

## Spousal Interrelations in Self-Reports of Cognition in the Context of Marital Problems

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### Key Words

Dyads · Gender differences · Marital quality · Dementia

### Abstract

**Background:** Problems with cognitive function are common among older adults, yet there is little research assessing the extent to which the cognitive problems of older husbands and wives are related to those of their partners and whether any observed relationships are moderated by gender or marital quality. **Objectives:** Our purpose was to analyze longitudinal relationships between older spouses' cognitive function and the cognitive function of their partners 5 years later, as well as to assess moderating roles of gender and marital quality. **Methods:** The subjects were 378 community-dwelling couples aged 46–89 years at baseline who were followed for 5 years. Cognitive function was measured with a scale assessing problems remembering names, finding the right word, misplacing things and paying attention. Marital quality was assessed by comparing those reporting marital problems often or sometimes with those reporting marital problems rarely or never. All data were collected by self-report. Statistical models adjusted for paired data where appropriate and included partner cognitive function, age, chronic conditions and financial hardship. Stratified models assessed moderating roles of gender and marital problems. **Results:** We found a negative relationship between husbands' baseline lower cognitive function and wives' subsequent cognitive function but only for the wives reporting marital prob-

lems. We found no comparable relationship between wives' baseline lower cognitive function and their husbands' subsequent cognitive function. **Conclusions:** Our gender-specific finding for wives is consistent with the gender differences noted in 2 previous studies. The limitation to wives with problems in their marriages is a new finding and might follow increased stress and depression responding to changes in their husbands' cognitive functioning.

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### Introduction

Because of the length of time they have been married to each other and the intertwining of their social relationships and role activities, older husbands and wives often have a unique support relationship with each other allowing them to manage the health crises and disabilities they experience by reallocating activities and responsibilities [1, 2]. There are, however, some crises that are more difficult to handle than others. One such specific challenge is diminished cognitive function. The prevalence of its most serious form, dementia, is estimated to range from 1.5% for those aged 65–69 years to 45% for those ≥95 [3].

More common than dementia but still with negative consequences for functioning and well-being are less severe forms of cognitive impairment, such as mild cognitive impairment (MCI), which include deficits in memory and word fluency beyond those associated with nor-

mal aging. The suggested criteria for diagnosing MCI include  $\geq 1$  deficient changes in memory, language, attention and executive function but no more than modest functional impairment – in short, not normal for age but not demented [4]. Using similar criteria, a large German study reported an MCI prevalence of 24.4% for those aged 75–84 years and a prevalence of 32.8% for those  $\geq 85$  [5].

Only a few studies have examined relationships between the cognitive functioning of marital partners over time and these suggest that the direction of the relationship is not equal. For example, husbands' performance on an inductive reasoning task predicted their wives' performance 7 years later but not the reverse [6]. Likewise, a study using data from the Australian Longitudinal Study of Aging reported that perceptual speed for husbands predicted subsequent perceptual speed decline for wives 1 year later but reported no evidence for the opposite effect [7]. Studies of older couples involving affective transmissions and conditions such as hearing loss and cognitive problems on health and well-being have also reported stronger impacts on wives than husbands [8–10]. Rationales for wives include greater importance of communication in marriage [8, 10] and greater importance of spouse relationships for older wives [11]. We only found 2 studies with the opposite unidirectional relationship. Lower cognitive function in wives was longitudinally associated with increased depressive symptomatology in husbands, but not the reverse, in an analysis by Moritz et al. [12]. Skarupsi et al. [13] reported the same result cross-sectionally but were unable to duplicate it in their longitudinal analyses. However, the findings in these last 2 studies were valid only for those with scores on the Short Mental Status Questionnaire that indicated severe cognitive impairment. We found no studies where the results were equal for husbands and wives. Thus, our hypothesis was that we would find a unidirectional relationship where husbands' baseline cognitive function predicted their wives' subsequent cognitive function but not the reverse.

The quality of the marital relationship likely plays a role as well. We found a few studies with cognitive function as an independent variable but none involving cognitive function as an outcome. Tower et al. [14] reported that lower cognitive function in wives had a stronger effect on husbands' depression in close marriages, consistent with the finding of Strawbridge et al. [9] that better marital quality exacerbated the relationships between husbands' lower cognitive function and wives' well-being. However, for physical disability, Bookwala and Franks [15] reported that marital disagreements exacerbated the relationships between spouse disability and partner depressive symp-

toms. Using cross-sectional data, Simonsick [16] viewed marital quality as a mediator rather than a moderator and reported that husbands' poor health increased wives' depression and low morale by reducing marital quality.

Because of the disparate results in direction of effects between older husbands and wives as well as the lack of analyses involving marital quality with cognitive function outcomes, our study focused on the extent to which gender and marital quality moderate the relationships between spouse lower cognitive function and subsequent partner cognitive function.

## Methods

### *Participants*

The sample was composed of 378 older dyads from the Alameda County Study. This study used a random household design in 1965 to enroll a cohort of 6,928 adults followed for 35 years. Alameda County is located in the San Francisco Bay Area, California, USA. A number of married couples were included because all adults in the selected households had been offered enrollment. Divorce and separation over the 35 years of the study totaled only 9.2%, reflecting the high rate of stable marriages in that generation. The last follow-up in 1999 included 2,123 participants, of whom 852 (426 couples) were still married and living together. The mean length of marriage was 44.7 years with 88.5% of the husbands and 89.0% of the wives in their first marriage. All had taken part in the study from the beginning. After removing 48 couples missing data on any of the variables used in the analyses, the final sample totaled 378 couples.

### *Measures*

#### *Cognitive Function*

Cognitive function was assessed by asking the subjects how often in the past 12 months they had experienced problems in 4 areas: difficulty remembering things, trouble finding the right word when talking, forgetting where they put something and finding it hard to pay attention. The response sets and scores for each problem were rarely or never (0), sometimes (1), often (2) and very often (3). These items reflect the 4 components proposed as underlying MCI [4], but an accurate diagnosis would necessitate a clinical assessment. Consistent with Skarupski et al. [13], we considered our scale to assess 'lower cognitive function' and accordingly summed the scores into a scale with a range from 0 to 12 such that higher scores indicate lower cognitive function. Standardized Cronbach's  $\alpha$  for the scale was 0.80.

#### *Marital Quality*

Married subjects were asked how often they had problems getting along with each other. We constructed a dichotomous variable dividing those who reported having problems sometimes or often from those reporting problems a few times or never.

#### *Adjustment Variables*

Chronic conditions included a count of the prevalence of 11 conditions in the past 12 months: arthritis, asthma, bronchitis,

**Table 1.** Longitudinal relationships of own and spouse lower cognitive function at baseline with lower cognitive function outcomes for husbands and wives at follow-up (n = 378 spouse pairs)

1994 baseline variables	1999 husbands' and wives' lower cognitive function outcomes					
	model adjusting for gender <sup>a</sup>		stratified models for husbands and wives			
	baseline relationships with husbands' and wives' lower cognitive function outcomes		baseline relationships with wives' lower cognitive function outcomes		baseline relationships with husbands' lower cognitive function outcomes	
	coeff.	95% CI	coeff.	95% CI	coeff.	95% CI
Male sex	0.08	-0.14 to 0.30		-		-
Age	0.02**	0.01-0.03	0.00	-0.02 to 0.02	0.03**	0.01-0.05
Chronic conditions	0.14*	0.03-0.26	0.11	-0.04 to 0.25	0.19*	0.02-0.36
Financial problems	0.32	-0.11 to 0.75	0.22	-0.26 to 0.71	0.30	-0.28 to 0.89
Own lower cognitive function	0.63***	0.55-0.71	0.59***	0.50-0.67	0.66***	0.58-0.75
Spouse lower cognitive function	0.06	-0.01 to 0.12	0.12**	0.05-0.19	-0.01	-0.10 to 0.08
Model R <sup>2</sup>	a		0.40		0.45	

Regression coefficients (coeff.) and confidence intervals (95% CI) are based upon a 1-point increase in the indicated baseline independent variable. \*  $p \leq 0.05$ , \*\*  $p \leq 0.01$ , \*\*\*  $p \leq 0.001$ .

<sup>a</sup> This model uses Liang and Zeger's general estimating equations [18] to adjust for paired data. R<sup>2</sup> is not available.

cancer, diabetes, emphysema, heart disease, high blood pressure, osteoporosis, peripheral artery disease and stroke. Financial hardship was defined as any of the following: not having enough money in the past 12 months to buy clothing, fill a prescription, see a doctor, pay rent or mortgage, or (in the past 30 days) buy food. This measure is a more powerful control variable than income because it better reflects wealth and has a stronger association with mental health [17].

#### Analyses

We conducted 3 sets of multiple regression analyses to assess the extent to which baseline spouse lower cognitive function predicted partner cognitive function 5 years later. Because the first model nested husbands and wives within their appropriate dyads, we used Liang and Zeger's generalized estimating equation method [18, 19]. Generalized estimating equation uses the correlations within each couple to adjust the regression coefficients and standard errors from what would be obtained if the observations had been independent. Partners' 1999 cognitive function score was first regressed on their 1994 cognitive function score and that of their spouse. Adjustments included the partner's sex, age, chronic conditions and financial hardship. We then added an interaction term (sex by spouse cognitive function) and found that the relationship between the cognitive function of one spouse and that of the other was significantly different for husbands and wives. The  $p$  value for the interaction term was 0.08, statistically significant using Greenland's [20] recommendation to set the significance criterion higher than 0.05 because of the reduced power associated with the use of interaction terms in statistical models. For ease of interpretation and so that we could specifically compare associations of the outcome partner's own baseline cognitive function with that of his or her spouse, we then used stratified models to present the results involving the moderating effects of gender and marital quality. These stratified models did not require general-

ized estimating equation modeling because outcomes for husbands and wives were in separate models. To allow both the strength and precision of the relationships to be better assessed, we present the results as unstandardized regression coefficients with their associated 95% confidence intervals. All calculations were performed using SAS software (PROC GENMOD), version 9.1 [21].

#### Results

The mean 1994 baseline age was 65.2 years for husbands and 62.8 years for wives with an overall age range of 49 to 89 years. Over 10% reported having financial problems; 57% mentioned  $\geq 1$  chronic conditions. Although each couple pair was assessing the same marriage, more wives than husbands (48% compared with 36%) described their marriages as sometimes or often having problems. Mean scores of 2.95 for husbands and 2.60 for wives on the cognitive function scale indicated relatively modest deficiencies in baseline cognitive functioning. However, only 11.6% of the husbands and 15.9% of the wives scored 0, indicating no difficulty on any item.

Longitudinal results for the relationships between baseline own and spouse cognitive function with partner cognitive function at follow-up are presented in table 1. For the combined model there was a strong relationship for own baseline lower cognitive function score, but the 0.06 regression coefficient for spouses' lower cognitive function was not statistically significant. Because adding

**Table 2.** Longitudinal relationships of own and spouse lower cognitive function at baseline with outcomes for husbands and wives at follow-up stratified by marital problems (n = 378 spouse pairs)

1994 baseline	1999 husbands' and wives' cognitive function outcomes by marital quality							
	baseline relationships with wives' outcomes by frequency of marital problems				baseline relationships with husbands' outcomes by frequency of marital problems			
	never or few		often or sometimes		never or few		often or sometimes	
	coeff.	95% CI	coeff.	95% CI	coeff.	95% CI	coeff.	95% CI
Age	0.00	-0.02 to 0.03	0.01	-0.02 to 0.04	0.03**	0.01-0.05	0.04	-0.01 to 0.08
Chronic conditions	0.14	-0.04 to 0.31	0.09	-0.17 to 0.35	0.23*	0.02-0.44	0.11	-0.17 to 0.38
Financial problems	-0.16	-0.82 to 0.50	0.54	-0.19 to 1.28	0.58	-0.21 to 1.36	-0.03	-0.97 to 0.90
Own lower cognitive function	0.54***	0.42-0.66	0.62***	0.49-0.74	0.67***	0.57-0.78	0.63***	0.47-0.78
Spouse lower cognitive function	0.07	-0.02 to 0.17	0.20**	0.07-0.32	-0.02	-0.13 to 0.10	-0.02	-0.18 to 0.14
Model R <sup>2</sup>	0.34		0.46		0.49		0.38	

Regression coefficients (coeff.) and confidence intervals (95% CI) are based upon a 1-point increase in the indicated baseline independent variable. \* p ≤ 0.05, \*\* p ≤ 0.01, \*\*\* p ≤ 0.001.

the interaction term of sex by cognitive function to this first model indicated a significant gender difference, the 2 stratified models in table 1 were run to indicate values for all of the variables involved. Comparing the results for husbands and wives in the stratified models indicated that while there was no spouse relationship for husbands, there was a spouse relationship between husbands' lower cognitive function at baseline and their wives' cognitive function at follow-up.

Table 2 presents the results analyzing the moderating roles of marital problems. Marital problems moderated the relationship for wives such that the only statistically significant results were for the wives reporting their marriages as often or sometimes having problems (48% of all marriages). There was no corresponding moderating effect for outcomes on husbands.

## Discussion

Our purpose was twofold: (1) to shed light on previously conflicting studies by analyzing the moderating effect of gender on the extent to which spouse lower cognitive function is associated with partner lower cognitive function and (2) to perform the first analyses involving the moderating effect of marital quality on the same relationships.

For gender, we found a unidirectional relationship consistent with the results reported by Gruber-Baldini et al. [6] as well as Gerstorf et al. [7]. In contrast, Moritz

et al. [12] had found a stronger impact on husbands, but their outcome variable (depression) was different from cognitive function and their results were valid only for husbands whose wives had severe cognitive impairment. As we discussed earlier, other studies examining differences in spouse effects on partner mental health and well-being observed the same unidirectional relationship we found here. The rationales in those studies involved the relatively greater importance of communication for wives and the significance of the marital relationship, although these rationales are not as easily applied to an outcome like cognitive function. Gerstorf et al. [7] have suggested 2 other possibilities. First, husbands with high cognitive functioning may provide resources that help maintain cognitive function for both themselves and their wives. Second, cognitively fit husbands may provide opportunities for their wives to lead more active lives in ways enhancing their own cognitive abilities. Conversely, a cognitively challenged husband might restrict his wife's outside roles. This latter argument is consistent with findings in the caregiving literature regarding increased stress and depression for wives caring for their husbands [22] with communication problems being the most stressful [23]. We did not measure such processes in our current study, but it is possible that they would apply to our findings as well. Of course, these rationales may be less compelling for younger generations given growing equality of education and employment between husbands and wives.

Such a stress rationale might also help explain our finding regarding moderating effects of marital quality,

which as far as we know is the first to examine this relationship. If studies arguing that communication and relationship quality are more important for older wives than their husbands are correct [8, 10, 11], then it follows that lowered cognitive function of husbands would be associated with increased stress and depression for their wives particularly in marriages already characterized by their wives as having poor quality. In any case, it is important to bear in mind that marital quality is a complex variable in itself. As DeLongis et al. [24] have pointed out, couples reporting no problems in their marriages may simply be indifferent to each other, while those reporting problems may care enough for each other to work on their relationships.

The limitations of this study include the self-reported measures used and the lack of a standardized marital quality scale. Such a scale would not only help deal with the issue raised immediately above regarding the inter-

pretation of problems in marriage but would also allow a test of whether the overall marital quality was impacted over time by a spouse's cognitive impairment such that the relationship of marital quality with partner cognitive impairment involved mediation rather than moderation.

In any case, further work is needed using longer time spans, multiple data collection points, and more precise measures of cognitive function and marital quality to understand the complex findings reported to date.

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