

# Widowhood, Age Heterogamy, and Health: The Role of Selection, Marital Quality, and Health Behaviors

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**Objective.** Although the impact of widowhood on the surviving spouse's health has been widely documented, there is little empirical research examining whether certain spousal choice decisions and marital sorting patterns predispose individuals to be more vulnerable to the adverse consequences of widowhood for health.

**Design and Method.** We use data from the Wisconsin Longitudinal Study and employ ordinary least squares models to (a) document variations in mental and physical health between married and widowed persons, (b) determine whether widowed persons in age heterogamous unions are especially vulnerable to the adverse consequences of widowhood, and (c) investigate to what extent differential selection, marital quality, and health practices account for health disparities by marital status and the spousal age gap.

**Results.** Widowed persons, especially those in age heterogamous unions, have worse mental health than married persons, but they do not seem to be more disadvantaged in terms of physical health. Differential selection, marital quality, and health behaviors partly account for some of the health disparities by marital status and spousal age gap.

**Discussion.** Our findings suggest that marrying a spouse who is very dissimilar in age may enhance one's vulnerability to the adverse consequences of widowhood for health.

**Key Words:** Age heterogamy—Health—Marital quality—Widowhood.

WIDOWHOOD is one of the most stressful transitions faced by older individuals (Holmes & Rahe, 1967; Utz, Caserta, & Lund, 2012). Surviving spouses must cope with grief following the loss of a partner who provided social and emotional support (Carr House, Kessler, Nesse, Sonnega, & Wortman, 2000; Lee, DeMaris, Bavin, & Sullivan, 2001). They must also assume the responsibilities that were previously assumed by the deceased partner (Carey, 1979–1980; Carr, House, Wortman, Nesse, & Kessler, 2001; Wortman, Kessler, & Umberson, 1992). The grief, compounded with the burden of added responsibilities, may have adverse effects on the psychological and physical well-being of the surviving spouse (Martikainen & Valkonen, 1996; Rendall, Weden, Favreault, & Waldron, 2011; Utz et al., 2012).

Prior work has extensively documented the impact of widowhood on psychological well-being, mortality, and physical health, with most finding evidence of adverse effects of widowhood (Carr et al., 2001; Elwert & Christakis, 2008; Martikainen & Valkonen, 1996; Rendall et al., 2011). Yet, emotional and physical responses to widowhood vary widely depending on personal resources, contextual effects, and personality, and there are some subpopulations who are particularly vulnerable to the adverse effects of widowhood (Carr et al., 2001; Lepore, Silver, Wortman, & Wayment, 1996; Stroebe, Schut, & Stroebe, 2007). The characteristics of marriage have particularly

important implications for the way individuals respond to widowhood (Carr et al., 2001). There is, however, little work examining whether marital sorting patterns and the resulting sociodemographic dissimilarities between spouses make certain individuals particularly vulnerable to the adverse effects of widowhood for health. Even less is known of the mechanisms engendering the differential vulnerability of individuals in unions with varying degrees of sociodemographic similarities between spouses.

This article examines whether individuals in age heterogamous unions (i.e., large age differentials between spouses) are particularly vulnerable to the adverse health consequences of widowhood. We focus on the spousal age gap because it has important implications for the family life of older adults. Specifically, widowhood is more common for spouses in age heterogamy than for those in age homogamy because (a) older male–younger female unions are more common than older female–younger male unions and (b) women outlive men of the same birth cohort (Barford, Dorling, Davey Smith, & Shaw, 2006; Drefahl, 2010; Fox, Bulusu, & Kinlen, 1979; Kemkes-Grotenthaler, 2004). Specifically, we compare the mental and physical health of widowed and married individuals. We then determine whether widowed persons who were previously in age heterogamous unions are particularly more vulnerable to the adverse consequences of widowhood. Finally, we investigate the extent to which differential selection, marital

quality, and health practices during marriage explain the health disadvantage of widowed persons, especially those in age heterogamous unions.

We use the terms *age homogamy* and *age heterogamy* extensively throughout the article. *Age homogamy* refers to unions between spouses who are similar in age. *Age heterogamy* refers to unions with large age differentials between spouses. In this article, we operationalize *age heterogamy* as marriages where wives are 4 or more years older than husbands and husbands are 12 or more years older than wives.

## BACKGROUND

### *Health Consequences of Widowhood*

Widowhood is one of the most distressing transitions faced by older adults (Holmes & Rahe, 1967). Consequently, surviving spouses experience a temporary rise in mortality risks and prevalence of depressive symptoms following the death of a spouse, but most display resilience and return to their prebereavement state as widowed persons learn how to overcome their loss, adjust to their new roles and responsibilities, and refrain from engaging in self-destructive behaviors (Byrne & Raphael, 1994; Lillard & Waite, 1995; Lichtenthal, Cruess, & Prigerson, 2004; Martikainen & Valkonen, 1996; Rendall et al., 2011; Stroebe et al., 2007; Waite, 1995). The consequences of widowhood are, however, more pronounced among men than for women and for younger than older widows. This highlights the importance of wives' social support and health monitoring for men's health and the fact that spousal loss may be most disruptive at younger ages because it is unexpected (Lee et al., 2001; Lillard & Waite, 1995; Stroebe et al., 2007).

Evidence is, however, inconsistent with respect to the effects of widowhood on physical health. Some find that widowhood has deleterious consequences for physical health and widowed persons have greater occurrences of physical health problems (Stroebe et al., 2007; Thompson, Breckenridge, Gallagher, & Peterson, 1984), higher incidence of disability (Leigh & Fries, 1992), and poorer self-reported health (Hahn, 1993; Wilcox et al., 2003). Others assert that widowhood does not exert a significant negative influence on physical health (Lichtenstein, Gatz, Pedersen, Berg, & McClearn, 1996; Michael, Berkman, Colditz, & Kawachi, 2001; Perkins & Harris, 1990). The inconsistent accounts likely arise because the distinct studies are conducted using different subsamples and focus on distinct dimensions of physical health, further highlighting the fact that responses to widowhood may vary widely by respondents' personal resources and contextual factors (Stroebe et al., 2007).

### *Patterns of Age Heterogamy and Interdependencies Between Age Heterogamy and Widowhood*

Age heterogamy has received considerable attention from social scientists (Atkinson & Glass 1985; Esteve, Cortina, &

Cabré, 2009; Garfinkel, Gleib, & McLanahan, 2002; Shafer, 2013; Shehan, Berardo, Vera, & Marion Carley, 1991). Empirical work on age heterogamy has primarily focused its attention on the documentation of patterns of age heterogamy, with most studies finding evidence that spouses tend to be similar in age (Atkinson & Glass 1985; Esteve et al., 2009; Mu & Xie 2011; Qian, 1998; Shafer, 2013; Shehan et al., 1991). Supplementary analysis using the American Community Survey shows that husbands are on average 2.4 years older than their wives, and 67% of all marriages involve older husbands and younger wives.

Coupled with the fact that mortality rates of men are higher than those of women at every age group (Barford et al., 2006), the fact that age heterogamous couples typically involve older husbands–younger wives suggests that the spousal age gap has important implications for family contexts. Specifically, younger women who married considerably older spouses will be substantially more likely to experience widowhood than similarly aged individuals in age homogamous unions.

### *Health Consequences of Age Heterogamy: Patterns and Explanations*

Studies describing the consequences of age heterogamy are rare, with few exceptions found in a small number of studies on the implications of age heterogamy on longevity (Drefahl, 2010; Foster, Klinger-Vartabedian, & Wispe, 1984; Klinger-Vartabedian & Wispe, 1989). These studies, however, offer mixed accounts about the relationship between age heterogamy and longevity. Some claim that spouses in age heterogamous unions have shorter life expectancies (Fox et al., 1979), whereas others assert that having an older spouse has detrimental effects on longevity, regardless of the size of age differentials between spouses (Drefahl, 2010; Klinger-Vartabedian & Wispe, 1989; Rose & Benjamin, 1971). These inconsistencies likely arise because of two reasons: (a) the literature is sparse with individual studies covering distinct time periods and examining distinct subpopulations and (b) the various studies use different operational definitions for age heterogamy (Drefahl, 2010; Rose & Benjamin, 1971; Shehan et al., 1991).

Interestingly, despite the mixed findings, past studies rely on three explanations to account for health disparities by the degree of spousal age gap. The first attributes health disparities according to the degree of spousal age gap to differential selection, that is, inherent differences in the characteristics of individuals who select into unions with varying degrees of age differentials between spouses (Drefahl, 2010). The second argues that spouses in age heterogamous unions have poorer health than those in age homogamous unions because they are in poorer quality unions and marital conflict has deleterious health consequences (Umberson, Williams, Powers, Liu, & Needham, 2006). Stated differently, individuals who are similar in

age have much more in common because they are in similar places in the life course (Shehan et al., 1991). Spouses in age homogamous unions will, therefore, have an easier time reaching spousal consensus than their peers in age heterogamous unions and have fewer incidences of marital conflict. The third argues that younger spouses in age heterogamous unions are unhealthier than their similarly aged counterparts in age homogamous unions because they lead unhealthier lifestyles during marriage. Specifically, these studies argue that older individuals are typically less physically fit and active than their younger peers due to declines in health accompanying the aging process (Case & Deaton, 2005). Because spouses typically engage in similar health behaviors as one another, younger spouses in age heterogamous unions typically exercise less and lead more sedentary lifestyles than similarly aged individuals in age homogamous unions (Petee et al., 2006). Additionally, younger spouses in age heterogamous unions may be less able to address their own health needs because they need to care for their older (and potentially ill) spouses (Arber, 2004; Drefahl, 2010; Finch & Mason, 1993). The sedentary lifestyle, coupled with their inability to address their own health care needs, often means that younger spouses in age heterogamous unions have poorer health outcomes than their peers in age homogamous unions.

### *Hypotheses*

Drawing from the research and theory discussed earlier, we develop the following hypotheses regarding the relationship between widowhood, age heterogamy, and health.

- H1:** Widowed persons will have a health disadvantage over their married peers, with the disadvantage being more pronounced for mental health than physical health outcomes.
- H2:** Widowed persons who were previously in age heterogamous unions (primarily the younger spouse) will be particularly vulnerable to the adverse consequences of widowhood for health.
- H3:** Widowed persons who were previously in age heterogamous unions are especially vulnerable to the adverse consequences of widowhood partly because they are a negatively selected group who were forced to broaden the age range of viable marriage candidates.
- H4:** Widowed persons who were previously in age heterogamous unions are especially vulnerable to the adverse consequences of widowhood partly because their shared environment (i.e., poorer marital quality and deleterious health behaviors) is conducive to adverse health outcomes.

## **DATA AND METHODS**

### *Data*

The Wisconsin Longitudinal Study (WLS) is a survey based on a random sample of 10,317 men and women who

graduated from Wisconsin high schools in 1957 (Sewell & Hauser, 1975; Sewell, Hauser, Springer, & Hauser, 2004). Survey data were collected in 1957, 1975, 1992/93, and 2003/05. We rely primarily on data from the telephone interviews and mail questionnaires collected in 1992/93 and 2003/05.

WLS is well-suited for the present analysis because of several reasons. First, the WLS collected detailed information about the mental and physical health of respondents. Second, it asked respondents to provide detailed accounts about their own and their spouse's sociodemographic characteristics, including each spouse's year of birth. Third, they asked detailed accounts about family background and education at the time of marriage, allowing us to assess inherent differences in the characteristics of individuals who selected in the unions with varying degrees of age similarities between spouses. Finally, it collected detailed reports about the respondent's marital quality and health practices when all respondents were married (1992/93), shielding us from the recollection bias associated with the use of retrospective data on marital quality (Carr et al., 2001).

### *Sample*

Our analytical sample consists of WLS graduates who (a) married their spouses prior to 1992; (b) are married in 1992/93; and (c) either remained continuously married or transitioned into widowhood between 1992/93 and 2003/05 (4,505 cases or 43.7%). Second, we also exclude respondents who are missing mental and physical health composite scores in 2003/05 (941 cases or 9.1%). Third, we limit our sample to respondents who provided either their current spouse's year of birth or age at interview in 1992/93 (19 cases or 0.2%). Finally, our analyses only include respondents who answered questions about their marital history, including year of entry into current marriage and year they lost their spouse among the subset of respondents who transitioned into widowhood (207 cases or 2%). Together, these restrictions yield a final analytic sample of 4,645 respondents (4,322 married and 323 widowed persons). We use this sample and assess the health status of all respondents when they are between the ages of 64 and 65 and document health disparities between those who remained married and those who transitioned into widowhood "early" between the ages of 53 and 66.

### *Measures*

*Dependent variables.*—The dependent variables are the mental and physical component summary scores of the 12-item Short Form Survey (SF-12). Each summary component score is standardized to have a mean of 50 and a standard deviation of 10 in the general population, with higher scores indicating better mental and physical health (Flynn, Smith, & Freese, 2006; Ware, Kosinski, & Keller, 1998).

*Independent variables.*—Our first independent variable is *marital status*, which is a dichotomous variable distinguishing between (a) respondents who were married in 1992/93 but experienced the death of their spouses between 1992/93 and 2003/05 and (b) respondents who are continuously married during the same period of time.

Our second independent variable is *spousal age gap* distinguishing respondents into two groups depending on the size of age differentials between spouses. Respondents are said to be in *age heterogamous unions* if the age differential between them and their spouse is within the 2.5 percentile (i.e., wives who are at least 4 years older than their husbands) or outside of the 97.5 percentile (i.e., husbands who are at least 12 years older than their wives) of the distribution of age differentials between spouses. Otherwise, they are classified as individuals in *age homogamous unions*. We use this operational definition of age heterogamy because (a) this spousal age gap is large enough to have implications for mortality and (b) we wanted to ensure that we had at least 30 cases to support the interaction term between marital status and spousal age gap (Agresti & Finlay, 2009).

Nonetheless, it should be noted that researchers cannot reach a consensus about the size of the spousal gap that constitutes age heterogamy, and there is considerable variation concerning the operational definition of age heterogamy (Drefahl, 2010; Shehan et al., 1991; Vera, Berardo, & Berardo, 1985). We ran several models applying a distinct cutoff points to define age heterogamy. Our general story remains unchanged. The only difference across these analyses is the size of the coefficient and level of significance for the coefficient.

*Control variables.*—Our study includes four sets of control variables. *Differential selection* is measured by including *respondent's gender* (female; male), *respondent's education at the time of entry into marriage* (high school graduate; some college; college graduate), *spouse's education at the time of entry into marriage* (less than high school education; high school graduate; attended but did not complete college; college graduate), *father's occupation* (unskilled labor; farming; skilled labor; white collar; professional), and *childhood health* (fair or less; good; excellent). We would have liked to include controls for respondent's and spouse's health at the time of marriage. Yet, the only measure of health status available prior to or at the time of marriage for all the respondents is childhood health. We believe that childhood health will serve as a good proxy for health status at the time of marriage given the strong correlation between childhood and adult health (Paxson & Case, 2009).

*Marital quality* is measured by including two dichotomous variables: *closeness with spouses* (very close; not very close) and *similar outlook about life* (very similar; not very similar).

*Health practices during marriage* are captured through the inclusion of two categorical variables: *frequency of light exercise* (three or more times; once or twice; less than once a week) and *smoking behavior* (smokes regularly; does not smoke regularly). We also included *spouse's health* (poor, good, and excellent) to capture the impact of spouse's health on respondent's health behaviors and lifestyles.

We also control for the *characteristics of the marriage*—duration and order of marriage—which are known to shape the relationship between widowhood, age heterogamy, and health (Drefahl, 2010). *Duration*, which is computed by subtracting the year of marriage from the year of interview (1992/93), is included to net out differential exposure to health benefits of marriage. *Order of marriage* distinguishes between first and higher order marriages and is included because the well-being effects of first marriages differs from those of remarriages (Hughes & Waite, 2009).

We made strenuous efforts to ensure that our covariates follow proper temporal ordering. Differential selection is measured using information collected in 1957 or in retrospective reports collected in 1992/93. Marital quality and health practices during marriage are measured using information collected in 1992/93 when all respondents are married. Our dependent variables—mental and physical health—are constructed using information collected in 2003/05. Additionally, we accounted for missing data using mean substitution coupled with missing flags for continuous variables and through the inclusion of a missing category for nominal/ordinal variables.

#### *Analytical Strategy*

Our analyses is organized into two parts. The first part describes variations in mental and physical health summary scores by their marital status and size of spousal age gap. It also compares the premarital sociodemographic profiles, marital quality, and health practices (during marriage) according to respondents' marital status and the size of the spousal age gap.

The second part employs a series of ordinary least squares (OLS) regression models to investigate the extent to which (a) differential selection, (b) marital quality, and (c) health practices during marriage account for the health differentials according to marital status and the spousal age gap. Six additive models are estimated to accomplish this goal. Model 1 estimates health disparities by marital status and size of spousal age gap, net of duration, and remarriage status. Model 2 adds the interaction term for marital status by the spousal age gap, which allows us to determine whether widowed persons married to spouses with large age differentials are particularly vulnerable to the adverse effects of health. Model 3 incorporates the covariates accounting for differential selection to Model 2. Model 4 adds marital quality to Model 3. Model 5 adds health practices during marriage to Model 3. Model 6 includes all covariates. All

estimates are unweighted, which aligns with the weighting strategy adopted by most, if not all, studies using WLS (Hauser & Palloni, 2011; Warren & Hauser, 1997). Analyses using data from WLS are unweighted because (a) WLS relies on a simple random sample of respondents and does not include any oversamples and (b) WLS is a study describing the experiences of a cohort of individuals in the graduating class of 1957 and is not intended to be nationally representative.

## RESULTS

### *Descriptive Statistics*

We begin by describing variations in the mental and physical health summary scores by their marital status and spousal age gap. Our results, presented in Table 1, reveal three noteworthy differences. First, widowed persons have worse mental health than married persons: 53 versus 56 points. However, there is little variation in physical health outcomes by marital status: 48 points versus 49 points for widowed and married persons, respectively. Second, widowed respondents in age heterogamous unions have worse mental and physical health than their peers in age homogamous unions. For instance, the mean mental health summary scores of widowed persons who were previously in age heterogamous unions are 51 points compared with 54 points for their counterparts who were previously in age homogamous unions. The observed group differences in health are statistically significant for mental—but not physical—health outcomes. Finally, the mental and physical health outcomes of married respondents vary little depending on the spousal age gap.

Table 2 reports the distribution and means for all control variables, disaggregated by marital status and spousal age gap. We begin by comparing the premarital sociodemographic profiles of respondents in the distinct unions, disaggregated by marital status and spousal age gap. These comparisons offer three notable findings. First, consistent with prior findings, our results show that widowhood is much more common for women than for men and occurs at exceptionally high rates among those who are in age

heterogamous unions (Lee et al., 2001; Shehan et al., 1991). Second, we also find that individuals who are socioeconomically disadvantaged are more likely to transition into “early” widowhood than their more advantaged peers. For example, 30% of widowed respondents had at least some college education compared with 44% of continuously married respondents. Third, contrary to expectations, widowed persons in age heterogamous unions are not dually disadvantaged in terms of schooling, family background, or childhood health. In fact, widowed persons who were previously in age heterogamous unions are more advantaged in terms of childhood health and respondent’s education than widowed persons who were previously in age homogamous unions. For example, 19% of widowed persons in age heterogamous unions are college graduates compared with 15% of their counterparts in age homogamous unions.

We now turn our attention to group differences in marital quality. Consistent with prior work, we find that widowed persons were in poorer quality marriages than those who remained married (Umberson et al., 2006). For example, 82% of married respondents report being very close to their spouses compared with 75% of widowed respondents. Yet, contrary to past findings, we find that respondents in age heterogamous unions report higher marital quality than their peers in age homogamous unions, regardless of the outcome of their marital status. For example, 81% of widowed respondents in age heterogamous unions report being very close to their spouses compared with 74% of widowed respondents in age homogamous unions. Our results may differ from prior findings because of two reasons. First, prior work has examined how spousal differences in race/ethnic, educational, and religious backgrounds affect marital quality; however, studies have not investigated the implications of age heterogamy for marital quality (Bumpass & Sweet, 1972; Bradbury, Fincham, & Breach, 2000; Larson & Holman, 1994). As noted by Bumpass and Sweet (1972), age differences between spouses may not pose as significant of a barrier to spousal consensus as socioeconomic, religious, and race/ethnic differences between spouses. Second, the disparate results could also arise due to sampling, specifically the exclusion of unions ending in divorce from our analytical sample. If age heterogamous

Table 1. Mean Mental and Physical Health Composite Scores by Marital Status and Age Heterogamy (Unweighted)

	Total		Married		Widowed	
	Married (4,322)	Widowed (323)	Age homogamy (4,093)	Age heterogamy (229)	Age homogamy (286)	Age heterogamy (37)
<b>A. Mental health</b>						
Mean	55.8 <sup>a</sup>	53.4 <sup>a</sup>	55.8	55.5	53.7 <sup>b</sup>	51.0 <sup>b</sup>
SD	6.0	8.0	6.0	6.1	7.6	10.1
<b>B. Physical health</b>						
Mean	48.9	48.2	48.9	48.4	48.4	46.5
SD	9.4	10.1	9.3	10.3	9.9	11.2

Notes. SD = standard deviation.

<sup>a</sup>It denotes that disparities in mean mental health scores between married and widowed persons reflect statistically significant differences at the  $p < .05$  level.

<sup>b</sup>It denotes that disparities between widowed persons who were previously in unions with varying degrees of spousal age gap are statistically different at the  $p < .05$  level.

Table 2. Differences in Premarital Sociodemographic Characteristics, Marital Quality, and Health Behaviors by Marital Status and Age Heterogamy (Unweighted)

	Total		Married		Widowed	
	Married	Widowed	Homo	Hetero	Homo	Hetero
	(4,322)	(323)	(4,093)	(229)	(286)	(37)
<b>A. Differential selection</b>						
% Female	51	80***	51	53	78	92*
Childhood health (column %)						
Fair or less	16	17	16	15	17	16
Good	34	35	34	34	36	32
Excellent	50	48	50	51	47	51
Father occupation (column %)						
Unskilled	38	44*	38	40	43	51
Farming	20	17	20	17	16	19
Skilled	9	12	9	7	12	8
White collar	21	20	21	24	21	8
Professional	11	8	11	12	8	14
Respondent education (column %)						
High school graduate	56	70***	56	58	70	70
Some college	16	15	16	18	16	11
College graduate	28	15	28	24	15	19
Spouse education (column %)						
Less than high school	8	15***	8	10***	15	16*
High school graduate	53	54	53	46	55	46
Some college	15	13	15	16	13	11
College graduate	25	18	24	27	17	24
Missing	0	0	0	1	0	3
<b>B. Marital quality</b>						
Closeness between spouses						
% Very close	82	75**	82	86*	74	81
Similarity in life outlook with spouse						
% Very similar	57	50*	57	61	49	51
<b>C. Health practices during marriage</b>						
% Who smoke	46	49	46	46	48	57
Light exercise (column %)						
3 or more times/week	42	38*	43	41	37	41
1–2 times/week	29	26	29	28	27	22
Less than once/week	17	23	17	20	22	30
Missing	12	12	12	11	14	8
Spouse's health (column %)						
Poor	8	28***	8	9	26	43*
Good	42	47	43	39	47	49
Excellent	50	25	50	52	27	8

Notes. The superscripts in the third column denote the statistical significance of differences between married and widowed persons. The superscripts in the sixth and ninth columns denote the statistical significance of differences by the spousal age gap within each marital status.

\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ , \*\*\*\* $p < .001$  for differences across groups based on chi-square tests.

unions tend to be of poorer quality, then they would have been excluded from our sample at higher rates than age homogamous unions; thus, the age heterogamous unions represented in our analytical sample will be unions with disproportionately high levels of marital quality.

We conclude by describing variations in health practices by marital status and the size of the spousal age gap. Widowed persons are more likely to have lived with unhealthier spouses and to have engaged in fewer healthier practices during marriage than their counterparts who remained married. For example, 23% of widowed respondents exercised less than once a week compared with 17% of married respondents in age heterogamous unions. These differences are especially pronounced among respondents

in age heterogamous unions. For example, widowed persons in age heterogamous unions are 50% [ $100 \times (30 - 20)/20 = 50$ ] more likely than their married counterparts to exercise less than once a week. This compares with a differential of 29% [ $100 \times (22 - 17)/17 = 29$ ] between widowed and married persons in age homogamous unions. Combined, these results suggest that widowed persons who were in age heterogamous unions appear to be “dually” disadvantaged in terms of health practices, given their status as widows and as spouses in age heterogamous unions.

In sum, our descriptive results reveal that widowed respondents, especially those who were previously in age heterogamous unions, fare worse in terms of mental health than their married counterparts. The results also suggest

that widowed persons may be more disadvantaged in terms of mental health than their married counterparts because they tend to be a more negatively selected group, are in poorer quality unions, and are more likely to engage in unhealthier practices. We also find that widowed persons who were previously in age heterogamous unions are more likely to have engaged in deleterious health practices during marriage than all other groups, but there is little evidence suggesting that they are more disadvantaged or have poorer marital quality than their peers who were previously in age homogamous unions.

### Multivariate Statistics

Table 3 reports a series of OLS regression models predicting variations in mental health outcomes by marital status and spousal age gap. This section focuses on mental health because (a) our analyses revealed that disparities in physical health by marital status or spousal age gap are not statistically significant and (b) results for mental and physical health follow a similar pattern. Nonetheless, multivariate results for physical health are reported in [Supplementary Table S1](#).

Model 1 is our baseline model and includes marital status, spousal age gap, duration, and order of marriage. As hypothesized (in *Hypothesis 1*), widowed persons have worse mental health than married persons. The mental health scores of widowed persons are in fact 2.4 points lower than those of married persons. Interestingly, however, the mental health outcomes of respondents do not appear to differ depending on the size of the spousal age gap. The coefficient describing differences in mental health outcomes by the spousal age gap is not statistically significant.

Model 2 adds the interaction term between marital status and age heterogamy to decipher whether widowed respondents who were previously in age heterogamous unions are particularly vulnerable to the adverse effects of health. We also find evidence in support of *Hypothesis 2* stating that widowed persons who were previously in age heterogamous unions are especially vulnerable to the adverse consequences of widowhood. The mean mental health summary score of widowed persons in age heterogamous unions is 2.4 points lower than that of widowed persons who were previously married to spouses who are similar in age.

Model 3 adds controls for both spouse's education at the time of marriage, childhood health, and family background to the existing model. The results from this model will ascertain the extent to which differential selection accounts for health disparities according to marital status and the spousal age gap. Our results suggest that differential selection accounts for some of the health disparities between married and widowed persons, but it fails to explain why individuals in age heterogamous unions are particularly vulnerable to the adverse consequences of widowhood for

health. Specifically, the addition of covariates accounting for differential selection explains 8% [ $100 \times (-1.93 + 2.10) / -2.10 \approx 8$ ] of the health disparities between widowed and married persons. Yet, contrary to our expectations as detailed in *Hypothesis 3*, we found that the coefficient for the interaction term between widowhood and the spousal age gap does not change with the addition of these covariates.

Model 4 adds marital quality to Model 3. Comparing coefficients across Models 3 and 4 will provide insights on the extent to which marital quality accounts for health disparities according to marital status and the spousal age gap. The health disadvantage of widowed respondents over their married counterparts in small part arises due to differences in relationship quality between married and widowed respondents. The inclusion of marital quality into our models reduces the health disparity between widowed and married respondents by 9% [ $100 \times (-1.75 + 1.93) / -1.93 \approx 9$ ]. Yet, contrary to our expectations as detailed in *Hypothesis 4*, we find that marital quality fails to explain why individuals in age heterogamous unions are particularly vulnerable to the adverse consequences of widowhood for health. The coefficient for the interaction term between widowhood and spousal age gap does not change with the addition of these covariates.

Model 5 introduces health practices during marriage into Model 3. Differences in health behaviors during marriage explain about 19% [ $100 \times (-1.93 + 1.56) / -1.93 = 19$ ] of the health disparities between widowed and married individuals. Furthermore, as hypothesized (in *Hypothesis 4*), it also accounts for some of the health disparities between widowed respondents who were previously in age heterogamous and age homogamous unions. The interaction term for age heterogamy by the outcome of marital union decreases by 16% [ $100 \times (-2.44 + 2.05) / -2.44 \approx 16$ ] and ceases to be statistically significant once we add covariates on the respondent's health practices during marriage. In supplementary analysis (unreported here), we find that most of the explanatory power of the covariates that measure health practices accrue due to differences in frequency of exercise and spouse's health status according to the age differentials between spouses.

Model 6 (full model) includes all covariates. The three sets of covariates, primarily differential selection and marital quality, explain approximately 23% [ $100 \times (-1.93 + 1.48) / -1.93 \approx 23$ ] of the differences in mental health summary scores between widowed and married persons. The three sets of covariates (primarily health practices) account for 12% [ $100 \times (-2.44 + 2.15) / -2.44 \approx 12$ ] of the added vulnerability of being both widowed and having been in an age heterogamous union.

Altogether, our results offer the following insights. First, widowed persons have worse mental health than married persons. Second, widowed persons who were previously in age heterogamous unions are particularly vulnerable to the adverse consequences of widowhood. Third, differential

Table 3. Ordinary Least Squares Models Predicting the SF-12 Mental Health Summary Scores (Unweighted)

	Model 1		Model 2		Model 3	
	$\beta$	$\beta/SE$	<i>B</i>	$\beta/SE$	$\beta$	$\beta/SE$
Marital status (married)						
Widowhood	-2.36	-6.62***	-2.10	-5.57***	-1.93	-5.11***
Age gap between spouses (homogamy)						
Age heterogamy	-0.59	-1.40	-0.25	-0.56	-0.20	-0.45
Marital status $\times$ Age gap						
Widowhood $\times$ Age heterogamy			-2.44	-2.11*	-2.44	-2.13*
Gender (Male)						
Female					-0.27	-1.40
Father's occupation (unskilled)						
Farming					0.15	0.60
Skilled					-0.36	-1.10
White collar					0.26	1.07
Professional					0.14	0.43
Respondent's education (high school graduate)						
Some college					-0.35	-1.33
College graduate					-0.45	-1.77*
Spouse's education (less than high school)						
High school graduate					1.35	4.01***
Some college					1.14	2.86**
College graduate					1.32	3.35**
Missing					0.55	0.27
Childhood health (fair or less)						
Good					1.22	4.50***
Excellent					2.27	8.76***
Missing					1.42	0.64
Duration						
No. of years since marriage	0.00	-0.09	0.00	-0.01	0.01	0.29
No. of marriage (first)						
Previously married	0.06	0.16	0.07	0.18	0.13	0.30
Intercept						
Intercept	55.82	90.56***	55.76	90.38***	53.07	70.00***

Notes. Unweighted analysis; reference group in parenthesis.

\*Significant at  $p < .10$ .

\*Significant at  $p < .05$ .

\*\*Significant at  $p < .01$ .

\*\*\*Significant at  $p < .001$ .

selection, marital quality, and health practices during marriage partly account for health disparities between married and widowed persons. Fourth, differences in health practices during marriage also explain a portion of the extra vulnerability of widowed persons who were previously in age heterogamous unions.

We ran these models for the subsample of women and our general conclusions stay largely the same. These results (see [Supplementary Tables S2 and S3](#)), coupled with the fact that most widowed respondents who were previously in age heterogamous unions are women, suggest that individuals in age heterogamous unions are particularly vulnerable to the effects of widowhood largely describe the experiences of widowed women.

## DISCUSSION

The aim of this study is to (a) document variations in the mental and physical health outcomes of married and

widowed respondents, (b) ascertain whether widowed persons who were previously in age heterogamous unions are particularly vulnerable to the adverse effects of widowhood, and (c) assess the extent to which differential selection, marital quality, and health practices during marriage account for health disparities by marital status and spousal age gap. We report several notable findings.

Our findings demonstrate that widowed persons have worse mental health than married persons. This finding is consistent with the large body of work documenting the adverse consequences of widowhood for mental health ([Carr et al., 2000](#); [Lee et al., 2001](#); [Prigerson & Jacobs, 2001](#)). In contrast, disparities in physical health by marital status are not statistically significant. This finding adds to the subset of empirical studies showing that widowhood does not exert a deleterious effect on physical health ([Lichtenstein et al., 1996](#); [Michael et al., 2001](#); [Perkins & Harris, 1990](#)). However, it runs contrary to the body of work



Table 3. (Cont.). Ordinary Least Squares Models Predicting the SF-12 Mental Health Summary Scores (Unweighted)

	Model 4		Model 5		Model 6	
	<i>B</i>	$\beta/SE$	$\beta$	$\beta/SE$	<i>B</i>	$\beta/SE$
Marital status (married)						
Widowhood	-1.75	-4.67***	-1.56	-4.09***	-1.48	-3.92***
Spousal age gap (homo)						
Heterogamy	-0.29	-0.66	-0.20	-0.45	-0.28	-0.62
Marital status $\times$ Age gap						
Widowhood $\times$ Hetero	-2.44	-2.15*	-2.05	-1.80 <sup>+</sup>	-2.15	-1.89 <sup>+</sup>
Gender (Male)						
Female	-0.33	-1.71 <sup>+</sup>	-0.23	-1.21	-0.29	-1.50*
Father's occupation (unskilled)						
Farming	0.17	0.68	0.10	0.42	0.13	0.52
Skilled	-0.36	-1.09	-0.40	-1.21	-0.39	-1.19
White collar	0.26	1.06	0.25	1.00	0.24	1.00
Professional	0.13	0.39	0.08	0.24	0.08	0.25
Respondent's education (high school graduates)						
Some college	-0.37	-1.42	-0.41	-1.56	-0.42	-1.58
College graduate	-0.45	-1.75 <sup>+</sup>	-0.56	-2.19*	-0.53	-2.07*
Spouse's education (less than high school)						
High school	1.29	3.87***	1.12	3.35**	1.12	3.35**
Some college	1.00	2.53*	0.86	2.16*	0.80	2.02*
College graduate	1.15	2.95**	0.93	2.38*	0.87	2.22*
Childhood health (Fair or less)						
Good	1.21	4.51***	1.20	4.43***	1.20	4.44***
Excellent	2.14	8.29***	2.06	7.94***	1.99	7.72***
Close to spouse (not)	1.30	5.18***			1.16	4.63***
Very similar (not)	0.97	4.94***			0.81	4.08***
Smoked (did not)						
Smoked			-0.09	-0.48	-0.06	-0.33
Light exercise (3 or more times/week)						
Once or twice/week			-0.34	-1.56	-0.32	-1.49
Less than once/week			-0.39	-1.54	-0.34	-1.34
Spouse's health						
Good			0.86	2.60**	0.73	2.22*
Excellent			1.93	5.75***	1.50	4.45***
No. of years since marriage	0.00	0.13	0.01	0.28	0.00	0.14
Remarriage (first)	0.04	0.10	0.15	0.36	0.07	0.17
Intercept	51.76	67.08***	52.40	64.11***	51.40	62.10***

Notes. Unweighted analysis; reference groups in parenthesis; missing flags are also included in our analyses.

<sup>+</sup>Significant at  $p < .10$ .

\*Significant at  $p < .05$ .

\*\*Significant at  $p < .01$ .

\*\*\*Significant at  $p < .001$ .

showing that widowhood has adverse consequences for various dimensions of physical health (Bradbeer, Helme, Yong, Kendig, & Gibson, 2003; Hahn, 1993; Stroebe et al., 2007; Shahar, Schultz, Shahar, & Wing, 2001). We attribute the absence of a statistically significant association between widowhood and physical health to the fact that we relied on a global measure of health because of our interest on overall levels of physical health. This was also the case for Perkins and Harris (1990), who relied on a global measure of physical health and did not find statistically significant differences by marital status.

We also find that among widowed persons, those who were previously in age heterogamous unions were particularly vulnerable to the adverse consequences of widowhood. Combined with our analysis about the role of marital

quality and health practices in engendering health disparities by marital status and the spousal age gap and the results of supplementary analyses showing that 77% of surviving spouses in age heterogamous unions is the younger spouse, this finding lends support to the view that having an older spouse may have adverse effects on the younger spouse's health (Drefahl, 2010; Klinger-Vartabedian & Wispe, 1989; Rose & Benjamin, 1971).

Differential selection accounts for some of the health differentials between married and widowed respondents. Widowed persons may have a greater health disadvantage than their married peers because they are a negatively selected group in terms of socioeconomic status, which in turn can adversely affect the health of widowed persons (Waldron, Hughes, & Brooks, 1996). Differential selection,

however, fails to explain why widowed persons in age heterogamous unions are more vulnerable to the adverse consequences of widowhood for health. This is unsurprising given the fact that widowed persons in age heterogamous unions do not appear to be more disadvantaged than their counterparts who married spouses of a similar age.

We also find that widowed persons may have an increased health disadvantage than married individuals because they have poorer relationship quality, which is a well-known determinant of adverse health outcomes (Bradbury et al., 2000; Larson & Holman, 1994; Umberson et al., 2006). Marital quality, however, fails to explain why widowed persons in age heterogamous unions are more vulnerable to the adverse consequences of widowhood for health. This is unsurprising given the fact that individuals in age heterogamous unions, especially those who make their transitions into widowhood, have higher marital quality than their counterparts married to spouses who are similar in age. Although data limitations prevent us from examining this question, future studies should assess whether the higher rates of marital satisfaction observed in our study is the artifact of sample attrition or represents a real phenomenon among a subgroup of individuals with certain characteristics.

Finally, our study reveals that variations in health practices during marriage partly explain some of the health disparities between widowed and married persons as well as the extra vulnerability of widowed persons who were previously in age heterogamous unions. Having an older spouse may have deleterious consequences on health because they are less likely to be physically active than similarly aged counterparts because (a) they lead a sedentary lifestyle together with their less physically fit spouse and (b) physical activities may compete with the demands of caring for a less fit (and potentially impaired) spouse (Petee et al., 2006).

This study is not without limitations. First, WLS respondents represent the non-Hispanic White population born around 1939 who graduated from a Wisconsin high school in 1957 (Sewell et al., 2004) and exclude individuals without a high school education, race/ethnic minorities, and immigrants. Therefore, the generalizability of our results is limited as marriage market conditions, likelihood of transitioning into widowhood, and the health consequences of widowhood are known to differ by race, ethnicity, nativity status, and levels of education (Elwert & Christakis, 2006; Kearl & Murgia, 1985; Lichter, LeClere, & McLaughlin, 1991). Second, although the WLS has exceptionally high response and retention rates (i.e., 87% of original respondents in 1992/93 and 88% in 2004/05), it is not immune from biases arising due to sample attrition throughout its 50 years of existence (Sewell et al., 2004). Because sample attrition is greater among individuals with bad health and respondents in age heterogamous unions have worse health than their counterparts in age homogamous unions, it is possible that we may be underestimating the health disadvantage of respondents in age heterogamous unions relative to those married to spouses who are similar in age. This will be particularly

true for respondents who transition into widowhood. Third, our study captures the health disparities between persons who remained married and those who experienced widowhood at relatively younger ages (i.e., 53 and 66 years of age). Adverse effects of widowhood are more pronounced among younger widows/widowers than they are among older widows/widowers (Stroebe et al., 2007). Therefore, our findings on health disparities between widowed and married persons may be more pronounced than those obtained by comparing the health status of individuals who were widowed at older ages with that of married individuals. Fourth, we rely on self-reported measures of mental and physical health; thus, we cannot exclude the possibility that reporting of mental and physical health problems is higher among widowed, age heterogamous individuals. Widowed persons, for example, may be more inclined to notice impairments in mental health than married individuals because they can no longer rely on a partner to help them with a number of daily life aspects. Finally, we examine mental and physical health outcomes at a single point in time, which prohibits us from investigating how mental and physical health changes as a result of transitions into widowhood. Instead, our analysis is well equipped (a) to document health disparities by marital status and age differentials between spouses and (b) with careful temporal ordering to determine how the various mechanisms work together to engender health disparities between widowed and married persons with varying degrees of age similarities between spouses.

Despite the limitations, our study contributes to the literature on widowhood and health of the surviving spouse in several important ways. First, our results help identify a subgroup that is particularly vulnerable to the adverse consequences of widowhood: those who were previously in age heterogamous unions. By doing so, it adds to the literature on the consequences of widowhood by showing that the emotional responses to widowhood vary depending on spousal choice decisions, patterns of marital sorting, and sociodemographic similarities between spouses. Second, we contribute to the sparse literature on the consequences of age heterogamy by documenting variations in mental and physical health according to marital status and spousal age gap and by extending the scope of analyses to include outcomes other than mortality. Third, we test previously proposed explanations to account for health disparities by the spousal age gap, a topic which has received considerable attention but has been seldom empirically tested (Drefahl, 2010). Finally, we address these questions using a rich data set such as the WLS, which counts with exceptionally high retention rates, employs a longitudinal design creating auspicious circumstances for proper temporal ordering, and tends to have a lower per-item missing rate on key variables relevant for our study (e.g., marital quality) than other data sets.

Our findings underscore the opportunity for future work that will build upon the current study results. First, we recommend further examination of gender differences in the consequences of age heterogamous unions, paying close

attention to differences between older male–younger female couples and older female–younger male couples. We were unable to disentangle these differences because of sample size issues surrounding the subpopulation of widowed persons in age heterogamous unions. Second, future work would benefit from investigating the dynamics of racial and ethnic differences in the link between widowhood, age heterogamy, and health of the surviving spouse. This is of interest given that age heterogamy is more prevalent among Hispanic and Asian couples relative to their White counterparts (Vera et al., 1985). Finally, the current state of the literature would benefit from examining cohort differences and the length of widowhood as potential covariates in the relationship between widowhood and late life health.

In conclusion, our study demonstrates that widowed men and women, especially those in age heterogamous unions, have poorer mental health than their married counterparts. It reveals that differential selectivity, marital quality, and health practices explain health disparities between married and widowed persons, but they fail to explain why widowed persons previously in age heterogamous unions are more vulnerable to the adverse effects of widowhood than their counterparts in age homogamous unions. Last but not least, we find that variations in health practices during marriage are the primary reason why widowed persons in age heterogamous unions may be particularly vulnerable to the adverse health consequences of widowhood.

#### SUPPLEMENTARY MATERIAL

Supplementary material can be found at: <http://psychogerontology.oxfordjournals.org/>.

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