Children's Education and Parents' Health in Mexico: Evidence for "Upward" Transfers of Intergenerational Resources

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Abstract
This paper asks how adult children's socioeconomic resources influence older parents' physical health in Mexico, a context where older adults often face a lack of access to institutional resources and rely on kin, primarily children, as a main source of support. Educational expansion over the past decades as well as continued internal and international migration highlight the greater resources that adult children have access to compared to older parents. Using data from the Mexican Health and Aging Study (N=12,059), we find that the average level of children's education is negatively associated with the presence of any functional limitations or activities of daily living among parents and lower counts of both. This significant association withstands controls for respondent-, municipal-, and household-level traits as well as children's other characteristics. Future research should aim to understand the mechanisms behind the association between children's education and parental health.

Introduction

In Mexico, population aging challenges the social institutions responsible for elderly care. In this context, older adults often face a lack of access to formal institutional resources (Palloni et al., 2000; Uthoff et al., 2005; Wong & Higgins, 2007), leading them to rely on adult children as a main source of social, emotional, physical, and financial support (Wong 2008). Meanwhile, over the past century, Mexico has also undergone unprecedented shifts in levels of educational attainment, with younger cohorts becoming more and more educated relative to the older cohorts (Wong 2011). Yet despite the lack of formal institutional support for the elderly and dramatic shifts in the levels of educational attainment across cohorts, the degree to which offspring's educational attainment influences parental health has largely been overlooked. Analyzing how adult children's education influences elderly health is an important avenue of research considering that beyond more formal transfers, adult children may also serve as important sources of information about new health behaviors and practices. Therefore, this paper asks how adult children's resources – broadly defined by their educational attainment – affect parents' health, above and beyond parents' own socioeconomic resources. Understanding whether adult children's education is important for parental health could help identify the elderly who are most at risk for poor health and health declines, better comprehend the intergenerational benefits of education, and shed light on the health advantages and disadvantages across socioeconomic groups.

Literature Review

Prior research on the intergenerational transfers of resources and its subsequent effects on health typically focus on downward transfers from parents to children. This focus largely obscures the relationships between parent and adult children in later life, when parents, once the providers of care, may now be the net receivers of care, especially in countries where institutional support for later-life persons remains underdeveloped. This project sheds light on the "upward" transfers of adult children's resources on parents' health in a context where educational expansion over the past decades has increased dramatically and where internal and international migration provide a new cohort of individuals with immense social and economic resources that reach far beyond their own health outcomes. According to recent estimates, one-third of Mexicans over the age of 50 have no formal education. These individuals own 19% of the total wealth controlled by persons aged 50 or older and earn 15% of the total income made by that same group (Wong, 2011). Additionally, one in five older adults in Mexico have at least one child who currently lives or works in the United States (Wong 2011). This project aims to highlight the ways in which these demographic realities shape the context of health and aging for older parents in Mexico.

Previous research suggests variation in the socioeconomic gradient of health in Mexico. Like the United States, individuals with greater socioeconomic status living in urban areas report better health outcomes (with the notable exception of obesity) than their poorer counterparts in urban areas (Smith and Goldman, 2007). However, the gradient is much flatter in rural areas,

which may account for why Mexican- origin immigrants tend to show better health outcomes than the U.S. native born, despite their lower socioeconomic status (Buttenheim et al., 2010; Riosmena and Denis, 2012). Yet far less is known about how family members' resources also influence each other's health outcomes. Recent studies from developing and developed country contexts suggest that adult children's resources are associated with parental health. In Taiwan both parents' and children's years of schooling were positively associated with fewer parental reports of functional limitations, but only children's education was associated with the severity of those limitations (Zimmer, Hermalin and Lin 2002). Similar results were also found for mortality, where children's and parents' education were associated with the timing of parents' death, but only children's education was associated with parental mortality once parents had already reported a limiting health condition (Zimmer, Martin, Ofstedal and Chuang 2007).

In the United States, Friedman and Mare (2010) also examined the association between children's education and parental mortality. They found that both children and parents' education influence the timing of parents' death, but that the relationship was more pronounced for causes of death that were linked to health behaviors (e.g., smoking, exercise), than those that were not. In both Taiwan and the United States, these findings suggest that children's education may be linked to the progression of health outcomes among parents, but not necessarily the onset of such problems. Children with greater socioeconomic resources may be more likely to mobilize around caregiving, provide financial resources for medical care, advise parents on how to deal with an ailment, or have jobs that allow them to provide medical insurance for parents.

Aims

This project asks how offspring's educational attainment is associated with a number of different health outcomes among older parents in Mexico. We build on previous research by examining the association between children's educational attainment and both the presence and number of parents' functional limitations and activities of daily living. We control for individual-, household- and community-level characteristics and find that higher levels of children's education is associated with lower levels of functional limitations and activities of daily living among parents.

Sample

Data for this analysis come from the Mexican Health and Aging Study (MHAS), a panel study of older adults in Mexico. Three waves of data were collected in 2001, 2003 and 2012 and a fourth wave planned for 2014. The data are ideal for several reasons. First, MHAS is a nationally representative survey of older adults aged 50 and over in Mexico. Second, data on the educational attainment, geographic location and migration history of each child, regardless of whether or not they are co-residing with the respondent, are collected at each wave. Our preliminary analysis uses data from 2001. We limit our sample to respondents aged 50 and older who are parents and who have no missing data on functional limitations and disability measures. This provides a total analytical sample of 12,059 respondents. Table 1 shows descriptive traits of our sample.

Methods

In preliminary analyses, we examined the association between parents' and children's education and two measures of parental disability: functional limitations and activities of daily living (ADLs). For each measure, we examined both the presence and number of functional limitations and ADLs. Functional limitations include whether the respondent indicated having trouble crouching, going up stairs, walking, grasping, or reaching. ADLs include whether the respondent indicated not being able to bathe, eat, get in/out of bed, use the toilet, or get dressed. Our main variables of interest include the respondent's education and the education of all of their living children. For each respondent, we calculated the mean level of years of education for all children.

We use binomial logistic regression in our first set of models to predict the presence of any functional limitations and ADLs. For models predicting the counts of functional limitations and ADLs we use negative binomial regression. Although these are count variables, negative binomial regression models are considered to be more conservative and robust than Poisson models (Hoffman 2003). Additionally, in our data the counts of functional limitations and ADLs were both over-dispersed indicating that negative binomial models are more appropriate. Missing data were handled by multiple imputation and all analyses were conducted in Stata 12.

Preliminary Results

Our preliminary results indicate that the mean of all children's education is negatively associated with parents' functional limitations and ADLs. We also found that the magnitude of the association between children's education and parental health was almost as strong as the association between the respondent's education and their own health. In other words, children's education conveys almost as much protection against the presence of functional limitations and ADLs as the respondent's own education.

Table 2 shows these results more clearly. In detecting the presence of any functional limitations, we found that each additional year of children's education decreased the odds of having one or more functional limitation by 3% - the same coefficient as parental education. For the presence of ADLs we found similar results: each additional year of children's education was associated with a 3% decrease in the odds of reporting at least one ADLs. These associations remain statistically significant when we included controls for demographic-, municipal, and household-level characteristics. Results from models using an indicator for the most educated child were similar (not shown here).

Table 3 presents results from negative binomial regression models predicting counts of the number of functional limitations and ADLs. We found overwhelmingly congruent results. Each additional average year of children's education was associated with a 3% decrease in the total number of functional limitation and a 4% decrease in the total number of ADLs. Both of

these associations were statistically significant.

Discussion and Future Analyses

The aging of the Mexican population has been coupled with dramatic shifts in levels of educational attainment. While it has been widely established that educational attainment is beneficial to health, the degree to which the educational attainment of family members can confer health advantages is less well understood. Indeed, congruent with research from Taiwan (Zimmer et al. 2007) and the United States (Friedman & Mare 2010), we find that the average level of offspring's schooling is strongly associated with the parents' health. Higher average levels of children's education were associated with a lower likelihood of having *any* functional limitations and ADLs and also lower counts of both.

Although our work highlights the benefits of children's education in decreasing both the presence and the number of parental health problems, the exact mechanisms behind this association remain elusive. Children could convey health information or behaviors to parents, or share health insurance with parents that could lead to better outcomes among the elderly. Another possible explanation is that parents who push their children to achieve higher levels of education are select in largely immeasurable ways (motivation, knowledge, access to education, etc.), which lead to their own health benefits. Future research should assess the mechanisms through which the benefits of children's education are transferred "upwards" to parents.

Although the mechanisms remain unclear, findings from this paper underscore the multigenerational effects of education on health. Our results also suggest that in Mexico, a country with little formal institutional support for the elderly, those with less-educated children may be particularly vulnerable to disabilities and functional limitations. Future policies targeted at older adults in this population in particular may be especially effective.

We plan several next steps in our analysis before PAA. First, we plan to further clarify the relationship between children's educational attainment and parental health by testing other specifications of children's education. Second, we plan to explore how children's geographic proximities and migration histories interacts with children's education and is associated with parental health. Third, we intend to explore whether these associations vary by gender. Finally, we plan longitudinal analyses to analyze how children's education is associated with *health trajectories* using Waves 2 and 3 of the MHAS data.

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Table 1
Descriptive Statistics, Wave I, Mexican Health and Aging Survey

	Mean/Percentage	Standard Deviation
Functional Limitations		
Presence of Any	40.4%	
Number of Limitations	0.75	1.1
Activities of Daily Living		
Presence of Any	10.4%	
Number of Limitations	0.2	
Demographic Characteristics		
Gender		
Male	46.8%	
Age	62.2	9.55
Education		
Number of years	4.4	4.4
Marital Status		
Married	70.3%	
Single	1.4%	
Divorced	8.7%	
Widowed	19.6%	
Missing Marital Status		
Migration History		
U.S. Migrant	0.09	
Internal Migrant	0.61	
Locality Characteristics		
Urban	66.8%	
Migration Heavy Region	27.7%	
Number of Children	6.3	3.5
Children Characteristics		
Education		
Mean Number of years	9.2	3.8
Sex Composition		
All male	8.5%	
All female	7.1%	
Mixed	84.4%	
Geographic proximity of closest child		
Coresident	72.2%	
Same Town	24.6%	
In Mexico	2.3%	
Abroad	0.9%	
Child age composition		
All under 16	1.2%	
Mixed ages	17.4%	
All over 16	81.4%	
N	12,059	

Source: *Mexican Health and Aging Study.*

Table 2

Logistic Regression Predicting Presence of Any Functional Limitation(s) or Activities of Daily Living, Wave I, Mexican Health and Aging Survey

	Functional Limitations												Activities of Daily Living											
	Model 1				Model 2				Model 3				Model 1				Model 2				Model 3			
	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value
Demographic Characteristics																								
Gender																								
Male	0.48	-0.74	0.04	0.00	0.48	-0.73	0.04	0.00	0.49	-0.72	0.04	0.00	0.70	-0.36	0.07	0.00	0.70	-0.35	0.07	0.00	0.71	-0.35	0.07	0.00
Age	1.05	0.05	0.00	0.00	1.05	0.05	0.00	0.00	1.05	0.04	0.00	0.00	1.06	0.06	0.00	0.00	1.06	0.05	0.00	0.00	1.05	0.05	0.00	0.00
Education																								
Number of years	0.95	-0.05	0.01	0.00	0.95	-0.05	0.01	0.00	0.96	-0.04	0.01	0.00	0.94	-0.07	0.01	0.00	0.94	-0.06	0.01	0.00	0.95	-0.05	0.01	0.00
Marital Status																								
Married																								
Single	0.87	-0.14	0.17	0.40	0.91	-0.09	0.17	0.60	0.86	-0.16	0.17	0.37	1.27	0.24	0.25	0.34	1.36	0.30	0.25	0.23	1.30	0.26	0.25	0.30
Divorced	0.96	-0.04	0.07	0.55	0.97	-0.03	0.07	0.69	0.95	-0.05	0.07	0.46	0.87	-0.14	0.12	0.24	0.88	-0.13	0.12	0.30	0.87	-0.14	0.12	0.24
Widowed	0.91	-0.09	0.06	0.09	0.92	-0.09	0.06	0.11	0.89	-0.12	0.06	0.03	0.94	-0.06	0.08	0.44	0.95	-0.06	0.08	0.49	0.92	-0.08	0.08	0.30
Missing Marital Status																								
Migration History																								
U.S. Migrant	1.08	0.08	0.07	0.25	1.07	0.07	0.07	0.31	1.09	0.08	0.07	0.24	1.05	0.04	0.11	0.69	1.04	0.04	0.11	0.75	1.06	0.05	0.11	0.63
Internal Migrant	1.15	0.14	0.04	0.00	1.15	0.14	0.04	0.00	1.16	0.15	0.04	0.00	1.17	0.16	0.07	0.02	1.17	0.16	0.07	0.02	1.19	0.18	0.07	0.01
Locality Characteristics																								
Urban	1.31	0.27	0.04	0.00	1.33	0.28	0.04	0.00	1.35	0.30	0.05	0.00	1.15	0.14	0.07	0.05	1.17	0.16	0.07	0.03	1.20	0.18	0.07	0.01
Children Characteristics																								
Number of living children					1.02	0.02	0.01	0.00									1.02	0.02	0.01	0.03				
Education																								
Mean Number of years									0.97	-0.03	0.01	0.00									0.97	-0.04	0.01	0.00
Sex Composition																								
All male																								
All female									0.85	-0.16	0.10	0.12									0.73	-0.31	0.17	0.07
Mixed									0.98	-0.02	0.07	0.84									0.98	-0.02	0.12	0.86
Geographic proximity of closest child																								
Coresident																								
Same Town									0.96	-0.04	0.05	0.40									0.97	-0.03	0.07	0.63
In Mexico									0.86	-0.15	0.14	0.28									0.74	-0.31	0.22	0.17
Abroad									0.98	-0.02	0.21	0.94									0.88	-0.13	0.34	0.70
Child age composition																								
All under 16																								
Mixed ages									1.01	0.01	0.21	0.98									1.04	0.04	0.44	0.92
All over 16									1.35	0.30	0.21	0.15									1.30	0.27	0.43	0.54
Constant					-3.16	0.15	0.00		0.06	-2.84	0.25	0.00		-5.48	0.23	0.00		-5.58	0.24	0.00	0.01	-5.29	0.48	0.00
LL																								
N						12,059												11,568						

Source: *Mexican Health and Aging Study.*

† p < 0.1 * p <0.05 ** p <0.01 *** p < 0.001

Table 3

Negative Binomial Regression Predicting Number of Functional Limitations or Activities of Daily Living, Wave I, Mexican Health and Aging Survey

	Functional Limitations												Activities of Daily Living											
	Model 1				Model 2				Model 3				Model 1				Model 2				Model 3			
	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value	IRR	B	SE	p-value
Demographic Characteristics																								
Gender																								
Male	0.62	-0.48	0.03	0.00	0.62	-0.48	0.03	0.00	0.63	-0.47	0.03	0.00	0.72	-0.33	0.08	0.00	0.72	-0.33	0.08	0.00	0.72	-0.33	0.08	0.00
Age	1.04	0.03	0.00	0.00	1.03	0.03	0.00	0.00	1.03	0.03	0.00	0.00	1.06	0.06	0.00	0.00	1.06	0.05	0.00	0.00	1.05	0.05	0.00	0.00
Education																								
Number of years	0.96	-0.05	0.00	0.00	0.96	-0.04	0.00	0.00	0.97	-0.03	0.00	0.00	0.94	-0.06	0.01	0.00	0.95	-0.05	0.01	0.00	0.96	-0.04	0.01	0.00
Marital Status																								
Married																								
Single	1.01	0.01	0.12	0.94	1.05	0.05	0.12	0.68	1.00	0.00	0.12	1.00	1.12	0.11	0.29	0.71	1.16	0.15	0.29	0.61	1.13	0.13	0.29	0.67
Divorced	0.99	-0.01	0.05	0.87	1.00	0.00	0.05	0.96	0.98	-0.02	0.05	0.70	0.95	-0.05	0.13	0.68	0.97	-0.03	0.13	0.80	0.94	-0.07	0.13	0.61
Widowed	0.92	-0.08	0.04	0.03	0.93	-0.08	0.04	0.04	0.91	-0.10	0.04	0.01	0.93	-0.08	0.09	0.42	0.94	-0.06	0.10	0.51	0.92	-0.08	0.10	0.40
Missing Marital Status																								
Migration History																								
U.S. Migrant	1.09	0.09	0.05	0.08	1.08	0.08	0.05	0.11	1.10	0.09	0.05	0.06	1.10	0.09	0.12	0.45	1.09	0.09	0.12	0.47	1.12	0.12	0.12	0.34
Internal Migrant	1.06	0.06	0.03	0.06	1.06	0.05	0.03	0.07	1.06	0.06	0.03	0.03	1.13	0.12	0.07	0.11	1.12	0.11	0.07	0.12	1.13	0.13	0.07	0.08
Locality Characteristics																								
Urban	1.13	0.12	0.03	0.00	1.14	0.13	0.03	0.00	1.16	0.15	0.03	0.00	1.07	0.07	0.08	0.37	1.09	0.09	0.08	0.27	1.14	0.13	0.08	0.10
Children Characteristics																								
Number of living children					1.01	0.01	0.00	0.00									1.02	0.02	0.01	0.07				
Education																								
Mean Number of years									0.97	-0.03	0.00	0.00									0.96	-0.04	0.01	0.00
Sex Composition																								
All male																								
All female									0.88	-0.12	0.07	0.09									0.71	-0.35	0.18	0.06
Mixed									0.97	-0.03	0.05	0.53									0.92	-0.09	0.13	0.49
Geographic proximity of closest child																								
Coresident																								
Same Town									1.01	0.01	0.03	0.80									1.01	0.01	0.03	0.80
In Mexico									0.90	-0.10	0.09	0.29									0.90	-0.10	0.09	0.29
Abroad									0.98	-0.02	0.15	0.89									0.98	-0.02	0.15	0.89
Child age composition																								
All under 16																								
Mixed ages									1.15	0.14	0.17	0.42									0.94	-0.06	0.40	0.88
All over 16									1.41	0.34	0.17	0.04									1.12	0.11	0.39	0.78
Constant		-2.24	0.10	0.00		-2.30	0.10	0.00	0.11	-2.16	0.19	0.00		-4.95	0.25	0.00		-5.05	0.25	0.00	0.01	-4.50	0.45	0.00
LL																								
N							12,059												11,568					

Source: *Mexican Health and Aging Study.*

† p < 0.1 * p <0.05 ** p <0.01 *** p < 0.001