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Community-level prejudice and mortality among immigrant groups

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ABSTRACT

This study assesses whether anti-immigrant prejudice at the community level is prospectively associated with mortality. We used 10 waves of data from the General Social Survey (GSS) that were linked to mortality data via the National Death Index (NDI) for the period between 1993 and 2014 (n = 13,242). The 2014 GSS-NDI dataset is a nationally representative sample reporting social characteristics and attitudes in the United States that was prospectively linked to mortality data. Community-level prejudice was measured with 5 questions regarding anti-immigrant sentiments across 123 communities, defined using primary sampling units. Cox proportional hazards models tested the association between anti-immigrant prejudice and mortality hazard, controlling for covariates at the individual and community levels. Findings showed that among "other race" respondents, those born in the US had higher risk of mortality in communities with greater anti-immigrant prejudice, whereas foreign-born "other race" respondents had lower risk of mortality in communities with greater anti-immigrant prejudice. Sensitivity analyses indicated that the "other race" category was comprised largely of Asians and Hispanics, and that these results were similar for both groups. In contrast, anti-immigrant prejudice was not associated with mortality for foreign-born immigrants who self-report as white or black. We provide various hypotheses for why US-born immigrant groups seem to suffer higher mortality risk, while foreign-born immigrant groups do not, when they live in communities with high levels of prejudice.

1. Introduction

A small, but growing body of research has noted that self-reported anti-immigrant discrimination is related to illness for immigrant groups (Joseph, 2011; Rhodes et al., 2014; Yoo et al., 2010). While this research is important, reviews of the literature have noted that there is an over-emphasis on self-reported discrimination and that research on structural discrimination remains underdeveloped (Gee and Ford, 2011; Williams and Mohammed, 2009). Scholars have further noted that the literature has largely relied on cultural explanations of immigrant health outcomes and has only recently begun to address the influence of broader social, economic, and policy factors on the health of immigrants (Castañeda et al., 2015; Viruell-Fuentes et al., 2012). Failure to attend to these structural issues could lead to an underappreciation of the determinants of health among immigrant populations and to missed opportunities for population-level interventions and policies. Accordingly, the present study focuses on the health impacts of structural forms of anti-immigrant prejudice.

An emerging body of research examines the effects of structural stigma—defined as "societal level conditions, cultural norms, and institutional policies and practices that constrain the opportunities, resources, and wellbeing of the stigmatized" (Hatzenbuehler and Link, 2014, p. 2)—on the health of members of stigmatized groups. For example, recent work has shown that structural stigma in the form of area-level racism (Chae et al., 2015; Lee et al., 2015) is associated with increased risk for mortality among blacks. This research raises the possibility that anti-immigrant prejudice may similarly shape morbidity and mortality among immigrant groups. However, with rare exception (Ayón and Becerra, 2013), few studies have examined whether living in a community that is prejudiced against immigrants impacts the health of immigrant groups.

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The dearth of research on the health effects of structural stigma against immigrants is partly due to the availability of appropriate data structures that meet important requirements, including: (1) large and representative samples of immigrants and their health outcomes; and (2) measures of anti-immigrant prejudice at the community level. We propose such a study, making use of the General Social Survey (GSS), a longstanding survey that asks about social attitudes, which has been linked to individual mortality data from the National Death Index (NDI) (Muennig et al., 2011). This data set allows for the first time, to our knowledge, the study of whether community-level anti-immigrant prejudice is associated with mortality risk. This dataset has been used in previous studies of the mortality effects of community-level prejudice against gays and blacks (Hatzenbuehler et al., 2014; Lee et al., 2015).

The aim of the current study is to examine whether community-level prejudice against immigrants is associated with mortality. In addressing this overall aim, there are a number of possible outcomes that would lead to different conclusions about the relationship between anti-immigrant prejudice and mortality risk. First, it is possible that community-level prejudice against immigrants has no effect on mortality. It is also possible that community-level prejudice might affect proximal outcomes, such as stress and depression, but not more distal outcomes, such as mortality. Both possibilities would lead to the null hypothesis (i.e., no association between anti-immigrant prejudice and mortality).

A second possibility is that anti-immigration prejudice at the community level is associated with mortality, but that this association is artefactual. In other words, community attitudes towards immigration are indicative of some other community characteristic or characteristics that place the population at greater or lesser mortality risk. For example, communities with high anti-immigrant prejudice might have an older average population or a lower level of education, both of which are risk factors for mortality. Analyses can control for some community-level attributes in order to test these possibilities. However, the remaining association between anti-immigration prejudice and mortality may be due to some unaccounted for community-level characteristic, such as crime rate. We would expect crime rates to be associated with mortality for various racial minority groups, including blacks, Hispanics, and Asians. Mortality among whites may also be affected by crime. Therefore, if anti-immigration prejudice is associated with mortality due to some other, unaccounted for community-level characteristic(s) that is not targeting immigrants specifically, then we may expect to find significant associations between anti-immigrant prejudice and mortality among a variety of racial groups, including black and white respondents.

A third possibility is the potential effect of “pure” anti-immigrant animus that is not related to other factors, such as race. In this case, anti-immigrant prejudice is truly about being against foreigners settling in the US, irrespective of whether people are immigrating from Africa, Asia, Central America, Europe, or elsewhere. If this is true, we would expect to observe that anti-immigrant prejudice is associated with mortality across all immigrant groups, regardless of race. Thus, anti-immigrant prejudice would (1) not affect mortality of non-immigrants; and (2) increase the risk of mortality of Asian, black, Hispanic, and white immigrants in equal measure.

A fourth possibility is that anti-immigrant prejudice is also racialized. In this case, community-level prejudice against immigrants would affect mortality for those most likely to be targeted by racialized prejudice. Under this scenario, we would expect that racial/ethnic minorities with large proportions of immigrants, such as Asians and Hispanics, to have increased mortality risk due to higher anti-immigrant prejudice than either white or black Americans. This finding would be consistent with prior observations that Asians and Hispanics are more likely to be perceived as foreigners and un-American. For instance, studies examining social distancing find that whites report other white Americans to be the most prototypical Americans, followed by black Americans. Meanwhile, racial/ethnic minorities, including Hispanic Americans, Asian Americans, Native Americans, and Arab Americans, are perceived as further away from the American prototype (Devos and Banaji, 2005; Dovidio et al., 2010). Thus, because black and white Americans are not often assumed to be immigrants, they should be less affected by community-level anti-immigrant prejudice compared with Asian and Hispanics (regardless of actual immigration status). For the remainder of this paper, the phrase “immigrant minorities” refers to people of racial/ethnic groups that commonly contain large proportions of foreign-born immigrants (i.e., Asians and Hispanics), but may themselves have been born in the US or abroad. This outcome could present itself in two ways. First, the association between community-level anti-immigrant prejudice and mortality risk would be stronger for immigrant minorities and weaker or non-existent for blacks and whites. Secondly, we might find differences by nativity status. Given that foreign-born immigrant minorities are the intended targets of anti-immigrant prejudice, we might find their mortality risk to be heightened due to this prejudice compared to US-born immigrant minorities. We would not expect to find mortality risk differences between foreign-born versus US-born whites or blacks.

Finally, it is possible that US-born immigrant minorities experience the greatest mortality risk from community-level anti-immigrant prejudice, compared with foreign-born immigrant minorities, blacks, and whites. US-born immigrant minorities may have more exposure to interpersonal and structural discrimination, simply because they have lived in the US for a longer period of time on average than foreign-born immigrant minorities. Consistent with this idea, US-born minorities report higher levels of discrimination than their foreign-born counterparts (Brondolo et al., 2015). Furthermore, among foreign-born minorities, those who immigrated at younger ages and who have lived longer in the US report higher levels of racial discrimination than more recent immigrants (Brondolo et al., 2015; Flippen and Parrado, 2015). US-born Asians and Hispanics may also experience worse health effects due to anti-immigrant prejudice than their foreign-born counterparts because they have increased awareness of racial biases in the US (Otiniano Verissimo et al., 2014; Yip et al., 2008). In this case, we would expect that US-born immigrant minorities living in communities with high levels of anti-immigrant prejudice would experience increased mortality risk compared to foreign-born immigrant minorities. Under this scenario, we would still not expect to find differences in mortality by anti-immigrant prejudice for US-born or foreign-born blacks and whites.

With the increasing proportions of immigrants minorities in the US population, and the rise of anti-immigrant sentiments worldwide (Gorodzeisky and Semyonov, 2016; Ybarra et al., 2015), research that assesses the health implications of living in a social environment that is antagonistic towards immigrants is urgently needed (Gee and Ford, 2011; National Academies of Sciences (2016)). Our study is well positioned to begin to address this important research question.

2. Methods

2.1. Participants

We used data from the 1978–2010 General Social Survey (GSS) linked to the National Death Index (NDI) through 2014 (2014 GSS-NDI) (*The, 2014 General Social Survey-National Death Index*, Available online at www.gssndi.com. Accessed 10/5/16; Muennig et al., 2011).

The GSS is a nationally representative sample of the United States non-institutionalized adult population (aged 18+) conducted on a new population sample at each wave. The 2014 GSS-NDI is a new dataset in which questions from 22 waves of the GSS were prospectively linked to mortality data for participants who could be matched to NDI records or were determined to be alive as of 2014. After excluding waves in which key variables of interest for this study were not available, the resulting analytic sample included 10 waves of GSS-NDI participants with mortality data between 1993 and 2014 (N = 13,242).

2.2. Measures

2.2.1. Mortality and time

The main outcome of interest was time to death, or survival. All-cause mortality was obtained from the NDI. Respondents who passed away by 2014 were coded as one, and those still alive in 2014 were coded as zero. Individuals over the study period had a censored amount of time at risk. For the deceased, time was analyzed by subtracting the year of the interview from the year of death. For those still living in 2014, time was calculated by subtracting the year of the interview from 2014.

2.2.2. Anti-immigrant prejudice

Anti-immigrant prejudice was measured as a community-level variable based on five items that were asked repeatedly in the analysis time frame. The GSS used a split-ballot design, so that not all questions were asked among all respondents each year. The questions about immigration attitudes were asked of a randomly selected subset of the total sample in each wave, such that 44%–76% of the sample received these items, depending on question and the year asked. Only respondents who were asked all of the five items were included in the construction of the community-level anti-immigrant prejudice variable. Those who were not asked these questions were considered missing at random, so the community-level measure based on complete cases should be unbiased.

The first question, “Do you think the number of immigrants to America nowadays should be increased a lot, increased a little, remain the same as it is, reduced a little, or reduced a lot?” was asked once in 1996, and in every wave since 2004. The remaining four items were only asked in two years—1996 and 2004. Respondents were asked how much they agreed or disagreed with the following four statements: (1) “America should take stronger measures to exclude illegal immigrants,” (2) “Immigrants take jobs away from people who were born in America,” (3) “Immigrants increase crime rates,” and (4) “Immigrants are generally good for America's economy.” Responses were coded on a five-point Likert scale ranging from “agree strongly” to “disagree strongly.” Each of the items had a small number of missing among the people asked, due to providing no answer. The percentage missing ranged from a low of 4.0% for the item about immigrants taking away jobs to a high of 5.8% for the item about whether the number of immigrants should be increased or reduced.

Each of the five questions was dichotomized to represent the presence or absence of anti-immigrant prejudice. For the first question, individuals who answered that the number of immigrants to America nowadays should be “reduced a lot” were coded as one, while all other responses were coded as zero. Those who “strongly agreed” that America should take stronger measures to exclude illegal immigrants were coded as one. Those who “strongly agreed” or “agreed” that immigrants take jobs away from American-born people and/or increase crime rates were coded as one. Respondents who “strongly disagreed” or “disagreed” that immigrants are generally good for America's economy were coded as one. All other responses were coded as zero. Alternative cut-offs for these 5 items were also assessed and results were similar. Next, the five dichotomous items were summed at the individual level for each respondent with non-missing responses for at least three of the five items, resulting in a score of zero to five for each person. Respondents with less than three valid answers were not included in the creation of the community-level anti-immigration prejudice score. In total, 2,427 respondents had individual-level anti-immigrant prejudice scores. Higher scores indicated greater prejudice. The Cronbach's alpha for the five-item score was 0.72, indicating sufficient inter-item reliability.

We next created a measure of community-level anti-immigrant prejudice that is adapted from prior research on community-level anti-gay prejudice (Hatzenbuehler et al., 2014) and community-level anti-black prejudice (Lee et al., 2015). Individual anti-immigrant prejudice scores were averaged within primary sampling units (PSUs), which are comprised of metropolitan statistical areas or non-metropolitan counties in the GSS that are designed to be the “life spaces” in which individuals live and work. In this study, these geographical spaces are conceptualized as communities where individuals are likely to interact with others socially around their homes, workplaces, or recreational spaces (Gibson, 1995; Hatzenbuehler et al., 2014). On average, each PSU's anti-immigrant score was calculated from 22 respondents (range: 10 to 79). To avoid spurious effects resulting from small samples and influential values, PSUs with fewer than 10 respondents providing anti-immigrant prejudice scores were excluded from analyses (Muthén and Asparouhov, 2011; Snijders and Bosker, 1993). This resulted in the retention of 123 of the original 381 PSUs. Comparisons of the PSUs included in analysis to those that were excluded reveal that the included PSUs had more foreign-born respondents, more “other race” respondents, higher education levels, and higher income.

The final sample contained 13,242 respondents with complete data who lived in 123 PSUs. The median number of respondents per PSU was 150, with a range of 67 to 910.

2.2.3. Race and nativity

Between 1972 and 2000, the respondent's race was coded by the interviewer into one of three categories: white, black, and other. Respondents were asked to self-report race only if the interviewers were unsure. Starting in 2002, race was self-reported by all participants. Further, the categories were expanded to allow the specification of American Indian, Alaska Native, Asian or Pacific Islander subgroups, and Hispanic ethnicity. To maintain consistency over time, our analyses recoded the newer detailed racial categories into the older trichotomous categories (sensitivity analyses using the more detailed categories for respondents are described below). Self-reported nativity was coded as foreign-born = 1, US-born = 0.

2.2.4. Covariates

We included variables that prior research suggested may be potential confounders of the association between anti-immigrant prejudice and mortality. Individual-level covariates included: gender (binary), age (continuous), marital status (married, formerly married, single), years of education (continuous), unemployment (1 = unemployed; 0 = other), and family income (continuous, in 2016 dollars). Family income was square root transformed to reduce skewness.

Self-rated health was included as a categorical variable to control for health status at baseline (Idler and Benyamini, 1997). The original variable included four categories: excellent, good, fair, and poor. The fair and poor categories were collapsed because few people reported being in poor health.

We included four community-level covariates. Percent foreign-born was calculated as the number of foreign-born respondents divided by the total number of respondents in each PSU. This

estimate was then transformed by taking the square root to reduce skewness. Community-level socioeconomic status was measured using two continuous variables: the mean years of education and the mean family income in a PSU. Lastly, percent of the community who identify as politically conservative was calculated. Individual respondents were shown a seven-point scale on which political views that people might hold were arranged from extremely liberal to extremely conservative. Respondents were then asked to place themselves on the scale. Any individual reporting being "slightly" to "extremely" conservative was coded as one for identifying as conservative. All other respondents were coded as zero. Community-level conservatism was then calculated by dividing the number of people identifying as conservative by the total number of respondents in each PSU. Finally, we included a variable controlling for whether the anti-immigration score was based on the 1996 or 2004 samples, in order to adjust for historical changes in overall anti-immigration prejudice in the period between the two measurement time points.

2.3. Statistical analysis

Analyses were completed using Stata v.14 software and employed sample weights using the *svy* command to account for the complex survey design (StataCorp, 2015). The survey weights included an adjustment for potential clustering of standard errors within PSUs. Preliminary analyses included weighted descriptive statistics, stratified by race. Bivariate associations were assessed to examine patterns among individual- and community-level variables.

Next, we employed Cox proportional hazard models to evaluate whether anti-immigrant prejudice at the community level influences time to death. These models allow for analyses that take into account the censored amount of time at risk over the study period for those who died and those still alive by 2014. The first model examined whether community-level anti-immigrant prejudice was associated with premature mortality for the entire sample. The second model controlled for race, nativity, and other individual- and community-level covariates. The third model examined whether nativity status moderated the association between anti-immigrant prejudice and mortality risk. The fourth model examined whether race moderated the association between anti-immigrant prejudice and mortality risk. The fifth model examined the three-way interaction between anti-immigrant prejudice, race, and nativity status on mortality risk. We additionally examined whether the two-way interaction between anti-immigration prejudice and nativity was significant in the sub-samples of whites only, blacks only, and "other race" only. Sensitivity analyses disaggregating the "other race" category into Asian and Hispanic subgroups for the respondents who had these data were also performed.

3. Results

3.1. Descriptive statistics

Table 1 provides the weighted descriptive characteristics of the sample, stratified by race. Whites made up the vast majority of the sample (79%), followed by blacks (14%) and "other race" (8%). Blacks had the highest mortality rate (17% died by 2014) and "other race" respondents had the lowest (9% died by 2014). While more than 90% of whites and blacks were US-born, "other race" respondents were evenly split between US-born (47%) and foreign-born (53%). "Other race" respondents were significantly younger than the total sample, and blacks were younger than whites. Black and white respondents were more likely to be female than male, but "other race" respondents were just as likely to be female as male. Whites were more likely to be married than blacks and "other race" respondents. In terms of socioeconomic status, whites had the highest levels of education and income while blacks had the lowest. Whites were also more likely to report excellent health than both blacks and "other race" respondents. "Other race" respondents lived in PSUs with higher proportions of immigrants and fewer proportions of conservatives than PSUs in which whites lived. The PSUs were similar across races in terms of average levels of education and income. Whites were most likely to live in communities with higher levels of anti-immigrant prejudice, and "other race" respondents were least likely to live in communities with high anti-immigration prejudice.

3.2. Associations between anti-immigrant prejudice, nativity, race and mortality

Table 2 displays the results of the Cox proportional hazard models that evaluate the associations between anti-immigrant prejudice and mortality risk in the entire analytic sample. Model 1 showed that higher community-level anti-immigrant prejudice was associated with slightly higher risk of dying (HR = 1.10 [95% CI: 0.99, 1.22]), but this association was only marginally significant ($p < 0.1$). After controlling for demographic characteristics, socioeconomic status, self-rated health, community-level characteristics, and survey year in Model 2, the association between anti-immigrant prejudice and mortality was not significant. Model 3 showed that nativity was not a significant moderator of the association between anti-immigrant prejudice and mortality. Model 4 additionally showed that race was also not a significant moderator of the association between anti-immigrant prejudice and mortality. Lastly, Model 5 revealed a significant three-way interaction, such that anti-immigrant prejudice and mortality varied by both race and nativity (F-test = 4.04, $p = 0.018$).

3.3. Associations between anti-immigrant prejudice and mortality, stratified by race

Table 3 examines the associations between anti-immigrant prejudice and mortality, stratifying the sample by racial group: whites, blacks, and "other race" only. For each racial group, we tested whether anti-immigrant prejudice was associated with mortality, and whether this association varied by nativity status, controlling for all the covariates. Anti-immigrant prejudice was not associated with mortality after controlling for covariates for any of the race groups. In addition, the interaction between anti-immigrant prejudice and nativity status was not associated with mortality for whites or for blacks. However, for "other race" respondents, the interaction between anti-immigrant prejudice and nativity status was significantly associated with mortality (HR = 0.29 [95% CI: 0.11, 0.76], $p = 0.012$).

Although this interaction was significant in the "other race" category, further tests showed that anti-immigrant prejudice was not significantly associated with mortality among US-born only (HR = 1.52 [95% CI: 0.75, 3.08], $p = 0.239$) nor among foreign-born only (HR = 0.44 [95% CI: 0.18, 1.08], $p = 0.074$) respondents. The interaction was significant because the association between anti-immigrant prejudice and mortality for US-born respondents was significantly different compared to foreign-born respondents.

3.4. Association between anti-immigrant prejudice and mortality for "other race" only

Fig. 1 displays the likelihood of survival over the study period, distinguishing between US-born and foreign-born "other race" respondents who live in areas of either high- or low-anti-immigrant prejudice. We defined a community with high

Table 1
Sample demographics by race: General Social Survey-National Death Index, 1993–2014 (N = 13,242).

Variable	Total (N = 13,242)		White (N = 10,414)		Black (N = 1,794)		Other race (N = 1,034)	
	Weighted mean or proportion	95% CI	Weighted mean or proportion	95% CI	Weighted mean or proportion	95% CI	Weighted mean or proportion	95% CI
Deceased by 2014	0.14	(0.12, 0.15)	0.14	(0.12, 0.15)	0.17	(0.15, 0.20)	0.09	(0.07, 0.11)
Foreign-born	0.12	(0.09, 0.14)	0.07	(0.06, 0.09)	0.09	(0.06, 0.14)	0.53	(0.46, 0.59)
Age	43.51	(42.95, 44.07)	44.61	(44.00, 45.21)	41.52	(40.41, 42.64)	36.56	(35.74, 37.38)
Female	0.53	(0.52, 0.54)	0.52	(0.51, 0.53)	0.60	(0.57, 0.63)	0.50	(0.46, 0.53)
Marital status								
Married	0.56	(0.55, 0.58)	0.60	(0.58, 0.61)	0.38	(0.34, 0.41)	0.51	(0.48, 0.54)
Formerly married	0.20	(0.19, 0.21)	0.20	(0.19, 0.21)	0.25	(0.22, 0.27)	0.14	(0.12, 0.17)
Single	0.24	(0.22, 0.26)	0.20	(0.19, 0.22)	0.38	(0.35, 0.41)	0.35	(0.32, 0.38)
Years of education	13.56	(13.42, 13.71)	13.72	(13.55, 13.88)	12.85	(12.65, 13.04)	13.23	(12.89, 13.56)
Family income in $1,000 (sqrt)	8.08	(7.89, 8.27)	8.36	(8.13, 8.59)	6.76	(6.51, 7.02)	7.51	(7.15, 7.88)
Self-rated health								
Excellent	0.30	(0.28, 0.31)	0.31	(0.29, 0.33)	0.25	(0.23, 0.27)	0.24	(0.22, 0.27)
Good	0.50	(0.49, 0.52)	0.50	(0.49, 0.51)	0.51	(0.47, 0.54)	0.52	(0.49, 0.56)
Fair/Poor health	0.20	(0.19, 0.21)	0.19	(0.18, 0.20)	0.24	(0.21, 0.27)	0.23	(0.20, 0.26)
PSU Proportion foreign-born (sqrt)	0.30	(0.26, 0.33)	0.28	(0.25, 0.32)	0.32	(0.27, 0.38)	0.40	(0.35, 0.44)
PSU Average years of education	13.45	(13.31, 13.59)	13.43	(13.28, 13.58)	13.49	(13.30, 13.69)	13.58	(13.38, 13.78)
PSU Average family income in $1000	70.01	(66.75, 73.27)	69.36	(66.18, 72.55)	71.85	(67.79, 75.90)	73.17	(67.74, 78.59)
PSU Proportion conservative	0.35	(0.33, 0.36)	0.35	(0.34, 0.36)	0.34	(0.32, 0.37)	0.33	(0.31, 0.34)
PSU Year of survey on anti-immigration variables								
1996	0.61	(0.50, 0.70)	0.62	(0.52, 0.71)	0.63	(0.48, 0.75)	0.52	(0.34, 0.69)
2004	0.39	(0.30, 0.50)	0.38	(0.29, 0.48)	0.37	(0.25, 0.52)	0.48	(0.31, 0.66)
PSU Anti-immigrant prejudice	1.66	(1.54, 1.78)	1.70	(1.58, 1.82)	1.60	(1.44, 1.75)	1.38	(1.26, 1.51)

CI = confidence interval.
Sqrt = variable transformed by taking the square root in order to reduce skewness.
PSU = primary sampling unit.

Table 2
Cox proportional hazard models of hazards of death on anti-immigrant prejudice, nativity, race, and covariates. General Social Survey-National Death Index, 1993–2014 (N = 13,242).

Variables	Model 1 HR (95% CI)	Model 2 HR (95% CI)	Model 3 HR (95% CI)	Model 5 HR (95% CI)	Model 6 HR (95% CI)
Anti-immigrant prejudice	1.10†	1.05	1.07	1.05	1.06
	(0.99–1.22)	(0.93–1.19)	(0.94–1.21)	(0.93–1.18)	(0.93–1.20)
Nativity					
US-born		ref	ref	ref	ref
Foreign-born		0.76*	1.33	0.76*	0.93
		(0.59–0.99)	(0.63–2.81)	(0.59–0.98)	(0.38–2.25)
Race					
White		ref	ref	ref	ref
Black		1.34***	1.34***	1.23	1.29
		(1.16–1.54)	(1.17–1.54)	(0.86–1.77)	(0.89–1.87)
Other race		1.25	1.24	1.65	0.64
		(0.96–1.63)	(0.95–1.63)	(0.76–3.58)	(0.25–1.65)
2-Way interaction: nativity & prejudice					
US-born x anti-immigrant prejudice			ref		ref
Foreign-born x anti-immigrant prejudice			0.68		0.84
			(0.43–1.08)		(0.48–1.48)
2-Way interaction: race & prejudice					
White x anti-immigrant prejudice				ref	ref
Black x anti-immigrant prejudice				1.05	1.03
				(0.85–1.30)	(0.83–1.27)
Other race x anti-immigrant prejduice				0.83	1.39
				(0.49–1.40)	(0.76–2.55)
3-Way interaction: nativity, race, & prejudice					
White x US-born					ref
White x foreign-born					ref
Black x US-born					ref
Black x foreign-born					0.39
					(0.088–1.71)
Other race x US-born					ref
Other race x foreign-born					5.97*
					(1.26–28.2)
White x US-born x anti-immigrant prejudice					ref
White x foreign-born x anti-immigrant prejudice					ref
Black x US-born x anti-immigrant prejudice					ref
Black x foreign-born x anti-immigrant prejudice					1.77
					(0.68–4.58)
Other race x US-born x anti-immigrant prejudice					ref
Other race x foreign-born x anti-immigrant prejudice					0.35†
					(0.12–1.01)
Age		1.06***	1.06***	1.06***	1.06***
		(1.06–1.06)	(1.06–1.06)	(1.06–1.06)	(1.06–1.06)
Gender					
Male		ref	ref	ref	ref
Female		0.73***	0.73***	0.73***	0.73***
		(0.66–0.81)	(0.66–0.81)	(0.66–0.81)	(0.66–0.81)
Marital status					
Married		ref	ref	ref	ref
Formerly married		1.24***	1.24***	1.24***	1.24***
		(1.10–1.39)	(1.10–1.39)	(1.10–1.39)	(1.10–1.40)
Single		1.23*	1.23*	1.23*	1.24*
		(1.03–1.47)	(1.03–1.47)	(1.03–1.46)	(1.04–1.48)
Years of education		0.99	0.99	0.99	0.99
		(0.97–1.01)	(0.97–1.01)	(0.97–1.00)	(0.97–1.00)
Income (square-root)		0.96***	0.96***	0.96***	0.96***
		(0.94–0.98)	(0.94–0.98)	(0.94–0.98)	(0.95–0.98)
Self-rated health					
Excellent		ref	ref	ref	ref
Good		1.14†	1.14†	1.14†	1.13†
		(0.98–1.31)	(0.98–1.31)	(0.98–1.31)	(0.98–1.31)
Fair/poor		1.66***	1.66***	1.66***	1.66***
		(1.42–1.94)	(1.42–1.94)	(1.42–1.94)	(1.42–1.94)
PSU proportion foreign-born (square-root)		2.27**	2.18**	2.24**	2.22**
		(1.34–3.84)	(1.27–3.75)	(1.32–3.81)	(1.28–3.83)
PSU average years of education		0.93	0.94	0.93	0.94
		(0.85–1.02)	(0.85–1.03)	(0.85–1.02)	(0.85–1.03)
PSU average family income		1.00	1.00	1.00	1.00
		(1.00–1.01)	(1.00–1.01)	(1.00–1.01)	(1.00–1.01)
PSU proportion conservative		1.39	1.36	1.36	1.35
		(0.57–3.38)	(0.56–3.33)	(0.56–3.27)	(0.55–3.29)

(*continued on next page*)

Table 2 (*continued*)

Variables	Model 1 HR (95% CI)	Model 2 HR (95% CI)	Model 3 HR (95% CI)	Model 5 HR (95% CI)	Model 6 HR (95% CI)
Survey year					
1996		ref	ref	ref	ref
2004		0.97 (0.83–1.12)	0.96 (0.83–1.11)	0.96 (0.83–1.11)	0.96 (0.83–1.11)

***p < 0.001, **p < 0.01, *p < 0.05, †p < 0.1.
HR = hazard ratio.
CI = confidence interval.
Ref = reference category.
PSU = primary sampling unit.

Table 3
Hazard ratios of the association between community-level anti-immigrant prejudice and mortality by nativity status and racial group: General Social Survey-National Death Index, 1993–2014 (N = 13,242).

Race subpopulation	Variable	Model 1		Model 2	
		HR	95% CI	HR	95% CI
All	Anti-immigrant prejudice	1.05	(0.93, 1.19)	1.07	(0.94, 1.21)
N = 13,242	Foreign-born	**0.76**	**(0.59, 0.99)**	1.33	(0.63, 2.81)
	Anti-immigrant prejudice x foreign-born			0.68	(0.43, 1.08)
White	Anti-immigrant prejudice	1.03	(0.92, 1.17)	1.04	(0.92, 1.17)
N = 10,414	Foreign-born	**0.72**	**(0.55, 0.93)**	0.91	(0.36, 2.30)
	Anti-immigrant prejudice x foreign-born			0.85	(0.47, 1.53)
Black	Anti-immigrant prejudice	1.10	(0.84, 1.44)	1.09	(0.82, 1.44)
N = 1,794	Foreign-born	0.64	(0.40, 1.01)	0.41	(0.11, 1.49)
	Anti-immigrant prejudice x foreign-born			1.36	(0.63, 2.95)
Other	Anti-immigrant prejudice	0.94	(0.50, 1.80)	1.52	(0.75, 3.08)
N = 1,034	Foreign-born	0.87	(0.53, 1.43)	**4.99**	**(1.16, 21.5)**
	Anti-immigrant prejudice x foreign-born			**0.29**	**(0.11, 0.76)**

NOTE: Cox proportional hazards models controlled for age, gender, marital status, years of education, income (square-root), self-rated health, percent foreign born in primary sampling unit (PSU) (square-root), mean years of education in PSU, mean income in PSU, percent conservative in PSU, and year of survey. Models for "all races" additionally controlled for race.
Bold face indicates statistically significant at p < 0.05.

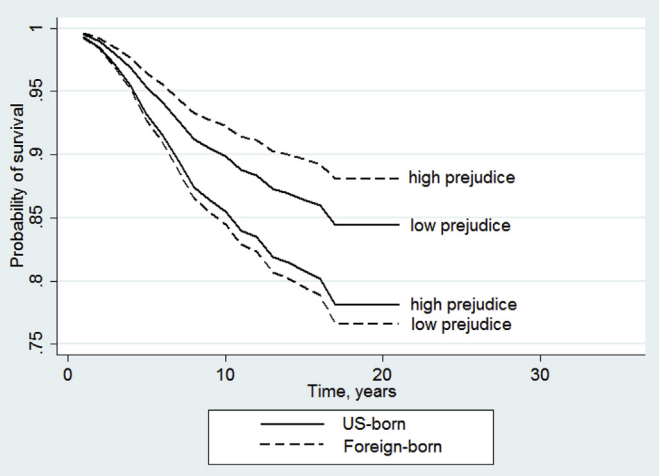


Fig. 1. Chance of survival by high/low anti-immigrant prejudice and nativity status among "other race" people: General Social Survey-National Death Index, 1993–2014 (N = 1034).
NOTE: Low prejudice is defined as one standard deviation below the mean for community-level anti-immigrant prejudice (0.93). High prejudice is defined as one standard deviation above the mean for community-level anti-immigrant prejudice (1.83). Model controls for age, gender, marital status, years of education, income (square-root), self-rated health, percent foreign born in primary sampling unit (PSU) (square-root), mean years of education in PSU, mean income in PSU, percent conservative in PSU, and year of survey.

prejudice as having an anti-immigrant prejudice score of one standard deviation above the mean (score of 1.83) and a community with low prejudice as having an anti-immigrant prejudice score of one standard deviation below the mean (score of 0.93).

For US-born "other-race" respondents, living in a high prejudice community seemed to be associated with increased mortality risk. The mortality hazard ratio for US-born respondents living in high-prejudice communities (HR = 2.63 [95% CI: 0.53, 13.12]) was 171% higher than US-born respondents living in low-prejudice communities (HR = 1.54 [95% CI: 0.75, 3.18]). Although the 95% confidence intervals of these hazard ratios overlap, this figure shows that mortality risk for US-born respondents was generally greater when living in high (vs. low) prejudice communities.

For foreign-born respondents, the direction of the association between anti-immigrant prejudice and mortality was the opposite. The mortality hazard ratio for foreign-born respondents living in the high-prejudice communities (HR = 0.15 [95% CI: 0.02, 1.20]) was 287% lower than foreign-born respondents living in low-prejudice communities (HR = 0.43 [95% CI: 0.17, 1.09]). The confidence intervals for the hazard ratios for foreign-born "other race" respondents were too wide to be conclusive. Nevertheless, the overall trends suggest that anti-immigrant prejudice was more detrimental to the survival of US-born "other race" respondents than foreign-born "other-race" respondents, and was perhaps even protective for foreign-born "other race" respondents.

3.5. Sensitivity analyses

We conducted additional analyses on Asians and Hispanics within the "other race" category for participants surveyed in 2002 and after to determine whether the results were similar among

respondents for who more detailed categories of race/ethnicity were available. Of the 1,034 other race respondents, 195 (18.9%) identified as Asian, 364 (35.2%) as Hispanic, 63 (6.1%) as American Indian or Alaska Native, and 18 (1.7%) as some other race. The remaining 38.1% of those in the "other race" category did not have specific race/ethnicity data available.

The results for the Asian and Hispanic subsample corresponded with the results found for the larger "other race" category (Appendix 1 and 2). Together, US-born Asians and Hispanics living in high-prejudice communities (HR = 10.32 [95% CI: 1.06, 100.52]) had a mortality ratio that was 361% greater than those living in low-prejudice communities (HR = 2.86 [95% CI: 1.03, 7.95]). Foreign-born Asians and Hispanics living in high-prejudice communities (HR = 0.50 [95% CI: 0.10, 2.65]) had a mortality ratio that was 146% lower than those living in low-prejudice communities (HR = 0.73 [95% CI: 0.35, 1.55]). These confidence intervals were too wide to be conclusive; however, the overall trends coincide with the trends for the larger "other race" category.

When examining Asians alone, the interaction between anti-immigrant prejudice and nativity was statistically significant and in the same direction as it was for the larger "other race" category. When examining Hispanics alone, the interaction between anti-immigrant prejudice and nativity was not statistically significant, but the trends were similar to those for Asians. The findings from these sensitivity analyses should be interpreted cautiously due to small sample sizes, but the trends are consistent with the findings reported in the broader analysis.

4. Discussion

The aim of this study was to determine whether anti-immigrant prejudice at the community level increased individuals' risk of dying, and whether this risk differed by race and nativity status, using nationally representative prospective data from the 2014 GSS-NDI. The data indicate several findings and potential interpretations.

First, community-level anti-immigrant prejudice was not associated with mortality for immigrants as a whole. If prejudice against immigrants truly reflected broad social attitudes against all foreign-born persons living in the US, we would expect to find some mortality difference by nativity status, regardless of race, but this was not observed in the current study. Second, anti-immigrant prejudice was not associated with mortality for whites or blacks, regardless of their nativity. This null finding is consistent with evidence that whites and blacks are more likely to be accepted as Americans (e.g., Devos and Banaji, 2005; Dovidio et al., 2010), irrespective of actual immigration status. This suggests that whites and blacks are not likely to be affected by the consequences of anti-immigrant prejudice that is directed towards groups that have larger proportions of immigrants.

Third, US-born immigrant minorities seemed to experience increased mortality risk in communities with high anti-immigrant prejudice, compared to those living in communities with lower levels of anti-immigrant prejudice. In contrast, foreign-born immigrant minorities seemed to experience a mortality advantage when living in communities with high anti-immigrant prejudice, compared to communities with lower levels of anti-immigrant prejudice. One possible explanation for these results is that US-born immigrant minorities were exposed to prejudiced community attitudes for a longer period of time. In these data, US-born respondents had a longer average duration of residence in a PSU (16.0 years [95% CI: 14.6, 17.3]) compared with foreign-born residents (9.9 years [95% CI: 7.6, 12.2]). Other research has shown that foreign-born immigrants tend to be more mobile within the US (Portes and Rumbaut, 2014; Zúñiga and Hernandez-Leon, 2005). Thus, it is possible that foreign-born residents did not reside in their communities long enough for the negative effects of anti-immigrant prejudice to manifest. Additionally, US-born immigrant minorities grew up in the US, making them more likely than their foreign-born counterparts to be exposed to racialized attitudes against immigrants during critical periods of identity development. Exposure to discrimination in adolescence has negative effects on mental health and health behaviors (Flores et al., 2010; Hwang and Goto, 2008) that, over time, could increase risk for morbidity and mortality. Another possible explanation is that US-born immigrant minorities are more affected by community-level prejudice than foreign-born immigrant minorities because they are more integrated into the dominant culture. Sociological theory on social capital suggests that the effects of contextual-level factors depends on the degree to which individuals are connected to their community's social networks (Carpiano, 2006). Unfortunately, not enough respondents in the GSS were asked about duration of residence, age at immigration, or social networks in order to assess the roles of these factors on mortality risk in this study. Further investigation of these possible explanations is important for future research.

Questions also remain as to the reasons for the apparent protective effect of high community-level prejudice on mortality outcomes for foreign-born immigrant minorities observed in this study. This finding might reflect selective migration, such that foreign-born persons who are able to move into and persist in prejudiced environments have considerable economic and social capital that is protective against negative health outcomes, including mortality. It is also possible that within PSUs, foreign-born immigrant minorities in this sample were more likely to live in smaller, more isolated ethnic enclaves with more homogenous social networks of other immigrants (Li, 2004; Logan et al., 2002); if so, they may be protected from the negative effects of community prejudice vis social and economic capital. This idea is supported by evidence that foreign-born immigrants who are more incorporated into dominant US culture report higher levels of discrimination (Flippen and Parrado, 2015). Unfortunately, we do not have information on neighborhood sociodemographic characteristics for areas smaller than the PSU to test this hypothesis.

It is also probable that our sample of foreign-born "other race" respondents in the GSS-NDI is not representative of most foreign-born Asian and Hispanic immigrants living in the US because the sample was restricted to only English-speaking subjects. Therefore, our study underrepresents Asian and Hispanic persons with limited English proficiency as well as undocumented persons. The foreign-born immigrant minorities included in the GSS-NDI sample likely represent a unique subset of this population that have the most social, economic, and health resources available to them. In fact, average family income for foreign-born "other race" respondents in the sample was $61,000, compared to $52,000 for US-born "other race" respondents. Additionally, foreign-born respondents in the "other race" category lived in PSUs with the highest average family income, education, and proportion foreign-born compared to US-born "other race" respondents, blacks, and whites. Although we do not have data to further evaluate why higher community-level prejudice lowered mortality for foreign-born immigrant minorities in this study, it is likely that the characteristics of this subsample and selection into certain communities may have influenced this finding.

There are important limitations of this study that should be noted. The relatively small sample size for "other race" respondents limited the power to detect significant associations between anti-immigrant prejudice and mortality among US-born (n = 506) and foreign-born respondents (n = 528) separately. These results should therefore be interpreted with some caution. Future studies should consider oversampling immigrant minorities.

A related issue is the use of the "other race" respondent group as a proxy for non-white and non-black immigrant minorities. On the one hand, sensitivity analyses using the data available for specific racial/ethnic groups showed that the results combining Asians and Hispanics were consistent with those for the "other race" category. However, small sample sizes further limited the power of subgroup analyses, such that associations for Asians and Hispanics alone were either unreliable or non-significant.

Another issue is that community-level anti-immigrant prejudice was measured at only one point in time for each respondent, based on the aggregate scores of individuals sampled within PSUs. Therefore, we were unable to account for any increases or decreases in anti-immigrant prejudice that may have occurred within communities over the study period. In addition, our measurement of community-level prejudice was at the level of the PSU (metropolitan statistical area or rural counties). It is possible that populations, especially foreign-born groups, are more impacted by smaller geographical areas, such as neighborhoods, that were not captured in this study. Another issue related to measurement was that we were only able to calculate community-level anti-immigrant prejudice in one-third of the available PSUs in the 2014 GSS-NDI, since questions were not asked in all years or in all PSUs. Therefore, the data may be influenced by selection bias. The excluded PSUs had fewer foreign-born, fewer "other race" respondents, lower education, and lower income. It is possible that "other race" respondents living in communities with fewer co-ethnics and lower socioeconomic status have even fewer economic and social resources to cope with anti-immigrant prejudice. Therefore, community-level prejudice may have had a greater impact on "other race" respondents in the excluded PSUs, making our current estimates more conservative.

Lastly, although we controlled for many possible confounders at the individual and community levels, there might be residual confounding due to omitted variables. For example, we were unable to account for residential segregation, crime rates, or availability of health care because the GSS does not make available the geocodes for participants.

Despite these limitations, this study also possesses several strengths. First, the dataset provided the unique opportunity to examine how collective attitudes about immigrants are related to mortality outcomes for individuals from immigrant populations. Most discrimination studies among racial/ethnic minorities such as Asians and Latinos examine how people's self-reported experiences of discrimination impact their health (Gee et al., 2009; Gee et al., 2006; Gee et al., 2007). A novel feature of this study is that we do not ask about a person's own experiences with discrimination, which are subject to a variety of reporting biases, including poor recall, social desirability, and reinterpretation (Meyer, 2003). Rather, we ask about prejudicial attitudes from multiple respondents, allowing for a more reliable estimate of a community-level exposure to prejudice. Importantly, this study responds to calls in the discrimination literature to move beyond individual reports of discrimination to consider discrimination at higher units of analysis, such as racial climate (Gee and Ford, 2011; Viruell-Fuentes et al., 2012; Williams and Mohammed, 2009). Furthermore, this is the first study to our knowledge to address anti-immigrant prejudice at an area-based level, adding to a small but growing literature (Rhodes et al., 2014).

The findings of this study contribute to an emerging body of research on structural stigma and mortality risk among minority populations in the US (e.g., Chae et al., 2015; Lee et al., 2015). To our knowledge, the current study is the first to evaluate the association between structural anti-immigrant prejudice on mortality risk for racial/ethnic minorities with large proportions of immigrants. This study therefore deepens our understanding of how structural stigma impacts the health of immigrant groups. Importantly, this research shows that the health and longevity of US-born immigrant minorities are likely to be negatively affected by anti-immigrant prejudice. Future studies on the impact of anti-immigrant prejudice on health outcomes other than mortality for foreign-born immigrants and their US-born co-ethnics, as well as the effects of anti-immigration policies, are warranted.

Appendix 1

Cox proportional hazard models of association between anti-immigrant prejudice, nativity status, and mortality for Asian and Hispanic respondents. General Social Survey-National Death Index, 1993–2014 (N = 559).

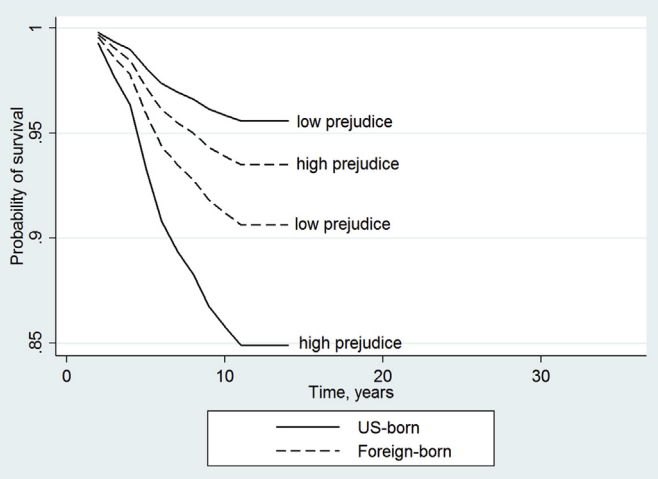
Variables	Asians & Hispanics (N = 559)		Asians Only (N = 195)		Hispanics Only (N = 364)	
	Model 1 HR (95% CI)	Model 2 HR (95% CI)	Model 1 HR (95% CI)	Model 2 [a] HR (95% CI)	Model 1 HR (95% CI)	Model 2 HR (95% CI)
Anti-immigrant prejudice	1.30 (0.69–2.47)	2.77* (1.03–7.49)	2.63 (0.52–13.3)	353,384** (36.3–3.44e+09)	0.94 (0.42–2.09)	1.59 (0.48–5.22)
Nativity						
US-born	ref	ref	ref	ref	ref	ref
Foreign-born	1.49 (0.68–3.26)	8.44* (1.63–43.8)	0.55 (0.11–2.74)	1.14e+07* (29.5–4.41e+12)	2.06† (0.90–4.69)	7.34† (0.90–59.7)
2-Way interaction: nativity & prejudice						
US-born x anti-immigrant prejudice		ref		ref		ref
Foreign-born x anti-immigrant prejudice		0.27* (0.089–0.81)		4.7e-06** (1.4e-09 - 0.016)		0.38 (0.10–1.43)
Age	1.05*** (1.03–1.08)	1.05*** (1.03–1.08)	1.03 (0.96–1.10)	1.06 (0.97–1.17)	1.06*** (1.04–1.09)	1.06*** (1.04–1.09)
Gender						
Male	ref	ref	ref	ref	ref	ref
Female	0.41** (0.23–0.74)	0.41** (0.22–0.74)	0.12 (0.0087–1.59)	0.030*** (0.0057–0.16)	0.61 (0.30–1.23)	0.60 (0.29–1.24)
Marital status[b]						
Married	ref	ref	–	–	ref	ref
Formerly married	0.89	0.91	–	–	0.92	0.93

(*continued*)

Variables	Asians & Hispanics (N = 559)		Asians Only (N = 195)		Hispanics Only (N = 364)	
	Model 1 HR (95% CI)	Model 2 HR (95% CI)	Model 1 HR (95% CI)	Model 2 [a] HR (95% CI)	Model 1 HR (95% CI)	Model 2 HR (95% CI)
	(0.39–2.04)	(0.39–2.13)			(0.31–2.71)	(0.31–2.83)
Single	0.28** (0.11–0.71)	0.30* (0.12–0.77)	–	–	0.39† (0.15–1.01)	0.40† (0.16–1.01)
Years of education	0.93* (0.86–1.00)	0.92* (0.86–0.99)	1.14 (0.78–1.66)	1.04 (0.85–1.27)	0.95 (0.84–1.07)	0.94 (0.84–1.07)
Income (sqrt)	1.01 (0.90–1.13)	1.02 (0.91–1.14)	1.04 (0.86–1.26)	0.99 (0.85–1.15)	1.00 (0.88–1.15)	1.01 (0.88–1.16)
Self-rated health						
Excellent	ref	ref	ref	ref	ref	ref
Good	1.37 (0.61–3.06)	1.35 (0.62–2.94)	2.06 (0.11–39.4)	2.13 (0.10–44.2)	1.42 (0.53–3.84)	1.41 (0.53–3.76)
Fair/Poor	1.04 (0.41–2.63)	0.98 (0.38–2.53)	1.24 (0.055–27.6)	0.72 (0.067–7.78)	1.12 (0.43–2.93)	1.08 (0.40–2.93)
PSU proportion foreign-born (sqrt)	24.0* (1.53–376)	21.0* (1.33–331)	1.47 (0.0017–1310)	26.2 (0.40–1720)	14.2 (0.29–688)	13.3 (0.26–684)
PSU average years of education	1.28 (0.73–2.24)	1.42 (0.84–2.42)	1.20 (0.28–5.12)	1.86 (0.32–11.0)	1.29 (0.68–2.46)	1.42 (0.75–2.66)
PSU average family income	1.00 (0.97–1.02)	1.00 (0.97–1.02)	1.02 (0.98–1.06)	1.02 (0.98–1.07)	1.00 (0.98–1.03)	1.00 (0.97–1.03)
PSU proportion conservative	7.57 (0.069–829)	9.39 (0.11–795)	0.0026 (5.6e-09 - 1255)	0.29 (0.000092–941)	18.0 (0.032–10,010)	21.2 (0.054–8239)
Survey year						
1996	ref	ref	ref	ref	ref	ref
2004	1.36 (0.59–3.13)	1.34 (0.58–3.11)	1.53 (0.28–8.31)	3.18 (0.53–18.9)	0.99 (0.33–3.01)	0.97 (0.32–2.90)

***p < 0.001, **p < 0.01, *p < 0.05, †p < 0.1.
NOTE: Continuous variables that are centered at the mean include: age, years of education, income (sqrt), PSU proportion foreign-born (sqrt), PSU average years of education, PSU average family income, and PSU proportion conservative.
HR = hazard ratio.
CI = confidence interval.
Ref = reference group.
Sqrt = variable transformed by taking the square-root in order to reduce skewness.
PSU = primary sampling unit.
[a] The large coefficient estimates in this model are unreliable due to small sample size.
[b] Marital status was dropped from analyses for the Asian only subgroup due to small sample size.

Appendix 2



Chance of survival by high/low anti-immigrant prejudice and nativity status among Asians and Hispanics: General Social Survey-National Death Index, 1993–2014 (N = 559). NOTE: Low prejudice is defined as one standard deviation below the mean for community-level anti-immigrant prejudice (0.93). High prejudice is defined as one standard deviation above the mean for community-level anti-immigrant prejudice (1.83). Model controls for age, gender, marital status, years of education, income (square-root), self-rated health, percent foreign born in primary sampling unit (PSU) (square-root), mean years of education in PSU, mean income in PSU, percent conservative in PSU, and year of survey.

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