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In this article, we investigate the relationship between health behaviors, marital status, and gender in the elderly population. We estimate logistic regression models to determine the factors that affect the likelihood of undertaking healthy behaviors. Using data from the 1987 National Medical Expenditure Survey, we find that marriage has positive impacts on health behaviors in the elderly population and that, when these effects differ by gender, they tend to be larger for elderly men than for elderly women. These results extend earlier findings showing that marriage encourages healthy behaviors for a younger population and demonstrate that these benefits continue later in life.
Key Words: Preventive health, Marital status, Gender, Elderly persons

Health-Related Behaviors and the Benefits of Marriage for Elderly Persons

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With the continuing aging of the U.S. population and evolving morbidity and mortality patterns, identifying the factors associated with adverse health outcomes in the elderly population is increasingly important. A number of studies has demonstrated that widows and widowers are at increased risk of morbidity and mortality as compared to their married counterparts (see, for example, Arens, 1982; Goldman, Korenman, & Weinstein, 1995; Neale, Tilley, & Vernon, 1986). As widowed persons constitute nearly half of the female population aged 65 and older and 14% of men aged 65 and older (Schick & Schick, 1994), the means by which marital status serves to improve health outcomes for the elderly population need to be understood better.

The demographic literature suggests two primary reasons for the increased morbidity and mortality of unmarried persons: selection and protection. Selection effects refer to the greater propensity of healthier persons to marry; morbidity and mortality rates would be higher among the unmarried as a result of the selection of the robust population into the married state. Alternatively, marriage may provide a protective benefit by influencing the social, psychological, and physical environments in which individuals live, thereby positively influencing their health. Thus, one explanation for the increased morbidity and mortality of the unmarried population is that the presence of a spouse results in positive changes in health-related behaviors (and consequent reductions in morbidity) for those who are married.

Of the research that explores the protective benefits of marriage, a significant strand has been devoted to analyzing the *mechanisms* by which marriage confers protective health benefits, although such studies have not focused on the elderly population (see Ross, Mirowsky, & Goldsteen, 1990, for a review). Researchers have pointed to social and emotional support, as well as to economic factors, to explain the beneficial effects of marriage on health. For example, it has been argued that marriage regulates individuals' conduct and encourages healthy behaviors (Anson, 1989; Umberson, 1987). Waite (1995) notes that "marriage provides individuals . . . with someone who monitors their health and health-related behaviors, and who encourages self-regulation" (p. 488).

The propensity to undertake healthy behaviors represents one particular dimension along which marriage can affect health. Umberson (1987), investigating the beneficial effects of marriage for adults of all ages, has demonstrated that marriage does promote healthy lifestyle choices, especially for men. In later work, she hypothesizes that men may gain more from marriage because wives encourage their husbands to live healthier lifestyles (see Umberson, 1992). This may be particularly true for elderly couples to the extent that they are more likely than younger couples to follow traditional gender roles and may have spent a greater proportion of their lifetime being married.

For the elderly population, however, little is known about the relationship between marital status and health behaviors. In addition to focusing on adults of all ages, Umberson's work concentrated on behaviors such as risk-taking and drug and alcohol use—behaviors that may not be as relevant to an elderly population. On the other hand, existing studies that have investigated elderly people's health behaviors have often been conducted with small samples that are not nationally representative (e.g., Hickey, Rakowski,

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& Julius, 1988; Rakowski, Julius, Hickey, & Halter, 1987). In this article, we investigate the relationship between health behaviors and marital status for a nationally representative sample of elderly persons. In addition, we consider the possibility that marriage may affect health behaviors differently for men and women. The outcomes we study are preventive health behaviors, including both primary prevention (such as exercise and smoking behaviors) and secondary prevention (such as blood pressure checks).

The Relationship Between Health Behaviors and Health Outcomes

Investigating the factors associated with healthy behaviors is only of interest if these behaviors are associated with positive health outcomes in the elderly population. Evidence suggests that correlation among health behaviors is low (Fuchs, 1982; Sobal, Revicki, & DeForge, 1992), implying that the factors that affect the propensity to undertake healthy behaviors may vary and that attempts to improve health may need to be behavior-specific. As a result, we consider a number of different health behaviors in our analysis. The behaviors we include are: (a) having blood pressure checked within the past year by a doctor or medical person; (b) performing physical activity (moderate or strenuous physical activity for at least 30 minutes, three or more times per week); (c) not being a current smoker; (d) using a seat belt always or nearly always when driving or riding in the front seat of a car; and (e) eating breakfast every day or almost every day.

The evidence regarding the first four behaviors is well established. Regular blood pressure screening for hypertension is associated with effective treatment for hypertension-related morbidity and mortality (Littenberg, Garber, & Sox, 1990; U.S. Preventive Services Task Force, 1989; U.S. Public Health Service, 1994). With respect to physical activity, there is growing evidence that exercise can be beneficial to elderly persons by decreasing mortality and improving quality of life (Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987; Rooney, 1993). Drawing on a number of studies, Buchner, Beresford, Larson, LaCroix, and Wagner (1992) conclude that exercise can improve strength and aerobic capacity for older adults. Elward and Larson (1992) argue that exercise can also improve and help maintain functional ability, although they call for more research. In addition, there is substantial evidence that smoking is associated with cardiovascular disease and cancer for middle-aged populations; it is also apparent that these risks continue into older adulthood. Paganini-Hill and Hsu (1994) followed a group of individuals aged 75 and older for 9.5 years and found that current smokers had substantially higher risks of death than those individuals who had never smoked. Studying a group of elderly individuals from the Honolulu Heart Program, Benfante, Reed, and Frank (1991) also found higher rates of coronary heart disease among current smokers relative to both former smokers and individuals who had never smoked. Although motor vehicle fatalities are not a leading cause of death for the elderly population, elderly persons represent a disproportionate share of all motor vehicle fatalities relative to their population size (U.S. Bureau of the Census, 1994). According to the National Safety Belt Coalition of the National Safety Council, safety belt use prevents fatalities and significantly lowers injury severity. Carethers (1992) has argued that improving traffic safety among elderly persons is an important health behavior.

With regard to eating breakfast, Morgan, Zabik, and Stampley (1986) showed that regular breakfast consumption for adults can improve diet adequacy and is correlated with overall nutritional status. Other studies report additional evidence regarding the benefits of eating breakfast on a regular basis. Kaplan and colleagues (1987) found evidence that eating breakfast has an independent and statistically significant effect on mortality for older adults. Among younger cohorts, there is limited evidence that eating breakfast can improve memory and mood (Smith, Kendrick, Maben, & Salmon, 1994), albeit based on small samples. Haines, Guilkey, and Popkin (1996) analyzed trends in breakfast consumption among adults and argued that skipping breakfast may be a signal of other health problems.

Data and Methods

Our data come from the 1987 National Medical Expenditure Survey (NMES). The NMES sample of 38,446 persons in approximately 14,000 households constitutes a national probability sample of the civilian, noninstitutionalized population of the United States. Information on health care utilization, expenditures, and insurance coverage for calendar year 1987 was collected for each individual, along with background social, demographic, and economic characteristics. Much of this information was gathered via proxy with a single respondent for each household (for additional information on the NMES survey, see Edwards & Berlin, 1989). In addition to the in-person interview conducted with one respondent for each household, the NMES also asked each adult in the survey to complete a self-administered questionnaire. Of particular interest for our analysis are the questions asking each adult about their health behaviors, attitudes, psychological distress, and social support.

We restrict our sample to individuals aged 65 and older who responded to the self-administered questionnaire. We further limit our analysis to those elderly persons who were married or widowed. Although elderly individuals in other marital states (e.g., never married, divorced) are of interest, small sample sizes prevented their inclusion in the analyses. Our overall sample size is 4,443, consisting of 1,800 men (275 widowed and 1,525 married) and 2,643 women (1,445 widowed and 1,198 married). All estimates presented are weighted to account for sampling probability, non-response to both the main and self-administered questionnaires, and poststratification to the November 1987 population as measured in the Current Population Survey sponsored by the

U.S. Bureau of the Census. Standard errors are also adjusted to account for the complex survey design.

We use logistic regression techniques to identify the independent effects of marital status and gender on health behaviors, controlling for demographic, economic, health, and social support variables. A description of the dependent and independent variables of interest is contained in Table 1. All the dependent variables are derived from items appearing in the self-administered questionnaire and are coded as dichotomous indicator variables.

We study five distinct sets of independent variables. The first group of variables, which are of primary interest in our analyses, are the marital status and gender variables. Two indicators are specified: sex (male) and marital status (married, which equals 1 if the elderly person is married and 0 if widowed). Because there is evidence suggesting that women value health more than men do (Kristiansen, 1990), we conjecture that men will be less likely to engage in healthy behaviors. As Umberson (1987) found for the general population, we also expect marriage to encourage healthy behaviors. Further, we hypothesize that the beneficial effect of marriage on healthy behaviors will be greater for elderly men than for elderly women, because wives may take on responsibility for maintaining their husbands' health in addition to their own (see Umberson, 1992).

Our analyses also control for a rich set of demographic variables. We allow for a nonlinear relationship between age and health behaviors by including both linear and quadratic age terms. In addition to controlling for age, we include indicators of educational attainment. Other variables included in the analyses are race/ethnicity, family size, and economic status. The two measures of race/ethnicity, which identify Hispanic and Black individuals relative to elders of other racial and ethnic groups, are included to account for observed differences in health and health behaviors (National Center for Health Statistics, 1996). Family size, which measures the number of family members residing with the elderly individual, reflects a person's proximity to other individuals, which has been shown to have an impact on health (Anson, 1989;

Table 1. Variable Definitions

Variable	Description
Dependent Variables	
Blood Pressure Check	= 1 if blood pressure checked within the last year by a doctor or medical person; 0 otherwise
Physical Activity	= 1 if person engages in moderate or strenuous physical activity for at least one-half hour, 3 or more days per week; 0 otherwise
Eating Breakfast	= 1 if person eats breakfast everyday or almost everyday; 0 otherwise
Wearing Seat Belt	= 1 if person wears a seat belt always or nearly always when driving or riding in the front seat of a car; 0 otherwise
Not Smoking	= 1 if person does not currently smoke; 0 otherwise
Independent Variables	
Marriage and Gender	
Married	= 1 if married; 0 if widowed
Male	= 1 if male; 0 if female
Demographics	
Age	Individual's age
Age^2	Age*Age/100
Family Size	No. of persons in the family
Education	Indicators of < 12, 12, 13–15 or 16+ years of education
Rural Area Indicator	= 1 if person lives in rural area; 0 otherwise
Region	Indicators for living in Northeast, South, West, Midwest
Hispanic	= 1 if person is Hispanic; 0 otherwise
Black	= 1 if person is Black (not Hispanic); 0 otherwise
Health and Attitudes	
Attitude	Measure of attitude toward health care; higher values indicate more negative attitudes (0–4)
Missing attitude	= 1 if attitude is unknown; 0 otherwise
Has usual source of care	= 1 if person has usual source of health care; 0 otherwise
Affect	Psychological distress index; higher values indicate more distress (5–30)
Missing affect	= 1 if affect is unknown; 0 otherwise
Economic Status	
Poor	= 1 if income below the federal poverty line (FPL); 0 otherwise
Near poor	= 1 if income between 100%–125% of the FPL; 0 otherwise
Low income	= 1 if income between 125%–200% of the FPL; 0 otherwise
Middle income	= 1 if income between 200%–400% of the FPL; 0 otherwise
High income	= 1 if income > 400% of the FPL; 0 otherwise
Social Support	
Social contact index	Summary measure of social contact; higher values indicate more social contact (0–8)
Share life indicator	= 1 if person has someone to share feelings and concerns; 0 otherwise
Missing social index or share life indicator	= 1 if social contact index or sharing life information is missing; 0 otherwise

House, Landis, & Umberson, 1988) and may improve health behaviors. Finally, we include a measure of family economic status relative to the federal poverty line.

Along with basic demographic information, we include two geographic measures. Region of residence, captured by three indicator variables, is incorporated to account for observed regional differences in health-related factors (Kitagawa & Hauser, 1973; Morrisey & Jensen, 1989). To the extent that individuals' health behaviors and attitudes toward health are influenced by their communities, we would expect to see variation in health behaviors by geography, even after controlling for other basic differences. For similar reasons, we incorporate an indicator denoting whether a person lives in a rural area (see Braden & Beauregard, 1994).

Because factors that affect an individual's perceived or actual benefit from adopting healthy behaviors should be included in the analysis, we construct several variables to reflect health status and health attitudes. The first variable indicates whether the individual has a usual source of health care. Individuals with a usual source of health care may have better information about the relative benefits associated with health behaviors; prior research has shown that having a regular physician affects the use of screening tests for elderly persons (Chao, Paganini-Hill, Ross, & Henderson, 1987). We expect that individuals with a usual source of health care, therefore, will be more likely to engage in healthy behaviors.

We also include a measure of psychological distress in our analysis, denoted affect, which is a scale incorporating items in the self-administered questionnaire that reflects the frequency of five psychosomatic symptoms occurring in the past 30 days: felt very nervous; felt calm and peaceful; felt downhearted and blue; felt happy; and felt so down that nothing could cheer you up. The scale is coded so that higher values reflect more psychological distress. Previous research has demonstrated that all five indicators measure the same concept and load on the same factor (Hahn & Schone, 1996), and the Cronbach's alpha for this measure is .87. Higher values of affect indicate increasing levels of psychological distress; therefore, we expect a negative relationship between affect and healthy behaviors.

The final health-attitude variable captures the extent to which each elderly person has a negative attitude toward seeking health care. Attitude represents the number of the following statements to which each individual responded "agree somewhat" or "agree strongly": "I can overcome most illness without help from a medically trained professional"; "Home remedies are often better than drugs prescribed by a doctor"; "If I get sick, it is my own behavior which determines how soon I get well again"; and "I understand my health better than most doctors do." A high score on this variable is consistent with an attitude that would lead someone to be less likely to seek medical assistance and more likely to take his or her own steps to improve health, suggesting a positive relationship with primary health behaviors and a negative relationship with secondary preventive behaviors. The responses were drawn from the self-administered questionnaire and the scores ranged from 0 to 4. There was some item nonresponse to the questions concerning psychological distress and attitudes about health care, so we include two additional indicators to account for missing information for these variables: missing attitude and missing affect.

A final group of variables is included in our analysis to reflect social support. We hypothesize that elderly individuals with greater social support will be more likely to engage in positive health behaviors. Individuals who are well integrated into a community and have frequent contact with friends and family members may perceive that their health is more valuable, not only to themselves but to others. In fact, existing evidence highlights the importance of social support for health and health behaviors (House et al., 1988; Potts, Hurwicz, Goldstein, & Berkanovic, 1992). To capture social support, we include two indicators. The first, a social contact index (social contact), is a scale reflecting the frequency of each of the following events during the 30-day period prior to completing the self-administered instrument: visits by friends, visits to friends at their homes, phone calls with friends, and social outings. For each of the variables comprising the index, responses were 0 (there was never contact), 1 (contact was occasional—less than once a week), and 2 (contact was frequent—at least once a week). Therefore, the social contact index takes on values between 0 and 8, and higher values of the index reflect greater social contact. Finally, we include a variable (share life) reflecting the individual's yes/no response to the following question: "Is there anyone in your life with whom you can really share your very private feelings and concerns?" Because the social-support information also came from the self-administered questionnaire and was subject to item nonresponse, we created an indicator for the missing social support measures. As the relative risk of morbidity and mortality increase with age, social support may have a particularly strong impact on health and health behaviors for the elderly population if increased social contact provides information and motivation for undertaking health-promoting behaviors.

Our primary interest in this article is to investigate the relationships between marital status and health behaviors for elderly men and women. As a result, it is vital to account for gender differences in addition to basic differences between widowed persons and those who are married. Thus, we explicitly compare (a) married women versus widowed women, (b) married men versus widowed men, (c) widowed men versus widowed women, and (d) married men versus married women. In order to facilitate each of these comparisons, we include three relevant indicator variables in all of our models: the indicator variable for gender (male), the indicator variable for marital status (married), and their interaction (Married × Male). By including the interaction, we can make comparisons by analyzing the relevant set of coefficients. For example, the coefficient on the married variable determines the propensity to engage in healthy behaviors for married women relative to widowed women.

Similarly, the effect of marriage on health behaviors of men can be found by determining whether the sum of the coefficients on married and Married × Male are significantly different from zero (i.e., the effect of being a widowed man is reflected in the male coefficient whereas the effect of being a married man is reflected in the male, married, and Married x Male coefficients). A full description of the method used to calculate the odds ratios is contained in the Appendix.

Results

Table 2 provides weighted descriptive information about our sample by gender and marital status. The distribution of our sample reflects that of the general population aged 65 and older, with a majority of women. Slightly more than half of these women are widowed, whereas elderly men are overwhelmingly married, reflecting their relatively higher rates of remarriage (Schoen & Weinick, 1993).

We observe some differences in health behaviors by marital status and gender. Having had a blood pressure check by a medical person within the last year is the most prevalent of our positive health behaviors, with proportions ranging from 87–96%. Comparing elderly women and men by marital status, we see that women are significantly more likely to have their blood pressure checked than men ($p < .05$ for married persons; $p < .01$ for widowed persons). Engaging in physical activity is relatively less common; approximately half of the individuals in our sample exercise

Table 2. Descriptive Statistics[a]

	Men		Women	
Variable	Married	Widowed	Married	Widowed
Total (in thousands)	8,524	1,584	6,547	7,958
Total (% distribution)	34.6	6.4	26.6	32.3
	Mean (Standard Error)			
Outcomes				
Blood pressure check	0.91 (.008)	0.87 (.029)	0.95 (.013)	0.96 (.012)
Physical activity	0.56 (.016)	0.41 (.045)	0.50 (.019)	0.45 (.021)
Eating breakfast	0.88 (.010)	0.88 (.022)	0.88 (.014)	0.89 (.013)
Seat belt use	0.60 (.020)	0.51 (.032)	0.71 (.023)	0.66 (.023)
Smoking	0.26 (.016)	0.32 (.039)	0.28 (.020)	0.31 (.022)
Demographics				
Age (yrs)	72.26 (.164)	76.54 (.506)	71.22 (.161)	76.10 (.224)
Family size	2.28 (.027)	1.45 (.049)	2.23 (.025)	1.48 (.032)
Education				
<12 yrs	0.45 (.017)	0.66 (.034)	0.42 (.018)	0.57 (.017)
12 yrs	0.30 (.012)	0.24 (.030)	0.36 (.015)	0.27 (.014)
13–15 yrs	0.12 (.010)	0.04 (.013)	0.13 (.010)	0.10 (.010)
16+ yrs	0.13 (.010)	0.05 (.013)	0.09 (.009)	0.06 (.006)
Rural area indicator	0.20 (.027)	0.18 (.033)	0.19 (.027)	0.18 (.027)
Region				
Northeast	0.19 (.015)	0.27 (.036)	0.20 (.017)	0.23 (.019)
Midwest	0.25 (.015)	0.26 (.033)	0.24 (.015)	0.27 (.015)
West	0.19 (.014)	0.16 (.026)	0.19 (.015)	0.16 (.013)
South	0.37 (.023)	0.32 (.035)	0.37 (.026)	0.34 (.017)
Hispanic	0.03 (.007)	0.02 (.009)	0.02 (.005)	0.03 (.005)
Black, not Hispanic	0.07 (.008)	0.12 (.022)	0.06 (.009)	0.09 (.010)
Health and Attitudes				
Attitude	1.43 (.040)	1.46 (.081)	1.40 (.039)	1.46 (.045)
Missing attitude	0.06 (.006)	0.11 (.020)	0.08 (.009)	0.12 (.011)
Usual source of care	0.92 (.010)	0.82 (.023)	0.92 (.009)	0.92 (.007)
Affect	10.61 (.157)	10.86 (.357)	11.26 (.140)	11.44 (.181)
Missing affect	0.04 (.005)	0.07 (.017)	0.06 (.008)	0.08 (.009)
Economic Status				
Poor	0.06 (.007)	0.16 (.028)	0.05 (.007)	0.21 (.013)
Near poor	0.04 (.007)	0.07 (.018)	0.04 (.006)	0.13 (.011)
Low income	0.17 (.013)	0.22 (.029)	0.16 (.012)	0.25 (.013)
Middle income	0.39 (.016)	0.36 (.032)	0.41 (.018)	0.27 (.016)
High income	0.34 (.014)	0.18 (.025)	0.34 (.016)	0.14 (.010)
Social Support				
Social contact index	6.48 (.061)	6.36 (.184)	6.00 (.070)	5.69 (.076)
Share life indicator	0.85 (.009)	0.69 (.031)	0.85 (.011)	0.76 (.011)
Missing social support	0.05 (.006)	0.09 (.021)	0.07 (.008)	0.10 (.008)

[a]Weighted to be nationally representative.

regularly. We also observe that widowed persons are significantly less likely to exercise than their married counterparts ($p < .01$ for men; $p < .10$ for women), and married men are more likely to be physically active than married women ($p < .05$). Many individuals (88–89%) report eating breakfast every day or almost every day. Smaller proportions of individuals report wearing seat belts regularly (ranging from 51% for widowed men to 71% for married women); widowed men are significantly less likely to wear seat belts than married men ($p < .05$), and women are more likely to wear seat belts than men ($p < .001$). Less than one third of elderly men and women reported being current smokers at the time of the survey.

We also observe significant differences in other characteristics of widowed and married men and women. Widowed persons are significantly older, have less education, and are more likely to be Black than married individuals. Married elderly men are also more likely to have a usual source of health care relative to those men who are widowed. Finally, we observe that widowed persons tend to be poorer and less likely to have someone with whom they can share their concerns.

Table 3 compares odds ratios (and corresponding 95% confidence intervals) for each of the health behaviors by marital status (married women vs widowed women and married men vs widowed men) and gender (widowed men vs widowed women and married men vs married women). The odds ratios are derived from the logistic regression models, which are shown in full in Table 4. These models, which control for all the independent variables described in Table 1, provide information on the effects of marital status and gender on individuals' propensities to undertake preventive health behaviors.

The odds ratios shown in the top panel of Table 3 support the hypothesis that marriage has a positive effect on health behaviors for elderly persons. With the exception of blood pressure checks, where we observe only a marginally significant beneficial effect of marriage on healthy behaviors for men, all of the other behaviors reveal a positive beneficial effect of marriage for men or women. Married elderly men are more than 70% more likely to engage in physical activity than their widowed counterparts, but there is no statistically significant difference in women's physical activity by marital status. With regard to eating breakfast and seat belt use, we observe that married elderly women are more likely to engage in these healthy behaviors than their widowed counterparts, although marriage does not have a statistically significant effect on the same behaviors for men. Our results also suggest beneficial effects of marriage, especially for men, in terms of not smoking: In particular, married men are over two times more likely *not* to smoke relative to widowed men, although the effect for married women relative to widowed women is somewhat smaller and only marginally significant.

The bottom panel of Table 3 shows gender differences in healthy behaviors for men and women by marital status. Widowed men are more likely to eat breakfast than widowed women and are less likely to use seat belts or not smoke. Similar patterns emerge for married men relative to married women: married men are more likely to engage in physical activity and eat breakfast than married women; married men are also less likely to wear seat belts and not smoke. Thus, we do find basic gender differences across the health behaviors, although they do not reveal a consistent pattern.

In addition to analyzing the independent effects of marital status and gender, we can assess the relative size of the marriage effect for men versus women by analyzing the coefficient on the Married x Male variable in Table 4. Overall, we find mixed evidence regarding the hypothesis that the marriage effect for men is greater than that for women. For eating breakfast and seat belt use, we observe no differences in the effects of marriage by gender. On the other hand, the marriage effect is larger for men for blood pressure checks, physical activity and not smoking (although the effect for blood pressure checks is only marginally significant). In sum, we do find beneficial effects of marriage on healthy behaviors; moreover, when the effects vary by gender, they tend to be larger for men than for women.

The full results shown in Table 4 also indicate that the demographic, economic, health, and social contact variables affect health behaviors. For example, elderly Black individuals and those with fewer than 12 years of education are less likely to engage in physical activity, to eat breakfast, or to use seat belts relative to those persons in other racial/ethnic groups and

Table 3. Odds Ratios (and 95% Confidence Intervals) for Preventive Behaviors by Marital Status and Gender From Logistic Regressions

Comparison	Blood Pressure Check	Physical Activity	Eating Breakfast	Seat Belt Use	Not Smoking
Marital Status Effects					
MW vs WW	1.00 (0.71, 1.43)	1.13 (0.89, 1.43)	1.33* (1.04, 1.70)	1.31** (1.07, 1.59)	1.28† (0.98, 1.69)
MM vs WM	1.53† (0.98, 2.40)	1.72** (1.16, 2.57)	1.17 (0.82, 1.68)	1.31 (0.94, 1.84)	2.01*** (1.40, 2.89)
Gender Effects					
WM vs WW	0.69† (0.47, 1.02)	1.22 (0.85, 1.77)	1.46* (1.02, 2.08)	0.71* (0.52, 0.96)	0.45*** (0.30, 0.67)
MM vs MW	1.05 (0.79, 1.40)	1.86*** (1.60, 2.18)	1.29* (1.03, 1.60)	0.71*** (0.61, 0.83)	0.71** (0.57, 0.88)

Notes: A full explanation of the derivation of the odds ratios is contained in the Appendix. MM, married men; MW, married women; WM, widowed men; WW, widowed women.

†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

Table 4. Logistic Regression Results for Men and Women

Variable	Blood Pressure Check	Physical Activity	Eating Breakfast	Seat Belt Use	Not Smoking
	Odds Ratio (e^{β})				
Intercept	0.03	0.00†	0.00*	0.00**	5.93E8*
Marriage & Gender					
Married[a]	1.00	1.13	1.33*	1.31**	1.28†
Male	0.69†	1.22	1.46*	0.71*	0.45***
Married × Male	1.53†	1.52*	0.88	1.01	1.57*
Demographics					
Age	1.07	1.35*	1.27†	1.40**	0.56**
Age^2	0.96	0.79*	0.90	0.80**	1.58**
Family size	0.93	0.87**	0.90*	0.91*	0.91†
Education[b]					
<12 yrs	0.98	0.77**	0.77*	0.75***	1.08
13–15 yrs	1.02	1.07	1.10	1.40**	1.03
16+ yrs	1.27	1.26	1.87**	1.92***	1.52*
Rural area indicator	0.97	0.73*	1.09	0.55*	1.21†
Region[c]					
Northeast	0.98	0.79*	0.82	1.06	1.04
Midwest	0.94	1.13	0.84	1.21	1.07
West	1.56*	1.45**	0.85	1.82**	1.00
Race/Eth. indicator					
Hispanic	0.92	0.60*	0.64	0.94	0.94
Black, not Hispanic	1.08	0.74†	0.61**	0.68**	1.10
Health and Attitudes					
Attitude	0.78***	1.10***	1.02	0.94*	0.98
Missing attitude	0.56*	1.14	0.89	0.76	0.85
Usual source of care	5.85***	0.63*	1.87***	0.87	1.19
Affect	1.08***	0.92***	0.97**	0.96***	0.97†
Missing affect	1.72	0.30***	0.50**	0.63*	0.65
Economic Variables[d]					
Poor	0.95	0.73†	1.10	0.65*	0.60*
Near poor	0.93	0.58**	0.80	0.71†	0.55**
Low income	1.03	0.99	0.95	0.80*	0.78
Middle income	1.23	0.92	1.15	0.82*	0.87
Social Support					
Social contact index	1.10**	1.19***	1.09**	1.07**	1.11***
Share life indicator	1.18	1.17	1.12	0.94	0.91
Missing social support	3.08**	1.71†	1.84*	2.59**	1.57
Sample size	4268	4147	4298	4270	4139
−2*LL	2592.8	4841.5	3454.9	5359.6	3400.9
p Value	0.00	0.00	0.00	0.00	0.00

Note: Source:1987 National Medical Expenditure Survey.
[a]Relative to being widowed.
[b]Relative to 12 years of education.
[c]Relative to South.
[d]Relative to high income.
†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

those with more education. In addition, we find that poor or near poor economic status is associated with a lower propensity to engage in positive health behaviors. With the exception of having blood pressure checks, age has a significant effect on all of the other behaviors (the effect on eating breakfast is only marginally significant), suggesting that the propensity to engage in health behaviors changes over the life course, even for elderly persons. Contrary to expectations, we find that family size reduces the odds of healthy behaviors. The results also suggest variation in the propensity of elderly persons to undertake health behaviors by other demographic variables, health and attitudes, and geographic location.

One of the most striking results in Table 4 is the effect of social contact on health behaviors. For all the behaviors we analyze, we find that higher values of the social contact index (indicating more social contact) are associated with increased odds of engaging in healthy behaviors. Although it may appear that the odds ratios for the social contact index are relatively small, they only represent the effect of a one-unit change in the index. Therefore, we also consider the effects of a three-unit increase in the social contact

index: odds ratios ranged from 1.23 for seat belt use to 1.69 for physical activity. Because a three-unit increase in the social contact index can represent a change as small as increasing contacts from a less-than-weekly basis to a weekly basis, the magnitudes of these findings highlight the importance of social contact for health behaviors among elderly persons.

We have been silent to this point about the role of our missing information indicators on the health behaviors (i.e., missing attitude, missing affect, and missing social support). It is clear that the missing information indicators have significant and, at times, large effects on behaviors. Unfortunately, the odds ratios for these variables yield no clear patterns. Our results regarding these missing indicators definitely suggest that the item nonresponse associated with health attitudes, psychological distress, and social support is not random. Controlling for this item nonresponse in our regression models, however, eliminates potential bias in the relationship between the other regressors and the dependent variables. Future work is needed to understand the role of item nonresponse to subjective measures in research on health behaviors.

Discussion

The main purpose of this article has been to determine whether marriage has beneficial effects on preventive health behaviors among elderly persons. Overall, we find compelling evidence that marriage improves the odds of engaging in positive behaviors (including physical activity, eating breakfast, wearing seat belts, and not smoking) relative to elderly widowed persons. These results extend Umberson's (1987, 1992) earlier findings regarding the beneficial effects of marriage, demonstrating that marriage continues to have beneficial effects on healthy behaviors later in life.

In addition, our results provide some evidence that, when the benefits of marriage vary by gender, they tend to be more substantial for elderly men. Married and widowed elderly men's health behaviors differ more markedly from one another than those of married and widowed elderly women; this is consistent with Verbrugge's (1985) argument and Kristiansen's (1990) finding that women value health more than men. Wives may encourage their husbands to engage in healthy behaviors because they place an intrinsically higher value on health. In addition, these patterns are consistent with traditional gender roles concerning health, in which wives may take on responsibility for monitoring their husbands' health-related behaviors. Thus, to the extent that men value health less than women and wives have a greater impact on their husbands' health behaviors than husbands do on their wives', it follows that the marriage effect would be larger for elderly men than for elderly women.

In addition to showing that marriage encourages healthy behaviors in the older population, this research provides information that may be useful for identifying elderly persons who may be at particular risk of not engaging in healthy behaviors. Beyond noting their elderly patients' sex and marital status, health care practitioners may also want to pay particular attention to their socioeconomic characteristics: for example, older persons who are less educated, who are Black, and who are relatively poor are less likely to engage in healthy behaviors. Our results also indicate that preventive health behaviors among elderly persons are somewhat sensitive to psychological distress and a lack of social support. Therefore, developing tools that can be used easily by practitioners to measure the psychological and social circumstances of elderly persons may help encourage healthy behaviors among patients.

This research has established positive benefits of marriage on health behaviors for a nationally representative sample of elderly persons. However, our analysis suggests several other directions for future work. The protection and selection effects of marriage may have been confounded in our analysis if elderly persons in the married state are a selected sample relative to widowed individuals. If married persons are a selected sample, then the marital status effects discussed above could be biased and could potentially provide misleading information about the effects of marital status on elderly persons' health behaviors. Because all members of the population under consideration in our analysis are or were married, the possibility of this type of bias is limited.

However, it is possible that a more complicated form of selection is occurring. If (a) there is assortative mating that results in a strong correlation between spouses' health behaviors and (b) positive health behaviors lead to lower mortality, then we would expect that a disproportionate number of individuals with weak preferences for healthy behaviors would be represented within the widowed population. If this occurs, the implication would be that marriage *per se* does not have a beneficial effect on health behaviors but rather reflects the unobserved heterogeneity of widowed and married individuals with regard to health behaviors. Even if this type of selection bias does exist, health care practitioners may still be interested in attending to marital status as a proxy for individuals' underlying attitudes toward health behaviors. Exploring the extent of unobserved heterogeneity, and the dynamics of health behaviors more generally, is an important step for future research.

Another important area for future research is improving researchers' understanding of the reasons why some individuals choose not to adopt healthy behaviors. Improving the understanding of the psychology of these decisions and the factors that affect individuals' perceptions is crucial for encouraging healthy behaviors. In particular, enhancing knowledge regarding the formation of health attitudes, of providers' roles in encouraging behaviors, and of the cost and benefit factors associated with compliance with recommended regimens would be helpful for promoting healthy behaviors among elderly persons at both the individual and population levels. If social science research on health-related issues is to contribute to morbidity and mortality reductions in the population, then furthering researchers' understanding of the process by which individuals make such health decisions is crucial.

Perhaps the most important direction for future research is further investigation of the link between health behaviors and morbidity and mortality in the elderly population. There is substantial evidence that there are marital-status and gender differentials in morbidity and mortality. In this article, we have shown that health *behaviors* also vary by marital status and gender. One possible implication of these findings is that the promotion of healthy behaviors may be one mechanism by which marriage confers protective benefits and could be partially responsible for explaining these mortality and morbidity differentials. More detailed investigations concerning the link between healthy behaviors and morbidity and mortality could improve researchers' understanding of the relative importance of healthy behaviors for the elderly population.

APPENDIX

This appendix describes the calculation of the odds ratios contained in Table 3. We begin with a prototypical version of our logistic regression models:

$$Y = X\beta + \delta_1 \text{married} + \delta_2 \text{male} + \delta_3 \text{male} \times \text{married},$$

where Y measures the health behavior, X contains all of the variables *not* related to marital status and gender, and β represents their corresponding coefficients. The coefficients, δ_1, δ_2, and δ_3, are of primary interest because they measure the effects of marital status and gender. In the specification above, the indicator variables are constructed such that widowed women are the omitted category (i.e., when the variables married, male and Male × Married all equal zero). As in all logistic regression models, odds ratios can be determined by exponentiating the relevant coefficient. Thus, e^{δ_1} measures the odds of engaging in the healthy behavior for married women relative to widowed women. Similarly, e^{δ_2} provides the odds of engaging in the healthy behavior for widowed men relative to widowed women.

The odds of engaging in healthy behaviors for married men relative to widowed men and the odds for married men relative to married women can also be derived from the above model. To derive the odds of married men engaging in a healthy behavior relative to widowed men, note that δ_2 reflects the effect for widowed men and $\delta_1 + \delta_2 + \delta_3$ for married men. Therefore, the odds for married men relative to widowed men of engaging in the healthy behavior is $e^{\delta_1+\delta_3}$, the difference between the two groups' coefficients, exponentiated. To determine the odds of healthy behaviors for married men relative to married women, note that the effect for married women is given by δ_1, and the effect for married men is $\delta_1 + \delta_2 + \delta_3$. Thus, in a similar manner, the relative odds are given by $e^{\delta_2+\delta_3}$.

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