Lower Body Limitations, Measurement, and Healthy Life Expectancy in U.S. Populations ages 65+

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Abstract: Using data from the National Health Aging Trends Survey (NHATS) and the Hispanic Established Populations for the Epidemiologic Study of the Elderly (HEPESE), we examine how multiple measurements of disability effect health life expectancy differences across gender race and nativity status. Using objective measurements of functioning (POMA's), we compare how different racial groups self-report their abilities to carry out activities of daily living (ADL's). Results show that while rates of concordance are similar across groups, the consequences of concordance vary by overall prevalence rates per race i.e. while the same percentage of blacks and whites experience disability discordance this results in a much larger population for blacks because of their higher rates of POMA disability. Results from a multistate life table approach to burden of disability over time show that Mexicans experience longer periods of disability and possibly experience different disability trajectories compared to other groups.

Introduction
Considerable research into the Hispanic Epidemiologic Paradox has shown consistently that Hispanic have favorable to comparable mortality rates compared to the socioeconomically advantaged native born white population(Markides and Eschbach 2011). Recent research has shown that this advantage does not extend to disability nor functional limitation with Hispanics experiencing prolonged periods of disability and functional limitations at the end of their lives compared to non-Hispanic whites(Cantu et al. 2013; Hayward et al. Forthcoming).Research on the Hispanic Paradox and disability/function limitation implies a different association of physical limitation and disability with mortality compared to non-Hispanic whites but little research has been done on this association specifically. This paper looks specifically at how differences in the disablement process have consequences for mortality for elderly Mexican Americans.

Background
We borrow our theoretical construction of a disablement process from Verbugge and Jette in which functional limitation as a symptom precedes the more serve and socially defined disability(1994). The disablement process implies that physical limitation is a necessary but not sufficient condition of disability and vice versa but says little about the relationship between disability and mortality. In so much as the disablement process defines functional limitations as objective physical/mental symptoms and disability as a social process, disability is also a social psychological process of labeling/denial/acceptance.

Empirically, research on life expectancy with disability and physical limitation paint a picture of comparable life expectancy after the onset of disability compared to a longer life expectancy after the onset of functional limitations. For example Hayward et al. found using HRS data to model unhealthy life expectancy with ADL limitations at age 50 unhealthy life expectancies of 6.5 for foreign born Hispanic men, 6.3 for U.S. born Hispanic Men 11 for foreign born Hispanic Females and (8.3) for U.S. born Hispanic females(Forthcoming). Similarly Cantu et al. used similar methods and NHIS data to estimate unhealthy life expectancy with physical functional limitations (NAGI items) with foreign born Hispanic men experiencing 4.7 years U.S. born Hispanic men experiencing 5.5, foreign born women experiencing 9.3 years and U.S. born Hispanic women experiencing 11 years(2013). Taken together these studies appear to point towards functional limitation and disability having the same relationship with mortality for the Hispanic population.

Research on healthy life expectancy has consistently shown a disadvantage for Hispanics when using survey measured disability. There is some disagreement as to how valid survey items are for assessing health for Hispanic population, most notably in the case of self-rated health. In order to strengthen previous research into healthy life expectancy differential we use both survey measured disability as well as research measured disability to ensure that differences between Hispanic and other populations are as a result of actual disability and not survey error.

Methods

In order to compare across races and nativity using both researcher measured physical limitations as well as respondent survey activities of daily living required use of multiple data sets. To estimate healthy life expectancy for whites and blacks aged 65 we used disability data from the National Health and Aging Trends Survey (NHATS), which includes both POMAS and ADLS. We then borrow the life expectancy data for these groups from the National Center Health Statistics(NCHS) official life tables for the year 2008.

Hispanics as a nationally representative group proved to be more difficult. NHATS contains data on Hispanics but the cell sizes are simply to small to trust so we instead focus our analysis on Mexican Americans and data collected through the Hispanic Established Populations for the Epidemiologic Study of the Elderly Survey (HEPESE). The HEPESE includes both POMAS and ADLS in addition to mortality data. We are able to use data from the HEPESE to estimate life expectancy for the specific cohort of individuals we are looking at. While not nationally representative, the HEPESE is some of the most up to date and quality longitudinal data available for Mexican American populations.

Analytical Strategy

To estimate healthy life expectancy we use prevalence based multi-state life tables. We first estimate the prevalence of 4 stages of disability concordance, health (no adl no poma), POMA only, ADL only, and DUAL (Both POMA and ADL) using multinomial logistic regression based on age stratified by sex and race/nativity. We then apply our estimated prevalence rate to a mortality schedule, borrowed from the NCHS in the case of whites and blacks and estimated using the log of the odds of mortality in the case of Mexican Americans, to come up with a partial life expectancy in each of the 4 states. Finally we simulate this 500 times to come up with confidence intervals around our estimates.

Results

Early runs of our data find two troubling trends for Mexican Americans. First in line with previous research we are finding that Mexican Americans have relatively protracted periods of disability even when measured using the metric of POMA. This would suggest that previous research on the topic indeed has hit the mark even using survey methodology, or more simply that Mexican Americans experience more disability no matter how measured. The second quirk that jumps out of our analysis that was much less expected are the relatively short life expectancies for Mexican Americans. Previous research has consistently found that Hispanics enjoy a modest mortality advantage at age 65 but here we are finding a moderate health disadvantage. This particular quirk needs to unpacked more fully.
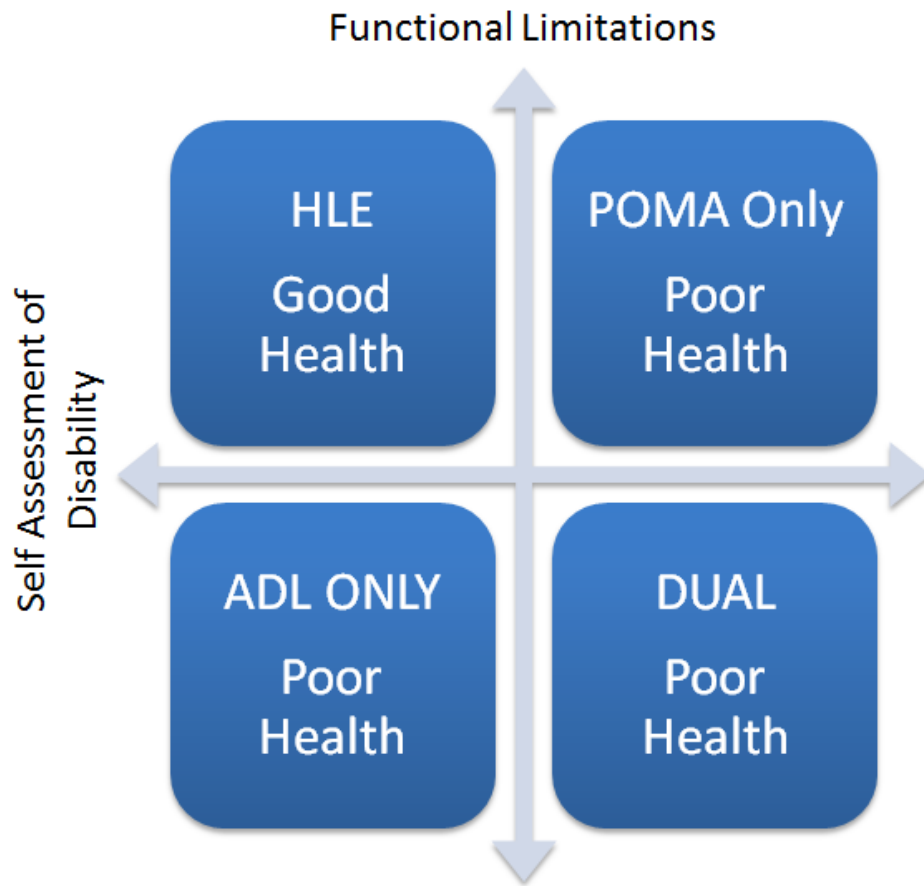
Figure 1Disability Concordance

Table 1: Sample Characteristics

| | NHATS Wave 1 | | | | HEPESE Waves 1 & 5 | | | |
| | White | | Black | | NB | | FB | |
	Observed	Weighted Percentage (SD)	Observed	Weighted Percentage (SD)	Observed	Weighted Percentage (SD)	Observed	Weighted Percentage (SD)
Age	78.81	8.27	77.23	7.85	74.68	6.72	76.27	7.76
Female	2798	0.57	893	0.6	922	0.58	1179	0.59
Lower Body Disability								
ADL Disability	417	0.07	161	0.09	230	0.12	202	0.14
POMA Disability	437	0.08	262	0.16	497	0.25	400	0.26
Combined Disability Index								
Healthy	4198	0.89	1158	0.81	1475	0.74	1154	0.72
Dual Negative	216	0.03	111	0.06	212	0.11	178	0.12
ADL ONLY	201	0.03	50	0.03	18	0.01	24	0.02
POMA ONLY	221	0.04	151	0.1	285	0.14	285	0.14
n	4836		1470		1993		1578	

Source: NHATS Wave 1, HEPESE Waves1 and 5

Table 2: Life Expectancy at age 65

| | NHATS Wave 1 | | | | | | HEPESE Waves 1 & 5 | | | | | |
	White			Black			NB Mex			FB Mex		
Female		(sd)			(sd)			(sd)			(sd)	
Total Life Expectancy	20	(n/a)		18.8	(n/a)		17.89	0.34	(d)	18.94	0.38	(c)
Healthy LE	17.28	0.12	(b) (c) (d)	14.5	0.27	(a) (c) (d)	11.92	0.32	(a) (b)	12.72	0.35	(a) (b)
Dual Negative LE	0.92	0.07	(b) (c) (d)	1.59	0.19	(a) (c) (d)	2.87	0.21	(a) (b)	2.89	0.22	(a) (b)
ADL ONLY LE	0.84	0.07	(c) (d)	0.68	0.13	(c) (d)	0.18	0.06	(a) (b)	0.25	0.08	(a) (b)
POMA ONLY LE	0.92	0.08	(b) (c) (d)	2	0.19	(a) (c) (d)	2.92	0.19	(a) (b)	3.07	0.24	(a) (b)
Healthy/Total Ratio	0.86	0.01	(b) (c) (d)	0.77	0.01	(a) (c) (d)	0.67	0.01	(a) (b)	0.67	0.01	(a) (b)
Male												
Total Life Expectancy	17.3	(n/a)		15.3	(n/a)		15.33	0.32	(d)	16.45	0.45	(c)
Healthy LE	15.78	0.11	(b) (c) (d)	12.64	0.26	(a) (c)	11.76	0.31	(a) (b)	12.68	0.43	(a) (b)
Dual Negative LE	0.46	0.06	(b) (c) (d)	0.79	0.16	(a) (c) (d)	1.45	0.16	(a) (b)	1.36	0.17	(a) (b)
ADL ONLY LE	0.42	0.06	(c)	0.42	0.12		0.19	0.06	(a) (d)	0.42	0.10	(c)
POMA ONLY LE	0.67	0.07	(b) (c) (d)	1.43	0.18	(a) (d)	1.94	0.20	(a)	1.98	0.21	(a) (b)
Healthy/Total Ratio	0.91	0.01	(b) (c) (d)	0.83	0.02	(a) (c) (d)	0.77	0.01	(a) (b)	0.77	0.01	(a) (b)

(a) different from white (b) different from black (c) different from NB Mex (d) different from FB Mex at p < .05

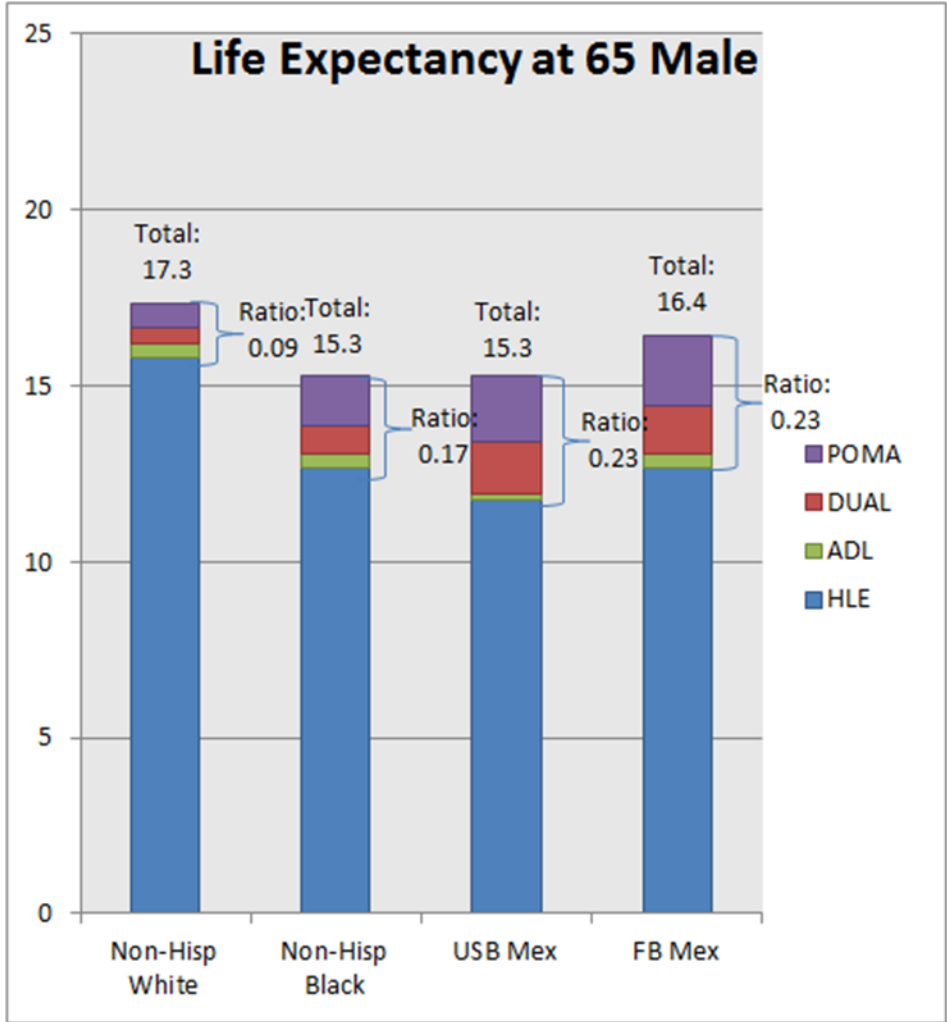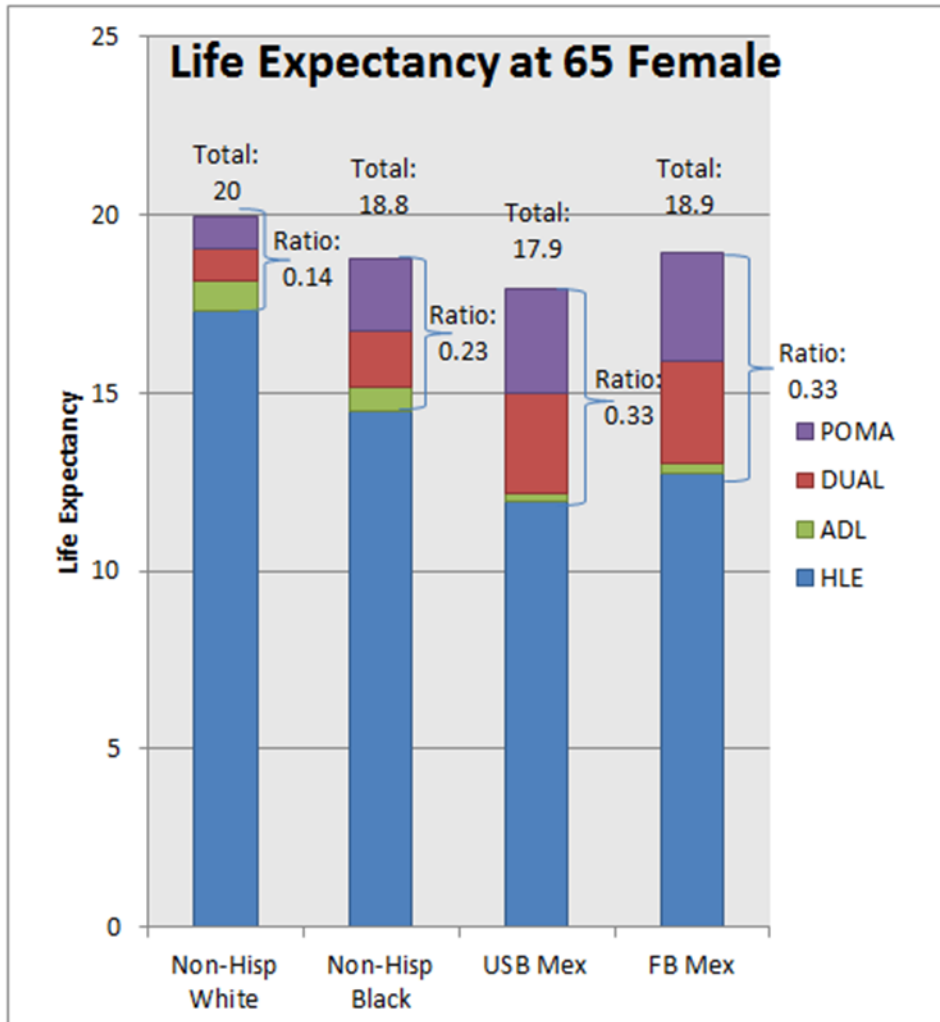Source: NHATS Wave 1, NCHS Life Tables 2008, Hepese Waves 1-7

Figure 2HLE at age 65 Male

Figure 3 HLE at age 65 Female