjusted for all other independent variables, are plotted in Figure 3. Similar to previous results on perceived limitation in daily activities, widowed women do not have dramatically different functional limitation levels based on whether they were with their spouses, although women who were absent at the moment of dying have more serious limitations than their counterparts. In contrast, widowed men who were with their spouse at the moment of dying have much lower levels of impairment than other men.

Discussion

Our study explored whether characteristics of a spouse's death and the context surrounding the death affected the physical functioning of older widows and widowers 6, 18, and 48 months after their loss. We evaluated whether specific aspects of the spousal death affected widows' and widowers' physical health in distinctive ways. Our findings confirm several findings from past studies, yet also point out a number of previously unexplored patterns.

First, we found that the context of spousal loss has long-term effects on the physical functioning of older adults. Specifically, we found that distressing aspects of the spousal loss lead to negative physical functioning in

(text continues on page 480)

Table 4
Unstandardized Coefficients of Residualized Regression Models on Functional Limitation

	Wave 1, 6 Months		Wave 2, 18 Months		Wave 3, 48 Months	
	Functional Limitation		Functional Limitation		Functional Limitation	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Stress indicators of spousal loss						
Acute death event						
Sudden death	-0.01 (0.12)	0.04 (0.14)	0.04 (0.10)	0.12 (0.12)	-0.08 (0.14)	-0.13 (0.17)
Absence at death	0.09 (0.11)	0.09 (0.11)	0.19* (0.09)	0.20* (0.10)	0.31* (0.13)	0.30* (0.14)
Chronic death process						
Ongoing health problems of spouse		0.11 (0.13)		0.06 (0.17)		-0.05 (0.18)
Caregiving prior to death		0.11 (0.12)		0.15 (0.11)		-0.08 (0.16)
Psychological well-being						
Depressive symptoms, wave 1	0.01 (0.02)	0.01 (0.02)				
Depressive symptoms, wave 2			0.05*** (0.02)	0.04*** (0.02)		
Depressive symptoms, wave 3					0.04 (0.023)	0.03 (0.02)
Demographic characteristics						

Female	0.02	0.11	0.09	0.21	0.21
	(0.13)	(0.12)	(0.13)	(0.15)	(0.15)
African American	0.00	0.04	0.04	0.02	0.03
	(0.15)	(0.13)	(0.13)	(0.17)	(0.17)
Assets	-0.01	-0.04	-0.03	-0.08+	-0.08+
	(0.04)	(0.03)	(0.03)	(0.05)	(0.05)
Age, wave 1	0.01	0.02**	0.02**	0.03**	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Years of education	0.03	0.01	0.01	0.06*	0.07*
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
Months between baseline and wave 1	0.01***	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Physical functioning at previous wave					
Functional limitation, baseline	0.59***	0.59***	0.59***	0.59***	0.50***
	(0.07)	(0.07)	(0.06)	(0.06)	(0.10)
Functional limitation, wave 1					
Functional limitation, wave 2					
Constant	-1.00	-1.63*	-1.91*	-2.52**	-2.36**
	(0.73)	(0.67)	(0.76)	(0.86)	(0.89)
Observations	239	184	182	99	99
R-squared	0.40	0.55	0.55	0.55	0.55

Note: Robust standard errors in parentheses.
 $\dagger p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5
Unstandardized Coefficients of Residualized Regression Models on
Functional Limitation Including Interactions Between the Stress
Indicator and Gender

	Wave 1, 6 Months	Wave 2, 18 Months	Wave 3, 48 Months
	Functional Limitation	Functional Limitation	Functional Limitation
	Model 1	Model 2	Model 3
Stress indicators of spousal loss			
Acute death event			
Sudden death	0.03 (0.14)	0.11 (0.11)	-0.11 (0.17)
Absence at death	-0.04 (0.24)	-0.02 (0.23)	0.75** (0.28)
Chronic death process			
Ongoing health problems of spouse	0.10 (0.13)	0.07 (0.16)	-0.06 (0.18)
Caregiving prior to death	0.12 (0.12)	0.16 (0.11)	-0.07 (0.16)
Psychological well-being			
Depressive symptoms, wave 1	0.01 (0.02)		
Depressive symptoms, wave 2		0.05** (0.02)	
Depressive symptoms, wave 3			0.04 (0.02)
Demographic characteristics			
Female	-0.05 (0.20)	-0.04 (0.16)	0.46* (0.20)
African American	0.02 (0.15)	0.04 (0.13)	0.02 (0.16)
Assets	-0.01 (0.04)	-0.04 (0.04)	-0.07 (0.05)
Age, wave 1	0.01 (0.01)	0.02** (0.01)	0.03* (0.01)
Years of education	0.03 (0.02)	0.01 (0.02)	0.05 (0.03)
Months between baseline and wave 1	0.01*** (0.00)	-0.00 (0.00)	0.00 (0.01)
Physical functioning at previous wave			
Functional limitation, baseline	0.58*** (0.07)		

(continued)

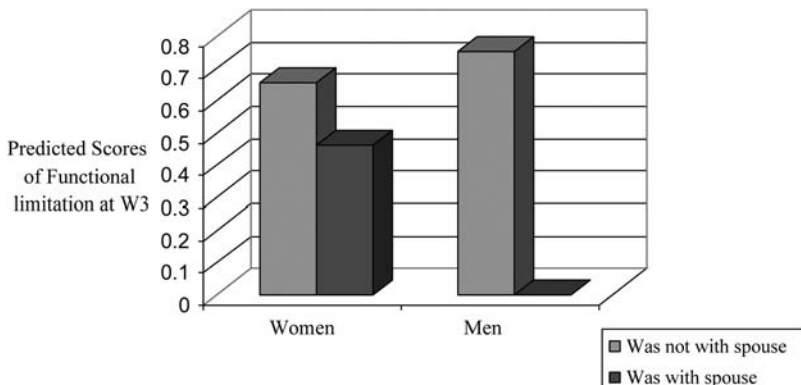
Table 5
(continued)

	Wave 1, 6 Months	Wave 2, 18 Months	Wave 3, 48 Months
	Functional Limitation	Functional Limitation	Functional Limitation
	Model 1	Model 2	Model 3
Functional limitation, wave 1		0.58*** (0.07)	
Functional limitation, wave 2			0.51*** (0.09)
Interaction term			
Female* Absence at death	0.17 (0.28)	0.30 (0.27)	-0.56+ (0.32)
Constant	-1.21 (0.76)	-1.92* (0.76)	-2.35* (0.91)
Observations	235	182	99
R-squared	0.39	0.56	0.57

Note: Robust standard errors in parentheses.

† $p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 3
Functional Limitation (Wave 3) by Gender and Absence at Death.
(Note: all other independent variables are controlled.)



the long run. That is, the effects of loss-related stress on physical health do not diminish yet *increase* over time; studies focusing on short time horizons only may fail to detect this important pattern. This finding stands in stark contrast with research showing the short-term effects only of death-related stress on the psychological well-being of the bereaved (Carr 2003).

Our findings related to the health consequences of bereavement are consistent with recent studies exploring the long-term effects of a variety of different stressors on the physical health of midlife adults. For example, Krause et al. (2004) show that traumatic events that occur during midlife (31 to 64 years old) are powerful predictors of both acute and chronic physical symptoms and functional disability among persons ages 75 and older. Similarly, Lantz et al. (2005) have found that stressful life events have long-term effects on self-rated health and functional limitation (i.e., about 7.5 years after baseline).

Second, we find that no single characteristic of spousal death or the dying process has uniformly harmful (or protective) effects on older bereaved spouses' physical functioning. Although some previous studies suggest that chronic stressors have more severe consequences for physical health than do acute stressors (Campbell and Cohen 1985; McEwen and Lasley 2002), our findings do not corroborate this. We believe that this discrepancy reflects the magnitude of the event considered; as noted early, spousal loss is considered among the most distressing of all life events (Holmes and Rahe 1967), and as such may be sufficiently devastating that it carries long-term physical health consequences.

Finally, we found that the physical consequences of loss matter differently for widows and widowers. Widowed women have similar level of physical functioning regardless of the characteristics of their spouse's death. In contrast, the consequences for men vary widely depending upon the nature of the loss. When spousal death occurs under high stress conditions, men and women do not differ substantially in their physical well-being. In contrast, gender differences are pronounced when bereaved persons experience relatively less distressing death contexts (i.e., good death), such as anticipated death.

These findings may reflect the gendered nature of social roles over the life course: "stress can differ in specificity, with some forms of stress linked to specific life domains, including social roles" (Atienza, Parris Stephens, and Townsend 2002:195). For instance, stressors associated with highly valued social roles are more harmful than social stressors associated with less salient roles (Krause 2004). As Lundberg (2005) has observed, women typically report higher levels of stress at home than do men, because they

must shoulder a greater share of housework and child care duties. As mentioned earlier, women provide practical, emotional, and health-regulating support to their spouses. Consequently, women may find the process of bereavement more distressing than men do, given their tendency to shoulder the responsibilities for marital relations and their spouse's health.

This can be why gender difference in physical health manifests when men and women experience less distressing death context. In contrast to men, women can have high stress levels even when they experience a good death of their spouses because they still feel responsibility and psychological stress due to their roles. Gender difference becomes very clear because women can have higher responsibility and psychological burden than men when they are in a relatively positive context of spousal loss. By contrast, when widowed persons experience a more stressful context, such as sudden death, both men and women have high stress levels by feeling more responsibility and grief through the process of the death. These overwhelming stressors accompanied by a more distressing death context lead to more physical problems regardless of gendered social roles. Thus, men and women do not have much difference in physical functioning in the long run.

Women can have high stress levels through the process of spousal loss regardless of context. In contrast to women, men have different variation in stress level depending on the context of spousal loss experienced because of the characteristics of their roles.

Limitations

Our study has several limitations. First, selective attrition across the study waves may bias our results. Those who agreed to participate in subsequent waves may have been physically and mentally healthier than their peers who did not participate (e.g., Fry 2001). Moreover, our relatively small sample size prevented us from assessing more fine-grained subgroup differences, such as three-way interactions between gender, death suddenness, and other aspects of the death. Future studies should address each of these concerns.

Finally, our study did not explore the role of remarriage in buffering against the health consequences of bereavement, particularly among men. Men are approximately five times more likely to remarry after spousal loss than women (Mastekaasa 1994); not only are the healthiest men most likely to marry, but those who remarry may find their health protected by their new wives. However, our study does not examine the effect of remarriage

because no respondents were remarried at wave 2 and fewer than 1% of widowed persons were remarried at wave 3. Future studies should investigate whether remarriage buffers against the physical health consequences associated with specific aspects of the late spouse’s death.

Despite these limitations, our study has documented the short- and long-term effects of spousal death on widows’ and widowers’ physical functioning, with a focus on the ways that specific death attributes affect survivors’ physical health. This study also extends research on stress and health into the dimension of physical functioning in later life. The deleterious effects of spousal loss on physical health might manifest after a long time relative to its effects on psychological well-being. This finding has potentially important implications for both formal and informal caregivers to older adults. Most efforts to assist bereaved spouses are focused on the first 6 to 12 months following loss, when grief symptoms are most severe (e.g., Richardson 2006). However, our findings suggest that practical assistance—especially in performing tasks of daily life, such as shopping and walking up stairs—may be most necessary in the longer term following loss. Practitioners and persons working with the bereaved should also recognize that a bereaved spouse’s response to loss may be conditioned by the larger context of the death, and interventions could be tailored accordingly.

Appendix Correlations among Four Stress Indicators of Spousal Loss

	(1)	(2)	(3)	(4)
(1) Sudden death	1.000			
(2) Absence at death	0.191**	1.000		
(3) Ongoing health problems of spouse	- 0.298***	- 0.088	1.000	
(4) Caregiving prior to death	- 0.342***	- 0.189**	0.445***	1.000

p* < .01. *p* < .001.

Notes

1. Catecholamines have been linked to cardiovascular conditions such as hypertension. Cortisol levels have been associated with cardiovascular disease, type 2 diabetes, reduced immune function and cognitive impairment (Lundberg 2005).

2. Caregiving also has serious consequences for psychological well-being, although an emerging body of research shows that caregiving may provide older adults with a sense of meaning, and that the strengthened bond between caregiver and patient may be linked to better psychological adjustment following spousal loss (e.g., Schulz et al. 2001).

3. We also estimated logistic regression models to assess whether respondents and non-respondents are significantly different between waves 2 and 3. We predicted attrition and included the same six variables that were included as selection variables in the Heckman models, described above. Only education significantly increased the likelihood of nonparticipation. See Carr (2006) for further information on the sources of attrition between the baseline and wave 1.

4. The four indicators of loss-related stress are modestly correlated, ranging from .19 to .45 (see Appendix). In preliminary analyses, we constructed two two-item subscales reflecting aspects of the death event versus the death process. The two scales had relatively low reliability scores; the Cronbach's alpha for the death event and death process subscales were .32 and .60, respectively. As a result, the analyses presented here focus on the individual items only.

5. Missing data are not a significant problem in the CLOC; most of the variables used in this analysis have missing data on less than 1% of cases. However, roughly 20% of respondents are missing data on assets. Values were imputed using regression analysis techniques; Table 1 presents descriptive statistics for the imputed value of assets.

6. Ongoing health problems of spouse and caregiving prior to death are each significant when the other measure is omitted in model 2 at wave 1. In preliminary analyses, we also assessed the effects of more fine-grained indicators of caregiving, such as the duration or perceived stressfulness of caregiving. Overall, those variables have similar effects to the simple dichotomous indicator used here. We have selected caregiving prior to death as our measure because there is no difference in terms of effects and most alternative caregiving-related variables have more missing cases than caregiving prior to death. Also, we do not include those variables together with caregiving prior to death in the models because of concerns on multicollinearity.

7. We have also examined the effect of physical pain at death, which was assessed by asking if spouse's illness was "physically painful for him/her." It was not significant for either outcome at any of the three waves.

8. The interaction term between spouse's ongoing health problems and gender is not significant at wave 3 when the interaction term between sudden death and gender is omitted. The interaction between sudden death and gender is significant even when the interaction between ongoing health problems of spouse and gender is omitted in the model. We include both interaction terms in the final model. Sudden death is negatively correlated with ongoing health problems of spouse, which means that widowed persons whose spouse had ongoing health problems are more likely to experience the anticipated death of the spouse. Yet, at the same time, sudden death and ongoing health problems of spouse are not mutually exclusive; 60 of 244 (24.5%) in the sample experienced both sudden death and ongoing health problems of spouse. Thus, the distinct effect of ongoing health problems across men and women can manifest after controlling for the interaction term between sudden death and gender.

9. An interaction term between gender and caregiving prior to death is excluded because the interaction term was not significant in any waves at preliminary analyses.

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