

Retraction

Journal of Health and Social Behavior

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DOI: 10.1177/0022146515595817

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The authors have retracted the article titled "In Sickness and in Health? Physical Illness as a Risk Factor for Marital Dissolution in Later Life," published in the *Journal of Health and Social Behavior* (2015, 56(1):59-73). There was a major error in the coding in their dependent variable of marital status. The conclusions of that paper should be considered invalid. A corrected version of the paper will be published in the September 2015 issue of *JHSB*.

RETRACTED: In Sickness and in Health? Physical Illness as a Risk Factor for Marital Dissolution in Later Life

Journal of Health and Social Behavior
2015, Vol. 56(1) 59–73
© American Sociological Association 2015
DOI: 10.1177/0022146514568351
jhsb.sagepub.com
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Abstract

The health consequences of marital dissolution are well known, but little work has examined the impact of health on the risk of marital dissolution. In this study we use a sample of 2,701 marriages from the Health and Retirement Study (1992–2010) to examine the role of serious physical illness onset (i.e., cancer, heart problems, lung disease, and/or stroke) in subsequent marital dissolution due to either divorce or widowhood. We use a series of discrete-time event history models with competing risks to estimate the impact of husband's and wife's physical illness onset on risk of divorce and widowhood. We find that only wife's illness onset is associated with elevated risk of divorce, while either husband's or wife's illness onset is associated with elevated risk of widowhood. These findings suggest the importance of health as a determinant of marital dissolution in later life via both biological and gendered social pathways.

Keywords

aging, chronic disease, gender, marriage, physical health

A large body of literature has identified marital status as a strong predictor of health and well-being. Not only are the married healthier than the unmarried (e.g., Lillard and Waite 1995; Umberson 1992), but studies find that both divorce and widowhood are precursors to declines in physical and mental health (e.g., Hughes and Waite 2009; Williams and Umberson 2004). Less attention, however, has been paid to how health may be a determinant of marital status. Work in this area has tended to focus on the positive selection of the healthier into marriage (e.g., Byrne et al. 1989; Smith and Smith 2010), but poor health may be an equally important force for selection out of marriage. Biological processes associated with poor health and illness increase mortality risk (Murphy, Xu, and Kochanek 2013) and thus elevate the risk of marital dissolution via widowhood. However, physical illness may also increase divorce risk via social processes by operating as a stressor on the marital relationship leading to lower marital quality (Amato 2010; Daniel et al. 2009; Yorgason,

Booth, and Johnson 2008). Illness may initiate changes to spouses' roles—in particular, increasing caregiving responsibilities for the healthy spouse—which can tax marital relationship dynamics (Wolff and Kasper 2006). Illness may also decrease household income due to the inability of one or both spouses to work (Teachman 2010), which may increase marital strain.

Only a few studies have examined the role of poor health in subsequent divorce, and these studies are mixed in their findings, with some finding

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poor health positively associated with elevated divorce risk (Joung et al. 1998; Teachman 2010; Wilson and Waddoups 2002) and others finding no association (Charles and Stephens 2004). These studies also tend to examine relatively young samples, although the implications of poor health for divorce may be particularly important as individuals age. Chronic morbidity incidence increases with age (Crimmins and Beltrán-Sánchez 2011), while mortality associated with several chronic diseases has decreased with medical advances (Crimmins 2004). This means that individuals are living longer with chronic illnesses and marriages are at decreased risk of dissolution due to widowhood than in the past. One consequence of this increased likelihood of longer-term survival with chronic illness may be increased divorce risk.

The relationship between spousal health and divorce may also vary by gender. Small clinical studies have found a larger risk of divorce when wives become ill than when husbands do (e.g., Glantz et al. 2009) and, in particular, when wives as opposed to husbands are diagnosed with cancer (Carlsen et al. 2007). This variation by gender is consistent with the increasing advantage enjoyed by men in (re)marriage markets over the life course due to an ever-expanding pool of potential partners, and with findings that husbands may find caring for an ill spouse more stressful than do wives (England 2005). While the few clinical studies finding gender differences in the impact of illness on divorce risk are intriguing, these results have not been replicated in large social surveys or across an array of illnesses.

We use a sample of marriages from the initial cohort of the nationally representative Health and Retirement Study (HRS, 1992–2010) to examine the relationship between serious physical illness onset (for cancer, heart problems, lung disease, and/or stroke) and subsequent marital dissolution due to either divorce or widowhood. We also look at whether the relationship between illness and marriage dissolution varies by specific illness or, in the case of divorce, by gender. Estimating competing risk models for divorce and widowhood (compared with remaining married) for this sample contributes to research addressing trends in the relative contributions of divorce and widowhood to marriage dissolution at older ages (Stevenson and Wolfers 2007). Examining several types of physical illnesses/conditions enables a consideration of how the risk of divorce may be affected by the associated characteristics of each illness/condition,

such as level of disability, chronicity, and social meaning. Finally, analyzing the risk of divorce by whether it is the husband or wife who experiences illness onset furthers understanding of gendered experiences at the intersections of health and marriage in later life.

BACKGROUND

Health as a Determinant of Marital Status

The relationship between marital status and health is well known. Numerous studies have documented the health benefits to getting married (Lillard and Waite 1995; Umberson 1992). Studies also find negative health consequences of marital dissolution due to either divorce (Hughes and Waite 2009; Williams and Umberson 2004) or widowhood (Hughes and Waite 2009). The vast majority of this literature, however, has focused on the impact of marital status and transitions on health rather than on the impact of health on subsequent marital status.

Much of the literature focusing on health as a determinant of marital status has focused on positive selection of the healthy into marriage (e.g., Byrne et al. 1989; Fikkan and Rothblum 2012; Gohmacker et al. 1993; Smith and Smith 2010). Some other studies suggest that health functions as a determinant not only of entry into marriage but also of marital dissolution. Beyond the obvious pathway between a partner's health decline and subsequent widowhood, a few studies have examined physical health as a risk factor for marital dissolution via divorce. A meta-analysis of social and economic consequences of stroke among working-age adults found some evidence of an elevated divorce risk following stroke, as well as increased marital conflict and decreased sexual activity (Daniel et al. 2009), which may be precursors for divorce. Other studies have found that the relationship between illness and divorce may vary by specific illness. To illustrate, a Norwegian study did not find strong evidence for elevated divorce following cancer diagnosis, except for cervical and testicular cancers, which tend to strike younger individuals than many other cancers (Syse and Kravdal 2007). However, some studies find no evidence that poor health is a risk factor for divorce. For example, in their examination of marriages among mostly working-aged individuals, Charles and Stephens (2004) did not find disability related to subsequent divorce.

While the extant literature does not demonstrate a clear association between illness onset and risk of divorce, there are several reasons why we may expect that illness onset is linked to subsequent divorce. First, a sick individual may require assistance with daily personal care tasks, and for those who are married, the ill individual's spouse is most often the primary caregiver (Wolff and Kasper 2006). Caregiving has been identified as a source of psychological strain that may lead to increased morbidity and mortality among caregivers themselves (Schulz and Beach 1999). Second, caregiving may alter the relationship dynamics between husband and wife in ways that are distressing, particularly if initial marital quality was low (Choi and Marks 2006). In addition, one spouse's illness may affect household income by interfering with either the ill or the caregiving spouse's ability to engage in gainful employment. While both job loss and earnings shocks have been linked to elevated divorce risk (Charles and Stephens 2004; Weiss and Willis 1997), Singleton (2012) demonstrated that the impact of work-preventing disability onset on divorce was greatest among younger and better-educated men, which suggests that lost potential earnings may not be as meaningful for older couples.

A limitation of most of the studies that examine health and divorce is a focus on relatively young populations. Recent evidence suggests, however, that divorce at older ages is on the rise. The number of divorces occurring among adults aged 50 and older has doubled in the past two decades, and in 2010 one in four divorces occurred among those over 50 (Brown and Lin 2007). Late middle age and early older age are the stages in the life course when many individuals experience the onset of serious health conditions, and given more permissive attitudes toward divorce and the more frequent experience of divorce earlier in life (Uhlenberg and Myers 1981), illness onset may be an increasingly important risk factor for divorce among more recent cohorts of older Americans.

One prior study of marriages in which at least one spouse was in late middle or early old age found that marriages in which only one spouse was ill were at elevated risk of divorce compared with marriages in which both spouses were healthy, but only among marriages in which both spouses reported high levels of marital satisfaction (Wilson and Waddoups 2002). This study represents an important first step in the examination of the potential consequences of illness for divorce in middle and older ages. However, this study suffers from several limitations, most notably that health is

assessed with self-rated health rather than with illness diagnosis. While self-rated health measures are highly correlated with objective measures of health (Molarius and Janson 2002), self-rated health measures are also subject to drawbacks, such as gender differences in health-rating styles (Grol-Prokopczyk, Freese, and Hauser 2011) and the role of inputs not specifically related to physical health such as depression (Molarius and Janson 2002) or even marital quality itself, raising concerns of endogeneity.

Variation in the Relationship between Illness and Marital Dissolution

Most studies analyzing the effects of health on marital dissolution either have used relatively general measures of health or have examined a single condition; however, different illnesses/conditions may have different implications for marital dissolution. First, variation in the association of specific illnesses with death (Murphy et al. 2013) will affect the relative risks of widowhood versus divorce. Illnesses associated with high mortality risk, such as heart disease, are associated with lower risk of divorce simply because increased mortality risk makes it less likely that both spouses will remain alive, a basic condition for whether the marriage is at risk of divorce or not.

In addition, illnesses vary in the extent and duration of associated disabilities, which have implications for caregiving burden, work limitations, and curtailment of other life domains. Stroke, for instance, is the leading cause of major long-term disability (Roger et al. 2012) and might create more chronic stressors for a marriage than an illness like cancer, which is often associated with more modest, shorter-term disability linked to treatment side effects. Cognitive decline-related disability, which is associated with illnesses such as stroke or heart disease, may be more stressful for caregivers than physical disability (Pinquart and Sörensen 2003). In addition, the duration and probability of recovery from a disability may induce variation in the relationship between the associated illness and divorce. Divorce risk might be higher for conditions such as chronic obstructive pulmonary disease (COPD) in which recovery is unlikely and caregiving may extend for many years.

Illnesses also vary in their social meanings, which may have implications for their impact on divorce. Levels of research funding, positive media attention, and societal support vary across conditions and illnesses (Best 2012; Kedrowski and

Sarow 2007), with cancer, heart disease, and stroke being the subjects of large public health and advertising campaigns, while illnesses such as COPD—which has a direct association with the stigmatized behavior of smoking (Mannino and Buist 2007)—receive little attention. Such campaigns increase public awareness and popular support for these conditions—which may lessen the emotional burden for couples living with them. But perhaps as important, they also influence the availability of concrete resources such as support groups, which can play an important role in buffering the stress of illness. These differences across health conditions may influence how couples perceive their struggle against an illness and their hopefulness for the future—perceptions that may affect their adjustment to caregiving and care-receiving roles.

Gender, Illness, and Marital Dissolution

Gender may also moderate the relationship between poor health and marital dissolution. A few clinical studies have found higher divorce risks when wives, as opposed to husbands, experience cancer (Glantz et al. 2009; Kirchhoff et al. 2012) or for cancers that affect only women, such as cervical cancer (Carlsen et al. 2007). These findings, however, have been gleaned from relatively young (Kirchhoff et al. 2012) or small samples (Glantz et al. 2009) and limited to the study of cancer.

Several social processes suggest that middle-aged and older couples may be at greater risk of divorce when wives become ill than when husbands do. First, because sex ratios become increasingly skewed toward women at older ages given women's greater longevity (Austad 2006), and because men tend to marry women younger than they are (Presser 2005), older men are advantaged in the marriage market by a larger pool of potential partners than is available to older women. Marriage markets are skewed as well by the stronger normative value of youthful beauty for women in that "women are devalued [as potential partners] as they age more than men are" (England and McClintock 2010:814). Indeed, not only are men much more likely to remarry than women (Shafer and James 2013); the older men are at remarriage, the greater the age gap is with their wives (England and McClintock 2010).

In addition, gender norms regarding the role changes that frequently accompany illness may yield gender differences in the relationship between illness and subsequent divorce. Women are socialized and habituated to caregiving for others across

the life course (England 2005), and studies suggest that this extends to caring for ill husbands (Wolff and Kasper 2006). However, caregiving is not fully reciprocated by husbands for sick wives; wives receiving care were more likely to report experiencing gaps in needed caregiving from their spouses than husbands (Allen 1994). Given the gendered nature of caregiving and care-receiving and caregiving's frequent stressful nature, it is plausible that situations in which ill wives are dependent on husbands for care are more stressful than when wives are caring for ill husbands. On the other hand, illness may be more detrimental in cases where ill husbands must withdraw from employment, given the traditional emphasis on breadwinning for men (Becker 1981). However, as evidenced by Singelman's (2012) study on disability, earnings, and divorce, the importance of breadwinning may be less important at older ages when labor force detachment and declines in earnings for men are more age normative compared with earlier periods of the life course.

DATA AND METHODS

Data

We used data from Waves 1 through 10 of the RAND HRS data file, a user-friendly, harmonized data set generated from the original HRS files. The HRS is an ongoing, nationally representative, prospective panel study of Americans over the age of 50 years. Detailed health and sociodemographic information has been collected from respondents and their spouses (regardless of the spouse's age) every two years since 1992. We focused on the original HRS sample in which at least one spouse within the marriage was aged 51 through 61 at baseline, as prior work has identified this approximate age range where the risk of divorce is highest in the later life course (Brown and Lin 2012).

Analytic Sample

We constructed our analytic sample of marriages based on 9,348 HRS individuals who were married to one another at baseline (Wave 1), yielding 4,674 marriages. As we were interested in the role of serious physical illness *onset* as a risk factor for marital dissolution, we excluded marriages in which either spouse reported having ever had any of the four chronic conditions of interest at baseline, reducing the sample size to 3,104 marriages. If we were to include those who had ever had any of the serious

illnesses of interest, we might be selecting for particularly robust marriages, biasing downward our estimates of the relationship between illness and divorce. Further, we did not know the date of diagnosis for illness at baseline relative to date of marriage, making it impossible to ascertain the duration of time in which couples lived with illness prior to the study. We also excluded marriages that dissolved either due to divorce/separation or widowhood in the second wave (1994) as it could not be ensured that our key independent variable, illness onset, in Wave 2 preceded a change in marital status (see *Statistical Analysis*, below), reducing the sample size to 2,778 marriages. We also excluded those missing information on any covariates (missing data resulted in a loss of approximately 2.2% of marriages) or with a weight of zero, yielding a final analytic sample of 2,701 marriages, which correspond to 16,940 wave-to-wave marriage-periods for the pooled illness model. Analyses were weighted using Wave 1 household weights and clustered at the individual marriage-wave level. Our selection criteria facilitated the identification of the effect of illness onset on marital dissolution, but decreased the representativeness of our sample and thus the generalizability of our findings to all marriages in the sampling frame age range. Though our data were not nationally representative of all marriages in this age range, our sample does consist of a random sample of marriages in this select healthy population and thus had a considerable advantage over many other studies examining marriages that have relied on convenience samples.

Measures

Dependent Variable: Marital Dissolution Due to Divorce or Widowhood: The main outcome of interest was whether a Wave 1 marriage ends in divorce or widowhood in a subsequent wave. A marriage was defined as dissolved due to widowhood if either spouse died between consecutive waves and the marriage was intact in the penultimate wave. A marriage was defined as dissolved due to divorce if either spouse reported being divorced since the prior wave, or in the rare case that either spouse divorced and remarried between consecutive waves and thus never reported being divorced, if either spouse's total marriage count increased.

Key Independent Variable: Physical Illness Onset of Husband or Wife: The primary independent variable was respondent or spousal illness onset. We focused on the onset of four major

life-threatening illnesses: cancer, heart problems, lung disease, and stroke. Together, these illnesses comprise a substantial portion of chronic disease burden in the United States (Murphy et al. 2013) and pose a risk for marital dissolution via the death of an individual spouse as well as potentially via divorce. We examined whether husband or wife experienced the onset of any of these four conditions (see Table 3) as well as the onset of each specific condition modeled simultaneously (see Table 4). Illness onset was entered as a time-varying measure and was lagged by one period to ensure that illness onset preceded marital dissolution. The illness onset variable was coded as "1" for each subsequent wave in order to acknowledge that the full impacts of illness onset may not be fully experienced until a substantial period of time has elapsed following illness onset. Consistent with prior studies, cancer diagnosis excludes skin cancers. Heart problems include "heart attack, coronary heart disease, angina, congestive heart failure, or other heart problem," and lung disease includes but is not limited to "chronic lung disease such as chronic bronchitis or emphysema."

Other Baseline Covariates: We also included measures of several factors that prior research has found to be associated with divorce and/or widowhood (via individual mortality). Given the challenges of interpreting time-varying covariates as potential mechanisms for illness onset (see Goodliffe 2003) and for additional substantive reasons (e.g., income typically declines for both sick and well individuals in this age range), none of the covariates listed below are time varying. These included age (in years), college education (1 = yes, 0 = no), race-ethnicity (1 = nonwhite and/or Hispanic, 0 = white, non-Hispanic), marital duration (1 = less than 10 years, 0 = more than 10 years), and initial marital satisfaction. Marital satisfaction was ascertained with the following question: "Are you very satisfied, somewhat satisfied, about evenly satisfied and dissatisfied, somewhat dissatisfied, or very dissatisfied with your marriage?" The original assumed-interval measure is retained with "very satisfied" as the reference category for the marital satisfaction measure. Marriages were coded as remarriages if the Wave 1 marriage was a remarriage for either spouse. We also included a measure of husband and wife age differences at baseline; the age difference categories included wife older by 11 or more years, wife older by five to ten years, wife older by three or four years, husband and wife within two years' age of one another (reference category), husband older

by three or four years, husband older by five to ten years, and husband older by 11 or more years.

We also included measures of socioeconomic status: total household income at baseline, total household nonhousing assets at baseline, and home ownership at baseline. We included both measures of income and assets as prior research suggests that assets may be an especially important predictor of health at older ages (Robert and House 1996). We included measures of both total household (nonhousing) wealth and home ownership because the former reflects relatively liquid assets at baseline while the latter reflects less liquid assets that represent a substantial component of wealth holdings for many Americans. Missing values for income and assets were imputed by RAND. Household income was based on the sum of husband's and wife's income from earnings, pensions and annuities, Supplemental Security Income and Social Security Disability, Social Security, unemployment and worker's compensation, and other government transfers and then was coded into quintiles (bottom quintile is reference). Nonhousing assets were coded into five categories: negative wealth (i.e., debt); \$0 to \$50,000 (reference category); \$50,000 to \$100,000; \$100,000 to \$250,000; and \$250,000 or more. We also included dichotomous indicators for health insurance for both husband and wife.

Due to collinearity, we were unable to simultaneously model both spouses' education, race-ethnicity, or marital satisfaction. Models presented use husband's education and race-ethnicity, and wife's marital satisfaction, as there were fewer missing data for wife's reports of marital satisfaction and there was also more variation in marital satisfaction among wives compared with husbands (not shown). Additional analysis (not shown) indicated that results do not differ if wife's race-ethnicity or education is used instead of husband's or if husband's marital satisfaction is used.

Statistical Analysis

To assess risk of marital dissolution, we estimated a series of discrete-time event history models with competing events using multinomial logistic regression. Divorce/separation (referred to as "divorce" hereafter) or widowhood were modeled as competing events, as marriages with at least one spouse in the HRS age range were at risk for both divorce and widowhood. The continuously married category was the reference category. We employed a closed cohort design in which Wave 1 marriages were followed until the marriage dissolves or is

censored. We focused on the cohort of Wave 1 marriages since this was the only time period in which marital satisfaction—a key covariate of interest—was collected. We generated a marriage-period dataset in which each marriage contributed a marriage-period until marital dissolution occurs or until the marriage is censored. A marriage is defined as censored if the Wave 1 marriage remains intact through 2010, or if either spouse misses a wave. For marriages in which spouses differed in the number of waves they participated in in the survey, the minimum observation length of the two spouses was taken, and the marriage was subsequently coded as censored. Marriages were not followed after a wave was missed, as critical information (e.g., new illness onset) was missing and was difficult to impute. Additional analysis of survey attrition revealed that there was very little attrition of marriages (21 marriages out of 2,701 total—see Table 2). Period (length of observation) was included as both a linear and a quadratic term, as results from log likelihood ratio tests suggested including both linear and quadratic terms had better model fit compared with only including the linear term (not shown). These linear and quadratic period terms can alternatively be interpreted as reflecting the aging of husbands and wives, controlling for their baseline age. We present results both as log odds and as marginal effects with other covariates held at their means, which can be interpreted as probabilities (Long and Freese 2006).

RESULTS

Descriptive statistics are displayed in Table 1. Marriages are somewhat more likely to end by divorce than by widowhood. Thirty-two percent of marriages dissolve due to divorce, compared with 24% due to widowhood. Very few (less than 1%) of marriages miss a wave prior to an observed marital dissolution. The distribution of initial illness onset for husbands and wives, as well as timing of divorce and widowhood by wave, can be found in Table 2. Not surprisingly, there is a substantial amount of new chronic illness onset (cancer, heart problems, lung disease, and/or stroke) among husbands and wives (see Table 2) within marriages. Consistent with prior research, we observe an increase in physical illness incidence across waves (as husbands and wives age), and husbands experience higher illness incidence than do wives. Looking at the distribution of divorce and widowhood by wave, we see that divorce is a more common pathway out of marriage in earlier waves than

Table 1. Analytic Sample Weighted Baseline Descriptive Statistics, Health and Retirement Study (1992–2010) ($n = 2,701$ Marriages).

| | Mean/Proportion | SE | Range |
|--|-----------------|-----|--------------------|
| <i>Marriage status at end of observation</i> | | | |
| Remaining married | .44 | | |
| Divorced | .32 | | |
| Widowed | .24 | | |
| Attrition | less than .01 | | |
| Husband age (years) | 56.73 | .12 | (25–92) |
| Wife age (years) | 52.78 | .12 | (21–91) |
| Husband college educated | .27 | .01 | |
| Husband nonwhite and/or Hispanic | .14 | .01 | |
| Wife's report of marital satisfaction | 4.76 | .01 | (1–5) |
| Remarriage | .33 | .01 | |
| Marital duration less than 10 years | .11 | .01 | |
| Husband has health insurance | .79 | .01 | |
| Wife has health insurance | .79 | .01 | |
| <i>Household income quintiles</i> | | | |
| 1 | | | \$0–\$20,900 |
| 2 | | | \$21,000–\$34,800 |
| 3 | | | \$35,000–\$48,990 |
| 4 | | | \$49,000–\$69,500 |
| 5 | | | \$70,000–\$600,000 |
| <i>Household nonhousing assets</i> | | | |
| In debt | .03 | .00 | |
| \$0–\$50,000 | .40 | .01 | |
| \$50,000–\$100,000 | .18 | .01 | |
| \$100,000–\$250,000 | .19 | .01 | |
| More than \$250,000 | .20 | .01 | |
| Home ownership | .90 | .01 | |
| <i>Spousal age difference</i> | | | |
| Wife 11 years older or more | .01 | .00 | |
| Wife 5 to 10 years older | .04 | .00 | |
| Wife 3 or 4 years older | .03 | .00 | |
| Husband and wife within 2 years of one another | .33 | .01 | |
| Husband 3 to 4 years older | .20 | .01 | |
| Husband 1.5 to 10 years older | .29 | .01 | |
| Husband 1 year older or more | .10 | .01 | |

Note: Analyses are weighted using Wave 1 household weights.

widowhood. In later waves, widowhood is a more common pathway out of marriage.

Table 3 displays multinomial logistic regression models predicting marital dissolution due to divorce or widowhood as a function of onset of any of the four illnesses (cancer, heart problems, lung disease, and/or stroke). Husband's illness onset is not associated with subsequent divorce compared

with remaining married. In contrast, wife's illness onset is positively associated with 6% higher probability of subsequent divorce compared with remaining married. An F -test for equality of coefficients for husband's illness onset and wife's illness onset is significant ($p < .05$), indicating strong evidence that wife's illness onset is a stronger predictor of divorce than husband's illness onset.

Table 2. Divorce, Widowhood, Attrition, and Illness Onset by Wave, Health and Retirement Study (1992–2010) ($n = 2,701$ Marriages).

| | Marriage Ends due to Divorce | | Marriage Ends due to Widowhood | | Attrition | | Husband Experiences New Illness Onset | | Wife Experiences New Illness Onset | | Total Marriages by Wave |
|---------|------------------------------|----------|--------------------------------|----------|-----------|----------|---------------------------------------|----------|------------------------------------|----------|-------------------------|
| | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | |
| Wave 1 | n/a | n/a | | n/a | | n/a | 0 | 0 | 0 | 0 | 2,701 |
| Wave 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,701 |
| Wave 3 | 7.7 | 208 | 2.1 | 57 | <.1 | 12 | 5.8 | 158 | 3.3 | 89 | 2,701 |
| Wave 4 | 6.6 | 161 | 3.1 | 75 | <.1 | 1 | 6.5 | 158 | 3.4 | 82 | 2,336 |
| Wave 5 | 5.2 | 114 | 2.6 | 57 | <.1 | 3 | 8.3 | 182 | 4.7 | 104 | 2,110 |
| Wave 6 | 5.2 | 105 | 4.2 | 86 | 0 | 0 | 9.5 | 193 | 5.3 | 111 | 2,029 |
| Wave 7 | 3.9 | 72 | 3.6 | 67 | <.1 | 1 | 12.8 | 235 | 6.8 | 125 | 1,838 |
| Wave 8 | 3.5 | 59 | 5.0 | 85 | <.1 | 2 | 13.5 | 230 | 7.7 | 131 | 1,699 |
| Wave 9 | 3.6 | 56 | 6.3 | 98 | 0 | 0 | 14.5 | 226 | 10.1 | 166 | 1,555 |
| Wave 10 | 6.0 | 84 | 8.3 | 116 | <.1 | 2 | 14.8 | 208 | 11.0 | 154 | 1,401 |
| Total | | 859 | | 641 | | 21 | Not modeled | | Not modeled | | |

Note: n/a = not applicable. New disease onset = new diagnosis of cancer, heart problems, lung disease, and/or stroke since last wave. Both husbands and wives are illness free at baseline by definition. Marriages are intact until Wave 3 by definition.

Turning to the risk of subsequent widowhood versus remaining married, we see that husband's illness onset is associated with 5% higher probability of widowhood and wife's illness onset is associated with 4% higher probability of widowhood compared with staying married. Results of an F -test reveal that the strength of this relationship does not differ by which spouse experiences illness onset.

Next we turn to illness-specific (with separate indicators for cancer, heart problems, lung disease, and stroke) associations with marital dissolution in Table 4. Neither husband's nor wife's cancer or heart problems onset is associated with subsequent divorce. Wife's lung disease onset (but not husband's) is positively associated with an 8% higher probability of subsequent divorce compared with staying married (see Table 4), though the F -test ($p < .11$) is not statistically significant, suggesting that the relationship between lung disease onset and divorce does not statistically significantly differ whether the husband or wife experiences onset. Husband's stroke onset is marginally positively associated with divorce compared with staying married, and results of the F -test ($p < .84$) indicate this association is not statistically significantly different from the coefficient for wife's stroke, which is itself not statistically significant.

Looking at marital dissolution due to widowhood, we see that neither husband's nor wife's

cancer diagnosis is associated with elevated risk of widowhood, nor are husband's heart problems onset or wife's stroke onset. Wife's heart problems onset is associated with 5% higher probability of widowhood compared with remaining married. Husband's lung disease onset is associated with 8% higher probability of widowhood, and wife's lung disease onset is associated with 7% higher probability of widowhood compared with remaining married. Husband's stroke onset is marginally significantly associated with 5% higher probability of widowhood. None of the illness-specific F -tests for gender differences are statistically significant. Associations between other covariates and widowhood are quite similar to results presented in Table 3.

We now briefly discuss other covariates statistically significant at the $p \leq .05$ level. In both pooled illness onset models and specific illness onset models, husband minority race-ethnicity is positively associated with marital dissolution via divorce, as is poor marital quality. In both pooled illness onset models and specific illness onset models, husband's age is positively associated with marital dissolution via widowhood, as are marriages in which wives are 5 to 10 years older (compared with those in which husband and wife are within 2 years' age of one another). In both pooled illness onset

Table 3. Multinomial Logistic Regression Results: Marriage Ending via Divorce or Widowhood Compared to Remaining Married by Pooled Illness Onset (Cancer, Heart Problems, Lung Disease, and/or Stroke) and Other Covariates, Health and Retirement Study (1992–2010) ($n = 2,701$ Marriages; 16,940 Marriage-periods).

| | Divorced | | | Widowed | | |
|--|--------------|------|------------------|--------------|-----|------------------|
| | Coefficients | SE | Marginal Effects | Coefficients | SE | Marginal Effects |
| Period (linear) | .00 | .03 | -.01 | .31*** | .03 | .04 |
| Period (quadratic) | -.03*** | .00 | .00 | -.06*** | .00 | -.01 |
| Husband illness onset (lagged) | -.06 | .14 | -.02 | .39** | .12 | .05 |
| Wife illness onset (lagged) | .50** | .17 | .06 | .40* | .16 | .04 |
| Husband age | -.03 | .04 | -.01 | .09** | .03 | .01 |
| Wife age | .04 | .04 | .01 | .00 | .03 | .00 |
| Husband college educated | -.18 | .14 | -.02 | -.15 | .13 | -.02 |
| Husband nonwhite and/or Hispanic | .31* | .15 | .04 | .03 | .16 | .00 |
| <i>Wife's report of marital satisfaction</i> | | | | | | |
| Very dissatisfied | 1.54** | .56 | .29 | .31 | .80 | -.02 |
| Somewhat dissatisfied | 1.40* | .58 | .21 | .92 | .61 | .07 |
| About evenly satisfied and dissatisfied | .25 | .41 | .02 | .31 | .36 | .04 |
| Somewhat satisfied | -.12 | .17 | -.02 | .00 | .18 | .00 |
| Very satisfied (reference) | — | — | — | — | — | — |
| Remarriage | .05 | .15 | .00 | .06 | .15 | .01 |
| Marital duration <10 years | -.15 | .20 | -.01 | -.39 | .24 | -.05 |
| Husband has health insurance | -.38 | .15 | -.04 | -.38 | .28 | -.04 |
| Wife has health insurance | .39 | .25 | .04 | .31 | .28 | .03 |
| <i>Household income quintile</i> | | | | | | |
| 1 (reference) | — | — | — | — | — | — |
| 2 | -.21 | .20 | .03 | .08 | .19 | .01 |
| 3 | -.06 | .21 | .01 | -.02 | .20 | .00 |
| 4 | -.11 | .22 | -.02 | -.27 | .21 | -.03 |
| 5 | .03 | .22 | .01 | -.21 | .22 | -.03 |
| <i>Household nonhousing assets</i> | | | | | | |
| In debt | .31 | .31 | .03 | .37 | .32 | .05 |
| \$0–\$50,000 (reference) | — | — | — | — | — | — |
| \$50,000–\$100,000 | -.13 | .17 | -.01 | -.18 | .17 | -.02 |
| \$100,000–\$250,000 | -.33 | .17 | -.03 | -.35 | .16 | -.04 |
| More than \$250,000 | -.29 | .17 | -.02 | -.96*** | .20 | -.11 |
| Home ownership | .19 | .20 | .03 | -.31 | .21 | -.05 |
| <i>Age difference between spouses</i> | | | | | | |
| Wife 11 years older or more | -1.15 | 1.05 | -.09 | .07 | .95 | .03 |
| Wife 5–10 years older | .00 | .43 | -.03 | 1.01* | .43 | .19 |
| Wife 3–4 years older | -.78† | .46 | -.07 | .05 | .39 | .02 |
| Husband and wife within 2 years (reference) | — | — | — | — | — | — |
| Husband 3–4 years older | .22 | .19 | .03 | .06 | .19 | .00 |
| Husband 5–10 years older | .17 | .27 | .03 | -.17 | .26 | -.03 |
| Husband 11 years older or more | .73 | .53 | .11 | .05 | .50 | -.01 |
| Constant | -.95 | .79 | | -5.93*** | .79 | |

Note: Analysis weighted using Wave 1 household weights. For marginal effects, other covariates are held at their means. Log likelihood: -33968176. Dashes indicate reference category.

† $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4. Multinomial Logistic Regression Results: Marriage Ending via Divorce or Widowhood Compared to Remaining Married by Specific Illness Onset (and Other Covariates), Health and Retirement Study (1992–2010) ($n = 2,701$ Marriages; 16,940 Marriage-periods).

| | Divorced | | | Widowed | | |
|--|--------------|-----|------------------|--------------|-----|------------------|
| | Coefficients | SE | Marginal Effects | Coefficients | SE | Marginal Effects |
| Period (linear) | .01 | .03 | -.01 | .34*** | .02 | .04 |
| Period (quadratic) | -.03*** | .00 | .00 | -.06*** | .00 | -.01 |
| Husband cancer onset (lagged) | -.29 | .26 | -.04 | .08 | .19 | .02 |
| Wife cancer onset (lagged) | .22 | .28 | .02 | .19 | .25 | .02 |
| Husband heart problems onset (lagged) | -.09 | .18 | -.02 | .26 | .17 | .04 |
| Wife heart problems onset (lagged) | .39 | .24 | .04 | .47* | .24 | .05 |
| Husband lung disease onset (lagged) | .09 | .29 | .00 | .67*** | .24 | .08 |
| Wife lung disease onset (lagged) | .73* | .30 | .08 | .68* | .37 | .07 |
| Husband stroke onset (lagged) | .53† | .32 | .06 | .51† | .28 | .05 |
| Wife stroke onset (lagged) | .43 | .39 | .06 | -.09 | .40 | -.02 |
| Husband age | -.03 | .04 | -.01 | .09* | .03 | .01 |
| Wife age | .04 | .04 | .01 | .00 | .03 | .00 |
| Husband college educated | -.17 | .14 | -.02 | -.14 | .15 | -.01 |
| Husband nonwhite and/or Hispanic | .31* | .15 | .04 | .04 | .16 | .00 |
| <i>Wife's report of marital satisfaction</i> | | | | | | |
| Very dissatisfied | 1.55** | .55 | .29 | .34 | .79 | -.02 |
| Somewhat dissatisfied | 1.39* | .58 | .21 | .92 | .62 | .08 |
| About evenly satisfied and dissatisfied | .22 | .42 | .02 | .28 | .36 | .03 |
| Somewhat satisfied | -.12 | .17 | -.01 | -.01 | .18 | .00 |
| Very satisfied (reference) | — | — | — | — | — | — |
| Remarriage | .04 | .15 | .00 | .05 | .15 | .01 |
| Marital duration <10 years | .15 | .20 | -.01 | -.37 | .24 | -.05 |
| Husband has health insurance | -.36 | .25 | -.04 | -.37 | .28 | -.04 |
| Wife has health insurance | .37 | .25 | .04 | .30 | .28 | .03 |
| <i>Household income quintile (reference)</i> | | | | | | |
| 1 | — | — | — | — | — | — |
| 2 | .22 | .20 | .03 | .08 | .19 | .01 |
| 3 | .07 | .20 | .01 | -.02 | .20 | .00 |
| 4 | -.20 | .22 | -.02 | -.25 | .21 | -.03 |
| 5 | .04 | .23 | .01 | -.20 | .22 | -.03 |
| <i>Household nonhousing assets</i> | | | | | | |
| In debt | .31 | .32 | .03 | .37 | .32 | .05 |
| \$0–\$50,000 (reference) | — | — | — | — | — | — |
| \$50,000–\$100,000 | -.12 | .16 | -.01 | -.16 | .17 | -.02 |
| \$100,000–\$250,000 | -.32† | .17 | -.03 | -.33* | .16 | -.04 |
| More than \$250,000 | -.28 | .17 | -.02 | -.95*** | .20 | -.10 |
| Home ownership | .19 | .20 | .03 | -.29 | .21 | -.04 |

(continued)

Table 4. (continued)

| | Divorced | | | Widowed | | |
|---|-------------------|------|------------------|--------------|-----|------------------|
| | Coefficients | SE | Marginal Effects | Coefficients | SE | Marginal Effects |
| <i>Age difference between spouses</i> | | | | | | |
| Wife 11 years older or more | -1.14 | 1.05 | -.09 | .10 | .94 | .03 |
| Wife 5–10 years older | -.01 | .43 | -.03 | 1.00* | .43 | .18 |
| Wife 3–4 years older | -.78 [†] | .46 | -.07 | .05 | .38 | .02 |
| Husband and wife within 2 years (reference) | — | — | — | — | — | — |
| Husband 3–4 years older | .23 | .19 | .03 | .06 | .2 | .00 |
| Husband 5–10 years older | .17 | .27 | .03 | -.18 | .26 | -.03 |
| Husband 11 years older or more | .73 | .53 | .11 | .07 | .50 | -.02 |
| Constant | -1.00 | .78 | | -6.06*** | .79 | |

Note: Analysis weighted using Wave 1 household weights. For marginal effects, other covariates are held at their means. Log likelihood: -33901477. Dashes indicate reference category.

[†] $p \leq .10$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

models and specific illness onset models, higher level(s) of nonhousing assets are negatively associated with marital dissolution via divorce.

Supplementary Analysis

We also conducted several supplementary analyses. First, we conducted a first-difference, pooled ordinary least squares model (estimating the linear probability of divorce versus remaining married) to assess the robustness of our results to unobserved time-invariant variables that might be correlated with our observed covariates and thus bias our results. Our first-differences estimate of the probability of divorce following wife's illness onset (5.45%) was quite similar to the predicted probability of divorce risk obtained from the multinomial logistic regression marginal effects (5.52%, rounded to 6% in Table 3, both at $p \leq .01$). Thus, we conclude that our findings are relatively robust to unobserved time-invariant variables. We also looked at Catholic religious identity of husband and/or wife as well as whether either (or both spouses) have children. Neither Catholic identity nor the number of children predicted divorce when added to the panel of covariates examined in main analyses, and the main substantive findings remained unchanged. In addition, we included controls for husband's and wife's baseline self-rated health, as there may be meaningful physical health variation not captured by the absence of

over-diagnosis of the focal physical illnesses at baseline. Again, our substantive findings remain unchanged. We also included smoking status as a covariate that did not change substantive findings, though both husband's and wife's current smoking also predict marital dissolution due to widowhood. We also tested for interactions between illness onset and a variety of other covariates including marital satisfaction, race-ethnicity, and education added to the model with main effects. Interactions were not statistically significant. Finally, we reran our main analyses without weights; results were substantively quite similar.

DISCUSSION

The present study examined whether illness onset constituted a risk factor for marital dissolution at middle and older ages. In our analysis examining the onset of any of four serious illnesses (cancer, heart problems, lung disease, and/or stroke), we find that only wife's illness onset is associated with elevated risk of divorce, while either husband's or wife's illness onset is associated with elevated risk of widowhood. Our focus on illness and divorce in middle and older ages contributes to understanding the risk factors for divorce in later life, which constitutes a growing share of all divorces (Brown and Lin 2012). Still, it is important to acknowledge that the majority of divorces occur earlier in life, when illness is much rarer (and less normative), which

may make it more stressful to marriages. Recent work examining marriages among younger people found that husbands'—but not wives'—work-limiting health conditions were associated with elevated divorce risk (e.g., Teachman 2010), which may reflect the relatively greater emphasis of employment for spouses—especially husbands—earlier in the life course. Taken together, the present study and prior work point to the importance of contextualizing divorce risk factors within a life course framework and in conjunction with other factors, such as race and class. Further, given greater economic symmetry between spouses in more recent cohorts, birth cohort as well as age may alter the extent to which spouse's gender modifies illness onset as a risk factor for divorce.

Prior work has suggested that the better health of married people is not due to just the healthier selecting into marriage but beneficial social processes (i.e., social causation) occurring within marriages, such as spouses' encouraging one another in healthy lifestyle practices (Umberson 1992). Our work indicates that health-selection processes should not be discounted and should be considered more carefully on both conceptual and methodological grounds in future research. Specifically, researchers should consider how health operates as a stressor on marriages and should exercise caution in interpreting cross-sectional studies' evidence of the benefits of marriage. Further, these selection processes are gendered in nature. Women are vulnerable to marital dissolution in the face of illness through both widowhood and divorce. Women are more likely to experience widowhood than are men. Women's greater longevity compared with men's (Austad 2006) and the typical partnering of women with men who are older than them (England and McClintock 2000) mean that married women are likely to survive their husbands. Our work indicates that women's own health also has consequences for marital dissolution as women's own illness (not their husband's illness) elevates their risk of divorce. Both widowhood and divorce in turn have large consequences for health (Hughes and Waite 2009; Williams and Umberson 2004).

Turning to specific illnesses, we find modest evidence that the relationship between illness onset and divorce varies by specific illness. We find that wife's (but not husband's) lung disease is statistically significantly associated with elevated divorce risk, and husband's (but not wife's) stroke is marginally statistically significantly associated with elevated divorce risk, though *F*-tests for equality of coefficients cannot be rejected in either of these

cases. Cancer onset in either husband or wife is not associated with subsequent divorce. It should be noted, however, that the lack of significant *F*-tests may reflect a lack of statistical power rather than a lack of substantive difference. Our finding that cancer onset was not associated with divorce is in contrast to prior clinical studies that found elevated divorce risks for reproductive cancers (Carlsen et al. 2007; Syse and Kravdal 2007). Besides concerns about selection issues and differently aged samples, our lack of findings for cancer may reflect further variation within the experience of cancer, though a more fine-grained analysis by type of cancer also comes at an additional cost to statistical power.

Prior research highlights variations in illness experience by gender, which may influence risk of divorce for wives and husbands. For example, women often report more symptoms, pain, and depressive symptoms following the onset of chronic illness (Ganton, Revenson, and Tennen 2007). Differences in illness experiences among men and women may reflect variation in biological and social processes in relation to the specific illness. In the context of our findings, the elevated risk of divorce for wives who experienced lung disease may be due to women's excess burden of disease-associated distress. To illustrate, a study exploring anxiety and depression among COPD patients found that women tended to report more shortness of breath (dyspnea) and higher levels of anxiety and depression, controlling for ventilatory impairment (Di Marco et al. 2006). Regarding stroke, there was some evidence that husband's onset was predictive of subsequent divorce. In general, women have later onset of first-ever stroke, a higher lifetime risk of stroke at all ages, and poorer functional health outcomes following stroke (Petrea et al. 2009). Given that women appear to be more at risk of stroke and have worse outcomes, it is unexpected that husband's stroke was a risk factor for divorce. However, unlike lung disease, the coefficients for onset of stroke were similar in size and direction for both husbands and wives, which may be indicative of no meaningful difference between them in relation to risk of divorce.

Like in any study there are caveats to our work. First, while we conducted a robustness check against unobserved time-invariant using a first differences model, we cannot rule out omitted variable bias, especially related to time-varying omitted covariates. For example, while we restricted the sample to marriages in which both spouses were free of the illnesses of interest at baseline, it is

possible that marital quality dynamics over time influenced the development and management of prior illnesses in important ways we could not fully account for in the observational window and with available measures. We attempted to address this limitation in supplementary analysis by controlling for husband's and wife's self-rated health, but unobserved heterogeneity cannot be eliminated, nor can we account for marital quality dynamics either before or after Wave 1. Another limitation of this research is the reliance of self-reported marital status. Prior research has noted that marital status is misreported; however, it is most often misreported by divorced individuals with deceased former spouses (Weaver 2000). This suggests that divorce among our sample may be underestimated, while widowhood may be overestimated. In addition, our data do not permit us to observe which spouse initiates divorce. Prior work, mostly examining younger Americans, finds that about two-thirds of divorces are initiated by women (Brinig and Allen 2000). The gendered nature of marriage markets at older ages that privilege men suggests that men would be more likely to initiate divorce following wife's illness because men have more options for new partnerships than do women. On the other hand, however, sick wives who are not receiving adequate care from their husbands might rather divorce than remain married to a poor caregiver. In addition, we cannot differentiate between cohort, period, and age effects. The recent finding that divorce in middle and older ages has been increasing likely reflects a combination of factors, including the aging of cohorts with more favorable attitudes towards divorce, the experience of divorce earlier in the life course as a fairly normative event, and improvements in medical care that benefit all older adults. Further, we do not examine age variation within the "middle and older ages" group. For many conditions, illness onset becomes increasingly normative with individuals' age. The normative timing of illness onset in the later life course may make illness less stressful for individuals as well as decrease the availability of (at least similarly aged) relatively healthy potential mates.

This work suggests several avenues for future research. First, future work should examine the roles of caregiving, income loss, and labor force detachment as mechanisms linking illness with subsequent divorce. Additional studies should also examine other dimensions of health and well-being as risk factors for divorce. Recent work, for example, found that sexual activity and psychological well-being were important mediators of the relationship

between physical health decline and declines in marital quality (Galinsky and Waite 2014). Future work should also differentiate between illness diagnosis and disability, as the consequences of illness onset may operate both through the social stigma of diagnosis and through the disabling process associated with many illnesses.

Our findings suggest that older women's health experiences affect their risk of divorce. Other research has shown that following chronic illness onset, women often report more physical and psychological distress, which may directly or indirectly influence divorce risk. Nevertheless, married women diagnosed with a serious health condition may find themselves at increased risk of divorce and may have to manage disease sequelae while experiencing the stressors associated with divorce. These women may be particularly vulnerable for further health declines considering the negative health consequences associated with marital dissolution. While it may not be as great of a concern for older women (especially over the age of 65 years and eligible for Medicare), previous research has noted that following divorce women often experience health insurance loss (Lewelle and Smock 2012). Postdivorce women who do not qualify for public coverage or who must switch coverage—to either public or private health insurance—may lose access to health care when it is needed most. Given the increasing concern of the aging population and healthcare costs, policymakers should be aware of the relationship between disease and risk of divorce.

ACKNOWLEDGMENTS

Thank you to Samuel Isaacson, Dustin Brown, Sarah Burgard, and James House for helpful advice and productive conversations. We are also grateful to N. E. Barr for editorial assistance.

FUNDING

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by a National Institute on Aging training grant to the Population Studies Center at the University of Michigan (T32 AG000221).

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Retraction

Journal of Health and Social Behavior

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DOI: 10.1177/0022146515595817

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The authors have retracted the article titled "In Sickness and in Health? Physical Illness as a Risk Factor for Marital Dissolution in Later Life," published in the *Journal of Health and Social Behavior* (2015, 56(1):59-73). There was a major error in the coding in their dependent variable of marital status. The conclusions of that paper should be considered invalid. A corrected version of the paper will be published in the September 2015 issue of *JHSB*.