Migration of adult children to the U.S. and depression among older Mexican adults: Considering time-varying treatment and outcome

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Background

Giving the dual trends of rapidly aging populations and the out-migration of young adult family members across the globe, there has been substantial interest in the impact of adult child migration on the health of middle-aged and older adults who remain in their communities of origin. There is particular interest in the association between adult child migration and depression among older adults. Depression is the leading cause of disability worldwide,1 and even subclinical depressive symptoms are of concern for aging populations in low- and middle-income countries, including Mexico.2 Depressive symptoms may be linked to a number of other chronic conditions, including dementia, cardiovascular disease, and chronic pain.3,4

Findings have been substantially mixed as to whether or not there is any association between adult child migration and the health outcomes of older adults, including depressive symptoms. For example, Antman5 found a significant association between adult child migration to the U.S. and increased depressive symptoms, as well as self-rated health and history of a heart attack in a cross-sectional analysis of older adults in Mexico. On the other hand, Abas and authors6 found evidence of lower levels of depression among older Thai adults whose children had migrated out of rural areas. Similarly, Kuhn and authors7 found a significant association between having a migrant child and better health outcomes among older adults in Indonesia, including fewer needs for assistance with activities of daily living and better self-rated health.

Adults with migrant children may enjoy improved living conditions and access to health care if they benefit from economic remittances. On the other hand, the out-migration of adult children may contribute to social isolation and reduced help with care needs among older adults, which may in turn lead to greater depression. To date, there has been no research using longitudinal data that can account for temporality and the time-varying nature of exposures, outcomes, and potential confounding variables. Instead, out-migration has been treated as a singular event, with little attention to the dynamic interplay of family-member migration, health outcomes, and confounding factors that may influence both migration and health.

Methods

Data

We use panel data from the Mexican Health and Aging Study (MHAS), collected in 2001 (baseline), with follow-up waves in 2003 and 2012. Detailed accounts of the MHAS, including sampling strategy are available elsewhere.8 Briefly, the MHAS selected households with adults 50 years and older that were previously included in the nationally representative 2000 Mexican Employment Survey. Based on the pool of potential respondents, the MHAS used a multistage area probability sample, stratifying by two Mexican regions consisting of: 1) six states with high rates of out-migration to the United States and 2) the remaining 26 states and the Federal District of Mexico. Households in heavy out-migration states were oversampled relative to households in the remaining states.

At the household level, each adult 50 years or older had an equal probability of being selected, proportionate to the number of adults 50 years and older in the household. Spouses or
cohabitating partners were also interviewed regardless of age, but are included in our analytic sample only if they were also 50 years or older at baseline. The baseline response rate for selected households was 89.7%.

The MHAS included 11829 adults 50 years and older who were directly interviewed at baseline and had any living children (i.e. were ‘at risk’ of having an adult child living in the U.S.). Of these, 10422 respondents with any living children completed the survey at two-year follow-up and 6603 respondents with any living children completed the survey at follow-up in 2012. Although the MHAS completed proxy or next-of-kin interviews with respondents who were deceased, lost to follow-up, or were otherwise not able to answer their own interviews (e.g. due to cognitive impairment) proxy respondents did not answer information on the dependent variable of past-week depressive symptoms. Nevertheless, our methods account for the censoring of respondents missing due to death, loss to follow-up, or who were represented by a proxy interview.

**Key Measures**

Our outcome variable is measured with a modified 9-item Center for Epidemiological Studies – Depression (CES-D) scale. The scale was adapted in the style of the 8-item CES-D scale used for the Health and Retirement Study, which reduced responses to ‘yes’ or ‘no’ for ease of use with low-education older adults. This scale has been validated for use among older adults in Mexico, and has a reliability coefficient of $\alpha = 0.80$ for this sample. We used a cut-off of five or more symptoms as a proxy for major depression, as recommended.

Our primary exposure of interest is a binary indicator of whether or not any of the respondents’ children were in the U.S at the time of each survey wave. We constructed this measure from information from a detailed household roster that solicited the location of each of respondents’ children.

Models are stratified by gender given prior evidence of different patterns in depression outcomes for older men and women in Mexico. Demographic covariates include respondent age, educational attainment, residence characteristics (urban versus less urban; high out-migration state versus other state), marital status, employment status, and respondents’ personal history of migration either to the U.S. or within Mexico.

Health covariates include a continuous measure of respondents’ lower-body functional limitations, an indicator of cognitive functioning, and a measure of whether or not respondents report any doctor-diagnosed chronic condition (e.g. diabetes, hypertension). Additional covariates include whether or not respondents count on other sources of potential support, including whether or not other adult children live in their home or community, and whether or not community members are available to provide emotional or instrumental support.

**Analytic Strategy**

We first estimate marginal structural models developed to assess the causal effects of longitudinal exposures that 1) are not randomly assigned and 2) are subject to change over time. For example, whether or not respondents’ adult children migrated to the U.S. at any point across the MHAS study is likely influenced by a set of time-invariant covariates measured at baseline (e.g. respondents’ own migration history), as well as time-varying covariates (e.g. household economic status). These covariates may also be important predictors of late-life depression, thereby confounding the relationship between adult child migration and the mental
health of older adult parents who remain in Mexico. These marginal structural models build on traditional repeated regression models but use a series of inverse-probability-of-treatment weights that account for time-varying confounding as well as participant loss to follow-up, thus overcoming two key sources of bias.

We compare the results of the marginal structural model with a model that use targeted maximum likelihood estimation (TMLE) for dynamic models. TMLE improves upon the MSM technique by being double robust (i.e. achieving an unbiased estimate if either the treatment or outcome model is misspecified) and allowing for incorporation of machine-learning techniques, further decreasing reliance on correct model specification. In order to address missing data on covariates included in our models, we carry out a multiple imputation strategy that accounts for the longitudinal nature of the data.

**Preliminary Results**

At baseline, respondents were 62 years on average; 54% were women and 46% were men. Nearly 45% of female respondents and a quarter of male respondents reported five or more past-week depressive symptoms. Twenty-four percent of women and 23% of men reported having at least one child in the U.S., while about a third of respondents had at least one adult child living elsewhere in Mexico. Figure 1 presents the number of respondents who ‘switched’ on values of the exposure (i.e. having at least one child in the U.S.) between study waves. The full paper presents the complete results as well as a discussion on the implications of our findings for the mental health and well being of older adults in countries with massive migration movements such as Mexico.

**References**


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Figure 1. Change in adult child migration to the U.S for older Mexican adults, 2001-2003 and 2003-2012