The Hispanic Health Paradox across Generations: The Relationship of Child Generational Status and Citizenship with Health Outcomes

Alexander J. Balcazar[1], **Sara E. Grineski**[2], and **Timothy W. Collins**[3]

[1] Undergraduate Research Assistant, Department of Sociology and Anthropology, University of Texas at El Paso, El Paso, TX

[2] Associate Professor of Sociology, Department of Sociology and Anthropology, University of Texas at El Paso, El Paso, TX 79968, 915 747 8471

[3] Associate Professor of Geography, Department of Sociology and Anthropology, University of Texas at El Paso, El Paso, TX

Abstract

Objectives—In examining the Hispanic health paradox, researchers rarely determine if the paradox persists across immigrant generations. This study examines immigrant respiratory health disparities among Hispanic children in terms of current asthma, bronchitis, and allergies using an expanded six-group immigrant cohort framework that includes citizenship and the fourth-plus generation.

Study design—Cross-sectional primary survey data from 1,568 caretakers of Hispanic schoolchildren in El Paso, Texas (USA) were utilized.

Methods—Data were analyzed using generalized linear models.

Results—Results indicate that a healthy immigrant advantage lasts until the 2.5 generation for bronchitis and allergies ($p<.05$), and until the third generation for asthma ($p<10$). Citizenship was not an influence on the likelihood of a child having a respiratory health condition.

Conclusions—Findings demonstrate the utility of the expanded six-group cohort framework for examining intergenerational patterns in health conditions among immigrant groups.

Keywords

Hispanic health paradox; asthma; children; generational status; immigrant health

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(corresponding author) Sara E. Grineski segrineski@utep.edu.

1. Introduction

In spite of low socioeconomic status and limited access to healthcare, Hispanic immigrants tend to have better health outcomes than their US-born and white counterparts[1]. For example, Hispanics have the lowest prevalence of asthma in the United States when compared to other racial and ethnic groups[1]. Possible explanations for this Hispanic health paradox include low levels of acculturation (including maintenance of specific cultural practices and strong family support systems), healthier lifestyles of immigrants (e.g., diet), selective migration, and genetic heritage[2,3]. Specific to respiratory health, the immigrant advantage may be due to general environmental and socioeconomic conditions in the country of origin[4]. For example, early life experiences in agricultural areas may protect against the development of asthma and allergies (the hygiene hypothesis)[5].

The Hispanic health paradox has been well-documented in terms of health advantages for foreign-born children and those living in the US for fewer years, but less often across immigrant generational cohorts, even though limited evidence suggests that protective effects can pass from one generation to the next[6]. To our knowledge only one study has examined asthma and allergies across generational cohorts[7]. This study found that US Hispanic children's unadjusted asthma and allergy prevalence increased across first, second and third generations; however, it was limited in that subsequent Hispanic generations were not compared to each other, but to third-plus generation non-Hispanic whites[7]. This means the effect of Hispanic generational status on Hispanic respiratory health disparities was not assessed, which is our primary goal here. This dearth of research on asthma is a critical gap because nine percent of US children suffer from asthma[8] and asthma is a health condition for which a Hispanic health paradox has been identified[4].

1.1 Conceptual Framework

Children's immigrant generational status has usually been conceptualized based on the child's and parents' nativity in a three-group generational framework[7,9-13]. This three-group framework is based on the classical immigrant assimilation model, which posits that immigrants gradually adopt the behaviors of the dominant cultural group over time, with linear increases in assimilation occurring progressively across successive generations[14]. More recent models seek to account for alternative immigrant assimilation paths by expanding on the three-group framework. Some have separated out a 2.5 generation, which includes US-born children with one foreign-born and one US-born parent[15,16]. Others have refined the first generation by considering both nativity and citizenship[17,18]. While citizenship confers entitlement to federal healthcare assistance programs[2], how it translates into actual health advantages has rarely been investigated (see only[19,20]).

In addition to underemphasizing citizenship, the literature lacks consideration of a fourth generation. i.e., those who are US-born with US-born parents and grandparents (see only[21]). The common practice of aggregating higher generational cohorts within a 'third-plus' generation may mask significant differences between later generational cohorts, especially among immigrant groups with substantial racial/ethnic minority composition that have not generally experienced linear assimilation paths across generations. This has led to a need for a more nuanced framework. Our six-group framework incorporates novel elements as well

as facets of previous approaches by distinguishing a fourth generation from the third generation, the 2.5 generation from the second and third generations, and first generation noncitizens from first generation naturalized citizens.

The general aim of this study is to determine if a Hispanic immigrant respiratory health advantage exists across generations and, if so, for how many generations. Surprisingly few studies have examined generational differences in common childhood diseases beyond obesity and developmental delays[21,22], despite the relevance for understanding the Hispanic health paradox. We contribute to the immigrant health disparities knowledge base by examining understudied respiratory health outcomes among children using a more nuanced immigrant generational cohort framework.

This study addresses three research questions using data from a population-based sample of fourth and fifth graders in the El Paso Independent School District (El Paso, Texas, USA): (1) What is the relationship between immigrant generational status and Hispanic children's health outcomes, adjusting for relevant covariates? (2) Into which generational status cohort does the healthy immigrant effect persist? (3) Is having citizenship associated with significantly better health outcomes among first generation children?

2. Methods

2.1. Participants and Study Area

Participants are primary caretakers of fourth and fifth graders attending school in the El Paso Independent School District (EPISD). A total of 6,295 households, containing all fourth and fifth graders, were included in our sampling frame. We selected the 1,568 Hispanic children whose caretakers responded to the survey for analysis.

EPISD is the largest school district in El Paso County (Texas), which is located on the US-Mexican border, and has an estimated population of 827,398 (2012). El Paso is home to a majority Hispanic population (81%) and the County has substantially lower median household income (2011 US $36,333) than the national figure (2011 US $50,502). Just 26% of El Paso County residents speak only English, while 72% speak Spanish; one-quarter were born outside the US. These characteristics make El Paso an ideal laboratory in which to examine inequalities within the Hispanic immigrant population due to the fact that it has substantial numbers of long-term, multigenerational Hispanic families as well as many new immigrants. This composition is less present in US cities outside of the Southwest, Florida, New York City, and Chicago.

2.2 Study Design

Data were collected through a cross-sectional, population-based mail survey that was approved by our university's Institutional Review Board. Surveys were conducted using the tailored design method by personalizing communication, following-up with non-respondents, and offering incentives[23]. All survey materials were provided in English and Spanish. Mailings were sent in three waves during May of 2012. The first mailing consisted of the survey packet, which included a consent letter and the survey, a $2 incentive and a postage-paid return envelope. A week later, we mailed a reminder postcard. One week after

that, we re-sent the survey packet to all non-respondents (again with $2 and a postage-paid return envelope).

In total, 1,904 surveys were returned for a 30.2% response rate. Research indicates that similar and substantially lower survey response rates can yield representative samples[23-27]. Descriptive statistics indicate that the sample is generally representative of the EPISD student population in terms of males (49.9% vs. 51.4% in EPISD), Hispanics (82.2% vs. 82.6% in EPISD) and economically disadvantaged students (60.4% vs. 71.1% in EPISD)[28].

2.3. Measures

Three respiratory health outcomes were measured at the level of the child. (1) Current Asthma was based on "yes" responses to both of the following questions: "Has your child had wheezing or whistling in the chest in the last 12 months?" and "Has the child ever been told by a doctor or other health professional that he or she has asthma?" (re-coded to 1=current asthma, 0=no)[29]. (2) Bronchitis was based on a "yes" response to the question: "During the past 12 months, was this child diagnosed with bronchitis by a health care provider?" (coded 1=bronchitis, 0=no)[30]. (3) Allergies was based on a "yes" response to the question: "Has your child ever had allergies or hay fever?" (coded 1=allergies, 0=no)[31].

To operationalize each Hispanic child's immigrant generational status, we used nativity (born in/outside the US) for the child, the child's parents, and for the child's four grandparents, as well as US citizenship status for the child. Our measure of children's immigrant generational status includes six categories: first generation noncitizen (foreign-born), first generation naturalized citizen (foreign-born), second generation (US-born with two foreign-born parents), 2.5 generation (US-born with one US-born parent and one foreign-born parent), third generation (US-born with both parents US-born), and fourth generation plus (US-born with all parents and grandparents US-born). Figure 1 shows the univarite distribution of generational status and Table 1 shows the count of children in each generational status grouping by health outcome.

Five control variables were included: child's age (in years), child's sex (coded 1=male, 0=female), household smoking in the past 12 months (coded 1=yes, 0=no). Yearly household income (coded 1=Less than $1,999 to 15= $150,000 or more) was treated as a continuous variable. Whether the child had continuous insurance coverage in the last 12 months (coded 1=yes, 0=no) was also included.

2.4 Multiple Imputation of Missing Values

To address nonresponse bias, missing values were multiply imputed prior to analysis. Multiple imputation (MI) involves creating multiple sets of values for missing observations using a regression-based approach. It is used to avoid the bias that can occur when missing values are not missing completely at random[32] and is appropriate for self-reported survey data[33]. In SPSS version 21, 20 imputed datasets were specified to increase power and 200 between-imputation iterations were used to ensure that the imputations were independent[33]. Using 20 datasets is the current "rule of thumb" in MI as it maximizes power and improves the validity of multi-parameter significance tests[33]. MI was only employed for the multivariate analysis. Univariate and bivariate analyses utilized original data.

2.5 Analysis

Using the original data, the significance of mean differences in each variable between the six immigrant generational groups was determined using chi-square tests. Generalized linear models (GZLM) were used to examine relationships between immigrant generational status and the three child respiratory health outcomes separately, adjusting for the five controls. We report the pooled results generated by SPSS across the 20 imputed datasets. In contrast to linear regression models, GZLM support analysis of non-normal distributions for multiple link functions[34]. We implemented binary logistic GZLMs[35].

For bronchitis and allergies, we ran each GZLM five times because we have six immigrant generational groups and analyzing all comparisons required running separate models employing five of the six groups as reference categories. For the current asthma model, we ran each GZLM only three times due to low counts among the first generation noncitizens (n=2) and first generation citizens (n=1) (see Table 1). SPSS version 21 was used to conduct all analyses. Since SPSS software does not perform multicollinearity diagnostics in GZLM, ordinary least squares regression was used to examine multicollinearity. According to variance inflation factor, tolerance, and condition index criteria[36], inferences from GZLM results were not affected by multicollinearity problems.

3. Results

3.1 Sample Characteristics

Table 2 reports the descriptive statistics of the Hispanic sample (using the non-imputed data) in terms of health outcomes and the control variables. Parents reported that 8% had current asthma, 9% had bronchitis, and 50% had allergies.

3.2 Bivariate Results

Table 2 also reports chi-square tests for associations between generational cohorts and other variables. All variables are significantly different between cohorts with the exception of age and sex. Across generations, there is an increase in the prevalence of current asthma, bronchitis, and allergies.

3.3 Generalized Linear Model Results

Table 3 reports the parameter estimates from the GZLM analyzing the immigrant generation status and control variables as predictors of the three respiratory health outcome variables. None of the control variables were statistically significant. Compared to the second generation (see Table 3-A), the fourth generation was significantly more likely to have current asthma (and the third generation was more likely at $p<0.10$). Compared to the 2.5 generation, fourth generation children were significantly more likely to have current asthma and the finding for the third generation approached significance ($p<0.10$). The fourth generation was nearly significantly ($p<0.10$) more likely to have current asthma than the third generation.

In regard to the child having bronchitis, compared to the first generation noncitizens and first generation citizens, there were no significant differences among all higher generations

(see Table 3-B). Compared to the second generation, third and fourth generations were significantly more likely to have bronchitis. Compared to the 2.5 generation, all higher generations were significantly more likely to have bronchitis. There were no significant differences in the models when using the third and fourth generations as reference groups in terms of having bronchitis.

Lastly, compared to first generation noncitizens, the third and fourth generations were significantly more likely to have allergies (and the comparison with the 2.5 generation was $p<0.10$) (see Table 3-C). Compared to first generation citizens, the differences for the third and fourth generations were nearly significant ($p<0.10$). Compared to the second generation, all higher generations were significantly more likely to have allergies and the finding for the 2.5 generation approached significance ($p<0.10$). Compared to the 2.5 generation, all higher generations were significantly more likely to have allergies (only the fourth generation was $p<0.10$ instead of $p<.05$). There were no significant differences when using the third and fourth generations as reference groups in terms of having allergies.

4. Discussion

As compared to Hispanic children nationwide, El Paso children were more likely to have allergies (50% vs. 8%), but they had similar rates of current asthma (8% vs. 9%)[8]. The unusually high rates of allergies among El Paso children may relate to the urbanized, windswept desert environment of El Paso. A generational Hispanic health paradox was visible for asthma, bronchitis, and allergies with the prevalence of each illness increasing with each successive generation. This is consistent with other studies[6,7]. Our expanded generational cohort framework allows for the identification of specific thresholds in the duration of the immigrant respiratory heath advantage for the first time. Multivariate models illustrate that the advantage persists until the 2.5 generation for bronchitis and allergies. This means having one foreign-born parent as compared to having two US-born parents (2.5 generation) translated into significantly ($p<.05$) reduced odds of bronchitis and allergies, as compared to having two US-born parents (3rd generation). For asthma, the advantage persisted until the third generation, although it was not as strong ($p<.10$). This suggests that having US-born grandparents (4th generation) contributed to increased risk of current asthma as compared to having US-born parents with foreign-born grandparents (3rd generation).

As such, this study suggests when, in intergenerational terms, to expect worsening respiratory health among US Hispanic migrant populations. This information could be practically useful to health care providers, school nurses, and those designing and running programs to serve Hispanic children as they may want to pay special attention to the respiratory health of US-born Hispanic children with non-immigrant parents. In El Paso, these children are more likely to have health insurance and to seek health care[37], but they are also more likely to suffer from respiratory problems. When they interface with the health care system, high quality, culturally responsive care is needed as Hispanic children in the US sometimes receive suboptimal care (e.g., they are less likely to be prescribed controller medications for asthma[38,39]). Additionally, this study suggests that health care providers should avoid using a 'one-size-fits-all' approach with Hispanic patients. Instead, they should recognize distinctions in the health challenges confronting US Hispanic subgroups. For

example, recognition that earlier immigrant generational cohorts may be more likely to experience health care access challenges[9,10,13,37], and that later generational cohorts may be more prone to chronic health problems such as those examined here, may enable providers to more effectively target the delivery of care to US Hispanics.

Citizenship was not an influence on the likelihood of a child having a respiratory health condition, even though it is an important correlate of access to care[37,40]. The lack of statistical significance was surprising because these Hispanic first generation citizen children were over 10 times more likely to have a regular doctor and over seven times more likely to be continuously insured than first generation noncitizens in the sample[37]. Significant disparities in access to healthcare have not translated into health outcome disparities for this age cohort of Hispanic children. It is unknown if this pattern will persist as the children age. Future efforts could expand our cohort framework and collect data on first generation non-citizens with and without legal residency status to better capture the dynamics of being first generation. Even if we were permitted by the EPISD to collect data on non-legal residents (which we were not), we would not have had sufficient numbers of first generation children to conduct that analysis since we were limited by low counts of first generation children.

The study is also limited in that our findings are specific to elementary school children, and it is unknown if they are generalizable to other age groups. We were unable to disaggregate the Hispanic children into country-of-origin subgroups because approximately three-quarters of the children were Mexican. Three respiratory health outcomes were studied and findings may not be generalizable to other health conditions. Given the localized nature of this sample, this analysis needs to be replicated at the national level.

This study advances the literature by examining Hispanic immigrant children's asthma, bronchitis, and allergies using a novel immigrant cohort framework that includes citizenship and extends into the fourth generation. A Hispanic immigrant health advantage persists until the 2.5 generation for bronchitis and allergies, and to the third generation for asthma; after those generational thresholds, health benefits erode. Using this expanded cohort framework instead of the three cohort model, we provided evidence that a Hispanic health paradox across successive immigrant generations exists for previously unexamined health conditions.

Acknowledgements

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Highlights

- A healthy immigrant advantage lasts until the 3rd generation for asthma

- A healthy immigrant advantage lasts until the 2.5 generation for bronchitis

- A healthy immigrant advantage lasts until the 2.5 generation for allergies

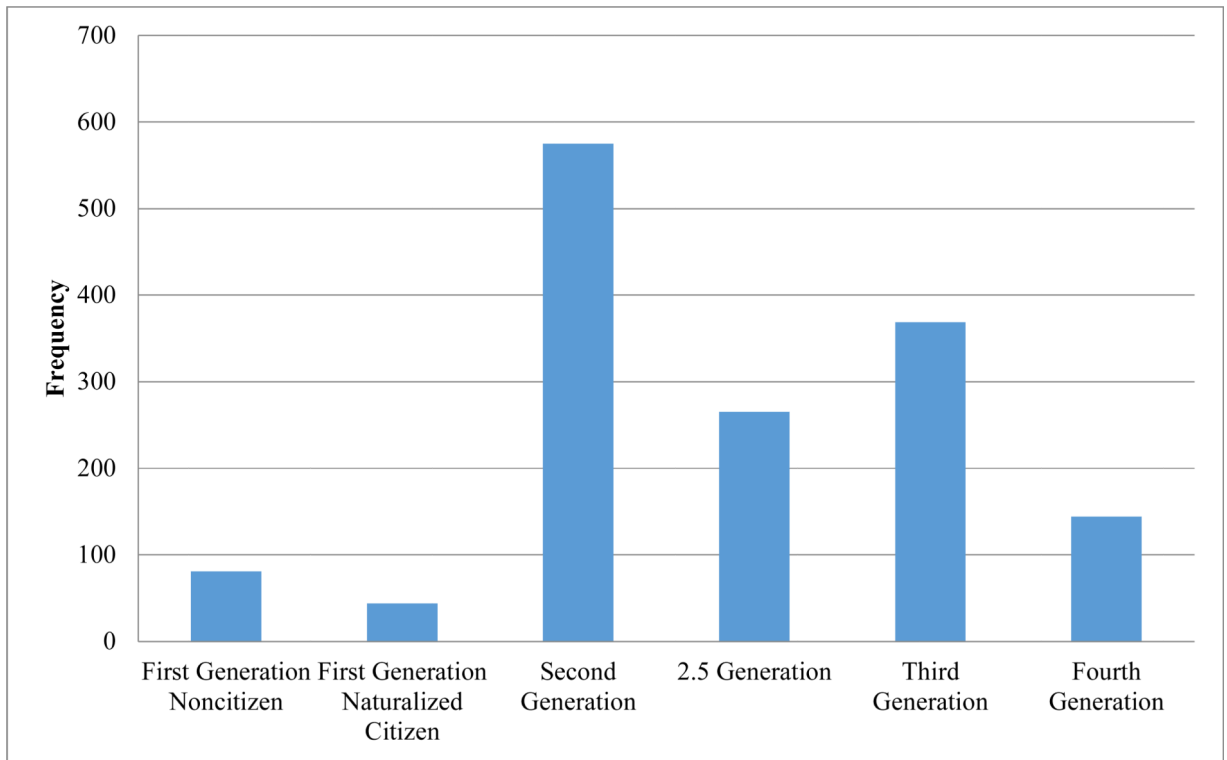- Citizenship was not an influence on having a respiratory health condition

Figure 1.
Histogram of the Distribution of the Child Generational Status Variable for Hispanic Children in El Paso (Texas, USA)

Table 1

Counts by cell for generational cohorts by health outcome (original, non-imputed data)

	Current Asthma		Bronchitis		Allergies	
	Yes	No	Yes	No	Yes	No
1st generation noncitizen	2	78	6	71	26	53
1st generation citizen	1	42	5	39	19	25
2nd generation	37	522	35	516	235	321
2.5 generation	16	246	12	251	136	126
3rd generation	40	326	42	320	221	144
4th plus generation	25	116	25	118	91	53
Total	121	1330	125	1315	728	722

Table 2

Sample Descriptive Statistics by Immigrant Generational Cohort (original, non-imputed data)

Variable	Response Options	Total Sample	First Generation Noncitizen	First Generation Citizen	Second Generation	2.5 Generation	Third Generation	Fourth Generation	Chi-Square	Significance	% Missing
Current Asthma	1=Yes; 0=No	0.08	0.03	0.02	0.07	0.06	0.11	0.18	28.96	.000	4.1
Bronchitis	1=Yes; 0=No	0.09	0.08	0.11	0.06	0.05	0.12	0.17	27.75	.000	4.8
Allergies	1=Yes; 0=No	0.50	0.33	0.43	0.42	0.52	0.61	0.63	49.98	.000	4.2
Age	8-13	10.41	10.59	10.27	10.39	10.42	10.39	10.46	25.24	.449	3.60
Male Sex	1=Male; 0=Female	0.49	0.39	0.50	0.50	0.48	0.49	0.50	3.50	.623	5.20
Smoking	1=Yes; 0=No	0.08	0.13	0.17	0.07	0.07	0.06	0.11	11.81	.037	5.90
Continuous Insurance	1=Yes; 0=No	0.84	0.32	0.82	0.86	0.86	0.88	0.94	171.08	.000	3.80
Income	1= <$2,000 to 15=>$150,000	6.45	4.19	6.05	5.12	7.41	7.45	8.45	251.92	.000	10.00

Table 3

Results of Generalized Linear Models: Predicting respiratory health outcomes among Hispanic children using Generational Status (multiply imputed data)

Generational Status	A. Current Asthma	B. Bronchitis	C. Allergies
	OR (CI)	*OR (CI)*	*OR (CI)*
(ref 1noncit)			
1cit		1.25 (0.35, 4.46)	1.39 (0.65, 2.99)
2		0.65 (0.25, 1.63)	1.32 (0.79, 2.19)
2.5		0.58 (0.21, 1.62)	1.70 (0.99, 2.93)*
3		1.24 (0.46, 3.18)	2.45 (1.45, 4.16)**
4		1.88 (0.69, 5.10)	2.54 (1.39, 4.64)**
(ref 1cit)			
2		0.52 (0.19, 1.43)	0.95 (0.50, 1.78)
2.5		0.47 (0.16, 1.36)	1.22 (0.65, 2.31)
3		0.99 (0.37, 2.72)	1.77 (0.93, 3.34)*
4		1.50 (0.53, 4.29)	1.82 (0.92, 3.63)*
(ref 2)			
2.5	0.88 (0.49, 1.58)	0.90 (0.48, 1.68)	1.29 (0.96, 1.74)*
3	1.52 (0.94, 2.47)*	1.93 (1.20, 3.09)**	1.86 (1.42, 2.45)**
4	2.52 (1.45, 4.39)**	2.91 (1.64, 5.16)**	1.92 (1.29, 2.85)**
(ref 2.5)			
3	1.74 (0.96, 3.13)*	2.14 (1.15, 3.99)**	1.44 (1.05, 1.98)**
4	2.87 (1.48, 5.58)**	3.23 (1.62, 6.46)**	1.49 (0.98, 2.27)*
(ref 3)			
4	1.66 (0.97, 2.84)*	1.51 (0.88, 2.60)	1.03 (0.69, 1.55)
Controls			
Age	0.94 (0.75, 1.18)	1.05 (0.83, 1.32)	0.98 (0.85, 1.11)
Sex	1.29 (0.89, 1.86)	1.11 (0.77, 1.61)	1.08 (0.88, 1.33)
Smoking	1.16 (0.57, 2.35)	1.54 (0.82, 2.87)	1.36 (0.91, 2.04)

Generational Status	A. Current Asthma	B. Bronchitis	C. Allergies
	OR (CI)	*OR (CI)*	*OR (CI)*
Household Income	1.01 (0.96, 1.07)	0.98 (0.92, 1.04)	1.06 (1.02, 1.09)
Continuous Insurance	1.37 (0.72, 2.62)	1.35 (0.72, 2.54)	1.32 (0.98, 1.78)

Note: CI= Confidence Interval; OR= Odds Ratios; The first generation cohorts are not used in the asthma model, due to small counts (see Table 1)

*
p< 0.10

**
p< 0.05