Offspring Educational Attainment and Older Parents' Cognition in Mexico*

Submission to the Annual Meeting of the Population Association of America

September 10, 2018

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Acknowledgements: We gratefully acknowledge funding from the National Institute of Aging from grants (T32 AG000037; K99 AG058799). The contents of this manuscript are solely the responsibility of the authors and do not represent the views of the National Institute of Aging, Shanghai University of Finance and Economics, the University of Hawaii at Manoa, Arizona State University or the University of Southern California.

Abstract: Disparities in later-life cognitive health point to the importance of family resources. Although the bulk of prior work establishes the directional flow of resources from parents to offspring, the "linked lives" perspective raises the question of whether offspring resources could affect parental health as well. This paper examines how children's education influences parents' cognitive health in Mexico, where a 1993 compulsory schooling reform increased the educational attainment of recent birth cohorts. Applying an instrumental variables approach, we found that each year of offspring schooling was associated with higher overall cognition among parents, but was less predictive across the different cognitive functioning domains. Offspring schooling was only associated with verbal learning, verbal fluency, and orientation, but not visual scanning, visuo-spatial ability, or visual memory. We suggest that more frequent, rich communication between educated offspring and their parents could help to explain our results and describe avenues for future research.

Introduction

An inadvertent consequence of the remarkable gains achieved in life expectancy throughout the 20th century has been a dramatic increase in cognitive impairment and dementia across the globe (Riley, 2005). Disparities in later-life cognitive health point to the importance of individual, as well as family resources in shaping both the onset and progression of cognitive decline (Jefferson et al., 2011; Lee et al., 2003). Although prior work establishes the directional flow of resources from parents to offspring (Clouston et al., 2012; Fors, Lennartsson, Lundberg, 2009; Singh-Manoux, Richards, Marmot, 2005; Stern 2002; 2012), the "linked lives" perspective raises the question of whether offspring resources affect parental health in later life (Elder, Johnson, and Crosnoe, 2003).

One recent paper found that having children with more schooling was negatively associated with dementia onset and overall cognitive decline among older adults in South Korea (Lee, 2018). Findings from this paper (Lee, 2018) echo results from a growing body of work highlighting the importance of children's resources for parental mortality more broadly (De Neve and Harling, 2016; Friedman and Mare, 2015; Sabater and Graham, 2016; Zimmer et al., 2007). Although analyzing overall cognitive functioning is important, recent research has also stressed the importance of understanding factors that affect specific dimensions of cognitive health (Antsey, 2000; Guerra-Carrillo, 2017). Indeed, assessing separate elements of cognitive functioning could help to illuminate the specific pathways through which children's education may be most beneficial for later-life cognition. In addition, although prior research reveals possible associations between children's resources and parental health, it is challenged by methodological constraints, such that confounding factors that influence both offspring education and parental health could lead to biased estimates (De Neve and Kawachi, 2017). Recent studies attempted to overcome this bias through sibling fixed-effects models (Torssander, 2013) and quasi-experimental data that have utilized educational reform policies (Lundborg and Majlesi, 2018; De Neve and Fink, 2018). Studies using educational reform policies to assess changes in offspring schooling and subsequent effects on parent mortality found that higher levels of offspring schooling were protective of older parents' longevity in South African and Tanzania, although important caveats exist with respect to parent and offspring gender (Lundborg and Majlesi, 2018; De Neve and Fink, 2018). However, few studies have assessed whether such policies play a role in parents' cognitive health (for an exception, see Ma, 2017).

Our paper examines how children's education influences parents' cognitive health in Mexico, a rapidly aging country where expansive educational reforms increased compulsory schooling among recent birth cohorts (de Herrera, 1996; Creighton & Park, 2010; Post, 2001). Harnessing a 1993 policy change in compulsory schooling and applying an instrumental variable approach, we examine how increased schooling differentially shaped access to educational attainment for cohorts of offspring and consequently, whether these increases were associated with parents' cognitive health. In addition, we expand upon recent work that documents the association between children's education and parents' overall cognition (Lee 2018) by examining specific cognitive domains (e.g. memory and visuospatial ability) that may help elucidate concrete mechanisms through which children's education influences parental cognition. Finally, we assess whether children's resources also matter more for mothers, compared to fathers, given prior research findings that highlight the greater importance of children's schooling for mothers' longevity, compared to fathers', in Mexico (Yahirun, Sheehan, Hayward, 2017). Understanding how offspring education influences later-life cognitive ability in Mexico is critical given that the number of adults living with dementia in Mexico and Latin America isprojected to quadruple over the first half of the 21st century (Parra et al., 2018). Many older adults in Mexico rely on support from adult children (Angel et al., 2016; Angel, Vega, López-Ortega, 2017) as the development of institutional support systems for older adults continue to lag behind population aging (Robledo, Ortega, & Lopera, 2012).

Background

Intergenerational pathways to cognitive health

A vast body of research on the intergenerational pathways to cognitive health focuses on the role of early life conditions (Al Hazzouri et al, 2011; Fors et al., 2009; Glymour and Manly, 2008; Luo and Waite, 2005; Zhang, Hayward, and Yu, 2016; Zhang and Hayward, 2008). This work underscores how parental resources and early life contexts influence both the biological and social pathways to cognitive functioning in later life. Biologically, parents establish the early childhood environment for learning that shapes children's cognitive reserve, a concept which neuroscientists refer to as "individual differences in how tasks are performed that may allow some people to be more resilient than others" (Stern, 2012). Cognitive reserve increases when education and cognitively stimulating environments in early childhood modify the brain's ability to function efficiently and effectively (Langa et al. 2017). Indirectly, parental resources also influence the socioeconomic pathways to cognitive functioning in later life. Highly-educated parents tend to raise children who also complete higher levels of schooling, and more schooling leads to cognitively stimulating occupations, higher incomes, and careers with benefits such as insurance, premium health care, etc. All of this leads to better health outcomes in mid-life that also shape later-life cognitive health (Greenfield and Morman, 2018; Luo and Waite, 2005; Zhang et al., 2016).

One perspective that is absent from research on the life-course determinants of cognition is the question of whether adult children may also act as important agents of change for parents' cognitive health in later life. Aging alters the composition of social networks as older adults leave the labor force, and the role of family members become more salient (Antonucci, 2011; Offer and Fischer, 2018). In later life, Mexican older adults are significantly more likely to have kin in their close social network, compared to young adults (Fuller-Iglesias and Antonucci, 2016). Offspring, who earlier in the life course were frequently the recipients of resources and support, emerge as providers of support and care, a pattern which is especially pronounced in Mexico (Angel et al., 2016; Angel, Vega, López-Ortega, 2017; Wong and Higgins, 2007).

Adult children's resources and parents' cognitive health

The salient role of offspring underscores the "linked lives" of parents and children, whereby events in one family member's life also shape the outcomes of other members (Elder et al., 2003). Recent research has analyzed how children's educational resources affect parents' physical health outcomes. Across a variety of contexts, parents with more-educated children experience delayed mortality compared to parents whose children have fewer years of schooling (De Neve and Harling, 2017; Friedman & Mare, 2014; Torssander, 2013; Zimmer et al., 2007; Zimmer, Hanson, and Smith, 2016). In Mexico in particular, recent studies also found that parents with more children who completed upper secondary school (high school) had fewer functional limitations and lived longer than parents with less-educated children (Yahirun, Sheehan, Hayward, 2016; 2017). However, the extent to which children's educational attainment may influence parental cognition in Mexico, which may have different etiologies than physical health, remains less clear.

In addition, even as recent work demonstrates a positive association between children's education and parents' general cognitive health (Lee, 2018), whether or not children's education matters across different domains of cognitive functioning is unclear. Indeed, it is possible that offspring schooling is associated with some aspects of cognitive health, but not others. Previous work suggests that the variance explained by educational attainment may differ across cognitive dimensions (Guerra-Carrillo, 2017) with some reporting education to be more closely related to crystalized abilities and memory, but less so with fluid abilities (Antsey, 2000) or processing speed (Guerra-Carrillo, 2017). However, some research has noted the lack of association between education and memory tasks in specific contexts: among older Mexican-Americans (Mantallana, 2011) and in Brazil (Laks, 2010), whereas other domains were affected by education. Prior studies have also reported variation in rates of cognitive decline across domains by level of education (Scarmeas, 2006; Leibovici, 1996; Alley et al., 2000). Given this evidence, we anticipate that the influence of children's educational attainment may also vary by cognitive domain.

Gender differences

Furthermore, the relationship between children's education and parents' cognitive functioning likely differs for mothers versus fathers. Insights from prior research suggest that patterns of cognitive functioning vary for women and men in later life (Sohn et al, 2018). Although cognitive abilities are similar across genders earlier in the life course, women are more susceptible to cognitive decline in older ages (Snyder et al., 2016). From a social support perspective, the ability of parents to draw on the resources of their family members likely differs for mothers versus fathers. For one, strong norms of motherhood, and women's loose attachment to the labor force in Mexico means that families are a central force in women's, rather than men's lives (Kanaiaupuni, 2000). Second, mothers are the family kinkeepers and as such are more likely to maintain contact with adult children than fathers (Diaz-Loving, 2006). Thus, intergenerational ties to children are more salient in the lives of mothers, especially in later life, compared to fathers.

The generally more salient connection between mothers and their children may also mean that mothers are more dependent on the resources of their offspring in later life. This idea finds support in *resource substitution* theory, which contends that education is a more important resource among individuals who are otherwise disadvantaged (Mirowsky and Ross, 2003). Individuals with fewer social or economic resources can use education, as an attained resource, to substitute for social or economic resources that they may lack. Conversely, individuals with more social advantages may derive greater benefits from education, leading to *resource multiplication* rather than resource substitution (Ross and Mirowsky, 2011).

Women, for example, may experience the health benefits of education more acutely than men due to their disadvantaged social status. At the individual level, prior work supports the idea that women's own education conveys stronger health benefits than men (Ross and Mirowsky, 2006). However, previous papers found mixed results regarding the differential health benefits of children's education on mothers' versus fathers' health (De Neve and Fink, 2018; Lundborg and Maljesi, 2017). One study found that a daughter's schooling was more important in extending the longevity of her father, compared to her mother, especially among low socioeconomic fathers (Lundborg and Maljesi, 2017). Still, others found the opposite: sons' schooling mattered more for parental survival than daughters' schooling (De Neve and Fink, 2018), whereas Lee (2018) found no evidence that parents' gender moderated the link between the eldest child's education and parents' cognitive decline. In Mexico, offspring schooling was more likely to extend mothers' longevity compared to fathers (Yahirun et al., 2017).

Mexico and the 1993 school reforms

Challenges to previous studies that examine the "upstream" influence of children's education on parental health stem from problems of potential endogeneity and omitted variable bias (De Neve and Kawachi, 2017). However, compulsory schooling laws provide quasi-experiments that influence education but would not otherwise influence individual health outcomes (Glymour and Manly, 2018). Two recent papers applied this approach to examine the effect of children's schooling on parental mortality, by using children's exposure to the educational reforms as a source of exogenous variation in their education. Lundborg and Majlesi (2017) exploited a 1948 educational policy reform in Sweden, which increased compulsory education levels from seven to nine years of schooling. Although they failed to find any significant effects of children's years of schooling on parental mortality on average, they found that increasing years of education of daughters was protective of father's mortality among men with low levels of education (Lundborg and Majlesi, 2017). De Neve and Fink (2018) studied the Tanzanian compulsory education reform in 1974 which mandated that all children start primary school by age seven and found that sons' education was also protective of parental mortality.

In Mexico, educational reform policy occurred gradually, throughout the 20th century, and was marked by a series of restructurings (Creigton and Park, 2010). Policies that increased student enrollment began in the latter half of the century under the "11 year plan" (1959-1975), and continued under the "Education for everyone" campaign (1972-1992), and the Constitutional Amendment of 1993 (1993 - present) (Creigton and Park, 2010). The "11 year plan" marked Mexico's largest sustained increase in public education spending that was aimed at growing the overall number of schools, and improving the infrastructure of existing schools and teacher training (de Herrera, 1996; Creigton & Park, 2010; Post, 2001). The "11 year plan" was followed by the "Education for everyone" campaign (1976-1992) which aimed to further the gains made in the prior period by expanding enrollment in rural areas (Creigton & Park, 2010; Post, 2001). Gains in educational attainment were substantial throughout the 1970s and culminated in an increase in compulsory schooling at the lower grade levels by the early 1990s (Creigton & Park, 2010; Santibanez et al., 2005; Torche & Ribeiro, 2007). However, economic downturn in the early 1990s stalled progress that was made in prior decades, and the 1993 Constitutional Amendment attempted to reverse this by increasing mandatory schooling from elementary school (grade 6) to lower secondary school (grade 9). Estimates suggest that those exposed to the 1993 Constitutional Amendment were more than twice as likely to transition from primary school to lower secondary school, demonstrating that the reform was effective at raising the population-level of educational attainment (Creigton and Park, 2010: pg. 528).

Current Study/Research questions

Our study uses the 1993 Constitutional Amendment reform to estimate the causal effect of increases in children's schooling from grade 6 to grade 9 on parental cognitive health. In this way, our work builds upon prior studies that used educational policy reforms in other contexts to reduce some of the endogeneity bias that is often present in research that examines how children's education affects parental mortality (De Neve and Fink, 2018; Lundborg and Majlesi, 2018) and speaks more broadly to work that has examined the health effects of compulsory schooling (see Hamad et al., 2018 for a review). As early life conditions have been shown to be critical for cognition among older adults in Mexico (Hazzouri et al., 2011), we also control for early life conditions of the parent, factors that could influence their cognition and children's educational attainment. In addition, we assess whether a child's educational attainment is equally predictive across different dimensions of parents' cognitive health in addition to a composite measure of cognition given previous research indicating that education is more closely associated with certain dimensions of cognitive health (Guerra-Carrillo, 2017, Antsey, 2000). Lastly, we examine whether these relationships differ for mothers versus fathers due to sex differences in cognitive health (Sohn et al, 2018; Snyder et al., 2016) and theories of resource substitution (Mirowsky and Ross, 2003; 2011) which suggest that for social and cultural reasons, women may be more effective in leveraging the resources of their children than fathers.

Data

We use data from the Mexican Health and Aging Study (MHAS), an ongoing, longitudinal, nationally representative study of health and aging among older Mexican adults ages 50 and older and their spouses/partners of any age. The first MHAS wave was collected in 2001 and three subsequent waves of data were collected in 2003, 2012, and 2015. In 2012, 15,723 interviews were conducted, which included original respondents as well as a refresher cohort of individuals born between 1952 and 1962. Both the original and refresher cohorts were followed-up again in 2015, but only the 2012 provides representative data on Mexico's population age 50 and older because no refresher sample was added in 2015. The MHAS is partially funded by the National Institutes of Health/National Institute on Aging (grant number NIH R01AG018016) and is highly comparable to the United States Health and Retirement Study (see Wong, Michaels-Obregon, & Palloni, 2017). All data and documentation are public use and available at www.MHASweb.org. The richness of the MHAS data provides an excellent opportunity to examine how offspring influence the health of aging adults as detailed information is collected not only of older adult respondents, but also of their children.

Although MHAS began surveying older Mexicans in 2001, our analysis uses data from the 2012 wave only. We use data from 2012 due to variation in the way in which the MHAS collected data on cognitive health prior to 2012. By Wave 3 (2012), MHAS had added measures of verbal fluency and orientation (Mejia-Arango, 2015) which were not available in the first two waves. In addition, a large time gap between the 2003 and 2012 surveys precludes finer longitudinal analysis of cognitive change and the time gap between the 2012 and 2015 waves may not allow sufficient time to detect differences in rates of cognitive decline by children's education. As mentioned above, the 2012 wave provides representative data on Mexico's population age 50 and older because no refresher sample was added in 2014.

The analytic sample is derived from the 15,723 respondents who were interviewed in 2012. The sample decreases when proxies are omitted (n=1,275), spouses/partners under age 50 are excluded (n=826), individuals whose most-educated child were younger than age 18 or older than 65 and individuals who were not parents in 2012 are also dropped from our sample (n=878). We also exclude individuals who were missing information on all cognition tasks or any control variables (n=3,754). Our final analytic sample consists of 8,990 older adult Mexican parents aged 50 and older in 2012.

Measures

Cognitive functioning

Cognitive functioning in the MHAS is measured using the Cross Cultural Cognitive Examination (CCCE) (Glosser et al., 1993), an instrument that is especially useful in populations with limited literacy and mathematical ability (Wolfe et al., 1992). The MHAS collects cognitive data spanning several different domains: verbal learning, verbal recall, visual scanning, verbal fluency, orientation, visuo-spatial ability, and visual memory. To assess verbal learning, respondents are read a list of eight words and asked to restate as many of the words as he/she is able. This is repeated two more times and the average number of words restated correctly across three trials is calculated as a measure of verbal learning (range: 0-8). Verbal recall is assessed as the number of words from the eight-word list that are recalled correctly after a delay. To measure visual scanning, respondents complete a one-minute task in which they identify a visual stimulus in an array of stimuli (range: 0-60). Verbal fluency is assessed using a one-minute animal naming exercise and the total number of unique named animals is calculated (range: 0-60). Orientation is measured by correctly identifying the day, month, and year (range: 0-3). Two visuo-spatial exercises are also conducted involving the drawing of a figure (visuo-spatial ability, range: 0-6) as well as the delayed recall of the figure (visual memory, range: 0-6). In addition to analyzing scores across individual cognitive tasks, we also construct a composite cognitive score using the standardized cognitive scores across tasks. The composite cognitive score is constructed as the average z-score across any of the cognitive tasks with non-missing scores. This approach allows each task to have equal weight in the final composite score as each task score is converted into z-scores rather than summing scores across tasks, a practice which would allow tasks with greater ranges to have more influence on the composite score.

Offspring Characteristics

In this analysis, we limit our offspring sample to the respondent's highest-educated child, a decision that parallels prior research in this area (see Zimmer et al., 2002; 2007). Thus, the main independent variable of interest is the education of the most-educated offspring, continuously coded in years (0-24 years). When children are tied for those with the most education, we choose the oldest child. In the event that children are the same age (i.e. twins), we drop those children and their parent from the sample (n=259). We focus on children who were adults, defined as those between ages 18 and 65 in 2012. We also account for that child's gender (son =1, daughter =0) and age in 1993, including second- and third-order terms to control for complex cohort trends in educational attainment.

Respondent Characteristics

We included a number of respondent characteristics that are correlates of cognitive health as well as children's educational attainment. Specifically, we account for the parent's own years of schooling (coded continuously as years of formal education, 0 to 17 or more years). To account for the respondent's age and the non-linear association between age and cognition, we include three measures: age: age, age^2, and age^3. We code gender as a dummy variable (1=male, 0=female) and include marital status as the following categorical variable: (0) married or partnered (referent), (1) widowed, and (2) other (never married/divorced/separated). We also control for the total number of living children. Mexico has an extremely heterogeneous population, and we include an indicator of indigenous status, measured as whether the respondent speaks an indigenous dialect (=1 if speaks an indigenous dialect, =0 if not). We also incorporate a measure of locality size to account for differences in cognition across rural/urban areas (Saenz et al., 2018). Locality size is categorized (in order from most urban to most rural) as: (0) 100,000 or more persons (referent), (1) 15,000-99,000 persons, (2) 2,500-14,999 persons, and (3) fewer than 2,500 persons.

Finally, given prior research citing the importance of early life indicators for later-life cognitive functioning, we include a number of childhood conditions that potentially affect both respondent's own cognitive health outcomes as well as the education of offspring. We include a measure of childhood health as height in centimeters. Height is a well-established correlate of childhood nutritional, inflammation, and health context (Crimmins and Finch, 2006). Categorical variables measuring the educational attainment of the respondent's mother and father are coded identically, and are added in as: (0) no formal schooling (referent), (1) less than six years of schooling, (2) six years of schooling (elementary school education), (3) and more than six years of schooling. Finally, we account for early childhood environment through a series of dummy variables (=1 if condition was met): no toilet in the household before age 10, often went to bed hungry before age 10, did not wear shoes regularly before age 10, self/siblings had to drop out of school to support family before age 10, self/family member slept in same room that was used to prepare food before age 10, and family received financial assistance before age 10.

Methods

To investigate the effects of children's schooling on the cognitive functioning of older adults, we estimate two sets of models. The first models use Ordinary Least Squares (OLS) regression, where we regress both the composite cognition score and the seven different cognition domain scores separately for men and women as below:

$$y_i = \alpha + \beta child\_edu_i + \phi Control_i + \varepsilon_i \quad (1)$$

In the above Equation (1), y_i is the cognitive function measure of interest of respondent *i*, $child\_edu_i$ is the educational attainment of the highest-educated child which is measured in years of schooling. $Control_i$ is a vector of child and respondent control variables. ε_i is the error term and all standard errors are adjusted for heteroskedasticity. We use a progressive adjustment strategy with nested models to assess how the addition of controls changes the association between children's education and parents' cognitive functioning. Model 1 includes year of education of the most-educated child, plus parents' demographic characteristics, and children's age and gender. Model 2 adds in controls for locality size to account for urban/rural differences. Early life conditions are included in Model 3.

Although the OLS regression models shed light on the potential impact of offspring education on later life cognitive abilities, omitted variables - unobserved individual or familial characteristics that correlate with both the cognitive abilities of older adults and the education of their children - could bias our results. In addition, reverse causality bias might also be present in our OLS analysis, such that parents with greater cognitive reserves are more likely to invest in children's education. In order to improve the causal interpretation of our study, our second analysis uses an Instrumental Variable Regression (IV)/Two Stage Least Squares approach. We exploit the 1993 educational policy change in Mexico, which raised compulsory education from six to nine years of schooling. This policy change implied that in 1993, offspring aged 15 and younger were required to finish lower secondary school, compared to offspring who were older than 15 who were not compelled to complete lower secondary school.

Children's exposure to the 1993 educational reform is used as the instrument for years of schooling, which identifies the causal effects of children's education on old age cognition. The first stage is given by Equation (2), where cls_i equals 1 if the highest-educated child of respondent *i* was aged 15 or younger in 1993 and was affected by the policy reform, and 0 if the respondent was older than age 15 in 1993:

$$child\_edu_i = \gamma + \varphi cls_i + \eta Control_i + \nu_i \qquad (2)$$

φ measures the increase in years of schooling due to the policy change, everything else equal. For cls_i to be a valid instrument, we assume exogenous variation in the years of education that is uncorrelated with the cognition outcomes of parents, except through its effect on the educational attainment of children. If other concurrent policy changes or cohort trends are unaccounted for, but also affect children's education as well as parental cognition, the IV approach might not be valid.[1] Therefore, we controlled for complex cohort trends in children's educational attainment by including as covariates a second and third order polynomial of the distance of children's age in 1993 to age 15. As higher order polynomials greatly compromise the precision of estimation and increase in complexity dominates the gain in model fit based on Akaike Information Criterion (AIC), we do not report results with even higher order control functions of cohort trends. Equation (1) then becomes Equation (3), the second stage equation with $child\_edu_i$ replaced by its prediction from the first stage:

$$y_i = \alpha + \beta child\_edu\_predicted_i + \phi Control_i + \varepsilon_i \quad (3)$$

β then can be interpreted causally as the increase in composite cognition score or standardized domain cognition score as a result of a one-year increase in years of schooling of the highest-educated child. We use a similar progressive adjustment strategy for the IV estimates as described above for the OLS models.

We examine both the composite cognitive functioning score as well as each domain separately given that the importance of children's education may vary across different domains of parents' cognitive functioning. In assessing whether or not children's education varies across the different cognitive domains, we provide a robustness check to our results. If the results are consistent across all areas, then this may be evidence of omitted variable bias or endogeneity, whereby the same underlying factors that shape parental cognitive health also influence children's education. However, if certain domains are significantly associated whereas others are

[1] The IV approach used in this paper is similar to the Regression Discontinuity Design. In Regression Discontinuity Design, eligibility or treatment status is determined by an institutional rule which generally requires an assignment variable to fall above (or below) an exogenous threshold. Under the assumption that without the treatment, the outcome variables would be continuous against the assignment variable and some other premises, any discontinuity in the outcome variables at the cutoff are due to the causal effects of the treatment (Lee and Lemieux, 2010).

not, this may suggest that children's education is acting in very specific ways to affect parents' cognitive health. Finally, to assess whether the relationships between children's education and different dimensions of parents' cognitive health differ for mothers versus fathers, we also conduct the same analysis for men and women separately.

Results

Table 1 presents descriptive characteristics of our sample. Note that the sample sizes for the outcome variables differ given variation in missingness across the different cognitive domains measured in the MHAS. In general, mean cognitive scores across the different domains suggested that the average respondent was able to complete many of the assigned tasks. For instance, the average respondent in the sample scored five or higher (on a scale of zero to six) for visuo-spatial ability and visual memory. Orientation scores also indicated that the average respondent correctly listed at least two components of the day, month, or year (2.533 out of 3). However, the average respondent named a little over 15 out of a range of 60 possible animals. Children in the sample were more educated than parents, with the average most-educated child having completed over 13 years of schooling, the equivalent of more than an upper secondary school education in Mexico. The sample of highest-educated children in our sample was fairly evenly split between sons and daughters.

Table 1: *Descriptive Statistics, Mexicans Aged 50+, Mexican Health and Aging Study, 2012.*

	Entire Sample		Men		Women	
	Mean	SD	Mean	SD	Mean	SD
<u>Cognitive Batteries</u>						
Composite Cognition Score	0.037	0.683	0.026	0.672	0.047	0.696
Verbal Learning Score (0-8)	4.855	1.213	4.680	1.230	4.992	1.182
Verbal Recall Score (0-8)	4.508	2.010	4.170	2.040	4.771	1.946
Visual Scanning Score (0-60)	29.650	15.290	29.890	15.210	29.470	15.340
Verbal Fluency Score (0-60)	15.350	5.133	15.680	5.203	15.100	5.064
Orientation Score (0-3)	2.533	0.776	2.556	0.751	2.514	0.795
Visuospatial Ability (0-6)	5.571	1.019	5.640	0.928	5.517	1.082

Visual Memory (0-6)	4.871	1.589	4.954	1.587	4.806	1.588
<u>Characteristics of Highest Educated Child</u>						
Years of Schooling of the Highest Educated Child	13.170	3.797	13.100	3.816	13.230	3.782
Son (%)	51.100		51.400		51.000	
<u>Demographic Characteristics</u>						
Own Years of Schooling	6.043	4.768	6.589	5.120	5.646	4.426
Number of Children	4.986	2.819	5.008	2.803	4.969	2.832
Own Age in 2012	64.380	9.122	65.260	9.113	63.690	9.071
Man	43.800					
Marital Status (%)						
Married	72.200		85.900		61.500	
Widowed	17.400		8.500		24.300	
Divorced, separated, never married	10.400		5.700		14.100	
Speaks an Indigenous Dialect	7.210		8.150		6.470	
Locality Size(measure of rural/urban, %)						
100,000+	61.600		59.500		63.300	
15,000-99,999	11.200		11.200		11.200	
2,500-14,999	10.000		10.500		9.600	
<2,500	17.200		18.800		15.900	
<u>Early Life Characteristics</u>						
Height in cm (measured/self reported)	159.900	9.695	166.300	8.081	154.800	7.651
Mother's education (%)						
No Education	48.100		49.300		47.100	
Incomplete Elementary Education	35.400		33.800		36.700	
Elementary Education	11.400		11.800		11.200	
Beyond Elementary Education	5.000		5.100		5.000	
Father's education (%)						
No Education	41.500		43.100		40.200	
Incomplete Elementary Education	37.700		36.700		38.400	
Elementary Education	13.000		12.500		13.300	
Beyond Elementary Education	7.900		7.700		8.000	
No Toilet in Household prior to Age 10 (%)	67.200		68.500		66.200	
Often Went to Bed Hungry prior to Age 10 (%)	28.800		31.400		26.800	

Did not Wear Shoes Regularly prior to Age 10 (%)	20.500	21.200	20.000
Self/siblings Had to Drop out of School to Support Family prior to Age 10 (%)	40.600	42.800	39.000
Self/family Member Slept in the Same Room That Was Used to Prepare Food prior to Age 10 (%)	22.400	23.400	21.600
Family Received Financial Assistance prior to Age 10 (%)	9.980	10.200	9.820
Observations	8,990	3,939	5,051

Source: Mexican Health and Aging Study, 2012.

Respondents themselves had on average six years of schooling – an elementary school education, which is reflective of the early birth cohorts in the sample. The average respondent was age 63, had 4-5 children, and was married in 2012. Approximately 7% of the sample spoke an indigenous language and most respondents in the analytical sample lived in urban areas. With respect to early life conditions, even though a large share of older adults in our sample were materially disadvantaged as children, with nearly 29% reporting going to bed hungry, and over 40% reporting having someone in their household leave school in order to support the family, less than 10% reported living in a household that received any type of financial assistance. The vast majority of respondents' mothers and fathers did not complete elementary school, again reflecting strong variation in educational attainment across birth cohorts.

Table 2 presents the OLS models, with nested models predicting the composite cognitive functioning score. In Model 1, the years of schooling of the most-educated child was positively and significantly associated with higher scores for parents' overall cognition even after accounting for the parent's years of education. However, the effect size was small – each additional year of schooling for the most-educated child equated to a .024 standard deviation increase in the composite cognition score for the respondent. Not surprisingly, more educated parents also tended to have higher overall cognitive scores. Here, the magnitude was greater, with each year of schooling associated with a .051 standard deviation increase on the composite cognitive score even after accounting for years of education of the most-educated child. Fathers had worse cognitive health than mothers and having more children was associated with worse cognitive functioning than fewer children. Sons, however, were associated with better cognitive health than daughters. Model 2 added in controls for locality size and the main results for children's education remained similar. Early life conditions were accounted for in Model 3, however, very few of the early life indicators were significant. The correlation between a child's schooling and parents' overall cognitive score remained positive, although the coefficient was not as strong as in Models 1 and 2.

Table 2: *Regression Coefficents from Models Predicting Standardized Cognitive Composite Score, Mexicans aged 50+, Mexican Health and Aging Study, 2012.*

	Standardized Composite Cognition Score		
	Model 1	Model 2	Model 3
Child's Characteristics			
Years of Schooling of the Highest Educated Child	0.024***	0.022***	0.020***
	(0.002)	(0.002)	(0.002)
Child's Age in 1993 - 15	-0.004***	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)
(Child's Age in 1993 - 15)^2	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
(Child's Age in 1993 - 15)^3	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Son	0.027**	0.029***	0.026**
	(0.011)	(0.011)	(0.011)
Demographic Characteristics			
Own Years of Schooling	0.051***	0.050***	0.045***
	(0.001)	(0.001)	(0.002)
Number of Children	-0.012***	-0.011***	-0.009***
	(0.002)	(0.002)	(0.002)
Own Age in 2012	0.087	0.090	0.096
	(0.082)	(0.083)	(0.082)
Own Age in 2012^2	-0.001	-0.001	-0.001

	(0.001)	(0.001)	(0.001)
Own Age in 2012^3	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Man	-0.021*	-0.020*	-0.050***
	(0.012)	(0.012)	(0.015)
Marital Status (omitted group: Married)			
Widowed	-0.023	-0.027	-0.024
	(0.018)	(0.018)	(0.018)
Divorced, separated, never married	-0.017	-0.022	-0.019
	(0.018)	(0.018)	(0.018)
Speaks an Indigenous Dialect	-0.160***	-0.149***	-0.117***
	(0.023)	(0.023)	(0.023)
Locality (omitted group: 100,000+)			
15,000-99,999		-0.021	-0.012
		(0.018)	(0.018)
2,500-14,999		-0.046**	-0.037*
		(0.018)	(0.019)
<2,500		-0.075***	-0.065***
		(0.017)	(0.017)
Early Life Characteristics			
Height in cm (measured/self reported)			0.003***
			(0.001)
Mother's Education (omitted group: no education)			
Incomplete Elementary Education			0.052***
			(0.014)
Elementary Education			0.027
			(0.021)
Beyond Elementary Education			0.024
			(0.029)
Father's Education (omitted group: no education)			
Incomplete Elementary Education			0.045***
			(0.014)
Elementary Education			0.063***
			(0.021)
Beyond Elementary Education			0.078***
			(0.025)
No Toilet in Household prior to Age 10			-0.012
			(0.013)
Often Went to Bed Hungry prior to Age 10			-0.002
			(0.014)
Did not Wear Shoes Regularly prior to Age 10			-0.013
			(0.015)
Self/siblings Had to Drop out of School to Support Family prior to age 10			-0.006
			(0.012)

Self/family Member Slept in the Same Room That Was Used to Prepare Food prior to			-0.017
			(0.015)
Family Received Financial Assistance prior to age 10			-0.017
			(0.018)
Constant	-2.069	-2.088	-2.728
	(1.803)	(1.812)	(1.802)
Observations		8,990	

Source: Mexican Health and Aging Study, 2012.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 presents abbreviated model results across all seven domains of cognitive functioning. The coefficients for children's schooling suggest that similar to the composite score, more offspring education was positively associated with parents' verbal learning and recall, visual scanning, verbal fluency, visuospatial ability, visual memory, and orientation. However, it is also clear that the strength of the association was weaker for certain outcomes. For example, an extra year of schooling among children was associated with a .016 standard deviation increase on the visual memory task, compared to a .025 standard deviation increases on the orientation scale. This contrast is confirmed by using a z-score test on the difference of the two coefficients ($z = 2.8$, $p < 0.01$).

Table 3: *Regression Coefficents from Models Predicting Specific Cognitive Scores, Mexicans aged 50+, Mexican Health and Aging Study, 2012.*

	Verbal Learning	Verbal Recall	Visual Scanning	Verbal Fluency	Orientati on	Visuo-spatial Ability	Visual Memory
Years of Schooling of the Highest-Educated Child	0.025***	0.018***	0.025***	0.022***	0.025***	0.016***	0.011***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)
Own Years of Schooling	0.049***	0.032***	0.072***	0.054***	0.035***	0.032***	0.032***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	8,940	8,902	8,422	8,919	8,959	8,442	8,341

Source: Mexican Health and Aging Study, 2012.
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Results from fully adjusted models. All models include controls for: child characteristics, demographic characteristics of respondent, locality size, and early life conditions

Table 4 presents the results from the first stage regression using the instrumental variable approach. In Model 1, the results demonstrate a positive and significant effect of exposure to the compulsory schooling reform on children's years of schooling. Exposure to the 1993 reform increased the average year of schooling by .397 years for the average child in the sample. The size of the coefficient barely changed once we added in controls at the child or parent level, including early life indicators.

Table 4: *Regression Coefficents from First Stage for Instrumental Variable Models Predicting Standardized Composite Score, Mexicans aged 50+, Mexican Health and Aging Study, 2012.*

	Model 1	Model 2	Model 3
	Years of Schooling of the Highest-Educated Child		
Exposure to 1993 compulsory school reform	0.397***	0.398***	0.372***
	(0.148)	(0.145)	(0.144)
Control: child's characteristics, demographic characteristics	Y	Y	Y
Control: locality	N	Y	Y
Control: early life characteristics	N	N	Y
Observations		8,990	

Source: Mexican Health and Aging Study, 2012.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 presents results for the second stage regression. In Model 1, years of schooling of the most-educated child was positively associated with parents' overall cognitive score. However, the coefficient for child's education in the IV model was stronger than in the OLS models: an increase in one year of schooling led to a .147 increase in the standard deviation on the composite cognitive score for parents, compared to a .024 increase in the equivalent OLS model. Results for model controls were similar to the OLS models, with the exception of parents' own education, which was not significant in the IV models. One reason for the insignificant coefficients for parents' own education was the increase in standard errors which is typical in IV/2SLS models (Greene, 2012). The magnitudes of the coefficients for parents' own education were also reduced in IV models, which was likely because the education of parents and children were so highly correlated. Of course, it is also possible that parents' own education matters less for cognitive health, if some of its effects worked through children's education, which was instrumented by exogenous variation in children's exposure to the compulsory schooling reform. Models 2 and 3 added in geographic variation and early life conditions for parents, but the main association for children's education did not change across models.

Table 5: *Regression Coefficents from Instrumental Variable Models Predicting Standardized Composite Score, Mexicans aged 50+, Mexican Health and Aging Study, 2012.*

	Model 1	Model 2	Model 3
	Standardized Composite Cognition Score		
Child's Characteristics			
Years of Schooling of the Highest Educated Child	0.147**	0.148**	0.147*
	(0.073)	(0.073)	(0.077)
Child's Age in 1993 - 15	-0.006***	-0.007**	-0.007**
	(0.002)	(0.003)	(0.003)
(Child's Age in 1993 - 15)^2	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
(Child's Age in 1993 - 15)^3	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Son	0.021	0.019	0.019
	(0.014)	(0.015)	(0.015)
Demographic Characteristics			
Own Years of Schooling	0.005	0.007	0.008
	(0.028)	(0.025)	(0.023)
Number of Children	-0.016***	-0.018***	-0.018***
	(0.004)	(0.005)	(0.006)
Own Age in 2012	0.117	0.114	0.110
	(0.104)	(0.103)	(0.102)
Own Age in 2012^2	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)
Own Age in 2012^3	0.000	0.000	0.000

	(0.000)	(0.000)	(0.000)
Man	0.061	0.057	0.058
	(0.051)	(0.047)	(0.068)
Marital Status (omitted group: Married)			
Widowed	0.015	0.023	0.023
	(0.032)	(0.037)	(0.037)
Divorced, separated, never married	0.040	0.049	0.046
	(0.040)	(0.047)	(0.046)
Speaks an Indigenous Dialect	-0.088*	-0.108***	-0.116***
	(0.051)	(0.037)	(0.029)
Locality (omitted group: 100,000+)			
15,000-99,999		0.011	0.008
		(0.029)	(0.026)
2,500-14,999		0.035	0.033
		(0.053)	(0.049)
<2,500		0.145	0.141
		(0.129)	(0.127)
Early Life Characteristics			
Height in cm (measured/self reported)			-0.000
			(0.002)
Mother's Education (omitted group: no education)			
Incomplete Elementary Education			0.019
			(0.027)
Elementary Education			-0.038
			(0.048)
Beyond Elementary Education			-0.039
			(0.052)
Father's Education (omitted group: no education)			
Incomplete Elementary Education			-0.006
			(0.037)
Elementary Education			0.024
			(0.036)
Beyond Elementary Education			0.035
			(0.041)
No Toilet in Household prior to Age 10			-0.009
			(0.017)
Often Went to Bed Hungry prior to Age 10			0.042
			(0.032)
Did not Wear Shoes Regularly prior to Age 10			0.012
			(0.025)
Self/siblings Had to Drop out of School to Support Family prior to age 10			-0.024
			(0.020)
Self/family Member Slept in the Same Room That Was Used to Prepare Food prior to			0.025

			(0.032)
Family Received Financial Assistance prior to age 10			-0.011
			(0.023)
Constant	-3.497	-3.516	-3.401
	(2.420)	(2.387)	(2.282)
Observations		8,990	

Source: Mexican Health and Aging Study, 2012.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The IV results across different domains of cognitive functioning are presented in Table 6. Unlike the non-IV OLS estimates, only for verbal learning, verbal fluency, and orientation are children's years of schooling significant. Note that the effect sizes also varied across these outcomes, with the association between offspring education and parents' verbal fluency (*b* = .388, p < .01) stronger than the coefficient for verbal learning (*b* = .206, p < .05), for example. Similar to the composite score, the coefficients for children's education for these outcome measures suggest stronger effect sizes compared to the standard OLS approach. Contrasting the coefficients for verbal fluency scores, each additional year of schooling for children translated to over 1/3rd of a standard deviation increase on the verbal fluency scale for parents using the IV estimates, compared to less than 1/20th of a standard deviation increase using the OLS models.

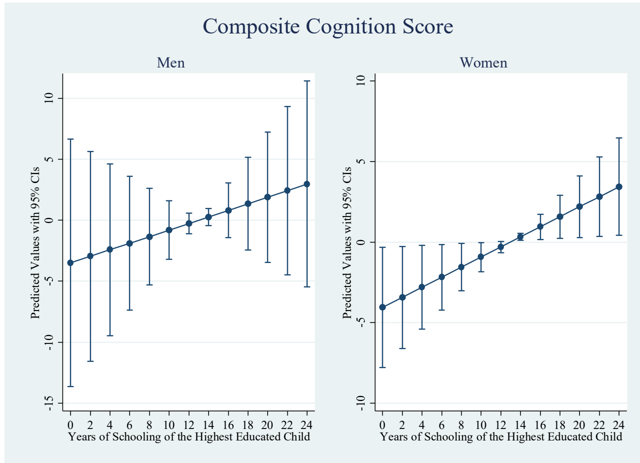
Table 6: *Regression Coefficents from Instrumental Variable Models Predicting Specific Cognitive Scores, Mexicans aged 50+, Mexican Health and Aging Study, 2012.*

	Verbal Learning	Verbal Recall	Visual Scanning	Verbal Fluency	Orientation	Visuospatial Ability	Visual Memory
Years of Schooling of the Highest-Educated Child	0.206*	0.121	0.007	0.383**	0.237*	0.081	0.041
	(0.123)	(0.112)	(0.117)	(0.171)	(0.131)	(0.137)	(0.133)
Own Years of Schooling	-0.003	0.002	0.077**	-0.050	-0.027	0.014	0.024
	(0.036)	(0.032)	(0.034)	(0.050)	(0.038)	(0.039)	(0.038)
First Stage							

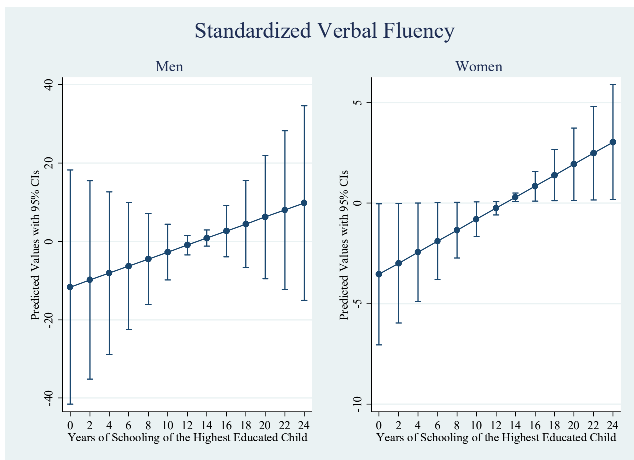
Exposure to 1993 compulsory school reform	0.359**	0.368**	0.290*	0.373***	0.370**	0.311**	0.317**
	(0.144)	(0.144)	(0.149)	(0.144)	(0.144)	(0.148)	(0.148)
Observations	8,940	8,902	8,422	8,919	8,959	8,442	8,341

Source: Mexican Health and Aging Study, 2012.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Results from fully adjusted models. All models include controls for: child characteristics, demographic characteristics of respondent, locality size, and early life conditions

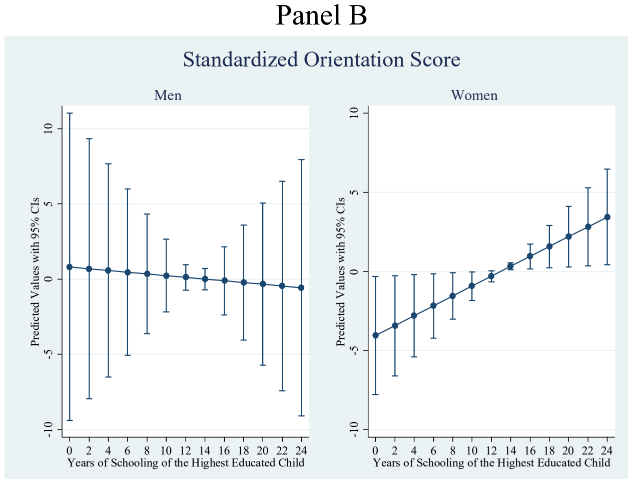
To assess whether mothers or fathers differentially benefit from the education of their children, we tested for the significance of the interaction between parents' gender and child's years of schooling on both the composite measure and across the various domains of cognitive functioning using the IV models. The results suggested that there were gender differences for the composite score, verbal fluency and orientation. We present the predicted scores for mothers versus fathers in Figure 1, although the full model results are available in Appendix Table A1. Figure 1, Panel A shows that for the composite score, the significant results found in Table 5 were mostly driven by mothers. Similar to previous results, having more educated children translated to higher composite scores among mothers. For instance, mothers whose child attained 16 years of schooling had higher scores that were nearly one standard deviation above the average, compared to mothers with eight years of schooling who score more than one standard deviation below the average. However, the confidence interval surrounding the predicted estimates suggests that the difference was clearly demarcated by those offspring with more than a high school education (14 years of schooling or more), versus those with a high school education or less. In Panels B and C, similar results are presented for parents' verbal fluency and orientation.



Panel A



Panel B



Panel C

Figure 1: *Predicted Cognition Scores from IV models by gender, Mexicans aged 50+, Mexican Health and Aging Study, 2012.*

Discussion

Long-standing research underscores the positive relationship between education and cognitive health among older adults (Langa et al., 2008; Langa et al., 2014). Whereas most of this work examined the effect of one's own education on cognitive functioning, recent research points to the importance of considering the education of family members – both parents and offspring – as a potential resource that also determines cognition in older adulthood (Al Hazzouri et al, 2011; Fors et al., 2009; Glymour and Manly, 2008; Lee, 2018; Zhang, Hayward, and Yu, 2016). The resources of adult children may be an especially critical – yet overlooked – factor for many older adults in contexts such as Mexico where offspring are the primary caregivers for older parents (Angel et al., 2016; Angel, Vega, López-Ortega, 2017).

This study expands upon recent work that assessed the relationship between offspring education and parents' cognitive health (Lee, 2018) in important ways. First, we exploited the 1993 educational policy reforms in Mexico that raised compulsory schooling from grade 6 (completion of elementary school) to grade 9 (completion of lower secondary school). We used the exogenous policy changes to school reform in an instrumental variable approach (Glymour and Manly, 2018) and compared our results to findings from standard ordinary least squares regression models. We found that in the instrumental variable analysis, a child's educational attainment was significantly associated with better general cognitive ability among parents.

Second, we built on previous work by also assessing different domains of cognitive health. Prior research found that the variance explained by educational attainment may differ across cognitive domains (Guerra-Carrillo, 2017). Furthermore, pinpointing the cognitive health outcomes that are affected by children's education could help shed light on some of the mechanisms through which children influence parental cognitive functioning. Applying the standard OLS framework, we found that children's schooling was positively associated with parental health across all domains of cognitive functioning. However, only some of these findings were robust when the IV approach was applied. Based on the IV estimates, each year of children's schooling was only associated with verbal learning, verbal fluency, and orientation.

To understand why children's education may matter for some domains, but not others, we return to the aims of specific tasks that were used to measure cognitive health. Cognitive health researchers argue that verbal learning and verbal fluency tasks measure underlying verbal ability (Shao et al., 2014), and in prior research, verbal fluency is also linked to vocabulary size (Sauzéon et al., 2011). Rich and frequent communication may help maintain and strengthen vocabulary size and verbal abilities in later life and social interaction has been associated with better semantic memory (measured using a verbal fluency task among other items) and slower declines in semantic memory (James, Wilson, Barnes, & Bennett 2011). Social networks have also been suggested to modify associations between neurologic pathology and cognition such that even at higher levels of pathology, those with larger social networks exhibit better cognitive function with greater modifying effects for semantic memory (Bennett et al., 2006). Because offspring and parents with greater socioeconomic resources are more likely to engage in social and emotional support than socioeconomically constrained families (Hogan et al., 1993; Rossi and Rossi, 1990), better resourced children may simply have more contact with parents and as a result, parents verbal abilities are maintained through being socially integrated.

Children's schooling was also predictive of parents' orientation abilities, measured by an assessment that asks respondents to correctly name the current day, month, and year. Prior work has found that children's contact with parents was associated with cognitive functioning and slower cognitive decline using a measure that included an orientation task (Zunzunegui et al., 2003) and similar results have been found in other work using cognitive measures including orientation tasks (Beland, Zunzuegui, Alvarado, 2005). Again, we suspect that one of the pathways through which better-educated children are able to strengthen the verbal abilities and orientation of older parents may be through frequent contact. On the other hand, these resources may be less effective at helping parents maintain other cognitive dimensions such as visuospatial abilities or visual memory. Along these lines, engaging in social activities has shown associations with memory and language cognitive abilities, but not with constructional praxis, or the ability to build or assemble objects (Sposito et al., 2015).

In addition, our results demonstrated that children's schooling was particularly effective for mothers, but not fathers in our sample. These findings parallel recent work in Mexico that also finds a stronger association between children's education and mothers' as opposed to fathers' mortality (Yahirun et al., 2017) and lends support to theories of resource substitution, such that women are more effective at leveraging the resources of offspring in part due to their lower socioeconomic status than fathers (Mirowsky and Ross, 2003). Not only may women rely more on the status of their children, mothers may simply maintain closer contact with children over the life course, compared to fathers, in part due to their cultural role as kin-keepers (Diaz-Loving, 2006).

One limitation of this paper is that this study does not test the mechanisms through which children's schooling could shape parents' verbal learning, verbal fluency, and orientation. As suggested, highly-educated children could influence parents' cognitive functioning through increased social support and contact. It is also possible that well-educated children are a source of less stress for parents (Lee, 2017; Yahirun, Sheehan, Mossakowski, 2018), which may in turn also affect parents' cognitive health. We believe this to be an avenue ripe for future research, especially as much less attention has been paid to the mechanisms that affect parents' cognitive health outcomes, as opposed to parents' mortality. A second limitation of our study is that by focusing on the most-educated child, we know less about the role of other children and possibly how children work together to shape parents' health outcomes (Matthews, 2002; Pillemer and Suitor, 2014). However, in additional robustness tests (not shown here), we found that the eldest child's education, as well as the youngest child's education, were not predictive of parents' cognitive health in the IV estimates, although they were significant in the OLS models. These findings suggest that the most-educated child may well be integral to parents' health in a way that other children are not. In addition, we lack contextual information (region, state, school quality) that may be related to children's exposure to the new policy and the effect that had on the broader community, which also shaped health behaviors and knowledge among parents. However, this makes our results conservative (Hamad et al., 2018). Our paper is also limited because we exclude proxy respondents, persons who are likely to have the poorest cognitive abilities. In the MHAS, proxy respondents do not complete the cognitive battery tests that we analyze, thus they cannot be included in the analysis. Finally, our study uses data from Wave 3 (2012) only, in part because Wave 3 includes the refresher sample and is thus representative of all adults ages 50 and older, whereas Wave 4 is only representative of those aged 53 and older. However, using data from 2012 only allow us to examine how children's schooling is associated with parents' cognitive health. Future work should also examine how offspring education is associated with cognitive health decline as well as the onset of cognitive impairment in Mexico.

Still, our study brings new insights into the ways in which offspring can shape the cognitive health outcomes of individual family members. In Mexico, as in other contexts, education is a fundamental cause of health (Link and Phelan, 2010) and growing attention has been paid to the way in which educational resources also shape the health outcomes of family members, whose lives are intertwined (De Neve and Kawachi, 2017). We argue that more attention should be paid to the resources of adult children, and researchers should consider how the resources of family members contribute to health disparities among older adults.

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Appendix

Table A1: *Regression Coefficents from Instrumental Variable Models Predicting Standardized Composite Score and Specific Cognitive Scores by gender, Mexicans aged 50+, Mexican Health and Aging Study, 2012.*

	Standardized Composite Score	Standardized Verbal Fluency Score	Standardized Orientation Score
		Men	
Years of Schooling of the Highest-Educated Child	0.269	0.894	-0.058
	(0.395)	(1.163)	(0.398)
Own Years of Schooling	-0.033	-0.217	0.061
	(0.119)	(0.350)	(0.120)
Observations	3,939	3,906	3,923
		Women	
Years of Schooling of the Highest-Educated Child	0.129*	0.274**	0.313**
	(0.071)	(0.135)	(0.144)
Own Years of Schooling	0.019	-0.007	-0.048
	(0.020)	(0.039)	(0.042)
Observations	5,051	5,013	5,036

Source: Mexican Health and Aging Study, 2012.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results from fully adjusted models. All models include controls for: child characteristics, demographic characteristics of respondent, locality size, and early life conditions