Social Engagement and Cognitive Function of older Adults in Mexico and the United States: How Universal is the Health Concordance in Couples?

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Background: Social engagement has been associated with positive cognitive outcomes across different populations of older adults.[1-5] Health concordance among members of couples is well-established in the literature for mental and physical health outcomes.[6] The ability to predict health outcomes within the couple is due to the shared environment and similar risk factors.[6] However, health concordance related to cognitive outcomes is not as explored, and neither is how health concordance differs between societies with different social roles and responsibilities for men and women. Mexico is a country with high familial values and gender-specific responsibilities, which may increase the importance of the couple relationship to determine health outcomes compared to the U.S., where individuals are more independent. There are gains from examining the role of social engagement on cognitive function by considering separately the common and the individual-level engagement that members of a couple have, and by comparing across two societies with vastly different economic levels and gendered social status for older adults.

Objective: The overarching objective is to determine if individual-level social engagement and couple-level social support predict individual cognitive functioning over time within a married cohort of cognitively intact older adults in Mexico and the U.S. We test two main hypotheses. First, we hypothesize that the effects of social engagement and social support on cognition will be larger for women than men. Second, we hypothesize that culture (differences between the US and Mexico) will moderate the effect of social engagement and social support on individuals' cognitive functioning.

Methods:

Dataset

We use data from the Health and Retirement Study (HRS)[7] and the Mexican Health and Aging Study (MHAS).[8] The sample design and survey protocol of both studies are quite similar, facilitating data comparability. We use two waves of data in each study. For the MHAS, we utilize the baseline wave (2001) and the fourth wave as follow-up (2015). To increase comparability with the MHAS, we select the fifth HRS wave as baseline (2000) and the wave from year 2014 as follow-up. The RAND HRS complemented with additional variables from the HRS was utilized for this analysis.

Analytical Sample

The inclusion criteria for this analysis used in the MHAS and HRS are summarized in Figure 1 and Figure 2, respectively. We followed 2,145 couples (4,290 individuals) in the MHAS and 3,313 couples in the HRS (6,626) to examine their cognitive functioning at the follow-up wave.

Dependent Variable

Cognitive functioning at follow-up is measured as a continuous variable. In the MHAS, cognition was measured with a modified version of the Cross Cultural Cognitive Examination, based on 5 domains: verbal memory learning, verbal memory recall, visuospatial abilities, visuospatial memory, and visual scanning. Because the domains have different ranges of scores, we standardized each domain and added the five domains to compose a total cognitive score. We categorized cognition to exclude individuals with dementia at baseline. Dementia was defined as having at least 2 cognitive domains impaired, and at least one Instrumental Activity of Daily Living impaired (IADL). Impairment in each cognitive domain was defined as having z-score lower than -2 SD from the mean, adjusted by age and education, as determined by the MHAS cognition work group (Mejia-Arango et al, in preparation).

In the HRS, cognition was measured with a modified version of the Telephone Interview for Cognitive Status (TICS), based on 4 domains: verbal memory learning, verbal memory recall, attention or serial 7s,

and numeracy or backwards counting, with a total range of 0 to 27. Because the domains have different ranges of scores, we standardized each domain and added the four domains to compose a total cognitive score. We categorized cognition to exclude individuals with dementia at baseline according to Langa-Weir methodology.[9] Those with score from 0 to 6 were defined as dementia.[9]

In order to facilitate comparisons between the HRS and MHAS measures, the total cognition scores were standardized as z-scores.

Independent Variable

Baseline social engagement was measured at the individual level and baseline social support was measured at the couple level. Individual social engagement was assessed by three variables based on previous literature[1]: volunteer activity at religious, educational, health-related or other organization for at least one hour in the past year; weekly or greater contact with parents or in-laws, and current employment status. These items were summed to form a single measure of social engagement (range 0-3).

Other covariates included individual age, education, smoking status, and comorbidities (hypertension, diabetes, stroke, arthritis). Couple-level social support was defined by two variables based on previous literature[1]: weekly or greater contact with children; and weekly or greater contact with neighbors. This variable was also dichotomized as no support (0) or any support (1).

Statistical Analysis

We will use the actor-partner interdependence model (APIM) to test the relationships between engagement and cognition. Figure 3 presents a path diagram of the APIM for the association of individual-level social engagement and cognitive function.

The APIMs were implemented using structural equation models (SEM). The APIMs afford the opportunity to disentangle the actor effects where the association with the outcome is within person (e.g., husbands engagement influences husband's cognition) and partner effects where the association is between people (e.g., husband's engagement influences spouse's cognition). APIMs also allow for actor-partner effects for one or more predictors and controls for additional covariates, measured at either the individual or the couple level.

The initial models test the actor-partner (husband –wife) effects of social engagement on cognitive function (z-scores) at follow-up. We then control for demographics and explicitly test the effects of social support, culture (US vs Mexico), and interactions of gender with social support and gender with culture. Distributions of model residuals were examined and model fit was assessed using to root mean square error of approximation (RMSEA), the Tucker-Lewis Index (TLI), and the comparative fit index (CFI).

Preliminary Results:

The baseline characteristics of the MHAS and HRS samples are presented in Tables 1 and 2, respectively. In both samples, women were significantly younger and completed fewer years of education compared to men. In the MHAS, women were significantly more likely than men to report participating in individual-level social engagement activities. Social support at the couple level was common and 92.7% of couples reported receiving support. Social engagement and social support is not available in the RAND HRS and will be merged from the original HRS files in the complete paper.

Figure 1 presents the results of the APIM in the MHAS data using SEM with all parameters freed. This model showed a significant actor effects between husband's social engagement and cognition ($\beta = 2.72$, p<0.001) and wife's social engagement and cognition ($\beta = 2.93$, p <0.001). This model also showed a significant partner relationship between a wife's social engagement and husband's cognition ($\beta = 1.21$, p = 0.04) but no evidence of a reciprocal partner effect of husband's engagement on wife's cognition. Imposing equality constraints on the actor effects did not significantly worsen model fit suggesting no significant difference in the actor effects.

Expected findings:

We will next combine the HRS and MHAS data We anticipate the findings in the combined HRS and MHAS analysis to be similar but hypothesize that cultural differences may influence the magnitude of effect.

Table1. Baseline characteristics of couples in the 2001 MHAS

	Men (N=2,145) %	Women (N=2,145) %	p-values
Age			
50-69	78.3	88.5	<0.001
70-79	17.7	9.6	
80+	4.0	1.9	
Years of Education Mean (SD)	5.33 (4.9)	4.66 (4.0)	<0.001
Education			
0 years	19.7	21.2	0.1
1 to 6 years	54.8	56.0	
7+ years	25.5	22.8	
Insurance status			
Uninsured	33.1	32.0	0.5
Insured	66.9	68.0	
Individual-level Social Engagement			
No Engagement	74.8	67.8	<0.001
Any Engagement	25.2	32.2	
Couple-level Social Support			
No Support		7.32	
Any Support		92.7	
Mean Cognitive Functioning (SD)	1.22 (2.8)	1.39 (2.7)	0.05

Table 2. Baseline characteristics of couples in the 2000 HRS

	Men (N=3,317) %	Women (N=3,309) %	p-values
Age			
50-69	69.8	79.6	<0.001
70-79	24.5	17.7	
80+	5.6	2.8	
Race and Ethnicity			
Non-Hispanic Whites	88.5	88.4	0.9
Non-Hispanic Blacks	5.5	5.3	
Hispanics	4.5	4.8	
Other	1.5	1.5	
Years of Education Mean (SD)	13.3 (2.9)	13.0 (2.5)	<0.001
Education			

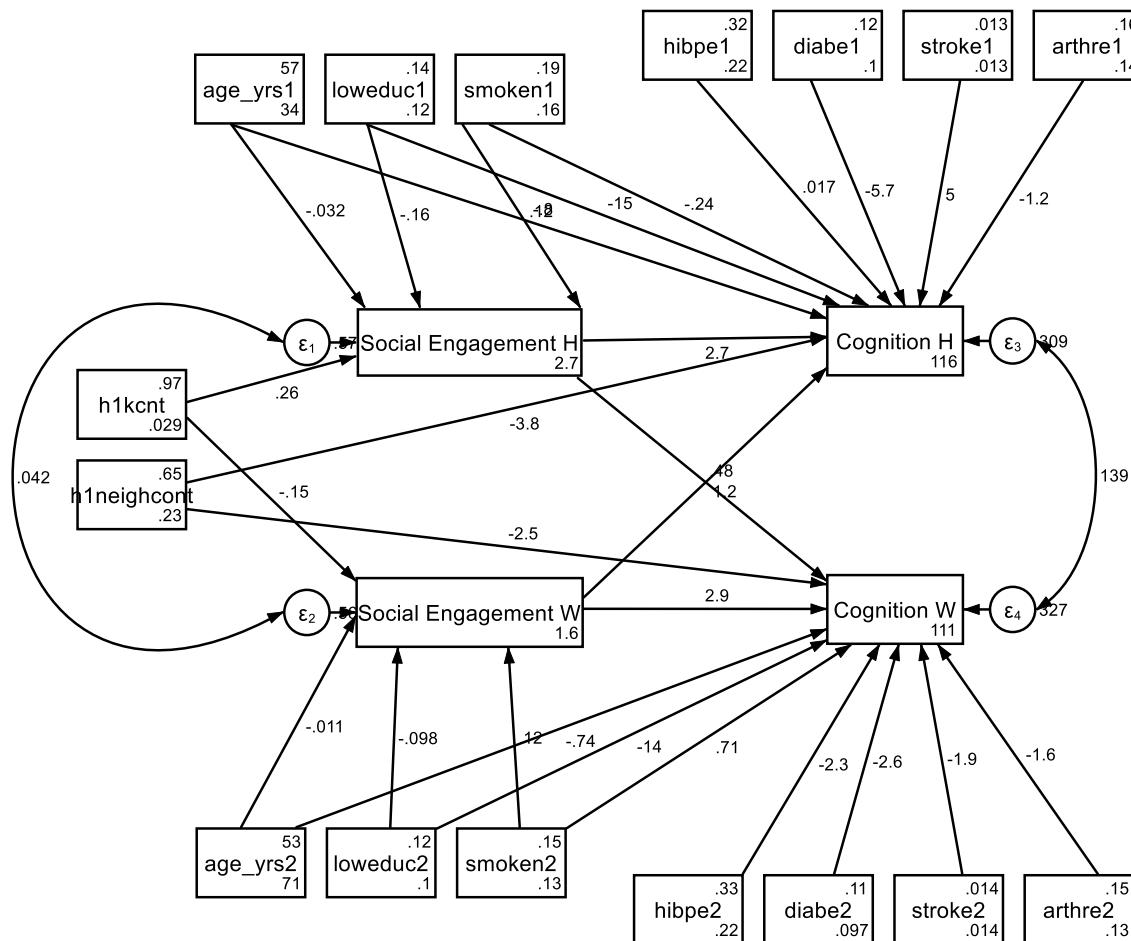|			
Less than High School	14.0	12.8	<0.001
High school or GED	33.3	40.6	
Some College	21.6	25.5	
College Graduate or more	31.1	21.1	
Insurance status			
Uninsured	2.3	3.3	0.02
Insured	97.7	96.7	
Individual-level Social Engagement			
No Engagement	40.9	44.1	0.002
Any Engagement	59.2	56.0	
Couple-level Social Support			
No Support		48.3	
Any Support		51.7	
Mean Cognitive Status (SD)	0.70 (1.8)	1.22 (1.9)	<0.001

Figure 1 Path diagram of the actor-partner interdependence model

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