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Social Capital and the Paradox of Poor but Healthy Groups in the United States

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Abstract Increased income strongly correlates with improved health and lower mortality risk. Yet in spite of having a lower mean and median income, both Hispanics and the foreign-born living within the U.S. have higher longevity compared with native-born, non-Hispanics. We explored the role of structural social capital in conferring protection against poor health outcomes among Hispanics and the foreign-born in the US. We used the National Health and Nutrition Examination Survey III 1988–1994 linked to prospective mortality follow up to examine the relationship between five measures of structural social capital and: (1) intermediate health outcomes (blood pressure, plasma fibrinogen, C-reactive protein, and total cholesterol) and (2) a distal outcome (all cause mortality). The foreign-born and Hispanics generally had lower measures of structural social capital relative to native-born non-Hispanics. Additionally, while structural social capital was protective against poor health or mortality among native-born persons, the association disappeared for Hispanics and the foreign-born.

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Background

Income is perhaps the most powerful correlate of health and longevity in the US [1]. Nevertheless, both the foreign-born and Hispanics within the US enjoy longer lives than native-born, non-Hispanic people in that nation despite having a lower mean and median income [2, 3]. In fact, those select foreign-born groups with higher incomes than native-born groups often have poorer health than their much lower income peers [4]. This overarching paradox—good health in the face of low income for some groups—has gone by many names, including the "healthy immigrant effect" and the "Hispanic paradox" [3]. For the foreign-born, it has been observed that these effects fade over time of residence in the US, with life expectancy advantages declining and income increasing [5–7].

Theoretical/Conceptual Framework

Undocumented migrants to the US (the numerically largest groups of whom migrate from Mexico and China) must be strong and healthy to endure the long trips by sea or walks through long stretches of dessert required to enter the country [8]. Another factor that may explain the higher longevity of foreign-born groups is "salmon bias" [5, 9]. Any foreign-born person who is counted in the US Census, but who dies outside of the US will not have a death certificate recorded, resulting in statistical immortality. This does not seem to play much of a role among groups who are either counted in US mortality statistics (e.g., Puerto

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Ricans) or who cannot easily return home (e.g., Cubans) [10]. On the other hand, Hispanics more generally have serum biomarker profiles that suggest that they are in comparable health with native-born groups [11]. If the health risk profile of the foreign-born is comparable to the native-born, but longevity is much higher, it would suggest that the higher longevity of the foreign-born is just a statistical artifact. In addition, lifestyle factors could play a role [12]. New Yorkers born in China tend to have a far better diet and biomarker profile than native-born New York Asians [8]. Yet, even when diet is not generally thought to be favorable to health, for example, the Indian or Mexican diets, foreign-born people from these nations tend to far outlive most other native-born groups in the US [2, 12].

Finally, some hypothesize that structural social capital is an important determinant of the health of foreign-born and Hispanic populations [13–15]. Structural social capital has been defined as having ties to families or community-based institutions [16]. For example, the number of times per year that one visits friends or family or attends church has been linked to superior biomarkers of health (e.g., lower cholesterol levels) and a longer life [16]. Beneficial social connections can: lead to better jobs, buffer psychological stress, help provide shelter, or provide loans when needed [17–20].

One example of this at work in migrant communities includes informal loan programs in the Korean-American community (where many share funds under a social trust) [15]. Many foreign-born groups are thought to have more traditional, family-centered values than native-born groups, potentially explaining why health and longevity deteriorate with every generation in the US [14, 15]. Moreover, one of the most powerful predictors of health and longevity is church attendance, and Hispanics tend to be much more religious than other groups, particularly more so than non-Hispanic native-born groups, and tend to use religion rather than substances to cope with stress [21]. On the other hand, the foreign-born sometimes leave many loved ones in their donor country, and sometimes struggle to find footing in the US. Very little is known about social capital among the foreign-born in the US more generally, and particularly on its association with health [22].

In this paper, we explore inter-group social capital, biomarker risk profiles, and survival time after stratifying by social capital. Social capital is a potential explanatory variable for the healthy migrant effect and for the Hispanic paradox if: (1) the adjusted odds of social capital is higher for foreign-born and Hispanic groups relative to native-born and non-Hispanic groups respectively; (2) biomarkers of health are correlated with these measures of social capital in all groups; and (3) survival time is correlated with these measures of social capital in all groups.

Methods

Participants

We examined data from the third National Health and Nutrition Examination Survey (NHANES-III), a nationally representative health examination survey of 33,994 persons aged 2 months and older conducted in the United States from 1988 through 1994 (NCHS 2010). This survey was linked to 18 years of prospective mortality follow up data (through 2006) via the National Death Index (NDI) to form the NHANES-III-NDI (NCHS 2011b, 2012) [21]. Our sample included those between age 18 and 65 because there is evidence of survival effects beginning around age 60–70, and because the NHANES-III-NDI has unusually long follow up.

Data Collection

All NHANES-III participants completed home interviews that comprised demographic, socioeconomic, dietary and health-related questions. A large sub-sample had physical examinations and laboratory investigations (30,818 in mobile examination centers, 493 in their homes). A complex multistage probability sampling design was used to select a sample representative of non-institutionalized US residents. All subjects were financially compensated for their participation.

The present study includes only those subjects who received medical examinations and had valid laboratory test values. Those without complete medical and laboratory examination data do not differ from those with complete data with respect to their sociodemographic profiles. It was not possible to disaggregate analyses by country or region of birth, as place of birth was recoded to prevent identification of individuals within the dataset.

Measures

Variables

The dependent variables of interest are all cause mortality, blood pressure (systolic and diastolic mmHg), and the following laboratory measures: plasma fibrinogen (mg/dL), c-reactive protein (CRP) (mg/L), and total cholesterol (mg/L). Data on low density lipoprotein levels and statin use were not available for a sufficient number of participants to analyze.

Five measures of structural social capital served as both dependent and independent variables. These measures have previously been shown to be associated with

health and mortality among native-born respondents [16]. Each of these was dichotomized to address non-linear associations with the outcome measure of interest and to estimate hazard ratios: the number of visits per year with friends and relatives, number of times per year attending church or religious services, membership in any clubs or organizations, and frequency of attendance at meetings outside of work. We used the same parameters as one earlier study of social capital among the native-born: at least one visit per month on average (i.e., <12 visits per year or ≥12 visits per year) to friends, family, neighbors, church, or meetings [16]. At least one monthly visit was felt to represent the minimal meaningful exposure in order to produce a health outcome. These measures were tested at different cut off points, but different cut off points did not substantively influence outcomes. Belonging to any club was dichotomized as yes or no.

We created a new independent variable ethnicity/origin with four categories: U.S. born non-Hispanic (USBNH), foreign born non-Hispanic (FBNH), U.S. born Hispanic (USBH), and foreign born Hispanic (FBH). We adjusted for the following demographic variables in our analysis: age, race (white, black, other), gender, educational attainment (<high school, high school diploma, some college or more), and geographic region (Northeast, Midwest, South, and West). We included age and gender to adjust for non-modifiable characteristics of the cohort, that plausibly co-vary with social capital. We included geographic region because regional differences in social capital may be confounded by regional differences in health practices. We included educational attainment, because education is correlated both with social capital and with health.

Biomarker Measurement

A complete methodology of variable measurement for NHANES-III is recorded elsewhere (Laboratory Procedures Used for the Third National Health and Nutrition Examination Survey, 1988–1994). Participant blood pressure was calculated by recording four consecutive blood pressure readings and taking the average of two readings. Plasma fibrinogen was measured using a Coagamate XC Plus automated coagulation analyzer (Organon Teknika, Durham, NC) at White Sands Research Center. CRP was measured by high-sensitivity CRP assay using a BN II nephelometer (Behring Diagnostics Inc., Somerville, NJ) at the University of Washington Medical Center. Serum total cholesterol was measured at Johns Hopkins University Lipoprotein Analytical Laboratory using a Hitachi 704 Analyzer (Boehringer Mannheim Diagnostics, Indianapolis, IN).

Analysis

First, we built logistic regression models to explore the effect of ethnicity/origin on our measures of structural social capital. We used foreign-born Hispanics as our reference category. Next, we built ordinary least square models to explore the relationship between our measures of social capital, stratified by ethnicity/origin and our biomarker outcomes. Finally, we employed Cox proportional hazards models to further examine the association between the social capital variables (stratified by ethnicity/origin) and mortality rates. All models were adjusted for the above-mentioned covariates.

To test the proportional hazards assumption, we first examined the interaction of survival time with social capital (the interaction was not significant) and we then checked the log–log survival curves for each of the social capital variables. With the exception of the visits neighbors variable in which the two curves overlapped somewhat, there were no violations of the proportional hazards assumption. All statistics were performed using SAS for Windows (version 9.3, SAS Institute Inc., Cary, NC). Data were considered significant if $p < 0.05$.

Results

Table 1 shows descriptive statistics as well as the frequency distribution of the social capital variables by ethnicity and place of birth. In Table 2, we present the adjusted odds of having various measures of social capital relative to foreign-born Hispanics (the group posited to be protected by social capital). A larger percentage of U.S.-born and foreign-born Hispanics are more likely to have lower educational attainment than U.S-born and foreign-born Non-Hispanics (Table 1). In these unadjusted analyses, the four groups of interest had roughly similar levels of social capital.

However, after adjusting for differences in age, race, gender, census region, and educational attainment between the groups of interest, differences emerge. In Table 1, we see that Foreign-born Hispanics are the reference group. All other groups had higher levels of social capital. The foreign-born non-Hispanic group also tended to have lower levels of social capital than either US-born non-Hispanics or US-born Hispanics. For example, US-born non-Hispanics had a 2.33 higher odds of visiting friends and relatives more than 12 times per year than foreign-born Hispanics (95 % confidence interval: 1.94, 2.80). U.S. born non-Hispanics, U.S. born Hispanics, and foreign-born non-Hispanics were also more likely to visit neighbors more than 12 times per year (OR = 1.80; 95 % CI = 1.61, 2.01,

Table 1 Descriptive statistics of the analytical sample by ethnicity/origin

	U.S-born non-hispanic	Foreign-born non-hispanic	U.S-born hispanic	Foreign-born hispanic
Number of Individuals	8920	746	2196	2570
Average age	39.6 (13.7)	39.1 (13.3)	38.5 (14.6)	35.2 (12.5)
Gender (%)				
Female	54.5	53.1	53.2	48.2
Male	45.5	46.9	46.8	51.8
Race (%)				
White	53.6	32.8	93.4	87.7
Black	45.9	42.2	1.6	4.7
Other	0.5	24.9	5	7.6
Education (%)				
<High school	25.3	23.7	41.9	73.2
High school	39.2	27.5	33.9	15.2
Some college+	35.6	48.8	24.2	11.6
Census region (%)				
Northeast	16.7	32.3	2.4	6.3
Midwest	24	12.1	7.6	10.6
South	47.2	31.2	47	28.4
West	12.1	24.4	43	54.7
Visit friends or relatives (%)				
<12	7.1	10.5	7.5	14.8
≥12	92.9	89.5	92.5	85.3
Visit neighbors (%)				
<12	49.4	58	55.5	61.6
≥12	50.6	42	44.5	38.4
Attend church (%)				
<12	46.8	46.4	44.5	40.6
≥12	53.2	53.6	55.5	59.4
Belong to clubs (%)				
No	66.1	73.1	75.8	92.2
Yes	33.9	26.9	24.2	7.8
Attend club meetings (%)				
<12	28.1	26.9	28	18.4
≥12	72	73.1	72	81.6

1978–2002 General Social Survey-National Death Index dataset with follow up through 2008

OR = 1.28; 95 % CI = 1.13, 1.44, OR = 1.32; 95 % CI = 1.10, 1.58) and were more likely to belong to clubs (OR = 3.65; 95 % CI = 3.08, 4.32) than foreign-born Hispanics. The one exception to this trend in structural social capital was church attendance, which foreign-born Hispanics did more frequently than other ethnic/origin groups. For those select few foreign-born Hispanics who did maintain club memberships, they attended club meetings significantly more often than U.S born non-Hispanics foreign-born non-Hispanics, and U.S. born Hispanics (Table 2).

Moreover, these measures of social capital are correlated with biomarkers and mortality hazards. After adjusting for age, race, gender, census region, and educational attainment, the laboratory markers of health (CRP, serum cholesterol, serum fibrinogen, systolic blood pressure, and diastolic blood pressure) differed across measures of social capital in the groups of interest (Table 3). Where improvements in biomarkers occurred in relation to measures of social capital, they translated into lower mortality rates in some groups (Table 4).

Table 2 Adjusted odds ratios [95 % confidence interval] of various measures of social capital (foreign-born Hispanics are the reference group)

	US born non-hispanic	Foreign-born non-hispanic	US born hispanic	Foreign-born hispanic
Visit friends or relatives[a]	2.33 [1.94, 2.80]	1.39 [1.04, 1.86]	2.07 [1.69, 2.53]	–
	$p < 0.0001$	$p = 0.03$	$p < 0.0001$	
Visit neighbors[a]	1.80 [1.61, 2.01]	1.32 [1.10, 1.58]	1.28 [1.13, 1.44]	–
	$p < 0.0001$	$p = 0.003$	$p < 0.0001$	
Attend church[a]	0.38 [0.35, 0.42]	0.42 [0.35, 0.51]	0.62 [0.54, 0.70]	–
	$p < 0.0001$	$p < 0.0001$	$p < 0.0001$	
Belong to clubs[b]	3.65 [3.08, 4.32]	2.32 [1.83, 2.95]	2.60 [2.17, 3.12]	–
	$p < 0.0001$	$p < 0.0001$	$p < 0.0001$	
Attend club meetings[b]	0.42 [0.29, 0.62]	0.42 [0.25, 0.69]	0.56 [0.37, 0.84]	–
	$p < 0.0001$	$p = 0.0006$	$p < 0.006$	

1978–2002 General Social Survey-National Death Index dataset with follow up through 2008

[a] More than or equal to 1 time per month relative to less than once per month

[b] Yes relative to no

Discussion

Among foreign-born Hispanics in the US, our structural social capital measures tend to be lower for all variables except church attendance. Surprisingly, there was little correlation between social capital and our two measures of health: biomarker profiles or survival time. For example, fibrinogen levels (-11.4 mg/dl, $p = 0.00$), C-reactive protein (-0.04 mg/dl; $p = 0.01$), systolic blood pressure (1 mm Hg; $p = 0.002$) and diastolic blood pressure (0.45 mm Hg; $p = 0.05$) were slightly lower for native-born church attendees than among group who attended church more frequently. Likewise, attending church was associated with a large reduction in mortality hazard for all groups but foreign-born Hispanics—the group with the highest level of social capital in this domain. While our hypothesis centered on the protective effects of social capital on health and survival by nativity and ethnicity, it is also useful to see the direct associations by measure of social capital. For this reason, we have summarized these findings in an online supplemental appendix.

Prior to our study, we hypothesized that Hispanics and the foreign-born tend to have strong family ties, religiosity, and residence in enclave communities and that higher levels of structural social capital within foreign-born communities might explain the healthy migrant effect and the Hispanic paradox. Contrary to our hypothesis, we found that both foreign-born Hispanics and foreign-born non-Hispanics tend to have many measures of structural social capital that are low relative to native-born Hispanics and non-Hispanics. Moreover, among the foreign-born, including foreign-born Hispanics, there are few apparent protective associations with measures of health or survival

and social capital irrespective of whether they are higher or lower among such groups.

Our study suffers from a number of important limitations. Foremost, we were only able to stratify by ethnicity and place of birth (inside or outside the US). The foreign-born are very diverse as a group, particularly after excluding Hispanics (who make up the vast majority of the foreign-born in the US). Nevertheless, when looking at population means of this very diverse group (the vast majority of whom have very long survival), we find lower levels of social capital. Additionally, the statistical power within each analysis differs greatly. We are best able to detect effects among native-born non-Hispanics, the majority group in our sample. When interpreting the results of our study, it is therefore important to consider the magnitude of the coefficient and the size of the confidence interval, particularly in the survival analyses. However, even with this caveat, we do observe that the correlations between structural social capital measures and biomarkers/survival time are often small in size, opposite in sign, or both for the foreign-born and for Hispanics born inside and outside the US. These observations suggest that statistical power does not explain the lack of statistically significant associations.

Attending church and visiting friends or relatives more than 12 times per year were measures that were previously known to be strongly predictive of favorable biomarkers and survival time [16]. However, this finding appears to be limited to native-born non-Hispanics. Our work therefore raises the possibility that the series of descriptive correlations observed in the public health literature on church attendance is spurious. If attending church actually is protective for health (as opposed to selecting for

Table 3 Ordinary least square regression analyses of the effect of differing levels of social capital on laboratory/physical examination variables stratified by ethnicity/origin while controlling for race, age, gender, geographical region, and educational level

	US born non-hispanic		Foreign-born non-hispanic		US-born hispanic		Foreign-born hispanic	
	Parameter	p value	Parameter	p value	Parameter	p value	Parameter	p value
Total cholesterol								
Visit friends or relatives	−0.60	0.74	0.12	0.98	6.34	0.09	4.47	0.07
Visit neighbors	−1.09	0.23	−3.40	0.28	3.55	0.07	−0.10	0.95
Attend church	−0.22	0.82	−0.49	0.88	2.91	0.15	−1.55	0.39
Belong to clubs	−2.01	0.05*	−2.00	0.58	1.65	0.48	−2.73	0.40
Attend club meetings	−0.70	0.69	−0.27	0.97	−2.74	0.50	−11.67	0.09
Plasma fibrinogen								
Visit friends or relatives	−4.60	0.37	3.30	0.80	4.38	0.64	10.18	0.19
Visit neighbors	−1.12	0.69	1.20	0.89	−1.53	0.78	8.86	0.17
Attend church	−11.36	0.00	−7.90	0.37	−7.33	0.22	−7.57	0.25
Belong to clubs	−4.87	0.11	3.26	0.74	−8.37	0.20	−20.77	0.05*
Attend club meetings	−14.48	0.003	−31.79	0.07	6.52	0.55	14.04	0.48
Serum C-reactive protein								
Visit friends or relatives	−0.06	0.05*	−0.03	0.56	0.05	0.50	−0.03	0.58
Visit neighbors	0.01	0.32	0.02	0.66	−0.05	0.26	0.04	0.34
Attend church	−0.04	0.01*	−0.04	0.22	0.02	0.68	−0.03	0.45
Belong to clubs	−0.06	0.0001*	−0.07	0.09	−0.08	0.12	−0.08	0.27
Attend club meetings	−0.01	0.79	−0.09	0.02*	0.04	0.44	−0.17	0.03*
Average systolic blood pressure								
Visit friends or relatives	0.54	0.37	−3.52	0.04	2.29	0.05*	1.51	0.04*
Visit neighbors	−0.39	0.20	1.59	0.13	0.22	0.72	0.06	0.91
Attend church	−1.00	0.002*	−0.72	0.50	−0.45	0.49	0.26	0.63
Belong to clubs	−0.57	0.09	0.30	0.80	−3.36	<.0001*	−0.43	0.66
Attend club meetings	−0.47	0.44	3.23	0.17	2.94	0.02*	−3.86	0.09
Average diastolic blood pressure								
Visit friends or relatives	−1.00	0.02*	−2.35	0.05*	−1.27	0.11	0.90	0.09
Visit neighbors	−0.38	0.08	−0.21	0.77	−0.52	0.22	0.01	0.97
Attend church	−0.45	0.05	−1.59	0.03*	−0.06	0.89	0.51	0.19
Belong to clubs	−0.10	0.67	0.34	0.68	−0.22	0.66	0.27	0.70
Attend club meetings	−0.07	0.87	−0.04	0.98	−0.22	0.82	−0.94	0.63

2008 General Social Survey-National Death Index

* $p < 0.05$

Table 4 Cox proportional hazards regression of the effect of differing levels of social capital on hazard rates, stratified by ethnicity and place of birth, and controlling for race, age, gender, geographical region, and education level

	USBNH	95 %CI		FBNH	95 %CI		USBH	95 %CI		FBH	95 %CI	
Visit friends or relatives	0.87	0.72	1.05	0.42*	0.20	0.86	0.70	0.49	1.01	0.95	0.65	1.40
Visit neighbors	1.05	0.93	1.18	1.29	0.69	2.39	0.99	0.76	1.28	1.20	0.89	1.61
Attend church	0.68*	0.60	0.77	0.52*	0.27	0.97	0.67*	0.51	0.88	1.04	0.76	1.42
Belong to clubs	0.72*	0.63	0.82	0.83	0.39	1.77	0.65*	0.46	0.92	0.62	0.32	1.19
Attend club meetings	0.83	0.65	1.06	0.96	0.22	4.24	1.13	0.57	2.22	1.53	0.28	8.38

2008 General Social Survey-National Death Index

USBNH U.S-born non-hispanic, *FBNH* foreign-born non-hispanic, *USBH* U.S-born hispanic, *FBH* foreign born hispanic

* $p < 0.05$

individuals who are less likely to smoke and drink), then we would expect it to be protective across all groups regardless of birth or ethnicity.

New Contribution to the Literature

There are a number of reasons why our study of social capital and the health and survival impacts of social capital among Hispanics and the foreign-born is important.

First, we find that many of our measures of structural social capital tend to be higher in the native-born than in the foreign-born, and also higher in non-Hispanics than Hispanics. This suggests that social capital is not an explanatory variable for either the healthy migrant effect or the Hispanic paradox. Second, our measures of structural social capital do not seem to be associated with either biomarkers of health or longevity among the groups we studied. This suggests that either these measures of social capital may be confounded by some other important variable (e.g., total wealth) or they simply do not matter for the foreign-born, which are a group for which many believe are quite different from others in society.

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