Brief Report

Marital History and the Burden of Cardiovascular Disease in Midlife

Zhenmei Zhang, PhD[1]

This study examines the effects of marital history on the burden of cardiovascular disease in midlife. With use of data from the 1992 Health and Retirement Study, a series of nested logistic regression models was used to estimate the association between marital history and the likelihood of cardiovascular disease. Results suggest that, in midlife, the continuously married and the never married are among the healthiest in cardiovascular outcomes. People with multiple marital losses are the most vulnerable group. People with multiple marital losses have a higher likelihood of cardiovascular disease and will need significant formal and informal care as they advance into old age.

Key Words: Cardiovascular disease, Marital history, Divorce, Cumulative disadvantage, Marital status

Being married is associated with longer life expectancy and lower rates of chronic health conditions (Pienta, Hayward, & Jenkins, 2000; Waite & Gallagher, 2000). However, during the past several decades, first-marriage rates declined, while rates of never marrying, divorce, and cohabitation increased significantly (Bianchi & Casper, 2000). The legacy of dramatic increases in singlehood, divorce, and cohabitation, combined with

longer life expectancy, means that more and more people are entering old age after experiencing multiple marital transitions (Pienta et al.). What are the implications of marital history on the well-being of cohorts currently on the cusp of old age?

Although many researchers have examined marital status and health, the focus has been on the effects of current marital status on health. Drawing on the 1992 Health and Retirement Study (HRS), this study expands on previous research by examining the health consequences of marital history—that is, the number of marriages, the number and type of marital losses, and cohabitation. Previous research has shown that a marital loss is usually harmful to health (Waite & Gallagher, 2000). What remains unclear is (a) whether the negative effects of marital loss can be modified or erased when a person enters a new relationship, and (b) the health implications of experiencing multiple marital breakups.

Enlightened by the life-course perspective, recent research suggests that the timing and sequence of life events—like marriage and marital dissolution—may lead to different life outcomes in later life through cumulative advantages and disadvantages (Dannefer, 1987; O'Rand, 1996; Wilmoth & Koso, 2002). Specifically, negative events can accumulate over the life course through episodes of illness, adverse socioeconomic conditions, and unhealthy behaviors, resulting in differential lifetime exposure to underlying causal factors of diseases (Kuh & Ben-Shlomo, 1997). This so-called cumulative-effects model suggests that different life trajectories can be associated with different disease risks (Kuh & Ben-Shlomo).

A growing body of research supports the cumulative-effects model. Holden and Kuo (1996) found that people who experienced multiple marital transitions

Table 1. Descriptive Statistics of Dependent and Key Independent Variables, 1992 HRS

Variable	%
Dependent variables	
Heart disease	12.7
Heart attack	5.6
Stroke	2.6
Key independent variables	
Marital trajectories	
Continuously married (reference)	54.8
Remarried after one divorce	13.4
Remarried after one widowhood	1.9
Remarried after multiple marital losses	4.3
Separated or divorced once	9.1
Separated or divorced with multiple marital losses	4.7
Widowed once	4.5
Widowed with multiple marital losses	1.4
Cohabiting	2.3
Never married	3.7

Notes: HRS = Health and Retirement Study. The means and percentages are weighted.

had significantly lower incomes and assets than couples in first marriages. Lower socioeconomic status might be one of the pathways linking multiple marital transitions and health. In terms of mortality, research in the United States as well as in Europe has shown that remarried persons have significantly higher mortality than the continuously married (Hemstrom, 1996; Tucker, Friedman, Wingard, & Schwartz, 1996).

An alternative perspective used in the literature on marital status and health—that is, the selection hypothesis—states that health is associated with marital status through the process of marital selection: Individuals suffering from health problems are less likely to marry and stay married than those who are healthy (Fu & Goldman, 1996; Joung, van de Mheen, Stronks, van Poppel, & Mackenbach, 1997; Lillard & Panis, 1996). In addition, previous research has shown that people with higher education and good economic prospects are more likely to get married (Smock, Manning, & Porter, 2005). This positive socioeconomic selection into marriage suggests that the observed advantage in health enjoyed by married couples cannot be entirely contributed to marriage itself. Nonetheless, there is little evidence that the selection process plays a major role in generating the health advantages of married people (Johnson & Wu, 2002; Waite & Gallagher, 2000).

Previous work in this area often focused on mortality and mental health as the primary health outcomes. The present study examines cardiovascular disease, the main cause of the burden of disability and the leading cause of death in midlife (National Center for Health Statistics, 2004). Two basic questions guide this research: (a) Are various characteristics of the marital history (e.g., current marital status, number and type of marital losses) associated with the likelihood of cardiovascular disease in midlife? and (b) Can socioeconomic status, health behaviors, and social

integration explain the links between marital history and cardiovascular morbidity?

Methods

Data

Data from the 1992 HRS were used to examine the association between marital history and the likelihood of cardiovascular disease. The HRS is a nationally representative sample of adults aged 51–61 and their spouses. Individuals in this cohort provide a unique opportunity to examine the effects of marital history on health because they were subject to high divorce rates throughout their adulthood from the late 1960s to the 1980s (Wilmoth & Koso, 2002). The analytic sample for the current study was restricted to 9,677 age-eligible respondents with complete information on marital history. The mean age of the sample was 55.6, and women accounted for 52.4% of the respondents. About 86.2% of the respondents were White, 10.3% were Black, and the remaining 3.5% belonged to other racial and ethnic groups. The HRS was based on a complex sampling design, and consequently all models were estimated using the statistical software package SU-DAAN Version 9.0 (Research Triangle Institute, 2005), which adjusts standard errors to correct for design effects. All models are based on weighted data.

Measures

Dependent Variables.—This study focuses on three cardiovascular outcomes: heart disease, heart attack, and stroke. Respondents reported whether a doctor ever told them that they had a particular cardiovascular problem. A dichotomous indicator of heart disease was created, where 1 = respondent reported that he or she had had a heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems, and 0 = otherwise. The same method was used to create the indicators of heart attack and stroke. Table 1 shows that approximately 12.7% of the sample reported having heart disease, 5.6% reported having had a heart attack, and 2.6% reported having had a stroke.

Independent Variables.—Respondents were classified into one of 10 mutually exclusive marital history groups: (a) continuously married, (b) remarried after one divorce, (c) remarried after one widowhood, (d) remarried after multiple marital losses (either multiple divorces, multiple widowhoods, or a combination of divorce and widowhood), (e) separated or divorced once, (f) separated or divorced with multiple marital losses, (g) widowed once, (h) widowed with multiple marital losses, (i) never married, and (j) cohabiting. Table 1 describes the distribution of the HRS respondents' marital history. In midlife, only about 54.8% of respondents were still in their first marriages, 13.4% were remarried after a divorce, 1.9% were remarried after being widowed, and 4.3% were

remarried after experiencing multiple marital dissolutions. A significant proportion of respondents were unmarried: About 9.1% had separated or divorced once, 4.7% were seperated or divorced with multiple marital dissolutions, 4.5% had been widowed once, 1.4% were widowed with multiple marital dissolutions, and 3.7% had never married. About 2.3% of the sample was cohabiting. A closer look at the cohabitants reveals that the majority (86.3%) had gone through at least one marital loss. Regardless of current marital status, 41.3% of respondents had experienced at least one marital loss (either separation or divorce or widowhood); as many as 11.3% of respondents had gone through two or more marital losses by midlife.

Three mechanisms may potentially mediate the association between marital history and cardiovascular-disease morbidity: socioeconomic status, health behavior, and social integration.

Four indicators of socioeconomic status were created: education, household income, wealth, and health insurance coverage. Education measured the number of years of schooling completed. Household income measured the household income during 1991. Wealth represented the market value of respondents' assets minus debts. Household income and wealth were adjusted by adding constants to all households to eliminate zero income and negative wealth, respectively, and then logging the values. Respondents were considered uninsured when they were not covered by any health insurance programs.

Four types of health behaviors were examined: smoking status, alcohol consumption, exercise, and body mass index (BMI). Smoking status included current smokers and past smokers, with people who had never smoked as the reference group. Alcohol consumption included 1–2 drinks per day and 3 or more drinks per day, with 0 drinks per day as the reference group. Exercise was coded 1 if the respondent exercised three times a week or more. BMI was measured as a categorical variable including obesity (BMI $\geq$ 30), overweight (25.0 $\leq$ BMI $\leq$ 29.9), and underweight (BMI <18.5), with normal weight (18.5 $\leq$ BMI $\leq$ 24.9) as the reference group.

Social integration was measured by three variables: childlessness, parental survival status, and church attendance. Childlessness was coded 1 if the respondent had no children. Parental survival status was a categorical variable including one living parent and both parents living, with no living parents as the reference category. Church attendance was a categorical variable including attendance one or more times a week, monthly, or yearly, with non-churchgoers as the reference category.

Age, gender, race, and nativity were controlled in this study because previous research has found that they are associated with cardiovascular disease. The risk of such disease increases with age, and men are more likely than women to develop cardiovascular disease (Black, 1992). Blacks are more likely than Whites to have hypertension and stroke, and foreign-born individuals are less likely than their American-born counterparts to have cardiovascular disease (Hayward, Crimmins, Miles, & Yang, 2000; Jasso, Massey, Rosenzweig, & Smith, 2004). Age was measured as a continuous variable ranging from 51 to 61 years old. Gender (1 = female) and nativity (1 = foreign born) were dummy variables. Race was a categorical variable including Black and Other, with White as the reference category. The weighted descriptive statistics for the independent variables are available from the author upon request.

Analytic Strategy

A series of nested logistic regression models was used to examine differences in the odds of cardiovascular disease across marital history groups and to determine whether the effects of marital history were reduced after introducing the hypothesized mechanisms into the model. The main effects of marital history on the likelihood of cardiovascular disease were examined in Model 1, controlling for age, gender, race, and nativity. In Model 2, the four indicators of socioeconomic status were added to Model 1. And in Model 3, health behaviors and social integration were added to Model 2. Finally, the significance of the interaction between gender and marital history was examined by introducing a set of interaction terms for gender and marital history to Model 3. Although prior work indicated that gender differences existed in the association between marital status and a few health outcomes such as mental health and self-assessed health (e.g., Brown, Bulanda, & Lee, 2005; Williams & Umberson, 2004), only one gender difference reached statistical significance in this study. Therefore, the result is not presented in the table but is described later in the article.

Results

Table 2 reports estimated odds ratios from logistic regression models. Model 1 in Table 2 shows that (controlling for age, gender, race, and nativity) the continuously married and the never married—the two groups who did not experience any marital loss—were among the healthiest groups in terms of every cardiovascular outcome examined. Because the continuously married tend to fare better than others, the cumulative-effects model is partially supported. Furthermore, the relative good cardiovascular health of never-married adults casts some doubt on the selection hypothesis, which would predict the never married as one of the most disadvantaged groups.

Three other findings are also consistent with the cumulative-effects hypothesis. First, although a marital loss, divorce in particular was associated with higher risks of several types of cardiovascular disease; the negative effect increased with the number of the losses. For example, Model 1 shows that regardless of current marital status, individuals who experienced one divorce were significantly more likely than the continuously married to report having had a heart attack but did not have significantly higher rates of heart disease or stroke. In contrast, the remarried with multiple marital losses

Model	Heart Disease	Heart Attack	Stroke
Model 1			
Remarried after one divorce	1.13	1.36*	1.07
Remarried after one widowhood	1.28	1.26	0.88
Remarried after multiple marital losses	1.58**	1.80**	2.28**
Separated or divorced once	1.16	1.41*	1.42
Separated or divorced with multiple marital losses	1.68**	2.09**	2.29**
Widowed once	0.99	0.89	1.28
Widowed with multiple marital losses	1.89**	2.20†	1.20
Never married	0.99	1.03	0.74
Cohabiting	1.17	1.95*	2.37*
−2 × Log-likelihood	7,205.00	3,961.47	2,253.28
Model 2			
Remarried after one divorce	1.13	1.36*	1.07
Remarried after one widowhood	1.27	1.22	0.86
Remarried after multiple marital losses	1.50**	1.64*	2.11**
Separated or divorced once	1.02	1.17	1.19
Separated or divorced with multiple marital losses	1.41**	1.58*	1.74†
Widowed once	0.85	0.70	1.03
Widowed with multiple marital losses	1.63*	1.73	0.96
Never married	0.84	0.82	0.58
Cohabiting	1.18	1.82*	2.21*
−2 × Log-likelihood	7,120.02	3,869.56	2,214.63
Model 3			
Remarried after one divorce	1.13	1.33†	1.05
Remarried after one widowhood	1.28	1.21	0.87
Remarried after multiple marital losses	1.49**	1.53†	2.05**
Separated or divorced once	1.06	1.25	1.23
Separated or divorced with multiple marital losses	1.44**	1.59*	1.73†
Widowed once	0.82	0.67	0.99
Widowed with multiple marital losses	1.52*	1.53	0.94
Never married	1.06	1.03	0.83
Cohabiting	1.27	1.97*	2.38*
−2 × Log-likelihood	7,016.40	3,786.25	2,155.13
N	9,677	9,677	9,677

Notes: Model specification: Model 1 controlled for age, gender, race, and nativity; Model 2 added socioeconomic status to Model 1; Model 3 added health behaviors and social integration to Model 2. Continuously married was the reference category for all three models.

*p <.05; **p < .01; †p < .1.

128%, respectively, than the odds among the continuously married. The odds of having heart disease, a heart attack, or a stroke among the currently divorced with multiple marital losses were higher by 68%, 109%, and 129%, respectively, than the odds of the continuously married. Similar disadvantages were also found for the currently widowed who had experienced multiple marital losses. Second, loss of first-marriage partners to death did not significantly increase the risk of cardiovascular disease for middle-aged people if no additional marital loss followed. For example, persons who had been widowed once and persons who had remarried after one widowhood were not significantly different from the continuously married. Third, the cohabitants were substantially disadvantaged. They were significantly more likely than the continuously married to report having had a heart attack or stroke. Because the majority of cohabitants had gone through at least one marital loss, this finding supports the cumulative-effects hypothesis.

The addition of socioeconomic status in Model 2 of Table 2 reduced but did not explain away the health advantages enjoyed by the continuously married. For example, with the inclusion of socioeconomic status, the odds of heart disease, heart attack, or stroke for the remarried who had experienced multiple losses dropped about 5%, 9%, and 7%, respectively, but were still statistically significant. Socioeconomic status played a much larger role in explaining the higher likelihood of cardiovascular disease among the divorced who had experienced multiple marital losses. Their odds of heart disease, heart attack, and stroke dropped about 16%, 24%, and 24%, respectively, when socioeconomic status was controlled. The results suggest that socioeconomic status is an important mechanism linking marital history and cardiovascular problems. Model 3 introduced health behaviors and social integration to Model 2. Overall, the disparities of the odds of cardiovascular disease across marital-history groups persisted. Health behaviors and social integration did not explain much of the remaining health advantage of the continuously married once socioeconomic status was controlled.

In models not shown here, multiplicative interaction terms for gender and each marital history group were added in Model 3 of Table 2 to examine whether the effects of marital history on the likelihood of cardiovascular disease differed significantly between men and women. Results suggested that the effects of marital history on the risk of cardiovascular disease were similar for men and women with one exception: After controlling for demographic characteristics, socioeconomic status, health behaviors, and social integration, first-time widows were significantly more likely than their male counterparts to report having had a heart attack.

Discussion

This study examined the effects of marital history on the likelihood of cardiovascular disease in midlife. Results suggest that current marital status and the number and type of marital losses are associated with

were significantly more likely than the continuously married to report having had heart disease, a heart attack, or a stroke. The odds of having heart disease, a heart attack, or a stroke among the remarried with multiple marital losses were higher by 58%, 80%, and

the likelihood of cardiovascular problems, with demographic controls. Consistent with the cumulative-effects model, the continuously married and the never married are among the healthiest in cardiovascular outcomes. People with multiple marital losses are the most vulnerable group, with significantly higher odds of cardiovascular disease than the continuously married. In addition, people who have divorced once, regardless of current marital status, have a higher risk of heart attack. However, first-time widows and widowers do not seem to be at a disadvantage compared with the continuously married. This is consistent with the argument that divorce often involves long-term marital strain and stress before and/or after divorce, whereas widowhood usually exerts acute short-term stress. Long-term stress can lead to cardiovascular problems. The results also show that cohabitants are at high risk of heart attack and stroke. As for the mechanisms linking marital history and cardiovascular health, socioeconomic status plays a significant role in explaining the higher risk of cardiovascular disease among people with multiple marital losses. However, differences in health behaviors and social integration do not explain many of the remaining differences.

There are several limitations to this study. First, because the 1992 HRS did not contain information about the relative timing of marital transitions and the onset of cardiovascular disease (HRS only asked about the year of the most recent heart attack and stroke), no causal inferences can be drawn between marital history and disease. Both health selectivity into stable marriages and cumulative negative effects of marital losses can produce the cardiovascular-disease morbidity patterns observed in this study. It is highly possible that both processes are operating. The relative good cardiovascular health of the never married, however, casts some doubt on the selection hypothesis. In order to disentangle causal processes, longitudinal data with detailed life-course information about respondents' childhood socioeconomic status, personality traits, family history of cardiovascular disease, and health status before and after marital losses are needed. Second, recent studies suggest that different dimensions of marital quality are related to well-being. The incorporation of quality of current and/or previous marriages may shed light on issues such as whether the health disadvantage of the divorced is due more to poor marital quality before the divorce than to events and conditions after the divorce. Nonetheless, the present results suggest that substantial health disparities exist across different marital trajectories in the risk of cardiovascular disease.

As the trend of marital instability shows no sign of abating, and more and more people live longer than ever before, the number of people with multiple marital losses will certainly increase in the future. This group of people, regardless of current marital status, has a higher risk of cardiovascular disease than the continuously married. Considering the debilitating nature of cardiovascular disease, they will need significant formal and informal care as they advance into old age. This study demonstrated the importance of going beyond current marital status in the study of marital status and health in old age as the marital history of baby boomers becomes increasingly complex.

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