Cohabitation and U.S. Adult Mortality: A Gender and Race-Ethnicity Perspective

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Abstract

Despite bourgeoning scholarly and political interest on the rapid growth of cohabitation in the U.S., we know very little how this emergent union type is related to U.S. adult mortality. Based on pooled data from the National Health Interview Survey-Longitudinal Mortality Follow-up files, we compare mortality rates of cohabiters to that of other marital status groups including the married, the unpartnered never-married, divorced/separated, and widowed. Results from Cox proportional hazards models suggest that on average, the overall mortality rate of cohabiters is higher than that of the married (especially for White men and women), lower than that of the divorced/separated or never married (especially for White men and Black men), and similar to that of the widowed. The lower mortality rate of cohabiters relative to the divorced is mainly due to income differences between these two groups; however, family income does not fully explain the higher mortality rate of cohabiters relative to the married.

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Over the past half century, the prevalence of non-marital cohabitation in the U.S. has steadily increased—from 0.4 million cohabiters in 1960 to 4.6 million in 2000—with a higher prevalence among Blacks and Hispanics than Whites (U.S. Census Bureau 2010; Seltzer 2004; Brown, Van Hook, and Glick 2008). Given a substantial literature showing that participating in marriage may protect health and longevity, one central concern related to the rising rates of cohabitation is that cohabiters may not receive the same health benefits as marriage presumably provides. While research suggests that the married are healthier, studies tend to make conclusions about the non-married as a whole. A significant portion of non-married Americans are involved in other types of intimate relationships such as cohabitation. However, very little is known about how mortality of cohabiters differs from other marital status groups such as the married, divorced, widowed, or never married in the U. S. (Carr and Springer 2010).

At least on some dimensions, recent research suggests that cohabitation is *similar* to marriage; therefore cohabitation and marriage may promote health and longevity in analogous ways. Married and cohabiting people share a home and engage in emotional and sexual intimacy, and a partner in both types of unions is a potential confidant, caregiver, and financial supporter (Manning and Smock 2005; Musick and Bumpass 2006). Alternatively, some research suggests that cohabitation is *dissimilar* to marriage on other dimensions; therefore cohabiting partners may not receive the same longevity benefits as married spouses. Compared to the married, cohabiters are more likely to engage in risky health behaviors (Horwitz and White 1998), report strain in their relationships (Skinner et al. 2002), experience more psychological distress (Brown 2000), and have shorter relationship durations (Heaton 2002).

The present study is among the first to explore the relationship between cohabitation and adult mortality in the U. S. To do so, we compare mortality rates of cohabiters to that of other marital status groups including the married, the unpartnered never-married, divorced/separated, and widowed. Documenting these mortality differences is an essential first step toward understanding the relationship between cohabitation and mortality. Given the long-standing observations about gender and racial-ethnic differences in family and mortality processes, we pay special attention to these potential social group differences in the link between cohabitation and mortality. We further examine whether family income—the most often documented mechanism linking union status and health (Rogers 1995; Lillard and Panis 1996)—explains any union status differences in mortality.

Cohabitation and Mortality: Empirical Evidence

Empirical evidence examining the link between cohabitation and mortality is sparse and mainly based on data from European populations. These European studies suggest that those who cohabit with others face lower mortality risk than those who live alone, but higher mortality risk than the married (Qin, Agerbo and Mortensen 2003; Koskinen, Joutsenniemi, Martelin and Martikainen 2007). These studies conclude that cohabitation status is in fact more important than marital status in predicting mortality (Lund et al. 2000; Lund et al. 2002; Scafato et al. 2008). They further conclude that the lower mortality rate of those who live with someone in comparison to those who live alone cannot be explained by differences in health behaviors such as smoking, diet, or physical activity among European populations (Lund et al. 2002).

No studies known to the authors have examined the relationship between cohabitation status and mortality using data from the U.S. Some research has explored the link between cohabitation and other measures of well-being in the U.S., but provides inconsistent evidence.

Studies have found that individuals in a cohabitating relationship are in worse health than the married but in better health than the unpartnered singles in terms of psychological distress (Brown 2000) and self-rated health (Wu, Penning, Pollard and Hart 2003). However, a recent study reveals that cohabiters tend to have poorer self-rated health, higher levels of psychological distress and longer time spent recovering due to health problems than both their married and single counterparts (Fuller 2010). In contrast, some studies report no significant difference between the married and cohabiters in a range of health outcomes including depression (Ross 1995; Horwitz and White 1998; Musick and Bumpass 2006), happiness (Musick and Bumpass 2006), functional health (Wu and Hart 2002), and self-rated health (Wu and Hart 2002); while others suggest similarity between cohabiters and the unpartnered singles in reporting psychological well-being (Horwitz and White 1998; Kim and McKenry 2002). Overall, these studies provide little consistent insight into how *mortality rates* may be similar, or different, for U.S. cohabiters versus other marital status groups.

Inconsistencies across studies on the relationship between cohabitation and health may be due to differences in measures of health, methods of analysis, and study samples from different countries and age groups—factors that are associated with different prevalence and norms of cohabitation. Besides these factors, another inconsistency in the literature about cohabitation and health reflects the confusion of which reference group cohabiters should be compared with. While some studies compare cohabiters with the married (e.g., Brown 2000), others compare cohabiters with the unpartnered singles (e.g., Lund et al. 2000; Lund et al. 2002; Scafato et al. 2008). This may reflect the non-institutionalized nature of cohabitation in society and the related confusion of social norms. In this study, we compare cohabiters with individuals from all other different family unions separately including the married, unpartnered never

married, divorced/separated, and widowed, in order to understand the relationship between cohabitation and mortality in a more comprehensive way.

Cohabitation and Mortality: Theoretical Predictions

Despite a lack of empirical evidence on how cohabitation is related to mortality in the U.S., a long-standing literature linking marital relationships with health and longevity offers theoretical insight into how cohabitation status is related to mortality. Some scholars argue that those who marry may be the healthiest of the population—leaving unhealthy people *selected* outside the bounds of marriage into other union types such as cohabitation (Horwitz and White 1998; Pollard and Harris 2005; Kenney and McLanahan 2006). In this sense, cohabiters may share preexisting characteristics before entering unions in contrast to the married—such as less education and lower earning potential (Xie, Raymo, Goyette and Thornton 2003), more likely not to have lived with both parents during childhood (Kenney and McLanahan 2006), and poorer mental health and health behaviors (Pollard and Harris 2005)—which may all contribute to potential higher mortality rates of cohabiters than the married. While selection processes may play a role in the relationship between union status and mortality, Carr and Springer (2010) contend in a review of relevant research that even when selection factors are controlled for, cohabiters are still worse in a variety of health outcomes than the married, but better than the unpartnered singles. Researchers have argued that involvement in a marital relationship is related to unique social, psychological, and economic resources, which in turn may promote longevity (Ross, Mirowsky and Goldstein 1990; Waite and Gallagher 2000). However, these resources may not be present—at least to a similar degree—in cohabiting relationships.

In terms of social and psychological resources, the marital relationship provides access to social support (i.e., providing love, advice, and care) and social integration (Ross et al. 1990),

which promote psychological well-being, physical health, and longevity (Bloom 1990; Turner and Marino 1994). Marriage also serves to inhibit, regulate, or facilitate health behaviors—a process known as social control—which shapes health and mortality (Umberson 1987, 1992; Waite and Lehrer 2003).

Although cohabiting partners also engage in sexual intimacy and can provide emotional and social support for one another (Musick and Bumpass 2006)—and thus may have advantages relative to the unpartnered never married, divorced and widowed, most literature suggests that cohabiters may not receive the same level of social and psychological benefits as the married. Research shows that in comparison to the married, cohabiters are less likely to receive support from friends or relatives (Eggebeen 2005), and more likely to partake in risky health behaviors (Horwitz and White 1998), although cohabiters who plan to marry engage in similar health behaviors as the married (Duncan et al. 2006; Lung et al. 2002; Wu, Penning, Pollard and Hart 2003). It may be that cohabitation does not provide the same social and psychological components of marriage because cohabiters are less committed to one another due to lacks of institutional legitimacy—legitimacy that is theorized to be responsible for many of the benefits of legal marriage for individuals' well-being (Bumpass and Lu 2000; Stanley, Whitton and Markman 2004; Waite and Gallagher 2000). Indeed, cohabiters report more strain in their relationships than their married counterparts (Horwitz and White 1998) and are more worried about their relationships dissolving (Brown 2000), both factors that have been shown to contribute to higher mortality rates (De Vogli, Chandola and Marmot 2007; Tower, Kasl and Darefsky 2002). If this is the case, cohabiters would have higher mortality rates than the married although lower rates than the unpartnered never married, divorced, and widowed.

In terms of economic recourses, a substantial literature establishes the link between marriage and increased economic resources. Economic resources are suggested to be a key reason for better health and lower mortality rates of the married than others (Lillard and Panis 1996). According to Becker (1981), marriage leads to an increase in economic resources through specialization in the division of labor, economies of scale, and the pooling of wealth. These economic resources may promote longevity by, for example, enhancing the ability to buy fruits and vegetables and thus improving nutrition, enhancing the ability to purchase medical care and health insurance, and increasing the probability of access to professional care in the event of illness or injury (Bernstein et al. 2008; Ross et al. 1990).

Cohabiters share a living space with a partner, and may to some extent gain benefit from economies of scale in similar ways as the married in comparison to the single. However, cohabiters have less education and lower earning potential (Xie, Raymo, Goyette and Thornton 2003), and they are less likely than the married to pool their income (Brines and Joyner 1999) or specialize between household and paid work (Davis, Greenstein and Marks 2007; Gupta 1999). Becker (1981) argues that a less specialized division of labor is associated with decreased economic returns. Moreover, some research suggests that marriage becomes a financial "capstone" (Cherlin 2004), wherein cohabiters delay marriage in order to obtain the financial stability they believe is necessary in order to marry (Edin and Kefalas 2005). In this sense, cohabiters may not accrue the financial benefits of marriage—or only benefit incrementally—and in turn have higher mortality rates than the married although lower rates than the unpartnered singles.

Gender, Cohabitation, and Health/Mortality

Empirical evidence on gender differences in the link between cohabitation and health/mortality is limited and inconsistent. Brown, Bulanda, and Lee (2005) suggest that cohabiting men report more depressive symptoms than married men but cohabitating women report similar levels of depression as married women. Duncan et al. (2006) find that while young men who transition to either marriage or cohabitation reduce their marijuana use and binge drinking, young women do not. A mortality study of Italian elderly cohort suggests that the mortality rate of cohabiting men is lower than men who live alone, but women's survival is not related to cohabitation status (e.g., Scafato et al. 2008). In contrast, a Danish mortality study of the elderly population aged 75 and above finds that continuously living alone is a stronger predictor for mortality of women than of men (Lund et al.; 2000). Yet, other studies find no significant gender difference in the relationship between cohabitation status and health/mortality (Lund et al. 2002).

More research has been devoted to examining gender differences in marriage links with health and mortality. This line of research generally suggests that marriage promotes health and longevity for both men and women, but that the magnitude of the association between marital status and health/mortality is greater for men than for women (Liu 2009; Gardner and Oswald 2004; Johnson et al. 2000; Rogers 1995; Umberson 1992; Ross et al. 1990; Gove 1973). Married men live longer than unmarried men mainly because married men have greater access to social and psychological resources (e.g., social support, social control of health behaviors) from marriage (Ross et al. 1990; Umberson 1992), while married women live longer than unmarried women mainly because married women are more likely to gain financial and economic resources with entrance into marriage with a typically higher earning spouse (Lillard and Waite 1995; Lund, Modvig, Due and Holstein 2002; Williams and Umberson 2004).

Some research suggests that men's health and longevity benefit more from marriage as a result of the traditional division of labor that is argued to be more rewarding to "bread earner" husbands than housewives (Bernard 1972; Gardner and Oswald 2004). Although cohabiting partners are more egalitarian than the married on a variety of dimensions such as household labor (Davis 2007; Gupta 1999) and income (Brines and Joyner 1999), gender differences on these dimensions still exist in cohabiting relationships. Like their married counterparts, for example, cohabiting women spent more time on household work than cohabiting men (Gupta 1999), while cohabiting men earn more than their female partner (Brines and Joyner 1999). Since cohabiting couples are less likely to pool their income together (Brines and Joyner 1999), cohabiting women may not gain similar economic benefits as married women from pooling income in relationship unions—a key mechanism linking union status and mortality for women. In contrast, although not so much as married men, cohabiting men may enjoy the benefit of household work and emotional support from their female partners (Gupta 1999), which may reduce the risk of mortality. These then suggest that cohabiting men would have lower mortality rates than single men, and morality differences between cohabiting and single women would be more modest.

Race-Ethnicity, Cohabitation, and Health/Mortality

Both cohabitation and mortality patterns differ across racial-ethnic groups, suggesting potential racial-ethnic differences in the relationship between cohabitation and mortality. Cohabitation is more prevalent among Blacks and Hispanics than Whites (Brown, Van Hook and Glick 2008). Blacks and Hispanics are also less likely to marry their cohabiting partner and more likely to experience dissolutions of relationship unions than their White counterparts (Bramlett and Mosher 2001; Raley and Bumpass 2003; Brown, Van Hook and Glick 2008; Thornton, Axinn and Xie 2007). Different prevalence rates of cohabitation across racial-ethnic groups suggest that

cohabitation may have different meanings and dynamics for Blacks, Whites, and Hispanics, and therefore differentially shape mortality across racial-ethnic groups. For example, Whites are the most likely to marry their cohabiting partner and therefore cohabitation for this group may be more of a "trial" marriage (Thornton, Axinn and Xie 2007). In contrast, cohabitation tends to be an *alternative* to marriage, viewed as "marriage-like" for Blacks and Hispanics (Thornton, Axinn and Xie 2007; Brown, Van Hook and Glick 2008). Therefore, cohabitation may mirror the dynamics of marriage in ways that shape mortality more so for Blacks and Hispanics than Whites.

Moreover, the economic consequences of marriage and cohabitation differ across racial-ethnic groups, potentially shaping mortality patterns. The earning premium of married men relative to unmarried men is greater for Whites than for Blacks and Hispanics (Cohen 1999). Black and Hispanic women are also less likely than White women to increase their financial capital from relationship unions (Farley 1988; Edin and Lein 1997; Edin and Kefalas 2005), which may in turn affect health and mortality. This body of work suggests that cohabitation, like marriage, may bring fewer economic benefits and have a smaller protective effect on mortality for Blacks and Hispanics than for Whites. However, we know of no studies that examine how cohabitation is related to mortality differently across racial-ethnic groups.

In sum, these literatures lead us to predict that cohabiters would have a morality rate higher than the married but lower than the single including the unpartnered never married, divorced, and widowed. We predict that these differences are at least partially due to differences in economic resources associated with family unions. Given the evidence that the association of marriage and mortality is greater for men than for women, we expect that cohabitation (in comparison to singlehood) has a stronger association with mortality for men than for women.

The greater prevalence of cohabitation as an alternative to marriage among Blacks and Hispanics suggests that mortality rates of cohabiters may be more similar to the married for these racial-ethnic groups; cohabiting Whites may gain a more modest longevity benefit from cohabitation as compared to marriage. Although previous studies provide valuable knowledge about the link between cohabitation and health/mortality, no previous studies have examined mortality differences by cohabitation status in the U.S. This is important because cohabitation has been continuously growing rapidly in the U.S. and mortality is a central concern of population health and well-being. Examining the association between cohabitation and mortality, both for the whole population but also across racial-ethnic and gender groups, enables us to better understand potential health inequalities associated with this rapid-growing family union type across demographic groups.

Data and Sample

We use data from the public-use version of the National Health Interview Survey-Longitudinal Mortality Follow-up (NHIS-LMF). The National Health Interview Survey (NHIS) is a multistage probability survey conducted annually by the National Center for Health Statistics (NCHS) and is representative of the civilian noninstitutionalized population of the U.S. (NCHS 2004). Through statistical matching techniques, NHIS survey respondents aged 18 and over who were interviewed between 1986 and 2004 are linked to death records in the National Death Index (NDI), a national file of deaths that occur each year in the U.S., through the end of 2006 (NCHS 2004). In this study, we use the pooled NHIS-LMF files from 1997 to 2004 because the NHIS did not collect information on cohabiting status prior to 1997.

Only individuals aged between 25 and 80 who are identified as non-Hispanic White (hereafter "White"), non-Hispanic Black (hereafter "Black") and Hispanics are included in the

present analysis because individuals from other racial-ethnic groups are highly heterogeneous and fewer deaths are observed for those groups. We further exclude those observations with missing values on cohabitation and marital status when the surveys were conducted. In the final analysis, we include 403,896 respondents who were interviewed in the baseline NHIS from 1997 to 2004. Among those respondents, 6,361 were determined to have died over the subsequent two years since the survey was conducted. Weights are applied in the analysis to adjust for the complex sampling frame of NHIS. All significance tests are based on robust standard errors, which are further adjusted for household unit to account for the clustering of observations within household.

Measures

Mortality. Mortality/survival is measured by the death rate of the participants from the date when the survey was conducted over the subsequent two-year follow-up. For those who died within two years after the survey was conducted, mortality status was coded as 1. Individuals who did not die over the subsequent two-year follow-up period were censored. Instead of using the full mortality follow-up (i.e., until the end of 2006) information, we truncate the mortality follow-up to two-year period mainly because NHIS did not follow up the union status of the respondents, and the two-year mortality follow-up reduces the exposure of union transitions.

Union Status. Because NHIS-LMF data provide no information on cohabitation and marital status at death, we use union status information at the time of the survey in the analysis. Union status is categorized into five categories: currently married, cohabiting (i.e., living with a partner), unpartnered never married, divorced/separated, and widowed. We use "cohabiting" as the reference group in the analysis to better understand mortality differences between cohabiters

and other union status groups. Transitions into and out of marital and cohabitating unions are not identifiable in the data as NHIS did not follow cohabitation and marital status of the respondents. We use two-year mortality follow-up information in the analysis in order to reduce the exposure of union transitions.

Family income. Because of the endogenous relationship between income and marital status (Becker 1981), we add family income into the analyses in order to examine if family income explain the mortality differences by union status. We follow previous studies (e.g., Lynch 2006; Liu and Umberson 2008) and use the midpoint of each income category converted into 2004 U.S. dollars based on the consumer price index to measure family income. We use the logarithmic transformation of family income to address the skewed distribution, which is further centered at the mean value. Missing reports on family income, which account for about five percent of the final analyzed sample, are imputed with the median value of specific survey year.

Other socio-demographic covariates. We include three racial-ethnic groups: Whites, Blacks, and Hispanics. Age is used as the analysis time scale and measured in one quarter-year units (which is the smallest unit available in the public versions of the NHIS-LMF data). Age at baseline survey is controlled as the model stratification variable. The mean age at baseline survey of the total analyzed sample is 47.31 years, with a standard deviation of 14.48. We also control for gender (1 = female, 0 = male), education (no high school diploma, high school graduate, some college, and college graduate with the last category as the reference) and geographic region (Northeast, Midwest, South, and West with Northeast as the reference). Table 1 shows the descriptive statistics of all socio-demographic covariates for the total sample as well as by gender and racial-ethnic subgroups in pooled baseline sample from the NHIS 1997-2004.

Table 1 about here

Statistical Methods

We estimate two Cox proportional hazards models to understand the relationship between cohabitation and mortality. Mortality rate is highly age dependent. We use age as the analysis time scale in both models to best control for the effect of age on mortality rate (see Singer and Willett 2003). We further stratify the analysis by age at baseline survey for both models. In the first model, we examine the general relationship between cohabitation and mortality, controlling for only the basic socio-demographic covariates (i.e., gender, race-ethnicity, education, and geographic region). We add family income in the second model to see how adding income may modify the relationship between cohabitation and mortality. A reduction in the significance level and/or magnitude of the effect of union status from Model 1 to Model 2 would suggest that family income plays a role in explaining the association between cohabitation and mortality. The final model we estimate can be specified as:

$$\log \frac{h_i(t)}{h_0(t)} = \sum \beta_j M_j + \sum \pi_k X_k$$

where t represents the analytic time metric, that is participants' age in this case. $h_i(t)$ is the resultant death hazard at age t and $h_0(t)$ is the baseline hazard at age t. M_j represents the set of union status dummy variables and β_j represents the corresponding coefficients ("cohabiting" is the reference group); X_k stands for the other covariates included in the model and π_k for the corresponding coefficients. β_j are of greatest interest for this study because they reflect mortality differences between cohabiters and other marital status groups. We conduct the analysis for the total sample first and then separately for the six gender and racial-ethnic subgroups including White men, White women, Black men, Black women, Hispanic men, and Hispanic women to better understand potential gender and racial-ethnic variations in mortality differences by union status.

Results

We start with reporting descriptive results on mortality risk by union status. Table 2 shows the total number and percentage of deaths over the subsequent two years since the surveys were conducted by union status for the total sample as well as by gender and racial-ethnic groups. From Table 2, we can see that there are a fairly sizable number of deaths for each union status group among the total sample analyzed. Readers, however, should interpret the results with caution for some race-ethnicity and gender subgroups for whom the number of deaths for cohabiters are relatively small. Specially, there are 13 deaths among cohabiting Black women, 7 deaths among cohabiting Hispanic women, and 18 deaths among cohabiting Hispanic men in the analyzed sample. Results in Table 2 suggest that for each gender and racial-ethnic group, cohabiters have the lowest mortality risk followed by the never married, married, and divorced; the widowed have the highest mortality risk. Note, these mortality differences are based on descriptive results without controlling for the socio-demographic covariates and may reflect different socio-demographic compositions (e.g., age) across union status groups.

Table 2 about here

Cohabitation and Mortality for the Total Sample

In order to better understand mortality differences by union status, we now turn to the results from Cox proportional hazards models which control for the effects of basic socio-demographic characteristics. We first estimate the general relationship between cohabitation and mortality for the total sample. We report results from two models in Table 3 and both models are stratified by age at baseline survey. Model 1 of Table 3 shows the estimated mortality hazard ratios by union status for the total sample after controlling for gender, race-ethnicity, education, and geographic region. Results from Model 1 of Table 3 suggest that in comparison to cohabiters,

the mortality rate is 26.5 (i.e., (1-0.735) X 100) percent lower for the married, 22.8 (i.e., (1.228-1) X 100) percent higher for unpartnered divorced/separated, and 40.5 (i.e., (1.405-1) X 100) percent higher for the never married respectively after controlling for the basic socio-demographic covariates. The mortality rate of the widowed is not significantly different from that of cohabiters net the effects of socio-demographic characteristics.

Estimated effects of all other covariates are in the expected direction and consistent with prior research (see Rogers, Hummer, and Nam 2000). Specifically, women have lower mortality rates than men, Blacks have higher mortality rates than Whites while Hispanics have lower mortality rates than Whites. People living in the South face higher mortality rates than people living in the Northeast. In comparison to college graduates, each of the lower education groups exhibits higher mortality rates. The mortality rate generally declines across survey year.

Table 3 about here

We add family income as an additional covariate in Model 2 of Table 3 to see if family income can explain any of the relationship between union status and mortality. Results in Model 2 of Table 3 suggest that family income is negatively related to mortality. A comparison of results from Models 1 and 2 suggests that adding family income results in little change in the estimate of mortality difference between the married and cohabiters. This suggests that marriage, in comparison to cohabitation, is related to additional factors promoting longevity which cannot be explained by increased family income. The mortality difference between the divorced/separated and cohabiters changes from significant in Model 1 to insignificant in Model 2 after family income is added. This suggests that the divorced/separated have a higher mortality rate than cohabiters mainly because the divorced/separated have less family income, which in turn is related to mortality. In addition, after family income is controlled, the significance level

of mortality difference between the never married and cohabiters reduces from $p < .001$ to $p < .05$, and the magnitude of relative mortality difference between the never married and cohabiters also reduces by about nine percent. This suggests that the unpartnered never married face a higher mortality rate than cohabiters partially, but not totally, because they have lower family income than cohabiters.

Gender and Racial-Ethnic Differences

To understand the potential gender and racial-ethnic differences in the relationship between cohabitation and mortality, we estimate Cox proportional hazards models for White men, White women, Black men, Black women, Hispanic men, and Hispanic women separately and report the results in Table 4. We estimate two models for each gender and racial-ethnic subgroup in Table 4. Model 1 controls for basic socio-demographic covariates including education, geographic region, and survey year. Model 2 adds family income as an additional covariate. Both models are stratified by age at baseline survey.

Table 4 about here

We first discuss the results from Model 1. Results from Model 1 of Table 4 suggest that married White men and women face lower rates of mortality than their cohabiting counterparts net the effects of social-demographic covariates. Specifically, the mortality rate of married White men is 27.8 percent lower than that of cohabiting White men; and the mortality rate of married White women is 31.8 percent lower than that of cohabiting White women net the effects of basic socio-demographic covariates. However, the lower mortality rate of the married relative to cohabiters does not appear for Hispanic or Black men or women.

Both divorced and never married White men have higher mortality rates than their cohabiting counterparts after socio-demographic covariates are controlled. Specifically, the

mortality rates of divorced and never married White men are 37.8 percent and 49.3 percent respectively higher than that of cohabiting White men. Widowed White men have a similar mortality rate as cohabiting White men net the effects of basic socio-demographic covariates.

For Blacks, the only significant mortality difference between cohabiters and other union status groups is that the mortality rate of never married Black men is 74.2 percent higher than that of cohabiting Black men. For Hispanics, the mortality rate of cohabiters is not significantly different from that of any other union status group for either men or women net the effects of other socio-demographic covariates.

Now, we compare the results from Models 1 and 2 in Table 4 to see if family income can explain any of the mortality differences by union status for gender and racial-ethnic subgroups. A comparison of results from Models 1 and 2 in Table 4 reveals that after family income is controlled, the higher mortality rate of divorced/separated White men relative to their cohabiting counterparts becomes insignificant in Model 2. This suggests that the higher mortality rate of the divorced/separated White men relative to their cohabiting counterparts is mainly due to family income difference between these two groups. In addition, adding family income decreases the significance level of two other significant effects in Table 4: the lower mortality rate of married White men and the higher mortality rate of never married White men relative to their cohabiting counterparts. These results suggest that family income explains a partial but not the whole mortality differences of married and never married White men relative to their cohabiting counterparts. Adding family income reveals little change in the results for White women or Blacks or Hispanics.

Discussion

Despite bourgeoning scholarly and political interest on the rapid growth of cohabitation in the U.S., we know very little how this emerging union type is related to mortality—the ultimate concern of population well-being. This is one of the first studies to investigate U.S. adult mortality differences between unmarried cohabiters and individuals in other family unions. Based on pooled data from the NHIS-LMF 1997-2004, we find that on average, the mortality rate of cohabiters is higher than that of the married, lower than that of the divorced/separated or never married, and similar to that of the widowed. The lower mortality rate of cohabiters relative to the divorced is mainly due to income differences between these two groups; however, family income does not fully explain the higher mortality rate of cohabiters relative to the married. We also find substantial gender and race-ethnicity variations in mortality patterns across union status groups.

Cohabitation versus marriage. One of the central concerns of scholarship on union status and health is whether cohabitation provides the same health benefits as marriage presumably does. Our results showing higher mortality rates of cohabiters relative to the married suggest that cohabitation may not be equivalent to marriage in protecting health and longevity. This is especially true for Whites (both men and women). We find that cohabiting White men and women have higher mortality rates than their married counterparts; and these mortality patterns cannot be explained by family income differences. This suggests that mortality advantages of marriage verses cohabitation go beyond an increase in income and economic stability—a major theory particularly related to women's marital benefit—to include other factors not tested in this analysis.

Past research suggests that cohabiters tend to live a relatively unhealthier lifestyle (Horwitz and White 1998; Fuller 2010), receive less social support (Eggebeen 2005), experience

more relationship strains and psychological distress (Brown 2000) than the married. While we were unable to test those factors in this analysis due to data constraints[1], it may be that social, psychological, and behavioral differences in cohabiting and marital relationships provide greater longevity benefits to married White men and women than to their cohabiting counterparts. However, we cannot rule out the possibility that individuals in better health or with more favorable health characteristics (e.g., better mental health, healthier life style) are more likely to choose to marry rather than cohabit—suggesting a potential selection process of marriage and cohabitation (Horwitz and White 1998; Kenney and McLanahan 2006). This selection process may contribute to lower mortality rates of the married than cohabiters.

In contrast to our White sample, we find that Black and Hispanic cohabiters have similar morality rates as their married counterparts for both men and women. This finding is consistent with our hypothesis and suggests that cohabitation may be more analogous to marriage for Blacks and Hispanics, and thus mirror the dynamics of marriage in ways that are linked to health and mortality (Brown, Van Hook and Glick 2008); while the institutionalized nature of a relationship is more important for Whites' mortality. Research suggests that marriage may not confer as much social and economic benefits for Blacks and Hispanic as for Whites (Farley 1988; Edin and Lein 1997; Edin and Kefalas 2005). Thus, Black and Hispanic cohabiting men and women may more easily match their married counterparts on these social and economic properties. Additionally, as cohabitation is more prevalent and more likely to be perceived as "marriage-like" among Blacks and Hispanics (Thornton, Axinn and Xie 2007; Brown, Van Hook and Glick 2008), it is possible that the selection process of healthier people into marriage rather than cohabitation is less relevant among these race-ethnicity groups than Whites. Thus, mortality differences between the married and cohabiters are more modest among Blacks and Hispanics.

Cohabitation versus singlehood. Although cohabitation may be less protective for longevity compared to marriage, especially for Whites, individuals who cohabit may receive some degree of benefit for longevity when compared to unpartnered individuals. Previous studies on health and family status typically include cohabitation within other union status groups—such as the never married, divorced or widowed without distinguishing cohabiting and unpartnered individuals; however, there is reason to suggest that there are important differences among these groups that differentially shape mortality (Carr and Springer 2010).

In line with this growing body of research highlighting the diversity of the "unmarried" category, we find that White men who cohabit have a lower mortality rate than White men who are divorced or separated; and this is mainly because cohabiting White men have higher family income than divorced/separated White men. In our pooled sample from the NHIS 1997-2004, family income of cohabiting White men is 35 percent higher than that of divorced White men. This finding is surprising, as most research suggests that loss of income is the driving factor in divorced *women's* higher mortality due to the loss of men's (typically) higher salaries (Lillard and Panis 1996). Our findings suggest that cohabiting White men, instead of women, may benefit from the increase in family income in contrast to divorced White men, and that a loss in income upon divorce has significant effects on divorced men's mortality if they do not live with a partner. It may be that divorced White men earn less, or they pay child support payments, which lower their income significantly in comparison to cohabiting White men (Bartfeld 2000). Lower income may limit their ability to afford healthy food and health care service, which thus affect health and mortality of divorced White men (Bernstein et al. 2008).

Moreover, we find that White and Black men who cohabit have lower mortality rates than their unpartnered never married counterparts. These mortality differences cannot be fully

explained by differences in family income. Yet, the mortality rate of cohabiting women is not different from that of never married, divorced/separated, or widowed women for any racial-ethnic subgroup examined. Additional analyses including gender interaction terms (not shown in paper but available upon request) suggest that gender variation in the mortality difference between the never married and cohabiters is statistically significant. This finding is consistent with our expectation that any union status is more important for men's mortality than women's (Gardner and Oswald 2004; Johnson et al. 2000; Ross et al. 1990; Umberson 1992).

Past research suggests that involvement in an intimate relationship promotes health and longevity; and a partner (usually female) in an intimate relationship is a key confidant who provides emotional support and assistant in case of illness for each other (Carr et al. 2010). Although most previous studies emphasize the benefit of marital relationship to men's mortality (e.g., Gove 1973; Rogers 1995), our results suggest that cohabitation relationship, to some degree (although less than marriage), may also promote longevity especially for White and Black men. However, it is also possible that White and Black men who choose to cohabit are healthier or have more favorable health characteristics before entering into unions than those who stay single. The potential preexisting differences between cohabiting and unpartnered White and Black men, rather than involvement in a relationship, may explain the mortality differences we identified.

Although our conceptual framework suggests different mortality patterns across union status groups, we cannot conclude whether the identified mortality differences are due to casual or selection processes of marriage and cohabitation. Are people in better health or more favorable mortality-related characteristics more likely to choose to marry rather than cohabit? Are they more likely to cohabit rather than stay single? Understanding these two different

selection processes of cohabitation will shed light on the dynamic process of the identified relationship between cohabitation and mortality in this study. The NHIS is based on cross-sectional survey. To fully explore the relative contributions of differential selection and causal process to mortality differences by union status, future studies should employ longitudinal data with adequate measures of potential selection factors.

This study has several other limitations. We cannot identify union transitions using the NHIS-LMF data. The truncation of mortality follow-up to two-year periods should reduce the exposure of union transitions, although it is possible that some respondents may not remain in the same cohabitation and marital status within the two-year mortality follow-up period. Moreover, although we group all cohabiters as one category because detailed classification within the cohabiting group is not available in the NHIS data, future research should consider the heterogeneity within the cohabitation group. For example, never married cohabiters and previously married cohabiters may live in different social context which may differently influence mortality. Future studies should consider marriage and cohabitation histories in studying cohabitation and mortality by using other datasets. In addition, the relatively small number of deaths for Black women (n = 13), Hispanic women (n = 7), and Hispanic men (n = 18) who were cohabiters may result in large standard errors in the estimation and increase the risk of Type II error (i.e., a failure to observe a significant effect). This may partially explain the lack of significant results for these race-ethnicity and gender subgroups. Finally, various social, biological, psychological, and behavioral mechanisms work together to determine the relationship between cohabitation and mortality. Although it is beyond the scope of the paper to explore a range of mechanisms to explain these mortality differences identified in this study, identifying the reasons behind those disparities is a critical next step for research in this area.

Future research should further assess the potential roles of selection process, relationship quality, health behavior and other socio-psychological factors in explaining those mortality differences.

Despite the limitations, our study makes an important contribution to the literature. For the first time, we document the U.S. adult mortality differences between cohabiters and other union status groups for the whole population as well as across gender and race-ethnicity groups. With the rapid growth of cohabitation in the U.S., there continue to be political and scholarly debates regarding the equivalence of this union type as to marriage in promoting well-being. While some researchers emphasize the similarity between cohabitation and marriage, others view the increasing trend of cohabitation as a threat to population well-being. Our results on mortality differences by union status add to mixed evidence on these debates. Cohabitation may not be as protective as marriage for longevity (especially for White men and White women), but it may provide some degree of benefits in comparison to being single (especially for White men and Black men). The key question is whether the cohabiters would have stayed single or become married if they did not choose to cohabit. If getting married was the preferred alternative option for the current cohabiter, then any policies and public programs intended to promote marriage may be effective in terms of enhancing population well-being. In contrast, if staying single was the preferred alternative option for the current cohabiter, policies to discourage cohabitation may not be a good solution to protect population well-being. The complexity of this issue is further highlighted by our findings across gender and race-ethnicity subgroups, suggesting that any types of union (i.e., marriage versus cohabitation) may be more important in affecting health and longevity for Whites than Blacks and Hispanics; and involvement in a cohabitation relationship rather than staying single may be more important for mortality of White men and Black men than other gender and race-ethnicity groups. These results point to the importance of continuing to

distinguish different gender and race-ethnicity groups in studying cohabitation in the future research.

Note

1. NHIS is a household survey and the data are composed of several files. The current analysis is based on the "Person File," which includes information for each person within the household. Additional health information was collected from *one* randomly selected adult in each family in the "Adult Sample File". The "Adult Sample File" includes more detailed heath information such as smoking, drinking and weight, however, it has a smaller sample size than the "Person File" because only one person in each family was included in the "Adult Sample File". We did not use the "Adult Sample File" due to the smaller number of deaths in the file, especially when examining variations across gender and race-ethnicity subgroups.

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Table 1. Weighted Descriptive Statistics of Variables Analyzed

	Total	NHW Men	NHB Men	Hispanic Men	NHW Women	NHB Women	Hispanic Women
Cohabitation and marital status (%)							
Cohabiting	5.21	5.30	8.71	6.74	4.49	5.09	5.18
Married	65.27	71.53	51.50	67.44	66.27	35.56	60.07
Widowed	5.55	2.14	2.90	1.24	8.83	10.30	6.27
Divorced/separated	12.75	9.93	15.81	11.20	12.92	23.36	17.32
Never married	11.22	11.10	21.08	13.39	7.48	25.69	11.16
Age at survey (in years)							
Mean	47.31	47.79	44.82	41.98	48.83	45.38	43.41
Standard deviation	14.48	14.29	13.54	13.01	14.79	14.03	13.78
Region (%)							
Northeast	19.48	20.50	15.63	13.55	20.81	16.73	15.45
Midwest	24.61	27.98	18.30	8.53	27.63	19.10	7.77
South	37.49	34.49	57.83	36.97	34.80	57.16	36.45
West	18.42	17.03	8.25	40.95	16.75	7.01	40.33
Education (%)							
College graduate	25.00	30.46	15.38	11.13	26.29	16.16	11.14
Some College	27.55	27.41	27.55	19.05	30.06	30.29	20.61
High school graduate	31.22	30.08	36.15	26.19	32.34	31.87	25.49
No diploma	16.23	12.05	20.92	43.63	11.31	21.68	42.76
Family income							
Median	40000.00	47077.88	34015.61	32909.41	42665.16	31500.83	31500.83
Standard deviation	25982.11	25436.86	24544.21	23529.89	26005.48	23796.65	23877.51
Total number of observations	403,896	132,095	22441	36378	142,416	30573	39993

Table 2. Total Number of Deaths by Marital Status

	Total	NHW Men	NHB Men	Hispanic Men	NHW Women	NHB Women	Hispanic Women
Cohabiting							
Number of deaths	182	77	27	18	40	13	7
Number of observations	21,458	6,975	1,928	2,407	6,530	1,550	2,068
% deaths	0.008	0.011	0.014	0.007	0.006	0.008	0.003
Married							
Number of deaths	3,416	1,714	240	295	873	144	150
Number of observations	259,356	94,863	11,629	24,481	93,866	10,736	23,781
% deaths	0.013	0.018	0.021	0.012	0.009	0.013	0.006
Widowed							
Number of deaths	1,213	250	71	30	610	174	78
Number of observations	22,809	2,923	719	503	12,772	3,385	2,507
% deaths	0.053	0.086	0.099	0.060	0.048	0.051	0.031
Divorced/separated							
Number of deaths	1,029	378	113	72	277	127	62
Number of observations	53,786	13,091	3,652	4,100	18,661	7,297	6,985
% deaths	0.019	0.029	0.031	0.018	0.015	0.017	0.009
Never married							
Number of deaths	521	206	89	41	95	69	21
Number of observations	46,487	14,243	4,513	4,887	10,587	7,605	4,652
% deaths	0.011	0.014	0.020	0.008	0.009	0.009	0.005
Total							
Number of deaths	6,361	2,625	540	456	1,895	527	318
Number of observations	403,896	132,095	22,441	36,378	142,416	30,573	39,993
% deaths	0.016	0.020	0.024	0.013	0.013	0.017	0.008

Table 3. Estimated Mortality Hazard Ratios by Cohabitation and Marital Status from Cox Hazards Models for the Total Sample

	Model 1	Model 2
Cohabitation and marital status (0=Cohabiting)		
Married	0.735***	0.762***
Widowed	1.011	0.959
Divorced/separated	1.228*	1.124
Never married	1.405***	1.276*
Gender (0=Male)		
Female	0.553***	0.544***
Race (0=non-Hispanic white)		
Non-Hispanic black	1.253***	1.206***
Hispanic	0.777***	0.751***
Region (0=Northeast)		
Midwest	1.080	1.070
South	1.176***	1.151***
West	1.084	1.080
Education (0=College graduate)		
Some College	1.504***	1.419***
High school graduate	1.769***	1.607***
No diploma	2.200***	1.863***
Survey year	0.981***	0.980***
Family income		0.775***
Log pseudolikelihood	-51242	-51154
Total number of observations	403896	

Notes: Models are stratified by age at baseline survey.
*p < .05 **p < .01 ***p < .001 (two-tailed tests)

Table 4. Estimated Mortality Hazard Ratios by Cohabitation and Marital Status from Cox Hazards Models By Race and Gender

	NHW Men		NHB Men		Hispanic Men	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Cohabitation and marital status (0=Cohabiting)						
Married	0.722**	0.749*	0.759	0.797	0.752	0.777
Widowed	1.019	0.982	1.301	1.266	1.015	0.983
Divorced/separated	1.378*	1.258	1.092	1.019	1.058	0.997
Never married	1.493**	1.344*	1.742*	1.583*	1.294	1.206
Family Income		0.755***		0.795***		0.779***
Log pseudolikelihood	-17663	-17621	-2550	-2543	-2318	-2311
Total number of observations	132095		22441		36378	

	NHW Women		NHB Women		Hispanic Women	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Cohabitation and marital status (0=Cohabiting)						
Married	0.682*	0.699*	0.850	0.879	1.116	1.131
Widowed	0.932	0.864	0.922	0.880	1.669	1.652
Divorced/separated	1.128	1.015	1.003	0.939	1.323	1.288
Never married	1.202	1.086	1.137	1.057	1.064	1.044
Family Income		0.788***		0.826**		0.921
Log pseudolikelihood	-13402	-13379	-2773	-2768	-1784	-1783
Total number of observations	142416		30573		39993	

Notes: Models are stratified by age at baseline survey. Region, education and survey year are controlled in all models.

*p < .05 **p < .01 ***p < .001 (two-tailed tests)