

Burden of Cognitive Impairment by Marital Status: Evidence from the Health and Retirement Study, 1998-2014

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Introduction:

Research suggests that marital status and cognitive impairment are significantly associated, including that those who are married have lower incidence and relative risk of dementia compared with the unmarried, namely separated/ divorced, widowed and never married (1,2,3). Despite the documented association between marital status and cognitive impairment, it remains unclear at what age various marital groups experience the onset of mild cognitive impairment (MCI) and, relatedly, how long different marital groups live with and without cognitive impairment. The present study attempts to answer these important research questions using two indicators- first, mean age at onset of MCI and second, life expectancy with and without cognitive impairment. The significance of this study also increases because of the two-fold increase in the divorce rate among older Americans during the last two decades (4).

Mild cognitive impairment (MCI) is often experienced as an intermediate stage between normal cognition and dementia (5). The domain of MCI is less explored in research. In this study, age at onset is estimated for MCI. Notably, mildly impaired people experience a rapid decline in cognition (6). They also have a high rate of conversion (20 to 40%) to dementia in a relatively brief period (7). Knowing the mean age at onset of MCI will help to increase health-promoting behaviors long before that age. This may also prove to be an essential step towards delaying the occurrence of dementia or severe cognitive impairment.

Data and methods:

Sample: We used data from the Health and Retirement Study (HRS). The HRS is a high-quality ongoing longitudinal, nationally-representative survey that covers Americans aged 50 and over and their spouses of any age. The survey began in 1992. The University of Michigan conducts it with support from the National Institute on Aging and the Social Security Administration. In the survey, the respondents are interviewed after every two years. We included all individuals who were aged 50 and over in 1998. These people were followed until death or censoring, which was at the date of the 2014 survey or before.

Measures:

Marital status: The variable marital status used in this study has four groups: married/cohabiting (referred to as partnered), separated/divorced, widowed, and never married. It is a time-varying variable that indicates marital status at the time of the interview.

Cognition: For assessing cognitive status, we used information from respondents as well as from proxies. The inclusion of information from a proxy is important as cognitive impairment is a common reason for the use of a proxy. For self-respondents (92.15%), HRS uses a modified version of the Telephone Interview for Cognitive Status (TICS) test. The total test score ranges from 0 to 27 points. These scores are based on four tasks: immediate verbal recall (0–10 points), delayed verbal recall (0–10 points), serial 7s (0–5 points), and counting backwards (0–2 points). As per standard protocol, scores of 11 or less were classified as cognitive impairment (CI), and

scores from 12 to 27 are classified as no cognitive impairment (NCI) (8). The cognitive impairment group comprises of people with mild cognitive impairment or cognitive impairment without dementia (7–11 points) and people with dementia (0–6 points). For proxy scores (7.85%), three measures are used. These are proxy’s assessment of the respondent’s cognitive status and instrumental activities of daily living and the interviewer’s report of whether the respondent appeared cognitively impaired. Scores range from 0 to 11 points. Following standard protocol, scores from 3 to 11 were classified as cognitive impairment, and scores of 2 or less were classified as NCI (9).

Analysis:

The multinomial logistic models were estimated for each of the two non-absorbing initial states-no cognitive impairment and cognitive impairment. The multinomial model controls for age and age squared, practice effect, education (college graduate, high school degree or some college and less than high school), race/ethnicity (non-Hispanic White, Hispanic or non-Hispanic Black), non-Black Hispanic, and non-Hispanic other. Following is the form of the model:

$$\log\left(\frac{p_{ij}}{p_{ii}}\right) = a_{ij} + b_{1,ij} Age + b_{2,ij} Age^2 + b_{3,ij} PE + \gamma_{ij} \cdot DEMOGR$$

where p_{ij} is transitional probability from state i to state j ; a_{ij} is the intercept; age is measured at mid-interview; PE is the practice effect; γ_{ij} is a coefficient vector for the variables included in $DEMOGR$ which are race/ethnicity, education, and marital status. We estimated the model separately for both genders. The transition probabilities were then applied into a Markov chain matrix population model to calculate age at onset of mild cognitive impairment, total life expectancy, and life expectancy in a cognitively intact and impaired state.

Results: For the total population, women (65.4 years) experienced a delayed onset of MCI compared with men (63.3 years) (**figure 1**). Among all the marital groups, partnered people experienced the oldest onset of MCI, for both men (63.7 years) and women (66.0 years). For men, the never married and separated/divorced experienced earliest onset of MCI (61.5 years each). Likewise, for women, the never married had the earliest onset of MCI (64.1 years).

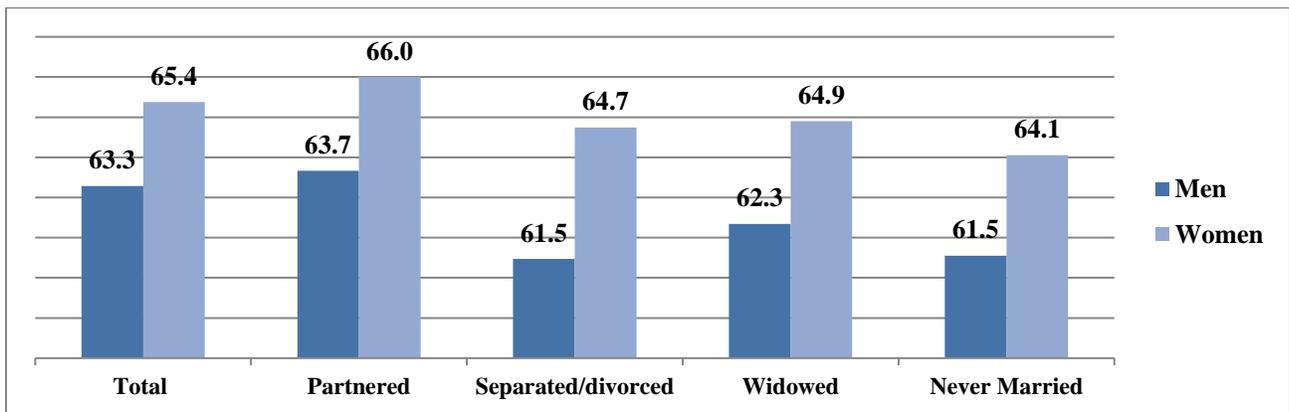


Figure1 : Mean age at onset of mild cognitive impairment for US older adults by gender and marital status (1998-2014)

Results show higher longevity for women in total and in each of the marital categories compared with men (table1). For men, total life expectancy (TLE) and life expectancy with NCI were

highest for the partnered (TLE: 26.6 years and LE_NCI 22.0 years). On the other hand, these indicators were lowest for separated/ divorced men. For women, total life expectancy and life expectancy with NCI were also highest for the partnered (TLE: 30.5 years and LE_NCI 24.7 years). On the other hand, these indicators were lowest for the never married women. Notably, the widowed lived highest number of years with cognitive impairment, for both men (4.8 years) and women (5.9 years).

Table 1: Total life expectancy (TLE), life expectancy with no cognitive impairment (LE_NCI) and cognitive impairment (LE_CI) at age 50 for US older adults by gender and marital status (1998-2014)

	Men			Women		
	TLE	LE_NCI	LE_CI	TLE	LE_NCI	LE_CI
Total population	25.7	21.2	4.5	29.2	23.5	5.7
Partnered	26.6	22.0	4.6	30.5	24.7	5.7
Separated/divorced	20.6	16.9	3.7	27.0	21.8	5.1
Widowed	23.8	19.0	4.8	28.3	22.4	5.9
Never Married	21.4	17.1	4.4	25.4	20.4	5.0

Various marital sub-groups have different TLEs and life expectancies with and without cognitive impairment. To compare the burden of cognitive impairment across marital groups, we calculated the percentage of total life expectancy spent with and without cognitive impairment.

Table 2: Percentage of total life expectancy with no cognitive impairment (% NCI) and cognitive impairment (% CI) at age 50 for US older adults by gender and marital status (1998-2014)

	Men		Women	
	% NCI	% CI	% NCI	% CI
Total population	82.5	17.5	80.5	19.5
Partnered	82.7	17.3	81.0	19.0
Separated/divorced	82.0	18.0	80.7	19.3
Widowed	79.8	20.2	79.2	20.8
Never Married	79.9	20.1	80.3	19.7

From **table 2**, we observe that compared to women (80.5%), men (82.5%) enjoyed higher percentage of their life in good cognitive health for overall population. For men, the partnered spent the highest (82.7%) percentage of life years with NCI and lowest (17.3 %) with cognitive impairment. On the other hand, widowed men (20.2%) spent the highest percentage of life with cognitive impairment. Likewise, partnered women spend the highest (81.0%) percentage of life years with NCI and lowest (19.0%) with cognitive impairment. Similar to men, widowed women (20.8%) spend highest share of their life with impaired cognition.

Discussion: The present study investigates the burden of cognitive impairment by one of its important risk factors called marital status. To achieve this goal, we have estimated mean age at onset of MCI and life expectancies with and without cognitive impairment by various marital groups. From this investigation, three crucial findings have emerged:

First, women enjoy more years with good cognitive function than men. This is likely attributable to the higher total life expectancy for women than men. However, women lag behind men in terms of the proportion of cognitive impairment free life years, also likely driven by women's longer life expectancies, i.e., they have more years of risk exposure. This finding is in accord with the recent study in England (10). Second, cognitive impairment affects men at younger ages than women. partnered men and women experience a relatively delayed onset of MCI compared

to other unmarried groups. Among the unmarried groups, the earliest onset of MCI is observed for never married people for both genders. Third, widowed men and women live the highest number and proportion of years with cognitive impairment. On the other hand, men and women who are partnered live the highest number and proportion of life years with cognitively intact health. Waite & Gallagher (2000) reported that married people enjoyed greater access to economic resources compared to unmarried people through specialization, economies of scale, and pooled wealth in marriage (11). These may have a positive influence on general and cognitive health. Moreover, one cohabiting partner provides the other partner an opportunity to widen his/ her social network by connecting with the partner's friends and family members. It is found that people with social interaction have a lower risk of cognitive impairment (12). This may be the reason why partnered people experience delayed onset of MCI and live highest percentage of life with NCI. Hence, they have the lowest burden of cognitive impairment. Contrarily, never married, separated/ divorced, and widowed people are not able to enjoy these increased economic resources that are enjoyed by married people via marriage. Moreover, marital disruption can directly affect cognitive functioning through emotional and financial distress (13). Importantly, the pain of marital dissolution on the widow is much stronger than divorce as death causes more considerable anguish (14). Probably because of these, the burden of cognitive impairment is higher for all the unmarried groups compared with the partnered.

Conclusion and future research scope: This study indicates differences in the burden of cognitive impairment by marital groups. The findings may help the health authority and policymakers to implement effective strategies to address the growing burden of cognitive impairment for the vulnerable groups. Further research should be undertaken to investigate whether the cognitive morbidity is expanding or compressing by various marital groups.

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