Differences in Cognitive Impairment of U.S. Older Adults by Race and Ethnicity

Carlos Díaz-Venegas, Ph.D., University of Texas Medical Branch
Brian Downer, Ph.D., University of Texas Medical Branch
Kenneth Langa, Ph.D., University of Michigan
Rebeca Wong, Ph.D., University of Texas Medical Branch

PRELIMINARY DRAFT

Introduction

The growing number of older adults has significant health implications for the U.S. Advancing age is widely considered to be the greatest risk factor for Alzheimer's disease (AD) and other dementias (Tanzi & Bertram, 2001). The number of older adults living with AD has increased from approximately 4.5 million in 2000 (Hebert et al., 2003) to 4.7 million in 2010 (Hebert, Weuve, Scherr, & Evans, 2013). Furthermore, the number of older adults living with AD is projected to approach or exceed 10 million people by 2050 (Hebert, et al., 2003; Hebert, Weuve, Scherr, & Evans, 2013). However, changes in the U.S. demographic structure may influence the number of older adults living with AD and other dementias. Hispanics are one of the fastest growing minority populations in the U.S. and the number of Hispanics living in the U.S. is expected to triple by 2050 (Jacobsen, Kent, Lee, & Mather, 2011). In addition, the number of Hispanic adults who are 65 years of age and older increased from approximately 1.7 million (4.9%) in 2000 to 2.8 million (7.0%) in 2009 (U.S. Census Bureau, 2011).

The increase of Hispanics residing in the U.S. and the rapid aging of this segment of the population has important implications for the prevalence and incidence of dementia in the U.S. Current evidence indicates Hispanics are at a greater risk for dementia compared to non-Hispanic whites (Demirovic et al., 2003; Langa, Kabeto, & Weir, 2009; Tang et al., 1998). There is also evidence that Hispanics are 4 to 7 years younger at time of dementia diagnoses as compared to

non-Hispanic whites (Clark et al., 2005; Fitten et al., 2014). Finally, Hispanic dementia patients have been observed to exhibit worse dementia symptoms compared to non-Hispanic whites (O'Bryant et al., 2013a; O'Bryant et al., 2013b).

Despite the longer life expectancy of Hispanics living in the U.S. compared to non-Hispanic whites (Markides & Coreil, 1986), Hispanics have higher prevalence of diabetes (Narayan et al., 2003), hypertension (Sundquist, Winkleby, & Pudaric, 2001), obesity (Wang & Beydoun, 2007), and lower educational attainment (Schhneider, Martinez, & Ownes, 2006) compared to non-Hispanic whites. These factors are all associated with an increased risk of dementia (Biessels et al., 2006; Kivipelto et al., 2005; Posner et al., 2002; Roe, Xiong, Miller, & Morris, 2007) and likely contribute to the greater risk for dementia among Hispanics. The effects of poor health and low educational attainment on cognitive functioning may be exacerbated by the relative financial instability of older Hispanics due to higher rates of poverty, unemployment, and low insurance coverage compared to non-Hispanic whites (Angel & Angel, 2009; Aranda et al., 2011).

An important feature of the extant literature is that the majority of studies examining ethnic and racial differences in dementia prevalence, age of onset, and dementia severity have used small sample populations drawn from clinical settings (Clark, et al., 2005; Fitten, et al., 2014; Fitten, Ortiz, & Ponton, 2001; O'Bryant, et al., 2013a; O'Bryant, et al., 2013b). This substantially limits the generalizability of these results to Hispanic older adults residing in the U.S. These limited sample sizes have also prevented previous studies from examining differences in cognitive impairment states between Hispanic groups (Mexican Americans, Cubans, Puerto Ricans, and other Hispanics).

This paper seeks to address these limitations by using a nationally representative sample of Hispanics in the U.S. to compare the prevalence of cognitive impairment consistent with dementia (CIC-D) and cognitive impairment without dementia (CIND) between different Hispanic groups, non-Hispanic whites and non-Hispanic blacks. While the goal of this paper is largely descriptive, we intend to use a cross-section of older adults in the U.S. to document gender- and age-specific differences in cognitive impairment states and level of functioning in specific cognitive domains among older adults, and to examine how these differences vary by race/ethnicity. We hypothesize: 1) that the prevalence of CIC-D and CIND will increase with age, will be higher among Hispanics compared to non-Hispanic whites, 2) that Hispanics will have lower functioning in all cognitive domains compared to non-Hispanic whites, and 3) that women will have higher prevalence of CIC-D and CINCD compared to men across all age groups and all race/ethnicities.

Data and Methods

Sample

Data from the Health and Retirement Study (HRS), a nationally representative panel of Americans aged 50 or older that contains information on health, housing, disability, and cognition, among other characteristics, were used for the present analysis. Baseline data collection for the HRS began in 1992 and included over 15,000 in-person and telephone interviews (response rate of 82%) of individuals born between 1931 and 1941. Follow up interviews were conducted every two years and new cohorts were added approximately every six years (Health and Retirement Study, 2011). The database includes information on the participants' demographic characteristics, economic condition, education, living arrangements,

marital status, and social network, as well as self-reports of functional capacity and chronic conditions. The HRS also provides detailed health characteristics such as limitations with basic and instrumental activities of daily living, cognition, depression, and mobility. For the purpose of this paper, we use data from the 2010 HRS (n = 22,037) because it contains an oversampling of Hispanics (Health and Retirement Study, 2008). Respondents were aged 50 or older in 2010 and we further divided the samples by age groups (50-59, 60-69, 70-79, and 80 or older) in order to estimate age-specific prevalence of cognitive impairment.

Measures

Cognitive functioning has been assessed in the HRS by either in-person or by telephone interview using a modified version of the Telephone Interview for Cognitive Status (TICS-M) (Brandt, Spencer, & Folstein, 1988). The TICS-M is comprised of 12 items with a score range of 0-50 points. For the purposes of this study we had to use a further modified version of the TICS because participants in the HRS who were younger than 65 years of age did not receive the date or object naming items and were not asked to recall the first names of the current president and vice-president (Crimmins, Kim, Langa, & Weir, 2011).

A summary of the cognitive measures used in this study is provided in Table 1. The total cognitive score of the variables presented in this table adds up to 27 points. Verbal memory was assessed by having a participant first listen to a list of 10 short, commonly used nouns, and then reciting as many words from that list as possible. Participants were also asked to recite as many words as possible from the list after a 5-minute delay during which time other assessments were administered. One point was awarded for each correctly recalled word for a maximum of 10 points. Working memory was measured using the Serial 7 calculation task. This involved having

a participant begin at 100 and subtract 7 for a total of 5 trials. One point was awarded for each correct subtraction for a maximum of 5 points. Finally, participants were instructed to count backwards for 10 continuous numbers as quickly as possible beginning at the number 20. Participants received 2 points if they were able to perform the task on the first attempt, 1 point if they required a second attempt and 0 points if they did not complete the task after 2 attempts.

[TABLE 1 AROUND HERE]

Participants were classified into one of three possible cognitive states based on their performance on the 27-point cognitive battery. Participants who scored between 0 and 6 points were defined as having cognitive impairment consistent with dementia (CIC-D), participants who scored between 7 and 11 points were defined as having cognitive impairment with no dementia (CIND), and participants who scored >12 points were classified as having normal cognition. CIND refers to adults with impaired functioning in any cognitive domain, but whose impairment is not severe enough to warrant a diagnosis of dementia (DeCarli, 2003). Cut off scores for these cognitive states were developed by Langa, Kabeto, and Weir (2009) and were chosen to produce the same population distribution of cognitive states (dementia, CIND, and normal) in the HRS as was estimated in the Aging, Demographics and Memory Study (ADAMS) (Crimmins, Kim, Langa, & Weir, 2011).

Covariates

Age: For descriptive analyses we grouped respondents into four age categories (50-59, 60-69, 70-79 and 80 or older). For regression analyses we used age as a continuous variable and we also included age squared to allow for a possible non-linear relationship between age and cognition (Lau & Redlawsk, 2008; Schaie, 2012). *Education:* For descriptive analyses we

included education in four categories (less than 9 years of education, 9-11 years, 12 years and 13 or more years). Similar to age, we used education as a continuous variable measuring the last completed year of formal schooling and we included years of education squared to allow for a non-linear relationship between education and cognition (Mendel et al., 1999). We expect that higher levels of education will result in higher levels of cognition but, at some point, the marginal benefit in the cognition score of adding one more year of education will decline. *Gender*: dichotomous variable (women = 1). *Race/Ethnicity*: dichotomous variables measuring non-Hispanic whites (reference category), non-Hispanic blacks, other origin (Asian, Pacific Islander or Native American), and Hispanic. Respondents who refused to answer race/ethnicity were considered missing for the analysis (30 cases).

Statistical Analysis

We consider gender- and age-specific estimates for the total cognitive score as well as separating by each cognitive domain. The sample includes 19,099 community-dwelling respondents aged 50 or older with a direct interview and with complete information in the cognition battery. We present the results for the total cognition score as well as the different cognitive domains because educational achievement might affect each component of the total cognitive score differently for men and women as well as for each race/ethnic origin (Halpern, 2004). We then perform Ordinary Least Squares (OLS) regressions for each race/ethnic category to obtain the adjusted total cognition scores controlling for age, years of education, age squared, years of education squared, and gender.

The procedures are conducted using STATA/SE version 13.1.

Preliminary Results

Table 2 presents baseline descriptive characteristics of Americans aged 50 or older stratified by race/ethnicity in 2010 for the full sample and by gender. In terms of age, the sample shows that non-Hispanic whites are the oldest on average (67.7 years) and are 5 years older than non-Hispanic blacks (62.1 years) and 6 years older than Hispanics (61.5).On average, non-Hispanic whites and other races have nearly 14 years of schooling while non-Hispanic blacks are about a year below. In contrast, Hispanics are the least educated averaging only 10 years of schooling. As for total cognition scores, women have higher score (16.0) than men (15.5) while breaking the score down by race/ethnicity shows that non-Hispanic white women and non-Hispanic black women have higher average scores than their male counterparts while the scores for Hispanics and other races are practically even.

[TABLE 2 AROUND HERE]

To show the association between cognition and age, Table 3 includes the average cognition score stratifying by race/ethnicity and by age groups. Results suggest that cognitive scores decline as the person ages regardless of race/ethnicity. Further, total cognition scores for non-Hispanic whites, blacks, and other race women are higher or equal than total cognition scores for their male counterparts. In contrast, only the youngest Hispanic women group (50-59 years old) shows a higher total cognitive score than 50-59 year old men. The rest of the Hispanic age groups show men having higher cognitive scores than women.

[TABLE 3 AROUND HERE]

Future Work

We are currently waiting for HRS approval to get the restricted data regarding detailed ethnicity information that will allow us to separate the Hispanic category in at least two groups (Mexican Americans and other Hispanics). We also want to use the cutoff points proposed by Langa, Weir, and Kabeto and combine them with the different cognitive domains available in the HRS to analyze if there are significant differences in each domain by race/ethnicity. We also plan to examine differences in the prevalence of CIC-D and CIND according to race/ethnicity.

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Table 1 – 2010 Health and Retirement Study Cognitive Battery

Domain	*Variable*	*Description*	*Score*
Verbal memory, immediate recall	Immediate Word Recall	Asking respondents to listen to a list of 10 nouns and then repeat them.	0-10
Verbal memory, delayed recall	Delayed Word Recall	Same as above but administered 5 minutes after completing other cognitive tests.	0-10
Working memory	Serial 7's	Subtract 7 from 100 and continue subtracting each subsequent number for five trials.	0-5
Attention and working memory	Counting Backwards	Counting backwards for 10 continuous numbers beginning with 20	0-2 2 = Correct on first try 1 = Correct on second try 0 = Incorrect on both tries

Source: Author's own elaboration with information from Ofstedal, Fisher, and Herzog (2005) and Fisher, Hassan, Rodgers, and Weir (2013).

Table 2 – Descriptive Characteristics of Americans Aged 50 or Older in the Health and Retirement Study by Race/Ethnicity and Gender, 2010

	FULL SAMPLE					MEN					WOMEN				
	All	White	Black	Other	Hispanic	All	White	Black	Other	Hispanic	All	White	Black	Other	Hispanic
Age***	64.1	67.7	62.1	59.9	61.5	63.4	64.0	61.4	59.1	61.3	64.6	65.3	62.6	60.7	61.7
Education***	13.2	13.6	12.6	13.6	10.1	13.4	13.8	12.4	13.8	10.4	13.1	13.5	12.7	13.4	9.8
Cognition***	15.7	16.3	13.3	15.2	13.7	15.5	16.0	13.0	15.3	13.8	16.0	16.6	13.6	15.1	13.7
N	19070	12415	3657	475	2523	8107	5398	1401	222	1086	10963	7017	2256	253	1437

Source: Author's own elaboration with data from the Health and Retirement Study (2014).
Note: Weighted data and unweighted sample size totals. All three covariates are expressed as averages. Cognition refers to the total cognitive score (0-27).
Significance: $^{*}p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$.Chi-square differences by race/ethnicity for each covariate.

Table 3 – Average Total Cognition Score of Americans Aged 50 or Older in the Health and Retirement Study by Race/Ethnicity and Age Group, 2010

TOTAL COGNITION SCORE (0-27)					CELL SIZES				
ALL	White	Black	Other	Hispanic	ALL	White	Black	Other	Hispanic
50-59	17.4	14.2	15.9	14.3	50-59	3426	1780	272	1270
60-69	16.9	13.5	14.9	13.9	60-69	3339	907	101	607
70-79	15.3	11.7	14.3	12.5	70-79	3614	749	71	508
80+	12.6	9.3	11.1	9.2	80+	2036	221	31	138

TOTAL COGNITION SCORE (0-27)					CELL SIZES				
MEN	White	Black	Other	Hispanic	MEN	White	Black	Other	Hispanic
50-59	16.9	13.6	15.7	13.9	50-59	1569	716	131	563
60-69	16.4	13.1	14.9	14.4	60-69	1375	327	47	254
70-79	14.8	11.0	15.7	12.9	70-79	1592	285	29	216
80+	12.4	9.6	11.70	9.3	80+	862	73	15	53

TOTAL COGNITION SCORE (0-27)					CELL SIZES				
WOMEN	White	Black	Other	Hispanic	WOMEN	White	Black	Other	Hispanic
50-59	17.8	14.6	16.0	14.5	50-59	1857	1064	141	707
60-69	17.4	13.8	14.9	13.6	60-69	1964	580	54	353
70-79	15.6	12.1	13.3	12.2	70-79	2022	464	42	292
80+	12.7	9.2	10.5	9.2	80+	1174	148	16	85

Source: Author's own elaboration with data from the Health and Retirement Study (2014).
Note: Weighted data and unweighted sample size totals.