A Propensity Score Approach to Examining Ethnic Density, Immigrant Concentration, and Latino Health Risks

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Research Questions

- Are neighborhood-level Latino ethnic density and immigrant concentration positively or negatively associated with Latinos having high blood pressure and high cholesterol level?
- Are these associations robust after taking into account sample selection bias from individuals' residential choice?

Significance

- **Biomarkers among Latinos**. Latinos are the largest racial/ethnic minority group in the US, and are projected to reach to 29% of total US population in 2060. Studying biomarkers among Latinos can well capture the biological "wear and tear" processes underlying their health risks.
- **Neighborhood context**. Neighborhoods are strongly patterned by race/ethnicity and social class. To particularly address health disparities, it is important to take a neighborhood approach and apply ecological models to study the impact of physical and social dimensions of neighborhood environment.
- **Sample selection bias**. Residents of similar characteristics are likely to choose to live in similar neighborhoods, which violates the basic assumption of random sampling in observations studies. We used Propensity Score Matching methods to address selection bias.

Theoretical Background

- **Segregation as a fundamental cause of health disparities.** Williams and Collins (2001) posit that racial segregation is a fundamental cause of racial disparities in health, because segregation persistently produces health risks as a result of area deprivation and concentrated disadvantage. Similar to blacks, Latinos are experiencing high levels of residential isolation and this pattern has been increasing over the past decade.
- **Ethnic density effect**. It is also argued that residing with co-ethnics or other minorities may provide potential benefits for minorities' health, such as fostering better social capital, providing health-promoting resources, and protecting minorities from discrimination and related stress.
- **Immigrant assimilation**. While spatial assimilation model contends that residing in ethnic enclaves is only the initial stage for newly-arrived immigrants along their assimilation process, resurgent ethnicity model asserts that a new pattern has emerged as some ethnic groups willingly choose to live with their co-ethnics as self-preference or self-segregation, even after they become financially secured and can afford moving into "white neighborhoods."

Data and Sample

- **2006 and 2008 Southeastern Pennsylvania Household Health Survey:** a biennial cross-sectional survey draws a stratified probability sample from 54 service areas in Bucks, Chester, Delaware, Montgomery, and Philadelphia counties, where each area had about 30,000 to 75,000 adult residents, and is conducted through telephone interviews with people aged 18 and older.
- **2005-2009 American Community Survey:** census-tract variables
- **Analytical sample** included 1,563 Hispanic adults aged between 18 and 91 years, with 30.9 percent male, and 42.8 percent US-born.

Measures

Outcome variables:

- ***High blood pressure*** was determined if a respondent answered "Yes" to the survey question "Have you ever been told by a doctor or other health professional that you have high blood pressure or hypertension?" Respondents who answered "No" or "Only during pregnancy" were considered not having high blood pressure.
- ***High cholesterol level*** was determined if a respondent in the survey answered "Yes" to the question "Have you ever been told by a doctor or other health professional that you have high cholesterol?"

Key neighborhood variables:

- ***Latino ethnic density*** was based on the raw ACS measure of percentage of Hispanic residents in each census tract (ranging from 0 to 0.86). It was then dichotomized as whether a census tract had 25% or more Hispanic residents.
- ***Immigrant concentration*** was based on the raw ACS measure of percentage of foreign-born residents in each census tract (ranging from 0 to 0.572). The original continuous measure was categorized based on tertiles in the analytical sample to indicate low, medium, or high immigrant concentration in a neighborhood.

Analytical Strategy

- In the first step, two-level random effects logistic regression models were estimated to predict the independent effects of Latino ethnic density and immigrant concentration on high blood pressure and high cholesterol level, respectively.
- In the second step, Propensity Score Matching was used to assess whether the results from multilevel regression analysis were susceptible to sample selection bias. Propensity scores were estimated for each respondent from a logistic regression model predicting living in a high Latino- or immigrant-concentrated neighborhood on a set of individual predictors. "Nearest neighbor" approach within a caliper of 0.01 was used for the matching. The average effect of the treatment on the treated (ATT) was calculated to compare the two groups (treatment and control).

Results from Multilevel Random Effects Models

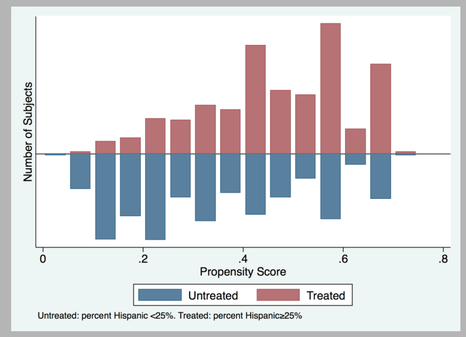
Odds Ratio from Two-level Logistic Regression

	High Blood Pressure			High Cholesterol Level		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Percent Hispanic ≥ 25%	**1.429***		1.367	**1.446****		**1.507***
	(0.232)		(0.265)	**(0.207)**		**(0.273)**
Immigrant concentration (medium)		0.732	0.692+		0.935	0.842
		(0.148)	(0.140)		(0.174)	(0.151)
Immigrant concentration (high)		**0.590****	**0.569****		0.691+	**0.671***
		(0.114)	**(0.108)**		(0.132)	**(0.118)**
Observations	1,532	1,532	1,532	1,532	1,532	1,532
Number of tracts	525	525	525	525	525	525

Note. All models adjusted for neighborhood poverty and individual controls. ***p<0.001, **p<0.01, *p<0.05, +p<0.10 (two-tailed test)

Propensity Score Matching: Latino Density

Overlap in Propensity Score by Latino ethnic density



ATT for Latino ethnic density and High Blood Pressure

Sample	Treated	Controls	Difference	Standard Error	t-Statistic
Unmatched	0.325	0.229	0.096	0.024	4.13
ATT	0.315	0.244	0.070	0.028	**2.52**

Note. Bootstrapping standard error is 0.027 (with 100 replications).

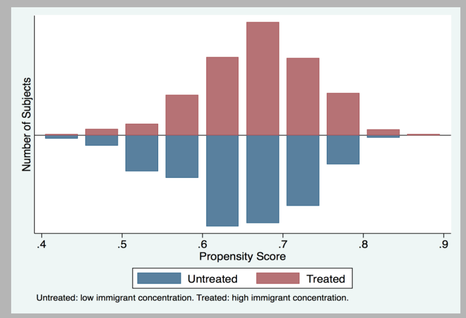
ATT for Latino ethnic density and High Cholesterol Level

Sample	Treated	Controls	Difference	Standard Error	t-Statistic
Unmatched	0.284	0.207	0.078	0.022	3.47
ATT	0.289	0.217	0.071	0.027	**2.61**

Note. Bootstrapping standard error is 0.028 (with 100 replications).

Propensity Score Matching: Immigrant Concentration

Overlap in Propensity Score by Immigrant Concentration



ATT for Immigrant Concentration and High Blood Pressure

Sample	Treated	Controls	Difference	Standard Error	t-Statistic
Unmatched	0.219	0.316	-0.096	0.030	-3.26
ATT	0.265	0.304	-0.039	0.036	-1.07

Note. Bootstrapping standard error is 0.031 (with 100 replications).

ATT for Immigrant Concentration and High Cholesterol Level

Sample	Treated	Controls	Difference	Standard Error	t-Statistic
Unmatched	0.193	0.276	-0.083	0.028	-2.94
ATT	0.218	0.273	-0.055	0.035	-1.59

Note. Bootstrapping standard error is 0.037 (with 100 replications).

Summary and Discussion

- Both multilevel models and propensity score matching analyses confirmed that Latino ethnic density was positively associated with them having high blood pressure and high cholesterol level.
- The negative association between immigrant concentration and Hispanic biological risks observed in multilevel modeling was not confirmed in Propensity Score Matching analysis. It is likely a result of neighborhood selection.
- Among Latinos, cumulative disadvantages can heighten the level of both individual- and neighborhood-level stressors that are shown to be playing crucial roles in the "wear and tear" process and physiological dysregulation, thus lead to adverse biomarker outcomes.
- Whether immigrant concentration exerts contextual influences on individual health risks warrants further examination.
- Propensity Score Analysis based on observational studies is still not a final solution to draw causal inference, future research may utilize more vigorous study designs, and apply additional operationalization such as language use or cultural preferences to better measure the "immigration effects".

Strengths and Limitations

- This study has made one step further in making causal inference in the neighborhood and health literature by utilizing Propensity Score Matching approach.
- This study is unique in that it seeks to single out the segregation effect from the immigration effect, both of which can be observed among the Latino population in the US.
- Key individual-level variables were based on self-reported measures, including the biomarker outcomes; the prevalence of both biological risk outcomes could be underestimated .
- Because this study was based on a sample of Latinos collected in the Southeastern Pennsylvania area, findings from this study should not be automatically generalized elsewhere.

Acknowledgements

This research is supported by the National Cancer Institute under grant number R01CA140319 (PI: Wen).