Widowhood and Race

Felix Elwert
Harvard University

Nicholas A. Christakis
Harvard University

The health effects of marital status are frequently cited in the current debate on marriage promotion, but little is known about how marital health effects vary across groups. This article assembles the largest properly longitudinal and nationally representative dataset of elderly married couples in the United States (N = 410,272 couples) and provides strong evidence that the "widowhood effect"—how the death of a spouse increases the mortality of the survivor—varies substantially by race. The authors find that whites married to whites suffer a large and enduring widowhood effect. By contrast, blacks married to blacks do not suffer a detectable widowhood effect, possibly because they manage to extend the survival advantage of marriage into widowhood. For racially intermarried men, wife's race appears to dominate the size and presence of the widowhood effect entirely, regardless of husband's own race. These results likely arise from differences in the marital cultures and marital contexts of black and white couples. More generally, these results demonstrate that the health effects of social ties depend on the individual attributes of the actors they connect.

The increased probability of death in the recently bereaved, known as the "widowhood effect," is key evidence in support of the sociological tenet that social relationships can affect the life chances of individuals (Durkheim [1897] 1997; House, Landis, and Umberson 1988). Dozens of studies across a large number of industrialized countries document that bereaved spouses suffer greater mortality than currently married persons (Hu and Goldman 1990), with evidence mounting that this association is at least partly causal (Lillard and Waite 1995; Lillard and Panis 1996).

Comparatively little is known, however, about how the widowhood effect depends on attributes of the affected individuals. Previous studies have tended to focus on the simple presence versus absence of a marital tie while paying little attention to how the characteristics (or actions) of spouses may influence the health outcomes of their union. In network analytical terms, previous work has stressed the existence over the content of social ties, and has underplayed the interaction between the attributes of social actors and the social ties that connect them.

What many studies lack, in other words, is attention to effect heterogeneity. Some concern for traits of individuals connected by a marital tie is, of course, reflected in the simple fact that the widowhood effect is typically assessed separately for men and women, but other dimensions of potential variation are almost universally neglected. With one inconclusive exception (Schaefer, Quesenberry, and Wi 1995), research on race differences in the widowhood effect is nonexistent. Effect heterogeneity is important for at least two reasons. First, critical attention to the way widowhood might have different effects in different population subgroups may contribute to an improved

Direct correspondence to Felix Elwert c/o Nicholas A. Christakis, Department of Health Care Policy, Harvard Medical School, 180 Longwood Avenue, Boston, MA 02115 (elwert@fas.harvard.edu). Supported by a grant to Nicholas A. Christakis from NIH (R-01 AG17548-01). Felix Elwert benefited from the hospitality of the Social Science Research Center Berlin, Germany, and an Eliot Fellowship from Harvard University. The authors thank Laurie Meneades for expert data programming required to build the analytic dataset, Andrew Clarkwest for computing Census statistics, and Diane Lauderdale and Bert Kestenbaum for sharing their name algorithms. The authors thank Paul Allison, Jack Iwashyna, Orlando Patterson, Wendy Roth, Christopher Winship, the *ASR* editor, and three anonymous reviewers for helpful discussions and advice.

understanding of the mechanisms by which social relations produce health outcomes. If widowhood is harmful in some circumstances but not in others, then those circumstances may be relevant to the mechanism by which widowhood exerts its effect on mortality. Second, effect heterogeneity may inform current policy debates that appear to assume a uniform effect of marriage for everybody. To the extent that widowhood is more harmful, or marriage more beneficial, in some groups than in others, the study of effect heterogeneity sheds light on whether interventions to foster marriage, or meliorate the consequences of marital loss, could beneficially be focused.

This paper investigates effect heterogeneity in the widowhood effect as a function of the race of each spouse. We hypothesize that race-specific differences exist because race captures factors that shape the health implications of marriage and widowhood. Thus, we view race as a proxy for diversity in marital cultures and marital contexts rather than as a causal factor in its own right (Winship and Sobel 2004). Our empirical analysis begins by contrasting the widowhood effects suffered by black spouses and white spouses in racially endogamous (same race) couples. We then compare these to the widowhood effects suffered by black spouses and white spouses in racially exogamous (intermarried) couples. Finally, we investigate how the widowhood effect evolves over the duration of bereavement and repeat the race-specific analyses in terms of the trajectory of the widowhood effect. Results document drastic racial differences in the health effects of marriage and widowhood between black and white couples. Interestingly, wife's race appears more important in determining these race differences than husband's race, suggesting a gendered dynamic of race in bereavement.

To permit this investigation, we develop a novel dataset. Research on heterogeneity in the widowhood effect requires a sufficient number of deaths and bereavements within each group under consideration. Most standard social science datasets, however, are either too small or too youthful to fulfill this requirement, because most deaths—and most spousal deaths—occur among the elderly.[1] While some existing datasets may be large enough, they either lack appropriate control variables for confounding by health problems at baseline, or are region-specific and not nationally representative. Consequently, we develop a new, large, nationally representative, and properly longitudinal dataset from Medicare claims records and other administrative sources. With 410,272 couples, including 4,414 interracially married couples, aged 67 years and older, two years of detailed medical histories for both spouses prior to baseline, and nine years of follow-up (1993–2002), this dataset is the largest of its kind and well suited for our objectives.

THEORY

Components of the Widowhood Effect

Before we can outline the possible relevance of race for the widowhood effect, some comments on the postulated mechanisms by which marriage confers health benefits and by which widowhood is harmful are necessary. Given the possibility that the widowhood effect may change over the duration of bereavement, we classify explanatory mechanisms by dividing the widowhood effect into two components: first, the long-term difference between the salubrious attributes of marriage and the detrimental qualities of widowhood; second, the transitional health burden, if any, of the actual transition from marriage to widowhood.

To account for the long-term survival advantage of married individuals relative to those who never married, sociologists emphasize the social integration in marriage through shared household living, which provides married spouses with a ready source for emotional support and direct care in case of illness (Christakis and Allison 2006; Litwak and Messeri 1989). Spouses, particularly wives, promote healthy behavior by encouraging regular eating and sleeping habits, supervising medication intake, and discouraging risky and unhealthful behaviors (Umberson 1987, 1992). Furthermore, married spouses may reap information and social support benefits from the extended reach of their respective friendship and kinship networks. Economic approaches advance similar arguments, phrased in terms of marital economies of scale and efficiency gains from the household division of labor (Becker 1981). Empirically, men appear to draw benefits more from the

[1] Seventy-four percent of all deaths in the United States occur at ages 65 and above (Hoyert, Kung, and Smith 2005).

household labor of their wives, whereas the mortality advantage for women appears to derive primarily from the financial contributions of their husbands (Trovato and Lauris 1989; Lillard and Waite 1995).

Upon the death of a spouse, many of the health benefits of marriage decrease or disappear. Traditionally, men lose their primary caregiver (Umberson, Wortman, and Kessler 1992), while widowed women suffer from reduced economic resources (Lillard and Waite 1995). Widows and widowers report less healthy lifestyles than do married individuals: increased smoking and less physical activity among men (Umberson 1987, 1992), and loss of appetite and body mass among women (Shahar et al. 2001). Consistent with reduced spousal health supervision and a reduced reach of medical referral networks, widowhood decreases the likelihood of admission to high-quality hospitals in case of serious illness for both men and women (Iwashyna and Christakis 2003). Increased mortality from chronic diseases with long latency periods shortly following the death of a spouse (Martikainen and Valkonen 1996a) is further evidence for a possible decline in the quality of medical care due to widowhood.

Nevertheless, despite the negative health impact of widowhood, widowed individuals may have a lasting advantage over never-married individuals (Lillard and Waite 1995), because some benefits of marriage do *not* terminate with the death of a spouse. For example, bereaved individuals may hold on to all or part of the survival advantage of marriage because of higher pension payments or social security entitlements derived from the employment history of a deceased spouse. They may enjoy the continued support from affinal kin (spouse's relatives) not available to never-married individuals. Moreover, they may benefit from behavioral conditioning, by which the spousal control of health behavior extends beyond the grave. Marriage may thus exert what we call a "memory effect" to shield bereaved individuals from increased mortality in widowhood. The strength of such a memory effect might depend on many factors, including the characteristics of the deceased spouse and of the surviving spouse.

The difficulty of the actual transition to widowhood also likely contributes to the widowhood effect. The transition to widowhood is a difficult process during which the survivor must come to terms with the emotional burden of bereavement, adjust to new social roles and daily routines, and, presumably, develop (partial) functional substitutes for the health benefits of marriage. We would thus expect a spike in the mortality of survivors immediately following bereavement. In line with this expectation, one large Finnish study found especially high excess mortality immediately following bereavement for most causes of death, particularly suicide (Martikainen and Valkonen 1996b). Similarly, the social-psychological literature documents a (partially) transitory effect of bereavement on grief and depression among surviving spouses (see Wortman and Silver 1989 for a review).

Potential Trajectories of the Widowhood Effect

Clearly, the combination of the factors just outlined leaves room for considerable heterogeneity in size and trajectory of the widowhood effect. Variations in (a) the difference between the long-term health implications of marriage and widowhood, (b) the strength of the memory effect by which the health benefits of marriage extend into widowhood, and (c) the size and duration of the short-term implications of the transition to widowhood may induce a variety of trajectories in the hazard of death over time. Figure 1 illustrates three stylized potential trajectories.

Figure 1A describes the trajectory most consistent with conventional expectations about the effects of marriage and widowhood on the hazard of death. Here, marriage exerts a protective effect and lowers mortality compared to singlehood. The difficulty of adjusting to widowhood creates a spike in mortality immediately following bereavement, after which the hazard of death returns to almost premarital levels in the long run. Figures 1B and 1C describe less expected, yet nonetheless possible, scenarios. In Figure 1B, bereaved individuals avoid suffering a widowhood effect, but only at the cost of never gaining a survival advantage from marriage to begin with. In Figure 1C, bereaved individuals also do not suffer a widowhood effect, but for very different reasons. Here, individuals do gain a survival advantage from marriage and manage to maintain this survival advantage even after their spouse has died, perhaps due to memory effects of marriage.

Figures 1B and 1C are important for the results reported later, because they show that the absence of a widowhood effect does not necessarily imply the absence of a protective effect of marriage.

Empirically, considerable uncertainty surrounds the actual trajectory of the widowhood effect, as previous research lends support to various features from different scenarios depicted in Figure 1. Figure 1A, the expected trajectory of the hazard of death over the marital life course, emerges when we combine the results of two well-known studies. From Lillard and Waite (1995), Figure 1A takes the decrease of

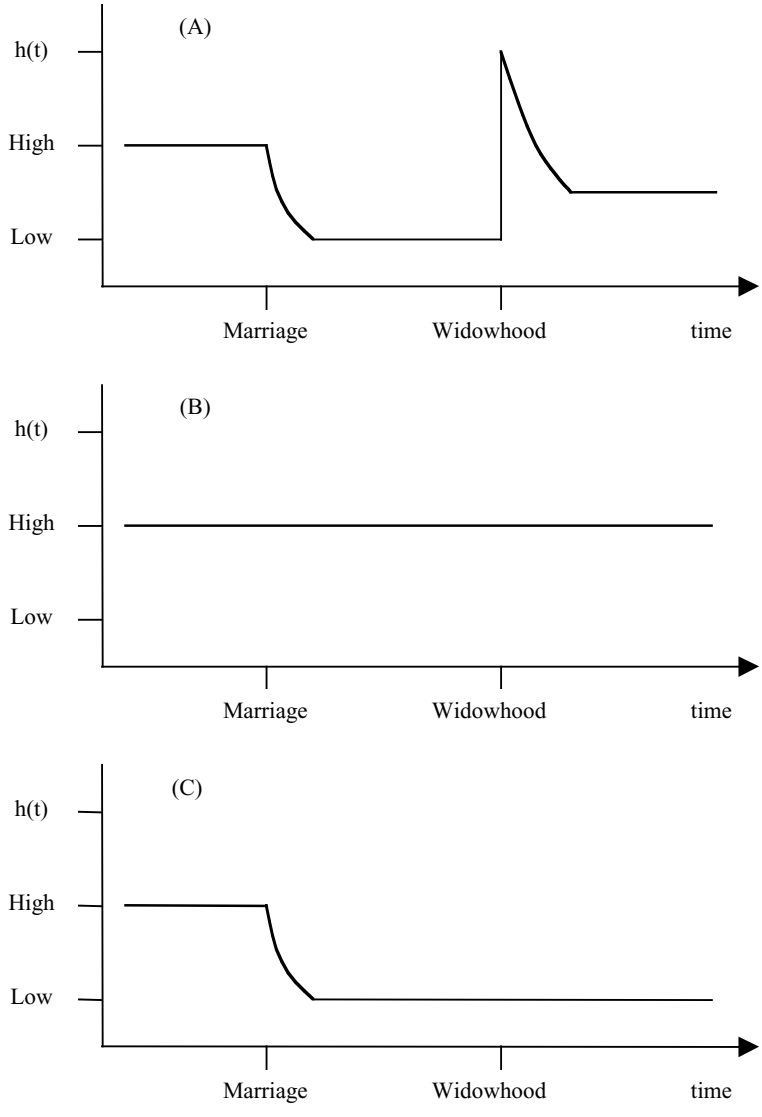

Figure 1. Three Stylized Scenarios for the Trajectory of the Hazard of Death Over Time As a Function of Marriage and Widowhood

Note: (A) Standard expectation for the trajectory of the hazard of death, *h(t),* over time: lowered mortality in marriage, return to high mortality in widowhood in the long run after a transitional spike immediately following bereavement. (B) No long-term widowhood effect due to absence of a protective effect of marriage. (C) No long-term widowhood effect due to extension of protective effect of marriage into widowhood. For clarity, all figures suppress the individual-level increase in the hazard of death over time.

the hazard of death upon entry into marriage and the long run return to almost premarital levels of mortality in widowhood. Lillard and Waite, however, do not trace the development of the widowhood effect over the duration of bereavement, such that their study is not informative of any additional mortality burden during the transition to widowhood. Martikainen and Valkonen's (1996b) Finnish study, by contrast, has no information on the entry into marriage, but it documents the existence of a transitional spike in mortality as well as the long-term elevation of mortality in widowhood compared to marriage. In line with a smaller transitional spike in mortality immediately following bereavement—portrayed *in extremis* as the total absence of a transitional spike in Figures 1B and 1C—Christakis and Iwashyna (2003) find that steps taken to ease the shock and burdensomeness of spouse's death, such as hospice care, may mitigate the adverse consequences of the transition to widowhood. The only large U.S. study known to us charting the trajectory of the widowhood effect by duration of bereavement, however, finds a pattern that is at odds with all the trajectories considered in Figure 1. Using health insurance records from California, Schaefer et al. (1995) find no statistically significant excess mortality during the first six months of widowhood among either men or women after adjusting for baseline covariates, and maximal excess mortality during months 7–12. We are not aware of any theoretical explanation for this pattern, though it may relate to the cumulative effect of the loss of social support over time. Our study revisits the issue of the trajectory of the widowhood effect in the contemporary United States in the context of investigating racial differences in the widowhood effect.

Heterogeneity in the Widowhood Effect By Race

We expect to find heterogeneity in the size and trajectory of the widowhood effect across social groups inasmuch as group membership—here delineated by the race of each spouse—correlates with, or causes, factors contributing to the widowhood effect. In this section, we focus on potential differences between endogamously married black and white couples (leaving matters of intermarriage and gender for later).

Previous research on race differences in the health effects of marital status and of the widowhood process is extremely limited. The only direct test of race differences in the effect of widowhood on mortality known to us finds no significant difference between blacks and whites (Schaefer et al. 1995), though this study was limited by a small sample of blacks and by its regional rather than national focus. Two other studies touch on the issue, but similarly fail to yield clear results. In a cross-sectional comparison of age-specific mortality among married and unmarried individuals, Litwak and Messeri (1989) find that blacks, on average, appear to receive fewer health benefits from marriage than whites. This race difference, however, attenuates with age among men, and reverses direction among elderly women, such that black women ages 65 and older appear to reap a greater health advantage from marriage than white women. Litwak and Messeri, however, compared married to all unmarried individuals and did not distinguish between never-married and widowed individuals; consequently, their results do not isolate the effect of widowhood on mortality. Carr (2004a) investigates the effect of widowhood on psychological outcomes among a regional sample of black and white respondents and finds no clear pattern in race differences; blacks report significantly lower levels of anger and despair in widowhood, but do not differ in levels of grief, yearning, shock, depressive symptoms, and anxiety.

In our opinion, this lack of clear previous findings on race differences in the widowhood effect may relate more to sample size restrictions than to a genuine absence of race differences in the population. Drawing on work that documents systematic differences in black and white marriages (different "marital cultures" according to some [Orbuch and Eyster 1997]) as well as systematic differences in how black couples and white couples relate to their social environment (different marital contexts), we hypothesize that the termination of marriage by death of a spouse will lead to a smaller widowhood effect among black couples than among white couples for several reasons.

First, and perhaps most important, black spouses have a clear advantage over white spouses with respect to social integration and social support in widowhood, because of pro-

nounced differences in household composition in old age. Unmarried elderly blacks are almost twice as likely as whites (approximately 40 versus 20 percent) to live with relatives (Ruggles 1994; Goldscheider and Bures 2003), a difference that is robust to socioeconomic controls (Farley and Allen 1987). Lillard and Waite (1995) document that shared living arrangements reduce mortality among the widowed through increased household income and economies of scale. We further expect that the presence of relatives in the household will reduce mortality among widowed individuals by substituting for the loss of spousal promotion of healthy behavior and by enabling ready assistance with the tasks of daily living and routine health care. The greater prevalence of nonmarital coresidence in old age among blacks should thus protect them from the widowhood effect by mitigating the loss of social integration arising from widowhood and replacing the essential pre-professional health care typically rendered by spouses.

Second, widowed blacks may enjoy survival advantages over widowed whites because of greater social support from persons who do *not* live in the same household, although previous research on this point is less clear. Typically, qualitative researchers find that black adults enjoy much greater social support than whites (e.g., Stack 1974), whereas large-sample quantitative research on the social networks of blacks and whites reports conflicting findings (e.g., Patterson 1998; Sarkisian and Gerstel 2004). There is some evidence, however, that blacks may indeed enjoy greater social support than whites in old age. For example, Silverstein and Waite (1993) find that old black women are more likely than old white women to receive instrumental support from individuals not living in the same household and that the difference increases with age (black men, however, are less likely to receive instrumental support). Ajrouch, Antonucci, and Janevic (2001) find that despite having smaller social networks than whites, blacks maintain closer contact with network members and count more family members in their networks. Non-coresident relatives play a central role in the care of the elderly (Taylor, Chatters, and Mays 1988; Spitze and Logan 1990), and some research suggests that elderly blacks enjoy more social support because of a more inclusive definition of kinship (Johnson 2000). Finally, blacks have a higher level of religious participation than whites (Taylor et al. 1996), which greatly enhances their opportunities for marshalling social support in crisis situations (Hatch 1991).[2]

Third, black spouses may experience a smaller widowhood effect than white spouses because endogamously married black couples adhere to a less rigidly gendered division of labor (see McLoyd et al. 2000 for a review). Historically, black wives have been more likely to participate in the labor market and to contribute a relatively larger share of family income than white wives (Patterson 1998). Black husbands in turn perform a greater share of household labor and child rearing (Orbuch and Eyster 1997), are more likely to approve of working wives, and value female contributions to family income more highly than do white husbands (Blee and Ticamyer 1995). While task specialization can create efficiency gains in marriage (Becker 1981), it simultaneously engenders mutual dependence, which becomes a liability with potentially serious health implications upon the death of a spouse (Oppenheimer 1997). Comparatively less task specialization in marriage may thus protect black spouses from some of the adverse implications of widowhood by promoting self-sufficiency and fostering skills of independent living. In a stark illustration of the dangers of gendered marital division of labor, Lillard and Waite (1995) find that the economic loss of widowhood, net of other covariates, explains the entire effect of widowhood on mortality among women. Less drastically, the assumption of household chores in widowhood increases the vulnerability to depression among men (Umberson et al. 1992). Both men and women suffer greater anxiety in widowhood if they had been dependent on their spouse for specific household tasks (Utz et al. 2004).

Fourth, black spouses may suffer less detriment in widowhood than white spouses because endogamously married black couples consistently report lower average marital quality than do whites, even net of controls (see McLoyd et

[2] According to scattered reports, cultural differences in funerary rites suggest special provisions for supporting black widows and widowers in the aftermath of spousal death (Wisocki and Skowron 2000).

al. 2000 for a review). Lower average self-reported marital quality may contribute to greater independence in marriage among black spouses compared to white spouses (Adelman, Chadwick, and Baerger 1996), and thus better prepare blacks for the increased isolation of widowhood. Research on the psychological adjustment to widowhood has shown that the loss of a spouse in a conflicted marriage leads to fewer psychological problems than the loss of a spouse in a happy marriage (Carr et al. 2000; Carr 2004a, 2004b). Together, these factors may help to explain why endogamously married black men and women might, on average, fear the death of their spouse less than their white counterparts (Adelman et al. 1996).

We can employ these arguments about racial differences in marriage and widowhood to derive tentative predictions about the expected trajectories of the widowhood effect suffered by endogamously married blacks and whites respectively. For whites, we see no reason to doubt that the trajectory of the widowhood effect will conform to conventional expectations charted in Figure 1A, in line with previous results by Lillard and Waite (1995) and Martikainen and Valkonen (1996b). Among blacks, greater spousal independence due to lower levels of task specialization in marriage and lower average self-reported marital quality will likely reduce the size of the widowhood effect by reducing the survival advantage of marriage relative to premarital levels of mortality, as pictured in Figure 1B. At the same time, the much greater prevalence of shared household living among unmarried elderly blacks, and greater social support from nonco-resident individuals will likely reduce the size of the widowhood effect among blacks relative to whites by providing functional substitutes for the social integration of marriage, thus creating a memory effect enabling widowed blacks to maintain the lower, marital levels of mortality even after the death of their spouse. Higher levels of religiosity and religious participation among blacks, as well as other factors, will provide bereaved black spouses with social and spiritual resources that could reduce the difficulty of the transition to widowhood. These latter arguments would predict a trajectory of the widowhood effect among blacks closer to Figure 1C. Either way, endogamously married blacks are expected to suffer a smaller widowhood effect than endogamously married whites.

Heterogeneity in the Widowhood Effect By Intermarriage and Gender

Interracial marriage is rare (Qian and Lichter 2004), especially among the elderly. Pervasive legal sanctions and rampant social disapproval discouraged racial intermarriage far into the twentieth century (Kennedy 2003). Accordingly, very little is known about morbidity and mortality in this population.[3] Our data contain the largest longitudinal and nationally representative sample of interracial couples currently available. Thus, they provide a unique opportunity to investigate whether stark differences in the socio-historical experience of racially intermarried and racially endogamous couples translate into corresponding differences in the widowhood effect.

Inasmuch as one can control for background differences between endogamous and intermarried couples, we can marshal the comparison between endogamous and intermarried couples to introduce gender into the investigation of race differences in the widowhood effect. Contrasting the widowhood effects suffered by racially endogamous and racially intermarried men and women can support inferences about the relative importance of husband's versus wife's race in determining racial variation in the widowhood effect. This would be impossible if husbands and wives always shared the same race.

Previous work on racial intermarriage provides little theoretical guidance for this objective. Yet we can draw on existing research on gender and race to steer our expectations. With respect to gender differences in the widowhood effect, most studies have found a bigger widowhood effect among men than among women (Gove 1973; Helsing and Szklo 1981; Martikainen and Valkonen 1996a). This finding is typically explained with reference to the greater importance of wives compared to hus-

[3] Most prior quantitative research is either descriptive or investigates the factors leading to the formation of interracial marriages. Very little quantitative research deals with the outcomes of interracial marriage for the spouses involved (Kalmijn 1998).

bands in the household production of health via wives' centrality for household management, the social control of health behaviors, and maintaining contacts with friends and family (Harrison 1978; di Leonardo 1987; Umberson 1992; Stolzenberg 2001). On the other hand, it must be noted that estimates for gender differences in the widowhood effect vary considerably across studies (Wisocki and Skowron 2000). One recent and well-executed study even finds no meaningful gender difference in the widowhood effect net of controls (Schaefer et al. 1995). With respect to race, Sarkisian and Gerstel (2004) find that race differences across multiple domains of inter-household-kin support hinge on different patterns of kin support among black and white women, whereas patterns of kin support among black and white men strongly resemble each other. If the greater importance of wives for the household production of health is related to their individual characteristics, and if black-white differences in social support are more pronounced among women than among men, we would cautiously expect that racial differences in the widowhood effect are more strongly tied to wife's race than to husband's race. To pick a specific example, since we expect black spouses to suffer a smaller widowhood effect than white spouses for the reasons outlined earlier, a greater importance of wives' race for determining racial differences in the widowhood effect would imply that white men married to black women would suffer a smaller widowhood effect than white men married to white women, and potentially also than black men married to white women.

Analytic Objectives

We summarize the discussion up to this point by restating the focal and ancillary goals of this study and putting them in theoretical perspective. Our overall objective is to examine several facets of the widowhood effect to shed light on the role of race in modulating the health implications of social structure. Our approach thus strikes a middle ground between a narrow network analytic focus on the mere presence or absence of social ties, and an equally narrow focus only on the personal characteristics of social actors—simply put, we expect that the effects of social connections depend on whom they connect.

A slight twist is introduced by our focus on the dissolution, rather than creation, of marital ties. Since dead spouses are dead, any influence of their personal characteristics on the mortality of the surviving spouse must necessarily derive from memory effects, which either maintain features of the now-dissolved marriage or index particular circumstances of widowhood that are associated with the characteristics of the deceased spouse.

Specifically, we expect that endogamously married whites suffer a larger widowhood effect than endogamously married blacks because of racial differences in the organization of marriage and social support in widowhood. Second, we expect that this smaller widowhood effect among blacks will derive both from a smaller difference between the health implications of marriage and widowhood in the long run and a less burdensome transition to widowhood in the short run. Third, we expect to find differences in the widowhood effect suffered by intermarried and endogamously married couples because of a different socio-historical experience. Lastly, we cautiously expect to find evidence for a gendered dynamic of race in bereavement, by which wives' race plays a larger role than husband's race in determining racial differences in the widowhood effect because of wives' centrality in the household production of health. As side benefits, our analyses will necessarily revisit the questions of a gender difference in the widowhood effect and the trajectory of the widowhood effect over the duration of bereavement.

METHODS

Data

For our analyses, we assemble the largest currently available longitudinal dataset of married couples in the United States. Specifically, we follow a large sample from the universe of all elderly married couples in which both spouses were alive on January 1, 1993. We extract and link individual-level and couple-level information from three files maintained by the Centers for Medicare & Medicaid Services (CMS). We use the 1993 Denominator file, which lists all individuals enrolled in Medicare at any point during the year and captures 96 percent of all

Americans older than 65 (Hatten 1980); the Medicare Provider Analysis and Review (MedPAR) file (for 1991 and 1992), which contains diagnostic and other information for all hospitalizations in Medicare beneficiaries; and the 2002 Vital Status file, which provides demographic information and death date follow-up for all individuals ever enrolled in Medicare, dead or alive. To this data, we merge county-level and zip code–level contextual information from the Area Resource File (Health Resources 1996), which compiles information on medical resources by county of residence, and the 1990 decennial Census, respectively.

In the first step of data development, all Medicare beneficiaries older than 65 as of January 1, 1993 in the Denominator file were examined and subjected to spousal identification algorithms (Iwashyna et al. 1998). Out of an estimated 6.6 million elderly married couples where both partners were alive and older than 65 at the beginning of the study, we detected 5,496,444 couples (83 percent). Past work has shown this pool to be representative of all elderly married couples in the U.S. (Iwashyna et al. 2002). The Vital Status file, drawn in late 2002, provides exact death dates for both spouses in the entire sample, if they had died. From the death dates of both members of each couple, we derive the outcome (time to death or censoring since January 1, 1993) and the key independent variable of interest (widowhood).

We derive race classifications for both spouses from the race and ethnicity variable in the Vital Status file. This variable was populated from the Social Security Administration's Master Beneficiary Record (MBR) and has been verified and updated against the self-reported race classifications on beneficiaries' applications for (replacement) social security cards by CMS (Arday et al. 2000). Previous research indicates that the race information in Medicare files is well suited to support comparisons between blacks and whites, but not between members of other races (Lauderdale and Goldberg 1996). We therefore restrict our analysis to couples where either partner is either non-Hispanic black or non-Hispanic white. Arday et al. (2000) estimate the positive predictive values (PPV) of the black and white categories in the Vital Status Record as 96.1 and 98.4 percent, respectively (Table 3), denoting the probability that persons identified as black or white in the Vital Status file identified themselves by the same race in the 1997 Medicare Current Beneficiary Survey. These PPVs are high, especially considering that measurement protocols and answer choices differed considerably between these two sources. Our supplementary analysis of the 2001 Census Quality Survey (U.S. Department of Commerce 2004) indicates that these PPVs are on par with the race codes in the Census.[4] We further improve the accuracy of the Vital Status race variables by adapting and implementing independently validated first- and last-name algorithms to remove Asian (Lauderdale and Kestenbaum 2000, 2002) and Hispanic individuals (Word and Perkins 1996) who are incorrectly labeled non-Hispanic white or non-Hispanic black in the Vital Status file.[5]

From the MedPAR files, we extract detailed health histories to control for differences in baseline morbidity. Following the recommendations of Zhang, Iwashyna, and Christakis (1999), we summarize the chronic disease burden at baseline by computing so-called Charlson co-morbidity scores (Charlson et al. 1987) from hospitalization records separately for each spouse. We trichotomize this measure of health burden into low, moderate, and severe (Charlson scores of 0, 1, and 2 or higher, respectively) and enter separate indicators for 1991 and 1992. We further include counts of the number of days each partner had spent in the hospital in 1991 and 1992. Since individuals typically enter

[4] The comparison between the quality of the Vital Status and Census race variables is instructive because the Census is the primary source of recent research on interracial marriage. The PPVs of racial identification in the Census range from 95.6 percent to 98.8 percent for blacks, and from 95.6 percent to 97.5 percent for whites, depending on analytical choices (for details, see the Online Supplement, *ASR* Web site: http://www2.asanet.org/journals/asr/2005/toc049.html).

[5] Not until recently could Asians and Hispanics check their own race in the relevant forms. For most of our sample, the answer choices at the time were black, white, and other. Thus, we drop those couples in which at least one spouse described their race as white or black on their social security application but would likely identify themselves as Hispanic or Asian, if given the fuller choice set available today (Lauderdale and Goldberg 1996).

Medicare at age 65, we restrict the analysis to couples where both partners were older than 67 at baseline to guarantee the availability of a full two years of health background controls for the entire sample. We also restrict our sample to those less than 98 years old.[6] These detailed, physician-ascertained controls for confounding by health status significantly exceed the (usually self-reported) health information available to previous studies of the widowhood effect.

The Denominator file provides additional individual-level demographic information (i.e., age and sex) from Social Security records; information on the couple's area of residence; and a poverty indicator for the couple at baseline.[7]

Knowledge of the area of residence (zip code) of all respondents in the dataset (from the 1993 Denominator file) allows us to supplement our individual-level variables with extensive controls for couples' residential context at baseline. The use of such area measures has been validated in the elderly, although it is not without limitations (Krieger 1992; Geronimus, Bound, and Neidert 1996). At the county level, we control for the crime rate and the availability of medical care as reported in the Area Resource File. At the zip code level, we control for urbanization, demographic composition, median home value, log median income, and median education, among other factors, which we draw from the Census Summary Tape File 3B. Since the widowhood effect should hinge on marital coresidence, we exclude couples with discordant zip codes between husband's and wife's addresses. Lastly, the availability of contextual information restricts our sample to couples living in the 50 States.

The final analysis employs a stratified sample. From the pool of 5,496,444 detected married couples, we first draw a simple random sample of couples found by one method of couple-detection (Iwashyna et al. 1998), which meets our race, age, and coresidence restrictions. We then include all remaining non-Hispanic black-white racially intermarried couples meeting the same restrictions. The final sample contains N = 410,272 elderly married couples, or an estimated 10 percent of the target population. We lose only 2.6 percent of the sample across analyses due to missing values.[8]

As a further check, we validated the representativeness of our sample separately for each race group included in the analysis against the 5 percent Public Use Micro Sample of the 1990 Census. Our data show good to excellent agreement with the Census on all variables common to both datasets (see Online Supplement to this article, *ASR* Web site: http://www2.asanet.org/journals/asr/2005/toc049.html).

Statistical Methods

We use continuous-time, semi-parametric (Cox) hazard models (Hosmer and Lemeshow 2002) to investigate racial effect heterogeneity in the widowhood effect. To avoid statistical complications from potential inter-spousal dependencies, we model time to death separately for men and women. Henceforth, we refer to the focal individual—husband or wife—as the "proband."

$$h(t) = h_0(t) \exp(X\beta) \exp[W(t)\gamma] \exp[Z(t)\delta] \quad (1)$$

The model in Equation 1 partitions proband's hazard of death at time *t, h(t),* into the product of a baseline hazard that varies freely with time, $h_0(t)$, and a function of the vector of individual-level and contextual explanatory variables, $\exp(X\beta) \exp[W(t)\gamma] \exp[Z(t)\delta]$, such that

[6] We consider two potential problems with these age cutoffs (our results are robust to both): 1) Since most husbands marry younger wives, this sample may be biased at younger ages toward husbands married to older wives. Yet, experiments with differing age cutoffs for men and women did not change the results. 2) There are potential race differences in age misreporting (a minor concern for administrative data; age is monitored rigorously because benefits depend on age). Cohorts born before 1900/1910 generally show the most misreporting (Preston et al. 1996). Yet restricting our analyses to spouses ≤85 of age in 1993 yields no qualitative change in the results.

[7] Following standard practice, we use the dual eligibility for Medicare and Medicaid services of either spouse in 1993 as a proxy for couple's poverty status at baseline (Clark and Hulbert 1998; see also http://www.cms.hhs.gov/dualeligibles).

[8] Most of these cases are lost due to some unavoidable mismatch between the zip codes of 1993 in the Denominator file and the zip codes of 1990 in the Census.

changes in the explanatory variables induce proportional shifts in the baseline hazard. Our models include time-invariant baseline controls, *X,* a time-varying widowhood indicator, *W(t),* and time-varying interactions between widowhood and one or more time-invariant control variables, *Z(t)*. The coefficient vectors β, γ, and δ, give the effects of changes in the explanatory variables. The outcome and all time-varying covariates are measured to the day. Time starts at cohort inception on January 1, 1993. Surviving probands are censored at the end of follow-up on January 1, 2002. The male and female analyses contain 2.6 million and 3.1 million person-years of observations, respectively.

Table 1 provides summary definitions for all variables included in our models. The key independent variable of interest, widowhood, enters the equation as a time-varying covariate. Same-day deaths are treated as non-widowed deaths for both spouses (n = 136, their inclusion has no impact on our results). Racial differences in the effect of widowhood on proband's mortality as a function of own race and spouse's race are captured by a series of time-varying two-way interactions between widowhood and four "couple-race" categories (both white; both black; husband white and wife black; and husband black and wife white) with endogamously married white couples serving as the reference category. The products of the coeffi-

Table 1. Summary Definition of Variables Included in the Multivariate Models

Category	Description	Source
Time to Death	Number of days from cohort inception (1/1/1993) to proband's death. Censored on 1/1/2002 if still alive.	VS
Age	Age to 0.1 years. Age squared. Age-order (on January 1, 1993). Entered separately for both spouses.	Den.
Couple-Race	Four indicators for the race combination of husband and wife: both white; both black; husband black and wife white; husband white and wife black. Restricted to non-Hispanic blacks and whites.	VS[a]
Widowhood(t)	Time-varying indicator of bereavement, = 1 from first day after spouse's death (thus treating same day deaths as non-widowed deaths).	VS
Interactions	Widowhood(t) × couple-race.	VS
	Widowhood(t) × indicators for time since spouse's death (<1, 2, 6, 12, 24, 36, 36+ months).	VS
	Widowhood(t) × couple-race × indicators for time since spouse's death.	VS
Health	Trichotomized Charlson comorbidity scores for prevalence of chronic health conditions. Weeks spent in hospital. Entered separately for 1991 and 1992 and both spouses.	MedPAR[b]
Poverty	Indicates that either spouse enrolls in state buy-in program on the basis of dual eligibility for Medicaid and Medicare in 1993, which implies living below or near the federal poverty level.	Den.
Region of Residence	Nine indicators for living in any of the nine geographic divisions of the 1990 Census in 1993.	Den.
Residential Context	County level: Population density; violent crime rate; practicing medical doctors per population; hospital beds per population.	ARF
	Zip-code level: Degree of urbanization; percent white, black, other race; percent foreign born; percent linguistically isolated; percent elderly; percent widowed among men and women; male unemployment rate; median home value; log median income; median education (percent below high school, high school, some college and above).	Census

Note: All models reported in this article include all of the above variables, except widowhood interaction terms, which are added as indicated in the text. VS = Vital Status file for 1993–2002; Den.= Denominator file for 1993; MedPAR = Medicare Provider Analysis and Review files for 1991 and 1992; ARF = Area Resource File for 1990–1993; Census = Census Summary Tape File 3B for 1990.

[a] The race variable from the VS source was cleaned using first- and last name algorithms as noted in the text.

[b] Charlson scores were computed using all hospital exit diagnoses of the calendar year.

cients on the widowhood indicator and each of these interaction terms give the couple-race-specific main effects of widowhood. We test the pair-wise difference among couple-race-specific widowhood effects using Wald tests for linear combinations of coefficients using the STATA software package, release 8.0 (StataCorp 2003).

We recover the temporal trajectory of the widowhood effect for all respondents by interacting the widowhood indicator with a series of indicators of time since spouse's death. We recover couple-race specific trajectories by entering triple interactions between widowhood, duration of widowhood, and couple-race.

These interaction terms primarily serve our substantive interest in group-specific effect heterogeneity in the widowhood effect. They also serve the important secondary purpose of relaxing the Cox proportionality assumption, which, if violated, may bias our estimates (Hosmer and Lemeshow 2002). Since our primary interest in this paper concerns race differences in the widowhood effect, we are particularly mindful of two possibilities: first, that the race-specific effects of widowhood may evolve non-proportionally over time; second, that the baseline mortality of our four couple-race groups may evolve non-proportionally over time. The first potential problem is solved by the inclusion of three-way interactions between widowhood, couple-race, and time since bereavement. The second potential problem is addressed by estimating supplemental stratified Cox models for our main models. Stratifying on couple-race allows the time-varying baseline hazard of each couple-race group to vary freely (i.e., non-proportionally) relative to the baseline hazard of the three other couple-race groups. On the downside, stratification suppresses the main effects of couple-race, which give the hazard of death when both spouses are still alive. Since we are interested both in married and in widowed mortality, and since the stratified and non-stratified results are very similar quantitatively, we report only the non-stratified results.

RESULTS

Descriptive Results and Cohort Attributes

Table 2 divides the sample by couple-race, widowhood, and vital status at the end of follow-up. At a total sample size of 820,544 individuals forming N = 410,272 elderly married couples, our dataset contains 388,794 (94.8 percent) endogamously married white couples, 17,064 (4.2 percent) endogamously married black couples, 2,359 (0.6 percent) intermarried couples where husband is black and wife is white, and 2,055 (0.5 percent) couples where husband is white and wife is black. All combinations of couple-race, widowhood, and proband death appear sufficiently populated to support effi-

Table 2. Sample Size By Gender of Proband, Survival to the End of Follow Up, and Widowhood at Time of Death or Censoring

			Not Widowed		Widowed	
Couple-Race	Total	(%)	Dead	Alive	Dead	Alive
Male Probands						
Both white	388,794	(94.8)	166,964	140,659	34,981	46,190
Both black	17,064	(4.2)	7,901	4,911	1,856	2,396
Husband black, wife white	2,359	(0.6)	1,095	795	205	264
Wife black, husband white	2,055	(0.5)	934	690	155	276
Total	410,272	(100.0)	176,894	147,055	37,197	49,126
Female Probands						
Both white	388,794	(94.8)	81,374	140,659	44,400	122,361
Both black	17,064	(4.2)	4,266	4,911	2,254	5,633
Husband black, wife white	2,359	(0.6)	474	795	255	835
Wife black, husband white	2,055	(0.5)	432	690	243	690
Total	410,272	(100.0)	86,546	147,055	47,152	129,519

Note: Authors' calculations. Unweighted sample frequencies. Both spouses are alive in all couples at cohort inception on January 1, 1993. End of follow up is January 1, 2002. All respondents are either non-Hispanic blacks or non-Hispanic whites.

cient multivariate estimation. This holds particularly for endogamously married spouses, where sample sizes range from 1,856 to 166,964 observations per cell.

Select sample statistics for the entire sample are displayed in the first column of Table 3. At cohort inception, the mean age of the husbands was 76.6 years, and of the wives 74.1 years. In 79 percent of the couples, the husband was older than the wife; 4.6 percent of couples lived in poverty; and 7 percent of husbands suffered severe co-morbidity burden at baseline, compared to 4 percent of women.

To-be-widowed couples—defined as those in which at least one spouse will have died by the end of follow-up—differ considerably at baseline from couples in which both spouses will remain alive, as shown in columns 2 and 3 of Table 3. Spouses in to-be-widowed couples are older (4 years on average) and more likely to be poor (by 4.8 percentage points) than couples in which both spouses are going to survive the nine-year study period. To-be-widowed husbands and wives are twice to three times as likely to suffer moderate co-morbidity and more than three times as likely to suffer severe co-morbidity burden in each of the two years preceding baseline and have also spent more time in the hospital.[9] This strong association between the baseline health of *both* spouses and widowhood clearly documents the selection of unhealthy individuals into widowhood and highlights the importance of adjusting for detailed measures of baseline health and prior health trajectories in the analysis of the widowhood effect. By contrast to these large individual-level differences, the differences between the residential environment of to-be-widowed and surviving couples are generally small.

Baseline differences between the four couple-race groups are documented in the last four columns of Table 3. Interestingly, the four couple-race groups resemble each other with respect to spouses' age and health at baseline. They differ considerably, however, on poverty and residential context. Endogamously married whites and endogamously married blacks generally mark the extremes and intermarried couples fall in between (cf. White and Sassler 2000). Among endogamously married black couples, 22 percent are poor, as compared to 4 percent of endogamous white couples and 12 percent of intermarried couples. Strong residential segregation by race is evident on most indicators of residential context. Couples in which at least one spouse is black are more likely to live close to other blacks, in urban, and in high-poverty areas; they are exposed to higher rates of violent crime and live in environments with greater unemployment, lower home values, and lower average levels of education than endogamously married white couples. Interestingly, the residential environment of couples consisting of a black husband and a white wife tend to resemble more the environment of endogamously married white couples, whereas couples consisting of a white husband and a black wife live in environments more similar to those of the average endogamously married black couple. This finding suggests a stronger role for wife's race than the husband's race in determining place of residence and social context.

Because it is known that neighborhood characteristics and poverty are strongly related to racial differences in health and mortality (Geronimus et al. 2001), these large racial differences in couple-level poverty and residential environment mandate the inclusion of these variables in the multivariate analysis of racial differences in the widowhood effect.

Regression Results

Results by couple-race and gender. A basic model (results not shown) that includes all control variables, but does not include interactions between widowhood and couple-race, reveals increased mortality upon bereavement for both men and women. For men, the hazard ratio (HR) is 1.17, indicating a 17 percent increase in the hazard of death due to widowhood ($p < 0.01$). The confidence interval (CI) ranges from a HR of 1.16 to 1.19. For women, the analysis reveals a HR of 1.15 and a CI of 1.14 to 1.17 ($p < 0.01$). This average effect of widowhood on mortality is substantial: it is comparable in force to being roughly 1.5 years older for men, and one third as detrimental as living in poverty as compared to not living in poverty for women.

[9] Only health covariates for 1992 are shown in Table 3. Descriptives for the entire set of control variables included in the multivariate models (listed in Table 1) are available upon request.

Table 3. Descriptive Statistics for Select Variables by Widowhood at the End of Follow Up and by Couple-Race

Individual-Level and Couple-Level Variables	All	Widowhood Status[a]		Couple-Race			
		Widowed	Both Alive	Both White	Both Black	Black Husband/ White Wife	White Husband/ Black Wife
Age, husband	76.56	78.04	73.91	76.56	76.57	76.62	76.27
	(5.69)	(5.88)	(4.20)	(5.68)	(5.93)	(5.84)	(5.90)
Age, wife	74.17	75.45	71.88	74.19	73.96	73.64	73.23
	(5.30)	(5.60)	(3.76)	(5.30)	(5.35)	(4.94)	(4.92)
Wife older than husband	21.0%	20.7%	21.5%	20.8%	24.6%	19.8%	21.4%
	(0.41)	(0.41)	(0.41)	(0.41)	(0.43)	(0.40)	(0.41)
Age difference	3.26	3.51	2.80	3.21	3.98	4.03	4.16
	(2.87)	(3.05)	(2.43)	(2.81)	(3.57)	(3.70)	(3.82)
Poverty	4.6%	6.3%	1.5%	3.8%	21.7%	11.7%	11.6%
	(0.21)	(0.24)	(0.12)	(0.19)	(0.41)	(0.32)	(0.32)
Health Indicators							
Moderate Charlson, 92, men	5.4%	9.8%	3.3%	5.4%	4.9%	5.5%	5.7%
	(0.23)	(0.30)	(0.18)	(0.23)	(0.21)	(0.23)	(0.23)
Severe Charlson, 92, men	7.3%	9.8%	2.9%	7.2%	8.7%	8.0%	8.0%
	(0.26)	(0.30)	(0.17)	(0.26)	(0.28)	(0.27)	(0.27)
Moderate Charlson, 92, women	4.0%	5.0%	2.3%	4.0%	4.6%	4.2%	4.7%
	(0.20)	(0.22)	(0.15)	(0.20)	(0.21)	(0.20)	(0.21)
Severe Charlson, 92, women	4.2%	5.7%	1.5%	4.1%	5.9%	3.9%	4.2%
	(0.20)	(0.23)	(0.12)	(0.20)	(0.24)	(0.19)	(0.20)
Weeks in Hospital 92, men	0.38	0.50	0.16	0.38	0.44	0.40	0.41
	(1.52)	(1.82)	(0.69)	(1.51)	(1.66)	(1.37)	(1.53)
Weeks in Hospital 92, women	0.29	0.39	0.13	0.29	0.35	0.29	0.29
	(1.31)	(1.57)	(0.62)	(1.31)	(1.40)	(1.39)	(1.16)
Residential Context[b]							
North East[c]	18.2%	18.1%	18.4%	18.5%	11.3%	16.7%	18.6%
	(0.39)	(0.38)	(0.39)	(0.39)	(0.32)	(0.37)	(0.39)
Midwest[c]	28.3%	28.3%	28.3%	28.9%	18.4%	19.0%	18.8%
	(0.45)	(0.45)	(0.45)	(0.45)	(0.39)	(0.39)	(0.39)
South[c]	35.2%	36.0%	33.7%	33.8%	62.7%	51.0%	45.5%
	(0.48)	(0.48)	(0.47)	(0.47)	(0.48)	(0.50)	(0.50)
West[c]	18.2%	17.5%	19.5%	18.7%	7.6%	13.1%	17.0%
	(0.39)	(0.38)	(0.40)	(0.39)	(0.27)	(0.34)	(0.38)

(continued on next page)

Table 3. *(Continued)*

		Widowhood Status[a]		Couple-Race			
Variable	All	Widowed	Both Alive	Both White	Both Black	Black Husband/ White Wife	White Husband/ Black Wife
Violent crime rate	6.00	6.03	5.96	5.79	10.39	7.96	8.58
	(7.06)	(7.18)	(6.84)	(6.79)	(10.14)	(9.26)	(9.48)
Urbanization index	68.50	67.93	69.53	68.20	74.47	70.50	74.51
	(38.21)	(38.39)	(37.86)	(38.24)	(37.14)	(38.03)	(36.57)
Black	8.6%	9.1%	7.8%	6.6%	50.1%	22.6%	28.5%
	(16.28)	(16.86)	(15.14)	(12.12)	(30.27)	(27.70)	(30.49)
Median home value (‘1000$)	94.43	91.61	99.49	95.72	66.71	89.09	86.98
	(79.92)	(77.31)	(84.16)	(80.72)	(54.02)	(73.87)	(71.96)
Male unemployment	4.4%	4.4%	4.2%	4.2%	6.9%	5.1%	5.8%
	(2.32)	(2.36)	(2.25)	(2.17)	(3.58)	(2.83)	(3.09)
Log median income, $	10.27	10.25	10.30	10.28	9.96	10.18	10.13
	(0.36)	(0.36)	(0.36)	(0.35)	(0.38)	(0.39)	(0.39)
Less than high school[d]	2.2%	2.5%	1.7%	1.9%	8.9%	3.8%	4.9%
	(0.15)	(0.16)	(0.13)	(0.14)	(0.29)	(0.19)	(0.22)
High school[d]	64.4%	66.2%	61.3%	63.7%	77.7%	68.8%	71.1%
	(0.48)	(0.47)	(0.49)	(0.48)	(0.42)	(0.46)	(0.45)
Some college[d]	33.4%	31.4%	37.0%	34.4%	13.4%	27.3%	24.0%
	(0.47)	(0.46)	(0.48)	(0.47)	(0.34)	(0.45)	(0.43)

Note: Authors’ calculations. Standard deviations in parentheses. N = 410,272 couples, with up to 2.6 percent missing cases per variable, mostly on the contextual variables. The full set of control variables is listed in Table 1. Descriptives for all variables are available upon request.

[a] Couples are divided into those in which at least one spouse dies between January 1, 1993 and January 1, 2002, and those in which both spouses remain alive.

[b] Violent crime rate is measured on the county level, all other indicators of residential context in this table are measured on the zip-code level.

[c] This table combines the nine geographic Census divisions used in the statistical analysis into four Census regions for space considerations.

[d] Percent of respondents living in zip codes with this median education among blacks and whites.

Figure 2 is based on a more complicated model that, unlike the foregoing model, includes interactions between widowhood and couple-race (for full models, see Table S2 on the Online Supplement, *ASR* Web site). Figure 2 displays in graphical form the effects of widowhood on proband's mortality separately for each couple-race group and the corresponding 95 percent confidence interval as hazard ratios. Confidence bars that overlap with the vertical HR = 1 line of no effect indicate that the effect of widowhood is not statistically significant at the $\alpha = 0.05$ level. Couple-race groups whose confidence bars do not overlap with each other's point estimates experience a statistically significant difference in widowhood effects.

We find that endogamously married white men suffer a large increase in mortality after the death of their wives (HR: 1.184; CI: [1.174–1.204]; $p < 0.01$), net of extensive demographic, socioeconomic, health, and contextual controls. Endogamously married black men, by contrast, do not suffer a detectable widowhood effect (HR: 1.008; CI: [.958–1.062]; $p > 0.1$). Qualitatively and quantitatively similar results are obtained for the widowhood effects suffered by endogamously married women. Endogamously married white women suffer a large widowhood effect upon the death of their husbands (HR: 1.162; CI: [1.146–1.177]; $p < 0.01$), whereas endogamously married black women suffer no detectable widowhood effect (HR: 1.004; CI: [0.953–1.057]; $p > 0.1$). The difference between the widowhood effects for endogamously married blacks and whites is highly significant ($p < 0.01$) for both men and women. We emphasize that the lack of statistical significance in the widowhood effect for endogamously married black men and women is not owed to imprecise measurement and limitations in sample size. Rather, the combination of very small point estimates and narrow con-

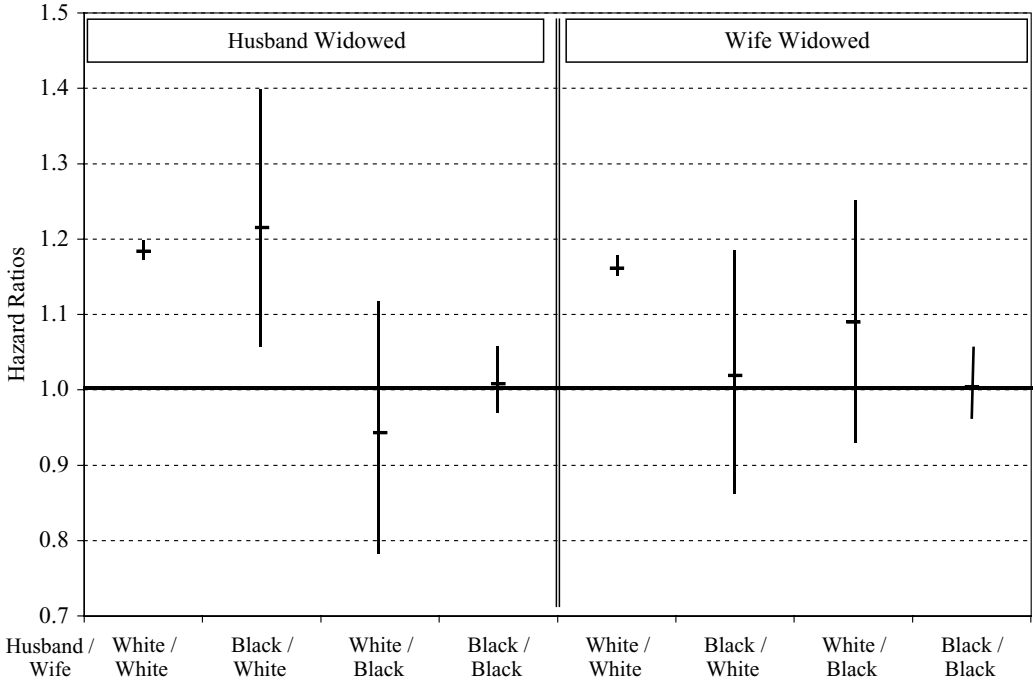

Figure 2. Widowhood Effects By Couple-Race and Gender

Note: Authors' calculations. Couple-race specific widowhood effects (hazard ratios and 95 percent confidence intervals) suffered by men and women upon the death of a spouse (HR = 1.00 means no widowhood effect). Effects were computed from Cox models including all control variables. The effects for two couple-race groups of probands of a given gender differ at the 5 percent level of statistical significance if the confidence bars of both groups do not overlap with the point estimate of the respective other group.

fidence intervals suggests that the widowhood effects for endogamously married black men and women are indeed very close to zero.

Our results for the widowhood effect among racially intermarried couples reveal a remarkable gender patterning in the effects of race. Among racially intermarried men, we find that black men married to white women suffer a large and statistically significant widowhood effect upon the death of their wives (HR: 1.215; CI: [1.045–1.414]; $p < 0.05$), whereas white men married to black women do not (HR: 0.943; CI: [0.794–1.120]; $p > 0.1$). Taken together with our finding of a large widowhood effect among endogamously married white men and no detectable effect among endogamously married black men, these findings suggest that the widowhood effect suffered by bereaved men varies not by their own race, but rather by the race of their wives.

This conclusion is further bolstered by examining the statistical significance of the pair-wise differences between the widowhood effects suffered by men in the four couple-race groups (Figure 2, first panel). The widowhood effect suffered by black men married to white women does not differ significantly from that suffered by white men married to white women net of controls ($p > 0.1$). Similarly, the estimate for white men married to black women does not differ significantly from the estimate for black men married to black women ($p > 0.1$). The effect for intermarried black husbands is significantly larger than that for intermarried white men and that for endogamously married black men ($p < 0.05$). The effect for intermarried white husbands differs from that for endogamously married white husbands ($p < 0.01$); and, as stated earlier, the effect of endogamously married white men differs from the effect for endogamously married black men ($p < 0.01$). Thus, all six pair-wise contrasts between the widowhood effects suffered by men in the four couple-race groups support the conclusion that wife's race dominates the size of the widowhood effect suffered by bereaved men, regardless of husbands' own race: the death of a white wife leads to increased mortality in the surviving husband net of controls, whereas the death of a black wife does not lead to a detectable increase in mortality.

We do not find a similar gendered race pattern in the widowhood effect suffered by women upon their husbands' deaths (Figure 2, second panel). Among women, only endogamously married white women appear to suffer increased mortality following their husband's death. Endogamously married black women do not experience a widowhood effect and differ significantly from endogamously married white women. The effects estimated for either group of racially intermarried women, however, cannot be statistically told apart from those for either group of endogamously married women. It may be that, even in our data, sample size, particularly for intermarried women, may be insufficient and the existing differences in effects too small to be distinguished empirically.

These results are remarkably robust to the particular choice of control variables in the final model, which is consistent with the robustness of previous work on the widowhood effect among endogamous whites (Schaefer et al. 1995; Lillard and Panis 1996; Martikainen and Valkonen 1996b). Indeed, a basic model controlling for nothing more than race and age of both spouses returns quantitatively similar estimates for the racial pattern of widowhood effects among men and women. Additional models (not shown) with age interactions showed no statistically significant variation in the widowhood effect by age for any group except for a modest decline among endogamously married white men and women at older ages, which did not affect the difference between the widowhood effects of endogamously married blacks and whites or the similarity of widowhood effects experienced by men and women.

TRAJECTORY OF THE WIDOWHOOD EFFECT. We examine how the widowhood effect develops over time by estimating Cox models with triple interactions between widowhood, duration indicators for time since bereavement, and couple-race. This serves two purposes: first, to investigate whether the gendered pattern of racial differences in the widowhood effect described in this article also holds over time; second, to investigate whether the widowhood effect originates solely from the longer-term differential health implications of the widowed and married states or also from a shorter-term transitional burden during the adjustment to widowhood.

We start by showing average results that do not take into account racial differences, as dis-

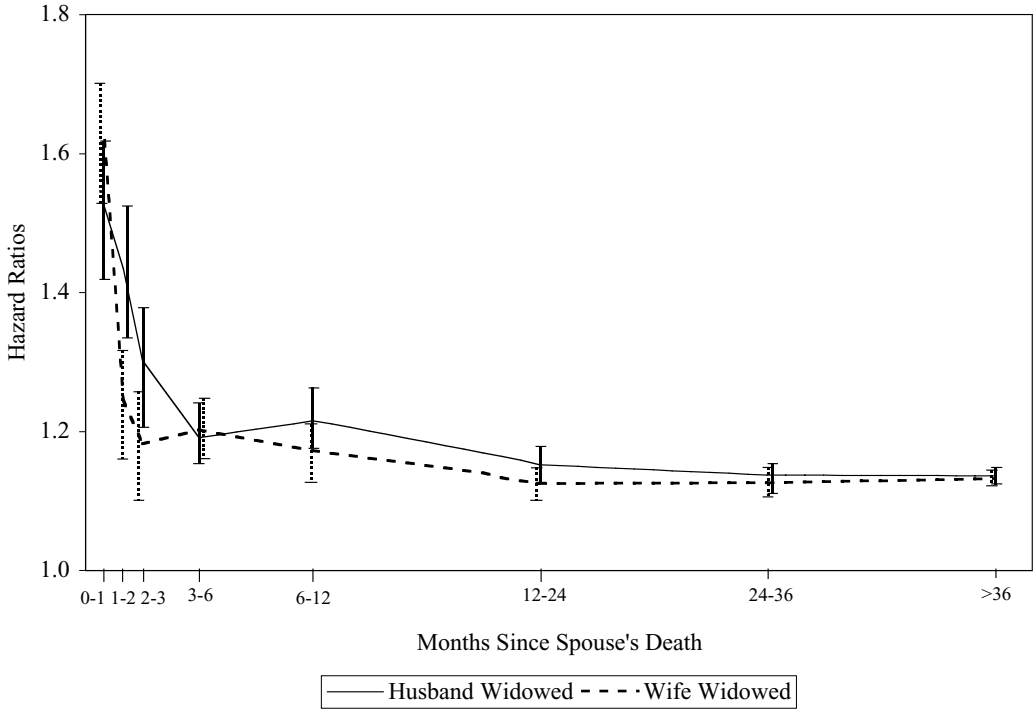

Figure 3. Time–Shape of the Widowhood Effect, All Races

Note: Excess mortality of widowhood in relation to the duration of bereavement among elderly Medicare beneficiaries in the United States. Hazard ratios and 95 percent confidence intervals from Cox models including all control variables. Averaged over all races in the sample. Follow-up 1993–2002.

played in Figure 3 and in the first column of Table 4. During the first month of bereavement, the hazard of death increases by a factor of 1.52 for men and 1.62 for women, and thereafter declines roughly monotonically until the second year of widowhood.[10] Mortality remains elevated and statistically significant for men and women (HR: 1.1, $p < 0.01$) and declines no further from the second year post-bereavement onward. The trajectory of the widowhood effect is remarkably similar for men and women at all points in time. Putting these effect sizes in perspective, the initial shock of widowhood is worse in terms of mortality than being poor as compared to not being poor.

The trajectories for the four couple-race groups tentatively confirm the results about the gendered nature of racial differences in the widowhood effect (Table 4, columns 2–5):[11] The widowhood effect is substantial and significant at all durations of bereavement among endogamously married whites. The trajectory for endogamously married black men cannot statistically be distinguished from zero at any duration and any acceptable level of significance, and it is lower than the trajectory for endogamously married whites throughout (significantly so for four out of eight durations).

[10] Apparent temporary increases are quantitatively small and not statistically significant. The overall downward trend, by contrast, is statistically significant.

[11] The quantitative trends for the individual couple-race groups, other than endogamously married whites, are somewhat erratic and marred by large confidence intervals, particularly for intermarried couples. We therefore restrict the discussion to overall trends and race-specific patterns of statistical significance.

Table 4. Temporal Trajectory of the Widowhood Effect: Proband's Hazard of Death as a Function of Time Since Spouse's Death By Couple-Race

Months since Spouse's Death	All	Couple-Race: Both White	Both Black	Black Husband/ White Wife	White Husband/ Black Wife
Male Probands					
0–1	1.52**	1.55**	1.06	2.07*	1.13
1–2	1.43**	1.45**	1.30	0.53	1.16
2–3	1.30**	1.31**	1.16	2.16*	0.29
3–6	1.19**	1.20**	1.05	1.01	1.09
6–12	1.22**	1.23**	1.05	1.22	0.78
12–24	1.15**	1.16**	1.09	0.88	1.19
24–36	1.14**	1.15**	0.97	1.10	0.94
36+	1.14**	1.15**	0.94	1.44*	0.85
Female Probands					
0–1	1.62**	1.64**	1.22	1.29	1.81
1–2	1.25**	1.26**	1.07	0.77	0.91
2–3	1.18**	1.12**	1.05	0.25	0.91
3–6	1.20**	1.21**	1.07	0.86	1.11
6–12	1.17**	1.18**	1.08	0.76	1.11
12–24	1.13**	1.14**	0.94	1.22	1.09
24–36	1.13**	1.13**	1.00	1.12	0.93
36+	1.13**	1.14**	0.99	1.00	1.11

Note: Authors' calculations. Table displays hazard ratios for proband's death from Cox models including all control variables (see Table 1) and triple interactions between widowhood, couple-race, and duration indicators for time since widowhood.
* $p < .05$; ** $p < .01$ (two-tailed tests).

Similarly, we cannot distinguish from zero the trajectory of white husbands married to black wives. The trajectory for black husbands married to white wives, however, is significantly different from zero (at some durations) and does not differ significantly from the signature for endogamously married white men (at any duration). Even as the experience of widowhood evolves over time, the excess mortality of bereaved men thus appears to be governed by the race of their now-deceased wives.

Among female probands, as before, endogamously married white women suffer a nonzero widowhood effect at every duration, whereas the temporal trajectories of the widowhood effect for all other couple-race groups are indistinguishable from zero or each other, also at all durations.

Among endogamously married white men and women, we discern clear evidence for both temporal components of the widowhood effect. The stable, long-term elevated excess mortality of widowhood from the second year of widowhood forward documents the mortality disadvantage of the state of widowhood as compared to the state of marriage. Moreover, the initial spike in excess mortality from the time of spouse's death up to about the sixth month of widowhood for men and the third month for women suggests an additional burden from adjusting to widowhood. A comparison of the trajectories for endogamously married white men and women suggests that the difference between the long-term mortality implications of marriage and widowhood is similar for men and women, although women overcome the transitional burden of the adjustment to widowhood somewhat faster than men.

By contrast, endogamously married black spouses do not appear to have worse mortality in widowhood compared to marriage, and do not appear to suffer increased mortality during the initial adjustment period upon transition into to widowhood either.[12]

[12] More precisely, while the point estimates for the widowhood effect among endogamously married black men and women during certain early periods of bereavement are large, none can be statistically distinguished from zero.

MORTALITY AMONG CURRENTLY MARRIED PERSONS AND OTHER RESULTS. It is often noted that blacks suffer higher mortality than do whites. Demographic research demonstrates, however, that racial differences in mortality are reduced substantially or even disappear when comparing blacks and whites in the same area of residence (Geronimus et al. 2001). In agreement with this research, we find no main effect of race on mortality in the model with couple-race specific widowhood effects (see Table S2 on the Online Supplement) once residential context is controlled, except possibly for somewhat elevated mortality among endogamously married black women.[13] This indicates that there are no race differences in mortality among husbands in the four couple-race groups, and only small race differences among women, as long as both spouses are alive.

Results for the other variables in the model largely conform to prior work or expectations (see Table S2 on the Online Supplement). Mortality is at its lowest in New England and West North Central states, and highest in the South. Mortality increases with age, poverty, and poor baseline health, as well as with indicators of disadvantaged residential context, such as crime rate, unemployment rate, and lower average education.

DISCUSSION

The widowhood effect is one of the best-documented examples of the sociological tenet that social structures can affect individuals—in this case, their very chances of survival—but information about effect heterogeneity in the widowhood effect is scarce.

We extend and depart from previous work by arguing that systematic variation in the mechanisms accounting for the widowhood effect across dimensions of social stratification should induce corresponding differences in size and shape of the widowhood effect. We suppose that these differences, in turn, can shed additional light on the etiology and reach of the widowhood effect. Empirically, we focus on effect heterogeneity in the widowhood effect as a function of the race of the husband and wife. Since all four combinations of race (white, black) and gender (male, female) are sufficiently represented in our data, and since individual-level information is available for all parties, we are not restricted to tracing effect heterogeneity as a function of proband's own race alone, but can also investigate how mortality differs by the race of the deceased spouse. Thus, our data provide a unique opportunity for studying the interlinked roles of race and gender in modulating the effects of marital ties on mortality.

Because close to 95 percent of elderly married couples in the United States are endogamously married whites, our results for this couple-race group provide the best point of comparison with previous work. Like earlier research, we find a large widowhood effect among endogamously married white men. We further confirm Schaefer et al.'s (1995) finding that white women, too, face a large and statistically significant widowhood effect that is not qualitatively lower than the widowhood effect suffered by men. This absence of appreciable gender differences contradicts most other research on the topic; however, this may also simply be a function of attenuating gender differences in old age and the fact that our sample is composed of elderly individuals (Wisocki and Skowron 2000). Unlike Schaefer et al. (1995), we find well-behaved trajectories for the evolution of the widowhood effect over the duration of bereavement among endogamously married white men and women, as well as strong evidence for substantial long-term detriment from widowhood. Excess mortality is largest during the first month of bereavement and declines sharply until the third (women) to sixth (men) month of widowhood. The widowhood effect plateaus from the second year of bereavement and remains highly statistically significant at substantively meaningful levels (HR: 1.14). We interpret this long-term widowhood effect as evidence for stable differences between the mortality implications of the married and widowed states. The short-term spike in mortality shortly following bereavement documents the particular burden of transitioning

[13] The hazard of death among endogamously married black women while their husbands are alive differs significantly from the white reference group, but we cannot reject the joint hypothesis that the hazard of death is the same for women of all couple-race groups as long as their husbands are alive ($p > 0.05$).

between marriage and widowhood. Bereaved women appear to overcome this transitional burden faster than do bereaved men, although the initial spike among women is actually larger relative to their baseline risk. For endogamously married whites, it appears that nothing comes to compensate for the survival advantage bestowed by marriage, even after years of widowhood.

In stark contrast to the foregoing results for endogamously married whites, we find no widowhood effect among endogamously married blacks—neither among men nor among women, neither short term nor long term. Near-zero point estimates paired with small confidence intervals in a large sample containing over 17,000 black couples with extensive individual-level, couple-level, and contextual controls lend strong support to the conclusion that neither widowhood nor the transition to widowhood affect the survival prospects of endogamously married black men and women.

A priori, the absence of a widowhood effect among endogamously married black men and women is compatible with two scenarios, previously introduced in Figures 1b and 1c. On one hand, blacks may not experience a widowhood effect because, unlike whites, they never gained survival advantages from marriage in the first place (Figure 1b). On the other hand, blacks may have gained survival advantages from marriage, but unlike whites, manage to extend this marital survival advantage into widowhood (Figure 1c). Unfortunately, our data permit no *direct* empirical test to adjudicate between these two possibilities—since we lack data on entries into marriage, we cannot estimate the survival gain of marriage relative to premarital levels of mortality.

Nonetheless, a straightforward indirect test between these two scenarios is indeed possible. First, note that prior work has convincingly shown that entry into marriage reduces mortality among whites (Lillard and Waite 1995). Second, our own results demonstrate that probands across all four couple-race groups face statistically indistinguishable hazards of death in marriage, net of controls, as long as their spouses are alive.[14] If endogamously married white spouses experience reduced mortality in marriage, and if the married mortality of other race groups is indistinguishable from married mortality among whites, then this would suggest to us that these other race groups, too, derive a survival advantage from marriage. In sum, this would imply that endogamously married blacks escape the widowhood effect suffered by whites by extending the survival advantage of marriage into widowhood, as postulated in Figure 1c.

We suggest three mechanisms to explain why endogamously married blacks may succeed in extending the protective effect of marriage into widowhood, while whites suffer increased mortality and experience a widowhood effect, as introduced earlier. First, our review of the literature indicates that widowed elderly blacks are at a considerable advantage over comparable whites with respect to receiving social support from persons living inside the same household and probably also from persons living elsewhere. Notably, about 40 percent of unmarried elderly blacks live with relatives compared to only 20 percent of unmarried elderly whites (Goldscheider and Bures 2003). Given the centrality of kin in the care for the elderly, this racial difference in household composition likely goes a long way to substitute for the routine tasks of spousal health support and supervision upon which the marital health advantage may depend (Umberson 1987, 1992). Second, racial differences in the gendered household division of labor may instill greater self-sufficiency and reduce spousal task dependence among black spouses and consequently, on average, prepare them better for widowhood. Third, greater religiosity and religious participation among blacks may provide them with spiritual comfort and social resources for dealing with loss that are less available to whites. Such differences may also contribute to an explanation for the absence of a transitional spike in mortality among endogamously married blacks.

Our results for intermarried men show that intermarried couples differ in their experience of widowhood from endogamous white and black couples even net of controls. (We do not further discuss the results for racially inter-

[14] As discussed earlier, endogamously married black women may suffer a greater hazard of death than endogamously married white women while their husbands are alive, but this difference, if it exists, is small—less than one third the size of the widowhood effect suffered by white women.

married women because estimates are too imprecise.) The results for intermarried men effectively introduce gender as an explanatory dimension for the racial differences in the widowhood effect uncovered here. Specifically, we find that marriage to a black wife protects men from the widowhood effect, whereas marriage to a white wife does not, regardless of husband's own race. Pair-wise statistical comparisons between the four couple-race groups confirm that wife's race governs the size of the widowhood effect among men entirely. This finding is all the more interesting as we have not been able to ascertain any meaningful gender differences in the widowhood effect among endogamously married black and white spouses of the kind found in most previous work on the widowhood effect. It is thus only through its interaction with race that gender assumes a role in determining heterogeneity in the widowhood effect.

As in the case of endogamously married blacks, the lack of statistically significant differences in the hazard of death among husbands across all four couple-race groups, as long as their wives are alive, suggests that the absence of a widowhood effect among men of either race married to black women derives from their ability to maintain the survival advantage of marriage into widowhood. It does not suggest the irrelevance of black wives for husband's survival.

How could a wife's race affect husband's mortality when the wife is dead? Clearly, any effect on the husband's current hazard of death cannot derive from her concurrent, active interventions. Rather, any apparent effect of a deceased spouse's attributes must either derive from memory effects that index characteristic aspects of the dissolved marriage, or be due to characteristic circumstances of the process of bereavement or the state of widowhood that correlate with the attributes of the deceased spouse. The dearth of research on racially intermarried couples, and elderly intermarried couples in particular, as well as limitations in our data prevent us from imposing strong interpretations regarding the mechanisms responsible for the phenomenon at hand. In the very least, however, the importance of wife's race for the widowhood effect in men is consistent with the known centrality of women in the household production of health, and with Sarkisian and Gerstel's (2004) finding that black-white differences in social support are owed predominantly to racial differences in the kin involvement of women rather than men.

A new potential mechanism with regard to the role of women is raised by our finding that the residential environment of intermarried couples resembles that of endogamously married couples on the basis of wives' rather than husbands' race. Wife's race may thus contribute to the explanation of husband's widowhood effect by deciding the nature of the neighborhood context in which the husband remains after the wife has died.[15] Another mechanism may operate through the greater rejection of intermarried couples by white relatives than by black relatives (Romano 2003, ch. 3; Root 2001, ch. 2). Since wives are typically responsible for maintaining kinship networks (di Leonardo 1987), black men married to white women may be more likely to suffer isolation and lack of support from their in-laws upon the death of their spouse than black men married to black women or white men married to black women.[16] Finally, the centrality of wives' race for determining the presence or absence of a widowhood effect among bereaved husbands may indicate that the three factors suggested by us as being responsible for the absence of a widowhood effect among endogamously married black men (more coresident kin, less gender role special-

[15] Note that the residential environment of couples involving black wives is disadvantaged on average compared to that of couples involving white wives (Table 3). At first glance, this might suggest higher, rather than lower, mortality for men married to black wives. On the other hand, qualitative research consistently finds greater neighborhood and kinship solidarity precisely in such disadvantaged neighborhoods and among blacks (Stack 1974; Johnson 2000; but see Patterson 1998 for a critical view), which may put surviving husbands of black women at an advantage in terms of social support.

[16] Of course, the most important care-giving kin for the elderly are their own children. In the case of intermarried couples, these children are themselves biracial and thus unlikely to reject their father on account of his interracial marriage. The argument might well hold, however, for the affinal kin of interracially married black men, that is, the white relatives of the deceased wife. Further research is needed to substantiate this hypothesis.

ization, and greater religious involvement) may be more strongly anchored in the marital and widowed environment created by the female partner.

Of course, observational studies, including the present one, can never fully exclude unmeasured confounding factors as an alternative explanation for patterns seen in the data (Goldman 1993; Korenman, Goldman, and Fu 1997). This holds particularly for unobserved differences in socio-historical context experienced by endogamous and interracial couples. We are cautiously optimistic, however, because the results presented here—particularly those for endogamously married whites—are remarkably robust to the introduction of control variables. This confirms previous findings in the literature supporting the causal nature of the widowhood effect (Schaefer et al. 1995; Lillard and Panis 1996; Martikainen and Valkonen 1996b). Even the introduction of detailed, objective baseline health controls for both spouses into our model does little to affect the size of the estimated coefficients for any of our four couple-race groups once basic demographic factors and poverty status are controlled for. Any remaining unobserved confounding factor would have to operate through pathways independent of baseline health. Remarriage is unlikely to confound our findings because very few widowed men, and even fewer widowed women, in this age group remarry (Clarke 1995). Similarly, we exclude cohabitation with a new romantic partner as an alternative explanation for the widowhood effect or racial differences therein, because only 2.6 percent of all unmarried individuals over the age of 60 cohabit, and race differences in cohabitation are negligible (Chevan 1996).

The consequences of marriage and marital transitions are increasingly at the forefront of social-political debates and current research in the sociology of the family. This study complicates the picture by documenting considerable and sharply patterned racial variation in the health effects of marital status transitions. We find a large and long-lasting widowhood effect for endogamously married white men and women, but we find no widowhood effect among endogamously married blacks. The absence of a widowhood effect among blacks is likely due to the extension of the marital survival advantage into widowhood. For blacks, unlike for whites, marriage may thus be beneficial even after it has ended. The availability of a large sample of intermarried spouses has further enabled us to investigate the gendered nature of these race differences in the widowhood effect, supporting surprising conclusions about the role of wives' race.[17] More generally, our work suggests that attributes of people to whom one is connected—in and of themselves or because they index contextual features—are relevant in understanding the salubrious nature of social ties.

Felix Elwert *is a Ph.D. candidate in sociology and an A.M. candidate in statistics at Harvard University. His research focuses on the causes and consequences of death and divorce for American families and on methods for causal inference from complex longitudinal data. He is a Graduate Associate of the Institute for Quantitative Social Science at Harvard.*

Nicholas A. Christakis *is Professor in the Department of Sociology at Harvard University and in the Department of Health Care Policy at Harvard Medical School. He is also an Attending Physician at Massachusetts General Hospital. His current research focuses on the spread of health-related phenomena within social networks.*

REFERENCES

Adelmann, Pamela K., Kirsten Chadwick, and Dana Royce Baerger. 1996. "Marital Quality of Black and White Adults over the Life Course." *Journal of Social and Personal Relationships* 13:361–84.

Ajrouch, Kristine J., Toni C. Antonucci, and Mary R. Janevic. 2001. "Social Networks Among Blacks and Whites: The Interaction Between Race and Age." *Journals of Gerontology, Series B*

[17] This article asks whether race difference in the widowhood effect depends on proband's own race or on spouse's race. Another issue is whether the widowhood effect depends on proband's own gender or on spouse's gender. Do men derive health benefits from marriage because they are men or because their partners are women? Currently, no dataset permits this research because gender in marriage does not vary. Increased homosexual coresidential unions and legal recognition of same-sex marriage in the U.S. may enable more research regarding the role of gender (and not only race) in health effects of marriage and widowhood, noting, of course, that many other factors beyond gender concordance differentiate homosexual and heterosexual couples.

Psychological Sciences and Social Sciences 56:112–18.

Arday Susan L., David R. Arday, Stephanie Monroe, and Jianyi Zhang. 2000. "HCFA's Racial and Ethnic Data: Current Accuracy and Recent Improvements." *Health Care Financing Review* 21:107–16.

Becker, Gary S. 1981. *A Treatise on the Family.* Cambridge, MA: Harvard University Press.

Blee, Kathleen and Ann Tickamyer. 1995. "Racial Differences in Men's Attitudes about Women's Gender Roles." *Journal of Marriage and the Family* 57:21–30.

Carr, Deborah S. 2004a. "Black/White Differences in Psychological Adjustment to Spousal Loss among Older Adults." *Research on Aging* 26:591–622.

———. 2004b. "Gender, Preloss Marital Dependence, and Older Adults' Adjustment to Widowhood." *Journal of Marriage and Family* 66:220–35.

Carr, Deborah S., James S. House, Ronald C. Kessler, Randolph M. Nesse, John Sonnega, and Camille Wortman. 2000. "Marital Quality and Psychological Adjustment to Widowhood Among Older Adults: A Longitudinal Analysis." *Journal of Gerontology: Social Sciences* 55B:S197–S207.

Charlson, M. E., P. Pompei, K. L. Ales, and C. R. MacKenzie. 1987. "A New Method of Classifying Prognostic Comorbidity in Longitudinal Studies: Development and Validation." *Journal of Chronic Diseases* 40:373–83.

Chevan, Albert. 1996. "As Cheaply as One: Cohabitation in the Older Population." *Journal of Marriage and the Family* 58:656–67.

Christakis, Nicholas A. and Paul D. Allison 2006. "Mortality after the Hospitalization of a Spouse." *New England Journal of Medicine* 354:in press.

Christakis, Nicholas A. and Theodore J. Iwashyna, 2003 "The Health Impact on Families of Health Care: A Matched Cohort Study of Hospice Use by Decedents and Mortality Outcomes in Surviving, Widowed Spouses." *Social Science and Medicine* 57:465–75.

Clark, William D. and Melissa M. Hulbert. 1998. "Research Issues: Dually Eligible Medicare and Medicaid Beneficiaries, Challenges and Opportunities." *Health Care Financing Review* 20:1–10.

Clarke, Sally C. 1995. "Advance Report of Final Divorce Statistics, 1989 and 1990." *Monthly Vital Statistics Report* 42.

di Leonardo, Micaela. 1987. "The Female World of Cards and Holidays: Women, Family, and the Work of Kinship." *Signs* 12:440–53.

Durkheim, Emile. [1897] 1997. *Suicide.* New York: Free Press.

Farley, Reynold, and Walter R. Allen. 1987. *The Color Line and the Quality of Life in America.* New York: Russell Sage Foundation.

Geronimus, Arline T., John Bound, and Lisa J. Neidert. 1996. "On the Validity of Using Census Geocode Characteristics to Proxy Individual Socioeconomic Characteristics." *Journal of the American Statistical Association* 91:529–37.

Geronimus, Arline T., John Bound, Timothy A. Waidmann, Cynthia G. Colen, and Dianne Steffick. 2001. "Inequality in Life Expectancy, Functional Status, and Active Life Expectancy across Selected Black and White Populations in the United States." *Demography* 38:227–51.

Goldman, Noreen. 1993. "Marriage Selection and Mortality Patterns: Inferences and Fallacies." *Demography* 30:189–208.

Goldscheider, Frances K. and Regina M. Bures. 2003. "The Racial Crossover in Family Complexity in the United States" *Demography* 40:569–87.

Gove, Walter R. 1973. "Sex, Marital Status, and Mortality." *American Journal of Sociology* 79:45–67.

Harrison, James. 1978. "Warning: The Male Sex Role May Be Dangerous to Your Health." *Journal of Social Issues* 34:65–86.

Hatch, Laurie R. 1991. "Informal Support Patterns of Older African-American and White Women: Examining Effects of Family, Paid Work, and Religious Participation." *Research on Aging* 13:144–70.

Hatten, James. 1980. "Medicare's Common Denominator: The Covered Population." *Health Care Financing Review* 2 (2):53–64.

Health Resources and Services Administration, Bureau of Health Professions. 1996. Area Resource File (ARF) System. Fairfax, VA: Quality Resource Systems, Inc.

Helsing, Knud J. and Moyses Szklo. 1981. "Mortality after Bereavement." *American Journal of Epidemiology* 114:41–52.

Hosmer, David W. Jr. and Stanley Lemeshow 2002. *Applied Survival Analysis: Regression Modeling of Time to Event Data.* New York: Wiley.

House, James S., Karl R. Landis, and Debra Umberson. 1988. "Social Relationships and Health." *Science* 241:540–5.

Hoyert, Donna L., Hsiang-Ching Kung, and Betty L. Smith. 2005. "Deaths: Preliminary Data for 2003." *National Vital Statistics Reports* 53.

Hu, Yuanreng and Noreen Goldman. 1990. "Mortality Differentials by Marital Status: An International Comparison." *Demography* 27:233–50.

Iwashyna, Theodore J., Gerardine Brennan, James X. Zhang, and Nicholas A. Christakis. 2002. "Finding Married Couples in Medicare Claims Data." *Health Services and Outcomes Research Methodology* 3:75–86.

Iwashyna, Theodore J. and Nicholas A. Christakis.

2003. "Marriage, Widowhood, and Health Care Use." *Social Science Medicine* 57:2137–47.

Iwashyna, Theodore J., James X. Zhang, Diane Lauderdale, and Nicholas A. Christakis. 1998. "A Methodology for Identifying Married Couples in Medicare Data: Mortality, Morbidity, and Health Care Use among the Married Elderly." *Demography* 35:413–9.

Johnson, Colleen L. 2000. "Perspectives on American Kinship in the Later 1990s." *Journal of Marriage and the Family* 62:632–9.

Kalmijn, Matthijs. 1998. "Intermarriage and Homogamy: Causes, Patterns, Trends." *Annual Review of Sociology* 24:395–421.

Kennedy, Randall. 2003. *Interracial Intimacies: Sex, Marriage, Identity, and Adoptions.* New York: Pantheon.

Korenman, Sanders, Noreen Goldman, and Haishan Fu. 1997. "Misclassification Bias in Estimates of Bereavement Effects." *American Journal of Epidemiology* 145:995–1002.

Krieger, Nancy. 1992. "Overcoming the Absence of Socioeconomic Data in Medical Records: Validation and Application of a Census-Based Methodology." *American Journal of Public Health* 92:703–10.

Lauderdale Diane S. and Jack Goldberg. 1996. "The Expanded Racial and Ethnic Codes in the Medicare Data Files: Their Completeness of Coverage and Accuracy." *American Journal of Public Health* 86:712–16.

Lauderdale Diane S. and Bert Kestenbaum. 2000. "Asian American Ethnic Identification by Surname." *Population Research and Policy Review* 19:283–300.

———. 2002. "Mortality Rates of Elderly Asian American Populations Based on Medicare and Social Security Data." *Demography* 39:529–40.

Lillard, Lee A. and Constantijn Panis. 1996. "Marital Status and Mortality: The Role of Health." *Demography* 33:313–27.

Lillard, Lee A. and Linda J. Waite. 1995. " 'Til Death Do Us Part: Marital Disruption and Mortality." *American Journal of Sociology* 100:1131–56.

Litwak, Eugene and Peter Messeri, in collaboration with Samuel Wolfe, Sheila Gorman, Merril Silverstein, and Miguel Guilarte. 1989. "Organizational Theory, Social Support, and Mortality Rates: A Theoretical Convergence." *American Sociological Review* 54:49–66.

Martikainen, Pekka and Tapani Valkonen. 1996a. "Mortality after the Death of a Spouse: Rates and Causes of Death in a Large Finnish Cohort." *American Journal of Public Health* 86:1087–93.

———. 1996b. "Mortality after Death of Spouse in Relation to Duration of Bereavement in Finland." *Journal of Epidemiology and Community Health* 50:264–8.

McLoyd, Vonnie C., Ana Mari Cauce, David Takeuchi, and Leon Wilson. 2000. "Marital Processes and Parental Socialization in Families of Color: A Decade Review of Research." *Journal of Marriage and the Family* 62:1070–93.

Oppenheimer, Valerie K. 1997. "Women's Employment and the Gains to Marriage: The Specialization and Trading Model of Marriage." *Annual Review of Sociology* 23:431–53.

Orbuch, Terri L. and Sandra L. Eyster. 1997. "Division of Household Labor among Black Couples and White Couples." *Social Forces* 76:301–32.

Patterson, Orlando. 1998. "Broken Bloodlines: Gender Relations and the Crisis of Marriages and Families among Afro-Americans." Pp. 1–168 in *Rituals of Blood: Consequences of Slavery in Two American Centuries.* Washington, DC: Civitas/Counterpoint.

Preston, Samuel E., Irma T. Elo, Ira Rosenwaike, and Mark Hill. 1996. "African-American Mortality at Older Ages: Results from a Matching Study." *Demography* 33:193–209.

Qian, Zhenchao and Daniel T. Lichter. 2004. "Marriage and Family in a Multiracial Society." New York: Russell Sage Foundation, and Washington, DC: Population Reference Bureau.

Romano, Renee C. 2003. *Race Mixing: Black-White Marriage in Postwar America.* Cambridge, MA: Harvard University Press.

Root, Maria P. P. 2001. *Love's Revolution: Interracial Marriage.* Philadelphia, PA: Temple University Press.

Ruggles, Steven. 1994. "The Origins of African-American Family Structure." *American Sociological Review* 59:136–51.

Sarkisian, Natalia and Naomi Gerstel. 2004. "Kin Support among Blacks and Whites: Race and Family Organization." *American Sociological Review* 69:812–37.

Schaefer, Catherine, Charles P. Quesenberry Jr., and Soora Wi. 1995. "Mortality Following Conjugal Bereavement and the Effects of a Shared Environment." *American Journal of Epidemiology* 141:1142–52.

Shahar, Danit R., Richard Schultz, Avner Shahar, and Rena R. Wing. 2001. "The Effect of Widowhood on Weight Change, Dietary Intake, and Eating Behavior in the Elderly Population." *Journal of Aging and Health* 13:189–99.

Silverstein, Merril and Linda J. Waite. 1993. "Are Blacks More Likely Than White to Receive and Provide Social Support in Middle and Old Age? Yes, No, and Maybe So." *Journals of Gerontology: Social Sciences* 48:S212–S222.

Spitze, Glenna D. and John Logan. 1990. "Sons, Daughters, and Intergenerational Support." *Journal of Marriage and the Family* 52:420–30.

Stack, Carol B. 1974. *All Our Kin: Strategies for*

Survival in a Black Community. New York: Harper and Row.

StataCorp. 2003. *Stata Statistical Software: Release 8.* College Station, TX: StataCorp.

Stolzenberg, Ross. 2001. "It's about Time and Gender: Spousal Employment and Health." *American Journal of Sociology* 101:61–100.

Taylor, Robert J., Linda M. Chatters, Rukmalie Jayakody, and Jeffrey S. Levin. 1996. "Black and White Differences in Religious Participation: A Multi-sample Comparison." *Journal for the Scientific Study of Religion* 35:403–10.

Taylor, Robert J., Linda M. Chatters, and Vikie Mays. 1988. "Parents, Children, Siblings, In-Laws, and Non-Kin Sources of Emergency Assistance to Black Americans." *Family Relations* 37:426–31.

Trovato, Frank and Gloria Lauris. 1989. "Marital Status and Mortality in Canada, 1951–1981." *Journal of Marriage and the Family* 51:907–22.

Umberson, Debra. 1987. "Family Status and Health Behaviors: Social Control as a Dimension of Social Integration." *Journal of Health and Social Behavior* 28:306–19.

———. 1992. "Gender, Marital Status and the Social Control of Health Behavior." *Social Science and Medicine* 34:907–17.

Umberson, Debra, Camille B. Wortman, and Ronald C. Kessler. 1992. "Widowhood and Depression: Explaining Long-Term Gender Differences in Vulnerabilities." *Journal of Health and Social Behavior* 33:10–24.

U.S. Department of Commerce. 2004. *Census Quality Survey Public Use Data File, 2001* [computer file, ICPSR release]. Washington, DC: U.S. Dept. of Commerce, Bureau of the Census [producer], and Ann Arbor, MI: Inter-University Consortium for Political and Social Research [distributor].

Utz, Rebecca L., Erin B. Reidy, Deborah Carr, Randolph Nesse, and Camille Wortman. 2004. "The Daily Consequences of Widowhood: The Role of Gender and Intergenerational Transfers on Subsequent Housework Performance." *Journal of Family Issues* 25:683–712.

White, Michael J. and Sharon Sassler. 2000. "Judging Not Only by Color: Ethnicity, Nativity, and Neighborhood Attainment." *Social Science Quarterly* 80:997–1013.

Winship, Christopher and Michael Sobel. 2004. "Causal Analysis in Sociological Studies." Pp. 481–503 in *Handbook of Data Analysis,* edited by Melissa A. Hardy and Alan Bryman. London, England: Sage.

Wisocki, Patricia and Jeffrey Skowron. 2000. "The Effects of Gender and Culture on Adjustment to Widowhood." Pp. 429–48 in *Handbook of Gender, Culture, and Health,* edited by Richard M. Eisler and M. Hersen. Mahwah, NJ: Lawrence Erlbaum.

Word, David L. and Colby Perkins Jr. 1996. "Building a Spanish Surname List for the 1990's—A New Approach to an Old Problem." Technical Working Paper No. 13, Population Division, U.S. Bureau of the Census, Washington, DC.

Wortman, Camille B. and Roxane Cohen Silver. 1989. "The Myths of Coping with Loss." *Journal of Consulting and Clinical Psychology* 57:349–57.

Zhang, James X., Theodore J. Iwashyna, and Nicholas A. Christakis. 1999. "The Performance of Different Lookback Periods and Sources of Information for Charlson Comorbidity Adjustment in Medicare Claims." *Medical Care* 37:1128–39.