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Longitudinal Influences of Partner Depression on Cognitive Functioning in Latino Spousal Pairs

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Key Words
Aging · Cognition · Depression, spouse · Gender

Abstract
Background/Aims: While social factors may influence the trajectories of cognitive aging, the influence of spousal characteristics (i.e. health or mental health) on cognitive decline has received little attention. This study examined the influence of baseline depressive symptoms in one spouse on cognitive functioning in the other. ***Methods:*** We conducted a longitudinal study of 279 Latino spousal pairs (558 people) taken from a cohort study (n = 1,789) in California's central valley with assessments every 12–18 months. ***Results:*** Higher husband baseline depression was significantly associated with lower cognitive scores maintained across time for both husbands ($p < 0.001$) and wives ($p = 0.01$). Wives with higher baseline depression scores showed significantly worse cognitive function over time ($p = 0.007$). ***Conclusions:*** Husbands' cognitive function was more strongly linked to their own level of depression, whereas wives' cognitive function was influenced by both their own and their partners' level of baseline depression. Our study further documents the public health significance of depression and our need to look beyond the individual to the reverberating effects of depression on the family.

Introduction

While a number of studies have identified depression as a possible risk factor for cognitive decline [1–5], the influence of partner depression on cognitive decline has not received similar attention. The influence of partner depression on cognition is of potential interest in view of recent studies highlighting the importance of the social environment for trajectories of cognitive decline in older adults [4, 6]. Spousal health and well-being is an important aspect of the social environment for most couples.

Epidemiological studies have found that older adults with fewer social ties are at increased risk for cognitive decline [6, 7] or transition into dementia [8]. The degree of social engagement, defined as the number of social relationships and the extent to which the individual is actively participating in those social relationships, has also been shown to influence the risk of cognitive decline [9]. One theory for the salutary effects of social networks and engagement on cognitive health, based on the 'use it or lose it' paradigm, is that social interactions are a source

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of cognitive stimulation, thereby promoting cognitive function [10]. Alternatively, social networks exert a positive effect on health by improving lifestyle and health behaviors that reduce the risk for diseases associated with cognitive decline, such as diabetes and hypertension. One important limitation of much of the social engagement literature is that it fails to take into account specific qualities of the social relationships [6].

Spousal pairs offer an important opportunity to examine in more detail how the qualities of interpersonal relationships may influence the dynamics of social engagement and cognitive decline. When both husband and wife are living together, each forms an important aspect of the social environment for the other with the potential to either amplify or dampen the risk for cognitive decline. Studies of social engagement have used marital status as an indicator of social ties or social engagement and have generally found that married older adults are at decreased risk of cognitive decline [6], although some studies have failed to find this effect [11–13]. One possible reason for these conflicting findings is that the qualities of a spouse are not assessed and may constitute a risk factor for adverse health and mental health outcomes in the partner. Another reason is that few studies consider the interactive and dynamic processes in the spousal pair across time and account for the within and between dyadic nature of the data statistically [14].

Cohort studies of aging and the caregiving literature highlight reciprocal effects of health and mental health status in aging spousal pairs. In contrast to the social engagement literature, these studies highlight the way in which characteristics of one spouse place the other at increased risk of adverse outcomes. Longitudinal studies of aging have found reciprocal effects in spousal pairs in terms of both physical and mental health status. Both theoretical research and a substantial body of cross-sectional empirical work suggest that depression in one spouse increases the risk of depression in the partner [15, 16], often referred to as the 'contagion effect'. Depressive symptoms, such as irritability and social withdrawal, may be perceived as stressful to family members, placing them at increased risk of depression [17, 18]. Poor health status in a spouse has also been associated with risk of depression in the partner [16].

The results of prior epidemiological studies are inconsistent with respect to gender differences in the 'contagion' effect in spousal pairs. One longitudinal study found that men were more likely than women to develop depressive symptoms in response to their partners' cognitive impairment [19]. Another study [20] found that worse cognitive functioning in wives was associated with higher depressive symptoms in husbands, but not the reverse. A large study of Latino spousal pairs found no association between depression and partner cognitive functioning [21].

Additional data on the adverse impact of psychiatric symptoms in spousal pairs comes from the caregiving literature. Spousal caregivers have been found to be at increased risk for adverse health and mental health effects, including elevated depressive symptoms [22], poorer physical health [23] and abnormal biological markers [23, 24] compared with noncaregivers. Studies of dementia caregiving have found that depression and other behavioral symptoms in the care recipient are most strongly associated with elevated caregiver depression [22]. As pointed out by Caswell et al. [25], despite abundant data on a variety of adverse mental and physical health outcomes, there is little data on cognitive functioning in caregivers. Finally, prior cross-sectional studies by our group have found high levels of depression symptoms in older Latinos and a strong association between depression levels in cognitively impaired older Latinos and depression in their family caregivers [26, 27].

The goal of this study was to examine the association of self and partner depression with cognition in a subsample of spousal pairs included in a community-based cohort study of Latino elderly. More specifically, we predicted that higher levels of depression in one spouse would be associated with poorer cognitive performance in the partner. Additionally, we predicted that higher depression scores in one spouse would be associated with change in cognitive functioning (i.e. a worse cognitive functioning) over time compared with partners of those with lower depression scores.

Methods

Study Design and Participants

The study participants were enrolled in the Sacramento Area Latino Study on Aging (SALSA), a community-based, prospective cohort study begun in 1998–1999 with visits every 12–18 months after baseline assessment. At inception, the SALSA participants were 1,789 Latinos aged 60 and older residing in the Sacramento metropolitan statistical area and surrounding suburban and rural counties in California. The sample was representative of older Latinos in the target area. The methods of enumeration and the recruitment process have been published elsewhere [28]. This analysis, based on data from baseline and up to 8 years of follow-up, includes only SALSA spousal pairs in which at baseline both partners were living in the community and nondemented. Of the 310 spousal pairs enrolled in SALSA at baseline, 31 pairs were dropped from the analysis because 1 or more persons in the dyad

had a baseline diagnosis of dementia or were institutionalized, leaving a total of 279 spousal pairs or 558 people.

Procedures

All field staff was bilingual in Spanish and English. The participants were interviewed in their homes and in their language of choice. In a 2-hour interview, each participant answered questions about lifestyle factors, depressive symptoms, acculturation and medical diagnoses [28].

Measures Used in the Analysis

For this study, the cognitive status was assessed using the Modified Mini Mental State exam (3MS). The 3MS is a test of global cognition with a scale of 0–100 [29] that has been validated and adapted for use in Mexican Americans. The 3MS scores from baseline and up to 8 years of follow-up were used for the repeated measures analyses (repeated measure). Baseline depressive symptoms were measured with the Center for Epidemiologic Studies-Depression (CES-D), a widely used scale (range of 0–60) that is highly correlated with clinical depression [30]. The sociodemographic characteristics included in this analysis were gender, age and years of formal education (in the USA or Mexico/Latin America). Education was measured as years of formal schooling.

Analysis

First, the mean and standard deviation (SD) of years of follow-up, baseline age, years of education, baseline CES-D and baseline 3MS were calculated, as well as Spearman rank correlations between husbands and wives for each of the variables. Then, the correlation between each individual's baseline 3MS score and his or her baseline CES-D score was calculated, as well as the correlation between each individual's baseline measures and the measures of his or her spouse. After this, longitudinal modeling was the tool used to investigate CES-D and 3MS paths. Our longitudinal models can capture 5 important components of the paths.

(1) Baseline scores for the measures, also called the intercept of the model. The average baseline level may differ according to the characteristics of the individual; these differences are estimated by the coefficient for main effects for the demographic and other predictors.
(2) We allow for individuals to have a baseline level that differs from the average for participants with similar demographics, via a random effect for intercept. We estimate the variance attributable to unexplained baseline differences.
(3) Our models allow for a tendency for a steady increase or decrease in scores over time (i.e. change over time), and we refer to this as the slope of the model. The slope may differ according to the characteristics of the individual; these differences are estimated by the coefficient for time and its interactions with other predictors.
(4) We allow for individuals to have slopes that differ from the average for participants with similar demographics, via a random effect for slope. We estimate the variance attributable to unexplained differences in slopes.
(5) Visit-to-visit variation that is not captured by the average trajectory, the random effect for intercept and the random effect for slope. This accounts for observed trajectories that show up-and-down patterns rather than smooth linear paths. We estimated the variance of such unexplained within-person deviations.

Components 1 and 3 correspond to the components of a linear regression model, and in longitudinal modeling these estimates are used to characterize the general population trajectory and how it differs by demographics or other predictors. Components 2 and 4 are unique to longitudinal modeling and are the key in accounting for person-specific trajectories that differ in intercepts and slopes, and in testing whether the differences between groups are greater than chance alone.

In the first stage of modeling, we only investigated the change in CES-D or 3MS scores over time, to determine whether transformations of the data would be necessary and to characterize the overall variation in intercept and rate of change. Subsequent models used a log transformation on the CES-D scores to approximate normality. In the second stage of analysis, we investigated the effects of other covariates on baseline levels and, using interaction terms with time, on the slope. Our primary hypothesis was that depression of the individual or spouse might affect cognitive function and change over time. We used models of depression to identify components of the depression trajectories that differed across individuals and might be predictive of change in self or partner cognitive functioning over time. A difference in depression at baseline may represent a general long-term pattern or trait (if little trend over time is found), or it might represent the effect of variation at that time (state) that might change from year to year. Thus, we considered not only baseline levels of depression as potential predictors, but also current-year levels (to isolate whether state variation predicts better than the overall level) and correlation between trends (to determine whether a long-term pattern of steady increase or decrease exists and is predictive). We examined the effects of depression both on baseline cognitive function via main effects and on change in cognitive function via interactions with time as part of the slope component. Residual analysis suggested change over time in the 3MS scores had a quadratic pattern, or learning effect, and so a quadratic time covariate was included in primary analysis models (see fig. 1). All computations were done in SAS v.9.0, and all plots were done in R v.2.5.1.

Results

Participant Characteristics

Longitudinal data on depression and cognitive function were available from 279 spousal pairs in which both individuals were nondemented and noninstitutionalized at baseline. The average length of follow-up was 3.3 years (table 1). The participants on average were about 69 years old and typically had less than a high school education. Most (59%) were Spanish-speaking.

Associations between Baseline Cognitive Function and Baseline Depression

At baseline, the mean 3MS was 86 out of 100 (table 1), consistent with the clinical assessment of no dementia. There was a modest correlation (0.28, $p < 0.001$) of baseline 3MS scores of husbands and wives. The mean base-

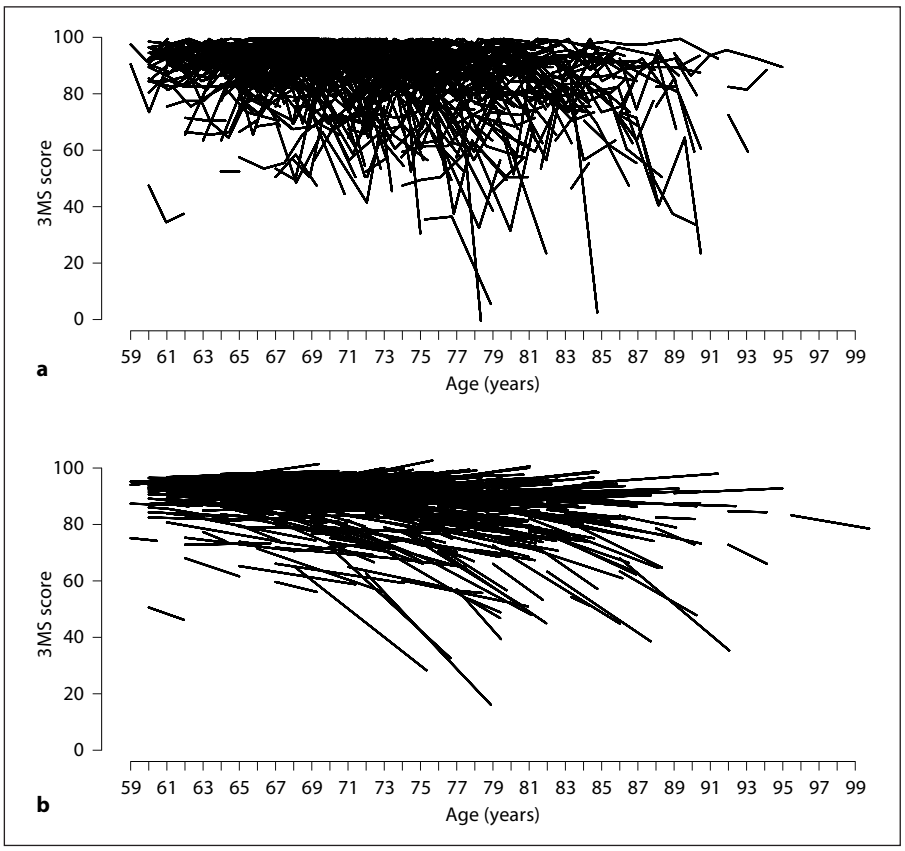

Fig. 1. Observed (**a**) and smoothed (**b**) trajectories of 3MS scores plotted against age at time of observation for SALSA participants. Smoothed trajectories are empirical Bayes estimates including estimated random starting points and random annual rates of decline.

line CES-D was 9 out of 60, and the correlation between husband's and wife's CES-D was 0.17 (p = 0.005). There was a significant association between an individual's baseline CES-D and 3MS (r = –0.16, p = 0.002). There was also a significant association of an individual's baseline 3MS and their partner's baseline depression (r = –0.11, p = 0.01). Because the CES-D distribution was highly right-skewed, this score was log transformed to approximate normality and to reduce the influence of outliers.

Patterns of Change in Cognitive Function and Depression over Time

Cross-sectional associations suggested a possible link between depression and cognitive function, so the next step was to determine whether patterns of change in cognitive function might be associated with baseline levels of depression or with change in depression. Longitudinal analysis of cognitive function trajectories showed little difference between husbands and wives (table 2). On average, husbands had a decrease of 0.50 (95% CI: –0.81 to –0.19) 3MS points per year, and wives had an average decrease of 0.32 (95% CI: –0.56 to –0.08) 3MS points per year, despite the fact that individuals with dementia had been removed. Substantial variation was evident from this average trajectory (fig. 1a). Individuals were estimated to have large differences in starting point or intercept (SD = 7.7 3MS points). The variation between individuals in their estimated change per year or random slope was smaller (SD = 1.7 3MS points per year) but still sufficient to distinguish individuals who declined substantially

Table 1. Baseline characteristics and concordance between husbands and wives (means ± SD)

Personal characteristics	Husbands	Wives	Spearman correlation
Follow-up, years	3.2	3.5	–
Spanish-speaking	178 (63.8%)	169 (60.6%)	–
Age at baseline, years	71.4 ± 6.8	68.2 ± 6.0	0.69
Education, years	6.9 ± 5.1	6.6 ± 4.9	0.57
Baseline CES-D	7.3 ± 8.7	10.8 ± 11.3	0.17
Baseline 3MS	85.2 ± 10.1	86.3 ± 10.3	0.28

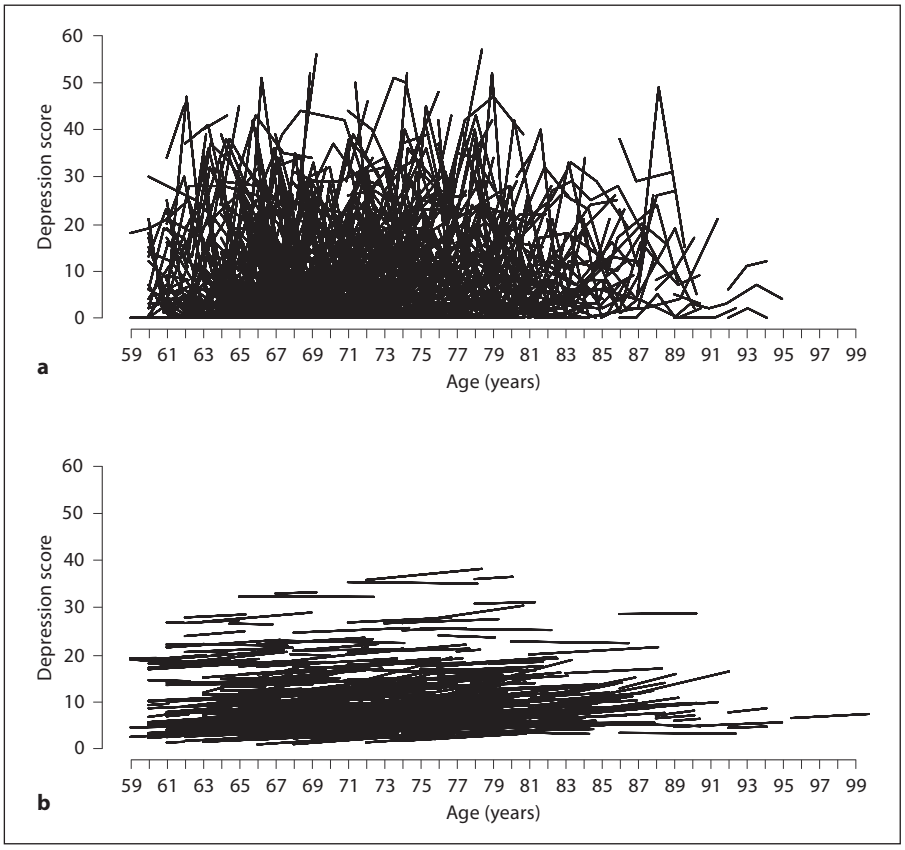

Fig. 2. Observed (**a**) and smoothed (**b**) depression scores plotted against age at time of observation. Smoothed scores are empirical Bayes estimates including person-specific random starting points and random annual rates of change.

from those who were stable or improved slightly, defining smoothed trajectories that differed both in starting level and rate of change (fig. 1b). The observed values showed substantial within-person variation from year to year, deviating from smooth curves (SD = 6.7 3MS points). Residual analyses showed curvature consistent with an increase in mean scores over the first few years, followed by a decline; subsequent modeling included a quadratic term in study time.

The CES-D scores were log-transformed before analysis to correct their highly skewed distribution. The results were again similar for husbands and wives (table 2). There was little change (about 4% per year) in mean CES-D (95% CI: 0.02–0.06). Random effect models showed a large amount of variation from year to year within individual paths (fig. 2a). There was little individual variation in slope, with most individual curves very flat after smoothing out within-person noise (fig. 2b). The individual baseline levels, however, varied substantially, and tracked very consistently over time. For husbands, a baseline CES-D 1 SD above the baseline depression state corresponded to a 78% higher baseline CES-D score. For wives, a 1 SD higher baseline CES-D corresponded to a CES-D score more than double the population baseline for women (137% increase).

Because there was little trend overall and no evidence for between-person differences in change in CES-D scores over time, subsequent analyses did not examine person-specific change in CES-D as an outcome or a predictor, but focused on baseline CES-D as a predictor of level and change in cognitive function. Secondary analyses used the current-year level of CES-D as a predictor to examine whether the year-to-year variation modified the relationships observed between baseline CES-D and 3MS.

Association between Depression and Change in Cognitive Function

After adjusting for age and education, the husband's baseline 3MS was significantly associated with his own but not his wife's baseline CES-D score (table 3, model 1, under 'Results for males'). There was not a significant association, however, between the rate of change in the husband's 3MS over time and either his own or his wife's baseline CES-D score (table 3, model 2, under 'Results for males').

Table 2. Patterns of change in 3MS and CES-D scores estimated through longitudinal models

Longitudinal patterns of change	Husbands	Wives
Change in 3MS		
Mean change in 3MS per year	–0.50	–0.32
Between-person SD of intercept	7.71	8.76
Between-person SD of rates of change	1.73	1.13
Within-person SD	6.71	
Change in CES-D		
Mean change in CES-D per year, %	0.05	0.03
Between-person SD of intercept	0.58	0.84
Between-person SD of rates of change	0.093	0.018
Within-person SD	0.87	

Mean change in CES-D: the CES-D depression score was log-transformed (base e), after adding 1, so that 0 on the original scale corresponds to 0 on the log-transformed scale, and a 1-unit increase on the log scale corresponds to a 2.78-fold increase on the original scale.

Table 3. Summary of random effect models examining effects of self and partner depression and other factors on baseline levels and rates of change of cognitive function

Predictor	Model 1		Model 2	
	estimate	p value	estimate	p value
Results for males				
Baseline for reference males[1]	84.0 (1.60)	<0.0001	83.7 (1.61)	<0.001
Baseline CES-D (partner)[2]	–0.081 (0.38)	0.83	0.029 (0.38)	0.94
Baseline CES-D (self)[2]	–1.44 (0.42)	<0.0001	–1.38 (0.43)	0.001
Time	1.85 (0.32)	<0.0001	2.21 (0.44)	<0.001
Time squared	–0.36 (0.05)	<0.0001	–0.36 (0.05)	<0.001
Education	0.82 (0.09)	<0.0001	0.82 (0.09)	<0.001
Baseline age	–0.17 (0.07)	0.013	–0.17 (0.07)	0.014
Baseline CES-D (partner) × time^2			–0.21 (0.13)	0.12
Baseline CES-D (self) × time^2			0.021 (0.15)	0.89
Results for females				
Baseline for reference females[1]	84.41 (1.50)	<0.0001	83.3 (1.53)	<0.001
Baseline CES-D (partner)[2]	–1.1 (0.43)	0.01	–0.86 (0.45)	0.058
Baseline CES-D (self)[2]	–0.37 (0.39)	0.34	0.002 (0.41)	0.99
Time	1.406 (0.30)	<0.0001	2.27 (0.39)	<0.001
Time squared	–0.27 (0.04)	<0.0001	–0.27 (0.04)	<0.001
Education	0.96 (0.10)	<0.0001	0.96 (0.10)	<0.001
Baseline age	–0.21 (0.07)	0.006	–0.20 (0.07)	0.008
Baseline CES-D (partner) × time^2			–0.20 (0.12)	0.10
Baseline CES-D (self) × time^2			–0.29 (0.11)	0.007

Figures in parentheses represent SE.

[1] Reference group: for each gender, the reference group for calculating the intercept at baseline was age 59 years (the minimum in the study) and 0 years of formal education.

[2] The CES-D depression score was log-transformed (base e), after adding 1, so that 0 on the original scale corresponds to 0 on the log-transformed scale, and a 1-unit increase on the log scale corresponds to a 2.78-fold increase on the original scale.

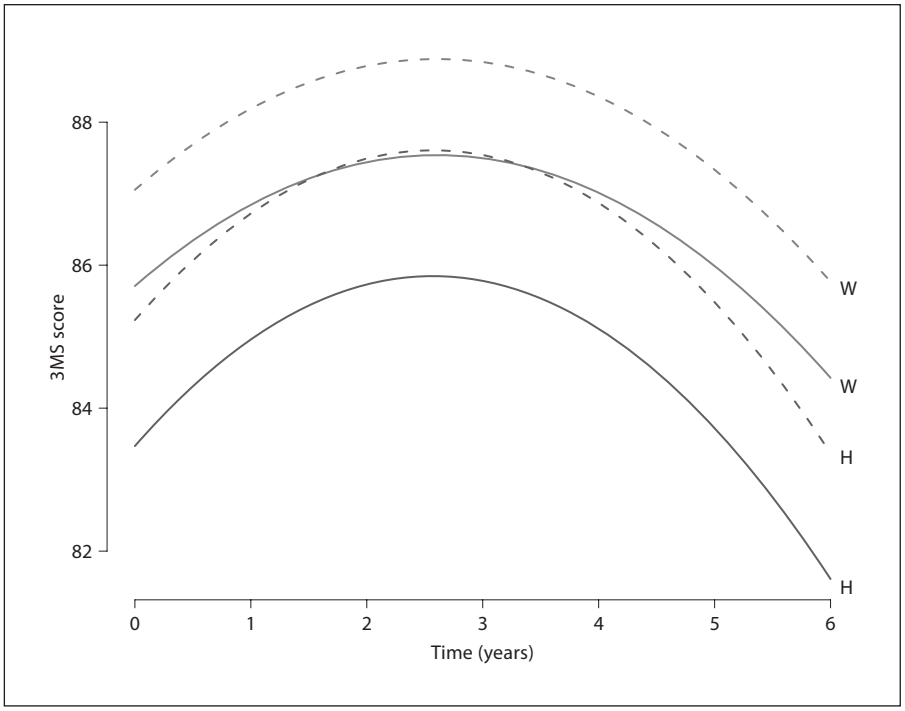

Fig. 3. Predicted change in average 3MS over time for husbands (H) and wives (W) with high (solid line) and low (broken line) spousal depression scores.

On average, husbands experienced an estimated increase in 3MS scores for approximately 3 years, but then experienced a decrease at a quicker rate thereafter (fig. 3).

In contrast to the husbands, the wife's baseline 3MS was significantly associated with her husband's but not her own baseline CES-D score (table 3, model 1, under 'Results for females'). However, wives with higher baseline CES-D scores showed poorer cognitive function over time, as indicated by a significant 'baseline CES-D (self) × time' interaction term (table 3, model 2, under 'Results for females'). A doubling of baseline CES-D was associated with about a 0.2-point faster decline per year, or about 20% faster than the rate estimated in years 4 and 5 for women without any depression. Wives also experienced a learning effect, with an increase in 3MS scores for 3 years, and then a quicker decline thereafter (fig. 3). Residual analysis was used to check the normality and linearity assumptions of our regression models, and no evidence of model failure or need for interaction with the quadratic term was present.

In secondary analyses, we examined the effect of year-to-year variation in CES-D on 3MS and rate of decline in 3MS. This means instead of using the baseline CES-D as our primary predictor of baseline 3MS and change in 3MS scores, we used the current-year CES-D scores from each visit to predict the baseline 3MS and change in 3MS scores. A higher correlation in the secondary analysis or better prediction of CES-D might suggest either that the changes in 3MS reflected short-term variation or state variation in CES-D, or that the variation in CES-D reflected some of the changes in 3MS. We found, on the whole, that the results were consistent with those of table 3 (results not shown). Determining if the rates of change in CES-D scores predict the rates of change in 3MS scores is difficult in this sample due to the fact that consistent, smooth changes in the CES-D were minimal in the time span in which couples were observed. Further secondary analysis included reverse-coding of the 3MS scores (101 – 3MS score) followed by a log transformation. The findings were similar to all results above (not shown).

Discussion

Our study results highlight gender differences in the complex relationship between self and partner depression and cognitive functioning over time. In this longitudinal study of older Latinos, we found evidence of both social and psychological influences on cognitive functioning in spousal pairs and striking and complex gender differences. More specifically, husbands' cognitive function was

more strongly linked to their own levels of depression, whereas wives' cognitive function was influenced by both their own and their partners' level of baseline depression. It is important to note that partner baseline depression scores were not associated with a more rapid deterioration in cognitive function over time, although a trend in this direction is noted for both women and men. Finally, wives with higher depression exhibited worse cognitive performance over time (i.e. a significant depression × time interaction), an effect that was not found in husbands. These findings persisted even after adjusting for multiple covariates.

While the relationship of an individual's depressive symptoms to their own cognitive decline has been found in several studies [4–6, 31], ours is the first to examine the relationship between baseline depression in one spouse and change in cognitive functioning over time in the other. Our findings are consistent with a prior cross-sectional study that examined cognitive functioning in caregivers and found an association of caregiver stress with a test of cognitive function [25]. In addition, another cross-sectional study of spousal pairs found an association of wife's cognitive impairment with husband's depressive symptoms, but not the reverse [19]. Interestingly, the gender difference observed in our study is consistent with that of Skarupski et al. [20], who, while modeling change in one spouse's depressive symptoms over time as a function of the other spouse's cognitive functioning, found a cross-sectional relationship between the wife's lower cognitive functioning and the husband's level of depressive symptoms, but not the reverse.

What might explain the possible relationship of spousal depression with worse partner cognitive performance? One possible explanation is based on the social engagement/cognitive function paradigm. Social interactions with one's spouse may constitute an important opportunity for cognitive stimulation in the everyday worlds of older adults [3]. Because depression may lead to social withdrawal and irritability, partners of persons with more depressive symptoms may have fewer opportunities for interpersonally mediated cognitive stimulation. One might expect that these effects would be attenuated when the spousal pair was residing with other family members, who could buffer the impact of depression-associated social withdrawal. Alternatively, living with a depressed spouse may be a source of psychosocial stress. Prior work has documented the increased burden of living with a person who is depressed [18]. Psychosocial stress may translate into biological or lifestyle effects that increase the risk of cognitive decline. Chronic stress has been associated with a number of adverse biological effects, including cortisol dysregulation, blunted immune response [24] and telomere shortening [32]. However, high cortisol levels and stress have been associated with hippocampal atrophy, the brain pathology most strongly implicated in episodic memory dysfunction and early Alzheimer's disease [33, 34].

While in this study we found gender differences in the strength of the relationship between cognitive functioning and partner baseline depressive symptoms, other studies of spousal pairs have found gender influences in other relationships, such as the link between husband and wife depression levels. While there are no prior studies of the relationship between depression and cognitive decline with which to compare, studies of non-Latinos have generally found increased vulnerability to depression among husbands in response to their wives' cognitive impairment compared with the reverse [17, 20]. In contrast, our findings suggest a greater vulnerability of women to their partners' depressive symptom status.

Our findings are more consistent with prior cross-sectional studies of older Latino spousal pairs. For example, a prior cross-sectional study of Latinos that examined the relationship of depression and partner well-being found that the women's level of depression was more sensitive to their partners' well-being [35]. The impact of having a spouse with depressive symptoms may be amplified among older Latinas because traditional gender values emphasize sacrifice and responsibility for the well-being of the family, which may engender increased feelings of guilt and responsibility for a spouse who is depressed [36]. Differences in gender-based contagion effects across ethnic groups are complex and clearly merit further study.

Equally intriguing were the gender influences on the self depression/cognitive performance relationship. Among husbands, self depression was associated with poorer cognitive performance, although there was no evidence of worsening cognitive performance over time (i.e. no significant self depression/time interaction). In contrast, wives' self depression was not associated with poorer cognitive performance in cross-section, but with poorer performance over time (i.e. significant self-depression-time interaction). We are not aware of other longitudinal studies that have examined gender modification of the self depression/cognitive decline relationship in any population. Our study highlights the importance of taking gender differences into account when modeling the relationship of depression and cognitive decline in Latinos and potentially in other populations as well.

This study has a number of important strengths and limitations. First, our research is based on an epidemiological study of primarily Mexican American spousal pairs in Northern California. The longitudinal, community-based nature of the sample is a strength of this study and enhances the generalizability of these findings to other Mexican Americans. The extent to which the relationship between spousal depression and partner cognitive decline exists in other ethnic populations deserves further study. One limitation of this study is that we used the CES-D, a self-report measure that evaluates depressive symptoms rather than clinical depression. However, at least 1 study of middle-aged and older Latinos found that the CES-D correlated moderately with clinical depression in a primary-care population [37]. Another limitation of our study is that the broader network of social ties was not measured, which would have allowed us to examine whether additional social ties might mitigate the effect of having a spouse with more depressive symptoms. In addition, we did not measure the quality of the marital relationship, another potentially important factor.

It should be emphasized that the effect sizes found in this study are quite modest. Furthermore, we did not examine clinically meaningful outcomes, such as the transition from normal cognition or mild cognitive impairment to dementia. However, we believe the findings are significant because they are novel and have potentially important ramifications for clinical practice and public health. First, this study adds to a growing literature on the adverse consequences of depression in older adults and extends these findings to those in the depressed person's social environment and also highlights the potential role of gender as a modifier for these effects. Recognizing and treating depression in one spouse may have the potential to improve the cognitive outcomes in the other, highlighting the importance of looking beyond the individual patient to consider the influence of spousal characteristics. This underscores the importance of identifying and treating depression in older Latinos, and perhaps in other populations as well. A second, related implication of these findings is that the effects of depression on spousal cognitive trajectories may translate to an earlier transition to mild cognitive impairment or dementia in the depressed person's partner. However, this interpretation must be tempered by the lack of decline in the 3MS, most likely due to selective attrition and learning effects.

While the literature on social environment and cognitive decline has tended to focus on the number of social ties or the degree of social engagement, the results of this study suggest that it may be equally important to take into consideration the quality of those relationships as well as ethnicity. The potential importance of gender as an important modifier of the relationship between self or partner depression and cognitive decline are also highlighted by these findings. Replicating this study among dementia caregivers might be particularly important, as the severity of depression and other neuropsychiatric symptoms in elderly with dementia is much higher than in the general population. Our study further documents the public health significance of depression and our need to look beyond the individual to the reverberating effects of depression on the family.

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