Article

Immigration concern and the white/non-white difference in smoking: Group position theory and health

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A B S T R A C T

National data indicate that U.S. whites have a higher prevalence of smoking compared to non-whites. Group position theory and public opinion data suggest racial differences in immigration concern. This study examines whether immigration concern mediates the racial difference in smoking. Drawing on the 2012 General Social Survey, the 2012 American National Election Study, and the 2006 Portraits of American Life Study, immigration concern was associated with smoking, controlling for covariates across all three nationally representative surveys. Mediation analysis indicated that immigration concern partially mediated the higher odds of smoking among whites across all surveys. Immigration concern also presents a possible explanation for the healthy immigrant advantage and Hispanic paradox as they pertain to smoking differences.

1. Introduction

Attitudes about immigration can be contentious. Sizable percentages of the U.S. population agree that immigrants "take jobs, health care," with 63% in July 1994, 38% in July 2000, 52% in March 2006, and 41% in March 2013 (Pew Research, 2013b). More recent data (June 2013) indicate that 51% agree that legalizing undocumented immigrants in the U.S. "would take jobs from U.S. citizens" (Pew Research, 2013a). Concerns about immigration informed the federal government shutdown and opposition to the Affordable Care Act in 2013 (Greenberg, Carville & Seifert, 2013), and threatened a federal government shutdown at the close of 2014 (Schlesinger, 2014), and a partial federal government shutdown in early 2015 (Sarly, 2015). Immigration can be a source of individual stress and negative emotion in the U.S. (Greenberg et al., 2013), factors proximal to smoking (Kassel, Stroud & Paronis, 2003). Concerns about immigration are also not limited solely to the United States, as they played a key role in the United Kingdom's momentous referendum vote to leave the European Union (Ashcroft, 2016). Drawing upon the social psychological lens afforded by group position theory, a longstanding sociological theory examining intergroup attitudes, the present study examines whether these worrisome attitudes about immigration might shed light on race-based differences in smoking as an emotion and stress-related health behavior.

One of the leading sociological social psychological theories on racial attitudes for over the last half century, group position theory predicts racial group differences on immigration attitudes by attribut-

ing such differences to dominant/subordinate position in a society's racial group hierarchy (Hutchings & Wong, 2014). Group position theory argues that perceived zero-sum competition for scarce resources alongside the dominant group's feelings of entitlement or proprietary access to scarce resources and opportunities can engender emotional hostility towards perceived out-group competitors (Blumer, 1958; Bobo, 1999). According to group position theory, perceived group competition encompasses elements of economic precariousness due to perceived economic competition (Quillian, 1995), and negative affect due to encroachment on the dominant group's perceived group entitlements and boundaries (Bobo, 1999). As a sociological theory of racial prejudice, group position theory's approach to understanding smoking behavior would be similar to research that has found a relationship between smoking and racial resentment, an indicator of contemporary racial prejudice that also highlights group-based negative affect (Samson, 2015b). Perceived economic insecurity and negative group-based emotion potentially link perceptions of group competition and smoking.

Research on substance use has long shown a relationship between smoking and both economic insecurity (Prochaska, Rogers & Shi, 2013; Carroll-Scott, Earnshaw, Ickovics, Rosenthal & Santilli, 2012), and negative emotion (Kassel et al., 2003). Periods of economic crisis have been linked to increased smoking among the unemployed (Gallus, Ghislandi & Muttarak, 2015). Potential mechanisms linking economic insecurity with smoking include feeling a loss of control, with smoking acting as a coping behavior (De Vogli & Santinello, 2005), or as relief for stress or tension (Rosenthal, Carroll-Scott, Earnshaw, Santilli &

Ickovics, 2012). Individuals who perceive immigrant group competition may similarly experience a sense of low control over the availability of jobs. Likewise, numerous studies have found associations between smoking and negative affect, such as aggression suppression in animal studies and anger reduction in laboratory-based human studies (Kassel et al., 2003). The anger-smoking link is worth particular consideration; a laboratory-based study revealed that random exposure to a demographic prime indicating a future in which whites would be a demographic minority (i.e. a loss in dominant group position) prompted increased feelings of anger and fear towards ethnic minorities among white student participants (Outten, Schmitt, Miller & Garcia, 2012).

Data from the Substance Abuse and Mental Health Services Administration (SAMHSA), the Centers for Disease Control and Prevention (CDC), the U.S. Census Bureau, and the National Longitudinal Study of Adolescent to Adult Health (Add Health) report that non-Hispanic whites in the U.S. typically have a higher prevalence of smoking compared to other ethno-racial groups, except American Indians/Alaska Natives and mixed race individuals (Agaku, Jamal, King, Kenemer, Neff & O'Connor, 2014; Kandel, Kiros, Schaffran & Hu, 2004; Substance Abuse & Mental Health Services Administration, 2014; Trinidad, Pérez-Stable, White, Emery & Messer, 2011). T This white/non-white smoking difference is more evident among teenagers and those in their early 20's (Lawrence et al., 2014). Factors tied to the racial/ethnic smoking difference include peer influence, parental smoking, family composition, delinquency, and academic attitudes (Kandel et al., 2004). However, prior research on smoking has not examined the occasionally contentious issue of immigration, as reflected in the aforementioned attitudes towards immigration. Research has already linked political attitudes and smoking, recognizing that attitudes are multidimensional constructs that can capture not only political opinion but stress and emotion as well (Samson, 2015b). Moreover, intergroup attitudes, such as group-based prejudice, have been found to predict both all-cause mortality, cardiovascular-related mortality, and circulatory-disease-related death (Hatzenbuehler, Bellatorre & Muennig, 2013; Lee, Muennig, Hatzenbuehler & Kawachi 2015; Leitner, Hehman, Ayduk, & Mendoza-Denton, 2016).

Studies on immigration attitudes and national identity have revealed racial differences that confirm group position theory. Five out of six immigration-related attitudes among whites, the dominant group, are associated with perceived zero-sum competition, compared to only two such immigration attitudes among blacks (Hutchings & Wong, 2014). In another study, Asian Americans' opposition to undocumented immigration is positively correlated to their perceived commonality with whites, while support for undocumented immigration is tied to perceived commonality with Hispanics and blacks (Samson, 2015a). The apparently special import of immigration concerns for whites is also reflected in studies finding that whites compared to other racial groups are more likely to see themselves as American, and have a stronger implicit association equating the category "white" and the category "American" (Devos & Banaji, 2005).

In light of group position theory's focus on dominant group entitlement and emotionally laden perceptions of out-group threat, numerous national data reporting a higher prevalence of smoking among whites (the dominant group in the U.S), and research indicating that immigration concern may be particularly salient for U.S. whites compared to other racial groups, the present study examines the following question: Does concern about immigration mediate the association between race and smoking? This study tests the following hypothesis: *immigration concern mediates the higher likelihood of ever and current smoking among non-Hispanic whites compared to non-whites*.

If this study's hypothesis is confirmed, the present research could provide another vantage point to view both the healthy immigrant effect and Hispanic paradox in health (Blue, 2011). Health researchers have found that despite having lower income and education on average, some immigrants enjoy better health on various health indicators than the native-born (Argeseanu Cunningham, Ruben & Venkat Narayan, 2008). Likewise, despite having lower socioeconomic status on average than non-Hispanic whites and therefore higher health risk profiles, Hispanics, with variation between Hispanic sub-groups, have some health outcomes similar to or better than non-Hispanic whites (Dominguez, Penman-Aguilar, Chang, Moonesinghe, Castellanos & Rodriguez-Lainz, 2015), including cardiovascular mortality (Allison, Cortes-Bergoderi, Erwin, Goel, Murad & Somers, 2014). Differences in the distribution of immigration concern as a health risk factor may distinguish immigrants from the native-born, as well as Hispanics from non-Hispanic whites. Ancillary results will examine both foreign-born/native-born and Hispanic/non-Hispanic white differences in smoking as a function of immigration concern. Restricting the survey samples to only Hispanics and non-Hispanic white respondents will assess the relevance of immigration concern as a mediator of the Hispanic paradox in smoking.

2. Methods

2.1. Samples

Data come from three national, multi-stage probability sample surveys: the General Social Survey (GSS), the American National Election Study (ANES), and the Portraits of American Life Study (PALS). The GSS and the ANES are considered among the three gold standards of U.S. public opinion surveys (Aldrich & McGraw, 2012). The GSS data used for this study are part of the 2010 panel re-interview and were collected in 2012 by the National Opinion Research Center (NORC) using face-to-face and phone interviews (71.4% response rate). The ANES data were collected between September 2012 and January 2013 by the University of Michigan and Stanford University using both face-to-face and Internet modes of interview. As an election survey, the ANES targeted U.S. citizens. ANES response rates were 38% for the face-to-face mode and 2% for the online mode, the latter survey response rate, though low, was as expected with Gfk KnowledgePanel surveys (ANES, 2014). Finally, RTI International collected the PALS data from April to October 2006 using an in-home survey administered via laptop (56% response rate).

There are some differences between the national probability samples. The 2012 GSS sampled all 50 states, while the ANES and PALS sample the continental United States. The ANES oversampled addresses from census tracts with high proportions of blacks and Hispanics, while PALS oversampled zip code sampling units with high "minority" concentrations. Table 1 provides descriptive characteristics for each of the survey samples. As can be seen from Table 1, the percentage of non-whites was higher in both the ANES and PALS due to oversampling. The GSS top-codes age at 89 years, the ANES at 90, and the PALS at 80 years of age. All surveys interviewed adult respondents (18 and over), with the exception of two 17-year old respondents in the ANES. The higher percentage of non-whites in the PALS sample may also account for the higher percentages in the PALS data of respondents with a high school degree or lower educational attainment as well as the lower percentage of those who did not identify as politically conservative.

The number of respondents analyzed for each survey was 1063 respondents (GSS), 5399 respondents (ANES), and 2527 respondents (PALS). For the GSS, respondents who were asked about their daily

Table 1
Respondent Characteristics for Each National Survey (Unweighted).

	General social survey	American national election study	Portraits of american life study
	N=1063	N=5399	N=2527
White	72.2%	60.3%	49.8%
Non-white (Reference)	27.8%	39.7%	50.2%
Immigration Concerns [a]	3.58 (1.1)	2.91 (0.9)	2.94 (1.4)
Missing	2.2%	2.4%	2.0%
	Range: 1 to 5	Range: 1 to 4.5	Range: 1 to 5
Age [a]	50.82 (17.91)	49.52 (16.7)	43.72 (16.4)
Missing	1.3%	1.0%	–
Education			
Less than high school	11.4%	10.1%	13.4%
High School (Reference)	28.3%	25.4% [b]	39.5%
Some College	28.3%	33.2%	18.8%
Bachelor's degree	20.8%	19.1%	16.8%
Postgraduate degree	11.2%	12.2%	11.4%
Income [a]	$59,515 (44,835)	$59,061 (53,696)	$53,181 (44,237)
Missing	8.9%	2.9%	10.6%
Gender			
Female	58.0%	51.3%	59.1%
Male	42.0%	48.7%	40.9%
Political Self-Identification			
Conservative	35.2%	36.6%	25.2%
Non-conservative (Reference)	64.8%	63.4%	73.9%
Missing	–	–	0.9%
Unemployed	5.5%	7.6%	6.8%
Missing	–	–	0.1%

[a] Mean values are provided for continuous variables, SD in parentheses
[b] The education reference category for the ANES includes high school (24.6%) and missing values (0.8%)

smoking (initial N=1551) were selected, while excluding those not asked about their immigration concerns (N=471), for a total of 1080 eligible respondents. There were no significant differences in key demographics between the 1080 respondents retained and the 471 dropped. Omitting American Indians and those missing values on smoking from the sample represented an additional loss of 1.5% of the sample (1063 out of 1080 eligible respondents retained). For the ANES, all respondents were asked about smoking (5914 respondents), but 404 respondents were either not asked about immigration concerns or were dropped from the sample by ANES survey administrators due to partial post-election interviews. Again, omitting American Indians and those missing values on smoking represented an additional loss of 2% from the ANES sample (5399 out of 5510 eligible respondents retained). Finally, omitting American Indians and those who identified as mixed race, as well as those with missing values on smoking accounted for a loss of 3% from the full PALS sample (2527 out of 2610 eligible respondents retained). For each sample, 97% or more of those who were asked both the smoking and immigration concern questions were analyzed in the present study.

To properly specify the model given findings reported in other national data regarding smoking among whites and non-whites, American Indians (and mixed race in PALS) were excluded unless they identified primarily as white, black, or Hispanic. The samples analyzed contain both U.S.-born and foreign-born respondents in each

racial group. Due to the split-ballot design of the GSS, the GSS sample also excluded respondents who were not asked about immigration in 2012. Due to the ANES pre-election and post-election survey format, the ANES sample excluded respondents who have missing data on the immigration items because they partially completed or did not complete a post-election survey, and were therefore not asked the post-election questions on immigration. Lastly, the present project did not require institutional or human subjects review and is in accordance with ethical standards designed to protect survey respondents because data from all three surveys are de-identified and preserve respondent confidentiality.

2.2. Measures

The ever smoker status (Yes/No) dependent variables were constructed using questions particular to each survey.

- GSS: "Do you smoke cigarettes, and if so about how many cigarettes a day?" (recoded to binary).
- ANES: "Have you smoked at least 100 cigarettes in your entire life?"
- PALS: "Have you smoked 100 or more cigarettes in your life?"

The percentage of ever smokers were: GSS (49.7%), ANES (44.8%), and PALS (43.4%).

The second set of dependent variables, current smoking status, used the aforementioned questions in addition to the following items:

- ANES: "Do you now smoke cigarettes [every day, some days, or not at all / not at all, or some days or every day]? (This item is recoded into a binary variable (never/every day), excluding "some days" and "not at all" from the outcome variable).
- PALS: "On average, how many cigarettes per day do you smoke?" (recoded to binary).

To properly capture current daily smokers, former smokers (i.e. zero cigarettes per day) were dropped from the current smoking status dependent variable (e.g. dropping former smokers on the GSS). For the GSS sample, only the initial question was needed to create the current daily smoker variable, as the initial question already asked about daily cigarette use, whereas the ANES and PALS surveys asked a separate question to further determine current smoking status. The percentages of current daily smokers were: GSS (30.9%), ANES (18.4%), and PALS (28.7%).

The key independent variables for this study are white racial identity and immigration concern. White respondents were identified based on racial self-identification, with those who identified as non-Hispanic white coded as white; non-white respondents were those who did not identify as non-Hispanic white (e.g. Hispanic, blacks, and Asians). The attitudes tapping immigration concern differed across surveys:

- GSS: "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?" Responses ranged across a five-point scale.
- ANES (two survey items, alpha reliability 0.62):
  ○ "Do you think the number of immigrants from foreign countries who are permitted to come to the United States to live should be increased a lot, increased a little, left the same as it is now, decreased a little, or decreased a lot?" Responses ranged across a five-point scale.

○ "Now I'd like to ask you about immigration in recent years. How likely is it that recent immigration levels will take jobs away from people already here – [extremely likely, very likely, somewhat likely, or not at all likely (Reverse coded)]?" Responses ranged across a four-point scale.

- PALS: "Immigrants coming into the U.S. are taking too many jobs away from other American citizens [strongly disagree, somewhat disagree, neither, somewhat agree, and strongly agree.]" Responses ranged across a five-point scale.

The ANES scale was constructed using an average of the two ANES items; if there was missing data on either of the two ANES items, then only the non-missing value was used for the scale score. The immigration concern scales across all three surveys are continuous indicators. Immigration concern was missing for 2.2% of the GSS sample, 2.4% of the ANES sample, and 2% of the PALS sample.

The models controlled for the standard battery of covariates: age (continuous), education (four dummy-coded categories, see Table 1), income (continuous, divided by 1000), and gender (female=1). Age was missing for 1.3% of the GSS sample and 1% of the ANES sample. The PALS educational category "Some college" combined those with vocational/technical degrees and 2-year rel igious degrees with those with associate degrees, while "postgraduate" also included "other" degree responses. The GSS income measure represented family income (8.9% missing) coded at the midpoint of 25 ordered categories and top coded at $150,000, while the ANES measure represented family income (2.9% missing) coded at the midpoint of 28 ordered categories topping off at $250,000. The PALS income measure represented household income based on midpoint coding of 19 ordered categories (10.6% missing) top-coded at $200,000.

Political conservative self-identification (Yes/No) and unemployed status (Yes/No) were also taken into account (controlled) due to their possible relationship to both immigration concern and smoking. Politically conservative self-identification was a combination of slightly conservative, conservative, and extremely conservative responses for both the GSS and ANES, and a combination of somewhat conservative and very conservative for the PALS (0.9% missing). Unemployed status was missing for 0.1% of the PALS sample (3 respondents).

2.3. Analyses

This study used logistic regression to estimate odds of smoking, controlling for covariates. Logistic regression diagnostics (e.g. examinations of Pearson residuals, the deviance residuals, leverage, etc.) did not reveal any problems from outliers or influential observations. Goodness of fit tests suggested an inverse transformation of age would significantly improve model specification for the ANES and PALS data, but did not produce substantively different results. Mediation testing relied on the Karlson-Holm-Breen (KHB) method, which estimates direct/indirect effects for the nonlinear probability models, controlling for covariates. (Breen, Karlson & Holm 2013). Because the models are nonlinear, mediation effect sizes cannot easily be gleaned by comparing the differences in coefficients across tables that include/omit a proposed mediator. In logit models, estimated coefficients are tied to a scale parameter that is a function of the residual standard deviation, causing the scale parameter to fluctuate depending upon the inclusion or exclusion of a mediating variable, as a model explains more or less variation. The KHB test was developed to address this problem of rescaling as well as additional problems tied to assumptions about the underlying distribution of error (Breen et al., 2013). Despite these crucial statistical improvements, the KHB method has yet to accom-

modate multiple imputations or complex survey design weights; therefore, unweighted models with missing data recovered through mean imputation are presented and were used to test mediation. Results were cross-validated with models using survey weights and models using missing data recovered through multiple imputation (Royston, 2004); again, results did not differ substantively (see AppendixTables A1 and A2 for survey-weighted results). Multiple imputation involved imputation by chained equations (ICE), which produced twenty imputed datasets yielding the averaged parameter estimates used to cross-validate the models presented below. For the ANES data, results did not differ between using only the face-to-face sample or the combined face-to-face and online sample.

3. Results

Bivariate tests of immigrant concern scores between whites and non-whites are presented in Table 2. Across all three national surveys, the mean level of immigration concern is significantly higher among whites than among non-whites. Average immigration concern for whites on the GSS was 3.7 compared to 3.3 for non-whites (p < 0.001, two-tailed), 3.0 for whites on the ANES compared to 2.8 for non-whites (p < 0.001, two-tailed), and 3.2 for whites on the PALS compared to 2.7 for non-whites (p < 0.001, two-tailed).

Table 3 presents ever smoking odds ratios from the multivariate regression models. Odds of ever smoking were higher among whites compared to non-whites, adjusting for covariates (see first column across all three surveys): GSS (OR=1.63 CI=1.21, 2.19), ANES (OR=1.40 CI=1.24, 1.58), PALS (OR=2.32 CI=1.95, 2.78). The unadjusted odds ratios were: GSS (OR=1.39 CI=1.06, 1.82), ANES (OR=1.28 CI=1.15, 1.43), PALS (OR=2.19 CI=1.86, 2.57). These results align with research indicating white/non-white differences in smoking prevalence using other national data (Jamal et al., 2014; Kandel et al., 2004; Substance Abuse & Mental Health Services Administration, 2014; Trinidad et al., 2011). Across all three surveys, likelihood ratio tests indicated that adding the immigration concern mediator produced significantly better fitting models. Higher levels of immigration concern were associated with higher odds of smoking (see second column across all surveys): GSS (OR=1.15 CI=1.02, 1.30), ANES (OR=1.16 CI=1.08, 1.24), PALS (OR=1.13 CI=1.06, 1.20). These associations were significant even adjusting for covariates. Also, immigration concern partially mediated white respondents' higher odds of smoking (comparing first and second columns for each survey). This observed mediation was confirmed using the KHB method; the mediation effect was statistically significant (two-tailed) across each survey: GSS (p < 0.05), ANES (p < 0.001), and PALS (p < 0.001).

Table 4 presents results from the multivariate regression models for current smoking status. The results largely confirm the findings from ever smoking. Odds of being a current daily smoker were higher among whites compared to non-whites: GSS (OR=1.73 CI=1.19, 2.54), ANES (OR=1.67 CI=1.38, 2.02), PALS (OR=2.32 CI=1.87, 2.89). As with ever smoking, adding the mediator produced significantly better fitting models across all surveys, and higher levels of immigration concern were associated with higher odds of current smoking: GSS (OR= 1.27 CI=1.07, 1.49), ANES (OR=1.41 CI=1.27, 1.57), PALS (OR=1.16 CI=1.07, 1.24). Immigration concern mediated white respondents' higher odds of current smoking as tested using the KHB method (two-tailed): GSS (p < 0.01), ANES (p < 0.001), and PALS (p < 0.001).

Since the PALS data contained additional race and health-related measures, supplementary analyses were conducted to rule out the influence of additional omitted variables such as perceived discrimination, ethnic identity, stress, mental disorders and alcohol use. The

Table 2
Differences in immigration concern between whites and non-whites.

General social survey (2012)					
	Whites	Non-whites			
Number of immigrants to U.S.					
Reduced a lot (5)	28.1%	13.2%			
Reduced a little (4)	26.8%	25.8%			
Remain the same as it (3)	32.4%	38.0%			
Increased a little (2)	8.9%	10.5%			
Increased a lot (1)	2.5%	8.1%			
Missing	1.3%	4.4%			
Mean	3.70***	3.28			
Standard Deviation	(1.05)	(1.08)			
T-statistic (df)	-5.83 (1061)				
American National Election Study (2012)					
	Whites	Non-whites		Whites	Non-whites
Number of immigrants to U.S.			Take away jobs		
Decreased a lot (5)	26.0%	15.0%	Extremely likely (4)	19.2%	17.1%
Decreased a little (4)	21.1%	18.0%	Very likely (3)	20.5%	17.1%
Left the same (3)	38.1%	48.6%	Somewhat likely (2)	43.8%	39.6%
Increased a little (2)	9.5%	10.1%	Not at all likely (1)	15.9%	24.7%
Increased a lot (1)	3.5%	5.7%			
Missing	1.8%	2.6%	Missing	0.7%	1.5%
Mean (scale score)	3.00***	2.78			
Standard Deviation	(0.89)	(0.82)			
T-statistic (df)	-9.44 (5397)				
Portraits of American Life Study (2006)					
	Whites	Non-whites			
Immigrants take our jobs					
Strongly agree (5)	21.1%	15.7%			
Somewhat agree (4)	23.8%	14.7%			
Neither (3)	21.0%	22.6%			
Somewhat disagree (2)	16.9%	14.4%			
Strongly disagree (1)	15.7%	30.1%			
Missing	1.4%	2.5%			
Mean	3.18***	2.71			
Standard Deviation	(1.36)	(1.43)			
T-statistic (df)	-8.27 (2499)				

*** $p < 0.001$ (two-tailed)

Table 3
Odds Ratios (ORs) and 95% confidence intervals (Cis) of ever smoking, by immigration concern.

	General social survey		American national election study		Portraits of AMerican Life Study	
	N=1063		N=5399		N=2527	
	(1)	(2)	(1)	(2)	(1)	(2)
White	**1.63 (1.21, 2.19)**	**1.53 (1.13, 2.06)**	**1.40 (1.24, 1.58)**	**1.35 (1.19, 1.52)**	**2.32 (1.95, 2.78)**	**2.19 (1.83, 2.63)**
Non-white	1.00		1.00		1.00	
Immigration Concern		**1.15 (1.02, 1.30)**		**1.16 (1.08, 1.24)**		**1.13 (1.06, 1.20)**
Age	1.01 (1.00, 1.02)	1.01 (1.00, 1.01)	1.03 (1.02, 1.03)	1.03 (1.02, 1.03)	1.02 (1.02, 1.03)	1.02 (1.02, 1.03)
Education						
Less than high school	1.14 (0.73, 1.78)	1.16 (0.74, 1.82)	1.24 (1.01, 1.53)	1.25 (1.01, 1.54)	1.09 (0.84, 1.42)	1.12 (0.86, 1.46)
High School	1.00		1.00		1.00	
Some College	0.98 (0.70, 1.36)	1.01 (0.72, 1.40)	0.90 (0.77, 1.04)	0.90 (0.78, 1.05)	1.09 (0.84, 1.37)	1.09 (0.86, 1.37)
Bachelor's degree	0.49 (0.34, 0.71)	0.52 (0.36, 0.77)	0.46 (0.39, 0.55)	0.49 (0.41, 0.59)	0.53 (0.41, 0.69)	0.57 (0.44, 0.74)
Postgraduate degree	0.47 (0.29, 0.75)	0.52 (0.33, 0.84)	0.32 (0.25, 0.39)	0.34 (0.27, 0.42)	0.52 (0.38, 0.70)	0.55 (0.41, 0.75)
Income	0.997 (0.993, 1.00)	0.997 (0.993, 1.00)	1.00 (0.998, 1.00)	1.00 (0.998, 1.00)	1.00 (0.996, 1.00)	1.00 (0.996, 1.00)
Gender						
Female	0.58 (0.45, 0.75)	0.58 (0.45, 0.75)	0.64 (0.57, 0.71)	0.63 (0.56, 0.71)	0.58 (0.49, 0.69)	0.58 (0.49, 0.69)
Male	1.00		1.00		1.00	
Conservative	0.73 (0.57, 0.96)	0.72 (0.55, 0.94)	0.69 (0.61, 0.78)	0.67 (0.59, 0.75)	0.71 (0.59, 0.87)	0.71 (0.58, 0.87)
Non-conservative	1.00		1.00		1.00	
Unemployed	1.05 (0.60, 1.84)	1.03 (0.59, 1.81)	1.35 (1.09, 1.68)	1.35 (1.09, 1.67)	1.16 (0.83, 1.61)	1.13 (0.81, 1.58)
Other than unemployed	1.00		1.00		1.00	
LR Chi-Square	68.44***	73.44***	561.90***	579.84***	267.08***	281.57***

For each sample, column (1) represents the model without the mediating variable, while column (2) represents the model with mediator.
Odds ratios of 1.00 indicate the reference category.
*** $p < 0.001$ (two-tailed)

Table 4

Odds Ratios (ORs) and 95% Confidence Intervals (Cis) for current smoking, by immigration concern.

	General social survey		American national election study		Portraits of american life study	
	N=774		N=3667		N=2010	
	(1)	(2)	(1)	(2)	(1)	(2)
White	**1.73 (1.19, 2.54)**	**1.52 (1.03, 2.25)**	**1.67 (1.38, 2.02)**	**1.52 (1.25, 1.84)**	**2.32 (1.87, 2.89)**	**2.16 (1.73, 2.69)**
Non-white	1.00		1.00		1.00	
Immigration Concern		**1.27 (1.07, 1.49)**		**1.41 (1.27, 1.57)**		**1.16 (1.07, 1.24)**
Age	0.99 (0.98, 0.998)	0.99 (0.98, 0.997)	1.01 (1.00, 1.01)	1.00 (0.999, 1.01)	1.01 (1.00, 1.02)	1.01 (1.00, 1.02)
Education						
Less than high school	1.17 (0.70, 1.95)	1.18 (0.70, 1.97)	1.48 (1.13, 1.94)	1.49 (1.13, 1.95)	1.23 (0.91, 1.65)	1.27 (0.94, 1.71)
High School	1.00		1.00		1.00	
Some College	0.79 (0.53, 1.19)	0.83 (0.55, 1.26)	0.70 (0.57, 0.87)	0.70 (0.57, 0.87)	0.99 (0.75, 1.30)	0.99 (0.75, 1.31)
Bachelor's degree	0.23 (0.13, 0.41)	0.25 (0.14, 0.45)	0.28 (0.20, 0.38)	0.32 (0.23, 0.44)	0.44 (0.31, 0.62)	0.48 (0.34, 0.67)
Postgraduate degree	0.17 (0.07, 0.41)	0.21 (0.08, 0.51)	0.15 (0.10, 0.24)	0.18 (0.11, 0.28)	0.21 (0.13, 0.35)	0.23 (0.14, 0.38)
Income	0.99 (0.98, 0.992)	0.986 (0.98, 0.992)	0.994 (0.992, 0.997)	0.995 (0.992, 0.997)	0.99 (0.992, 0.998)	0.995 (0.992, 0.998)
Gender						
Female	0.53 (0.37, 0.75)	0.53 (0.37, 0.76)	0.64 (0.54, 0.76)	0.62 (0.52, 0.75)	0.56 (0.46, 0.69)	0.56 (0.45, 0.69)
Male	1.00		1.00		1.00	
Conservative	0.68 (0.47, 0.98)	0.66 (0.46, 0.95)	0.68 (0.56, 0.83)	0.64 (0.53, 0.78)	0.61 (0.48, 0.79)	0.62 (0.48, 0.80)
Non-conservative	1.00		1.00		1.00	
Unemployed	1.33 (0.70, 2.54)	1.29 (0.68, 2.46)	1.54 (1.15, 2.06)	1.52 (1.113, 2.03)	1.46 (1.01, 2.09)	1.43 (0.99, 2.06)
Other than unemployed	1.00		1.00		1.00	
LR Chi-Square	136.71***	144.68***	340.04***	381.4***	204.2***	218.96***

For each sample, column (1) represents the model without the mediating variable, while column (2) represents the model with mediator.

Odds ratios of 1.00 indicate the reference category.

*** $p < 0.001$ (two-tailed)

association between immigration concern and smoking was confirmed net of perceived discrimination and closeness to one's racial group. The results also did not change after controlling for an index of life event stress (12 items, alpha = 0.59), "emotional, nervous, or psychiatric problems," and amount of daily alcohol use. Note that the index of life event stress contained three items capturing general feelings of economic insecurity: recent experiences of unemployment amidst a lengthy and unsuccessful job search, a recent job firing, or a major financial crisis. Life event stress does slightly reduce the effect of immigration concern as confirmed by the KHB test, though the main effect of immigration concern persists. Therefore, stress-related smoking is indeed partly captured by immigration concern. Because stress does not account for the residual significant association between immigration concerns and smoking, affect may yet play a role. Since the significant finding for immigration concern was not altered after controlling for stress, supplementary analysis results are available on request rather than fully presented here.

The ANES data did contain a partial measure of affect towards immigrants; however, the affect target was "illegal immigrants," not immigrants more generally. The affect measure consisted of a feeling thermometer, which was reverse-coded for this study to indicate negative or "cold" feelings at the maximum value of the range (0–100). After mean imputing missing values to recover 52 out of 3667 cases, the measure of negative affect towards illegal immigrants was included in the mediated model for current smoking (Table 4, ANES data, Column 2). The negative affect measure was related to higher odds of current smoking (OR=1.01 CI=1.005, 1.013) for each "degree" increase on the thermometer. Moreover, inclusion of the negative affect measure further reduced the higher odds of smoking among whites (from OR=1.52 CI=1.25, 1.84 to OR=1.29 CI=1.05, 1.58) and also reduced the higher odds of smoking attributed to immigration concern (from OR=1.41 CI=1.27, 1.57 to OR=1.27 CI=1.13, 1.43). A KHB test confirmed that both were significant reductions in effect size (p < 0.001), denoting the mediating role of negative affect towards illegal immigrants.

Finally, the GSS and ANES allowed additional controls for occupation. The GSS survey contained data on Census 2010 detailed major occupational categories and the ANES data contained similar detailed occupational data but only for the internet-mode (occupational data from the face-to-face mode will be available in a future data release). Since controlling for these detailed occupational categories did not change the findings, these ancillary results are available on request.

4. Discussion

Concern about immigration partially mediated the smoking difference between whites and non-whites across all three national surveys. This main finding identifies immigration concern as a smoking risk factor among whites, as all three national surveys are cross-sectional and cannot assess causality. Theoretically, the group position framework with its focus on perceived group competition proposes two dimensions that may account for the association between smoking and immigration concern among whites: economic vulnerability and negative affect. The models did control for factors linked to economic vulnerability, such as education, income, unemployed status, and recent economic vulnerability. There may yet be other omitted variables tied to economic vulnerability, such as feelings of low control that could still account for the residual association. Negative affect towards immigrants was also in play, as indicated by the feeling thermometer for illegal immigrants. One possible omitted factor that should be tested is subjective social status (Siahpush, Borland, Taylor, Singh, Ansari & Serraglio, 2006; Wolff, Acevedo-Garcia, Subramanian, Weber & Kawachi, 2010).

These results confirm that group position theory, a sociological social psychological theory that explains negative emotions arising from intergroup relations, can be applied to the study of affect-related health behaviors and outcomes. In his original articulation of group position theory, Blumer argued that racial group positioning is a "historical product," as groups are positioned in society as dominant or subordinate by various individuals, including leaders, officials, and everyday people, through talk, anecdotes, gossip, news, speeches, etc. (Blumer, 1958). The abstract conception of racial groups is further constructed by institutions operating in the "public arena," including "legislative assemblies, public meetings, conventions, the press, and the

printed word," as well as "[i]ntellectual and social elites, public figures of prominence, … leaders of powerful organizations … and strong interest groups."

This socio-historical defining of whites vis-à-vis non-whites in regards to immigration and citizenship would be a group position theoretical account for why immigration concern is greater for the former compared to the latter. It would also explain why whites concerned about immigration may feel a negative emotion that places them at higher risk of cigarette smoking, as they perceive U.S. immigration may threaten the access to scarce resources and opportunities to which they had been historically entitled. This argument aligns with previous research on the immigration attitudes of whites compared to blacks, in which perceived group competition with Hispanics is an underlying factor associated with five out of six immigration attitudes among whites, but only two among blacks (Hutchings & Wong, 2014). Moreover, the perceived Hispanic competition effects when present for both groups were about twice as strong among whites than blacks. Opposition to interracial marriage was another underlying factor that differentiated whites versus blacks on the two immigration concern attitudes used in the present study: immigration level preferences and perceived job competition. That opposition to interracial marriage was significantly related to these immigration attitudes for whites, but not for blacks is consistent with group position theory's proposition about the dominant group's desire to maintain the integrity of its group boundary against incursions from other groups, and not only in the domain of economic relations (Blumer, 1958; Bobo, 1999). These differences in the factors underlying immigration concern between whites and blacks, theoretically derived and empirically confirmed in prior attitudinal research, may partially explain why immigration concern is higher on average among whites than non-whites and why some whites may be at higher risk of smoking due to the emotionally-laden potential breach of these historically-constructed group boundaries reflected in their concerns about immigration.

4.1. Limitations and strengths

This study has some limitations. First, data are cross-sectional. Future research would need to clarify causal direction as well as more thoroughly examine possible confounding factors. It is unlikely that immigration concern is a causal factor in smoking initiation; rather, it may contribute to an individual's lower likelihood of smoking cessation and/or higher likelihood of relapse, as research on job loss and smoking indicates (Kriegbaum, Larsen, Christensen, Lund & Osler, 2011). The present study found mixed post-hoc results for the latter argument. Immigration concern differed between former smokers and current smokers on the GSS data and between former smokers and every-day smokers in the ANES data. However, there were no significant differences in immigration concern between current smokers and former smokers on the PALS data or between former smokers and those who smoked "some days" in the ANES data in the ANES data. It should also be noted that in the absence of longitudinal data, it is unclear whether former smoking status preceded immigrant attitudes or vice versa. Future research should investigate more fully. Second, only one of the immigration concern measures in the present study (perceived job competition) draws from the range of multiple item perceived group competition measures used in group position research (Bobo & Hutchings, 1996). Multiple item measures that capture other forms of perceived immigrant group competition, e.g. politics, residential, economic, cultural, etc., may increase reliability. Third, the absence of alternative smoking measures (e.g. cigarillos) may underestimate smoking among non-whites (Page & Evans, 2004). Fourth, lack of statistical power impedes more fine-grained analyses comparing whites to some specific non-white groups. Relatedly, tests of ordered differences in immigration attitudes and smoking behaviors *between* ethnic groups (e.g. Cubans vs. Mexicans vs. Puerto Ricans)

would necessarily be exploratory and outside the group position theoretical framework, at least until group position theory can be expanded to describe stable and ordered group positions and relations between non-dominant ethnic groups.

Finally, as with any survey, there is always a possibility of bias in data collection as well as respondent recall. The 2012 ANES sample excluded Alaska and Hawaii on the basis of cost saving, arguing, "their small populations make this exclusion a fairly small source of bias" (ANES, 2014), while the PALS also excluded Alaska and Hawaii. To mitigate selection bias related to interest in politics, the ANES did not reveal itself as the American National Election Study but used a generic and confidential name similar to National Study of American Life and the Survey of the American Public (ANES, 2014). The ANES and PALS weights are post-stratified to reflect overall population distributions (ANES, 2014; Emerson, James, & Sikkink, 2006), while the GSS samples typically resemble Census population distributions and are therefore not post-stratified (GSS, 2015). All three surveys adjust for non-response bias (ANES, 2014; Emerson et al., 2006; GSS, 2015). Lastly, at least for the current daily smoker dependent variable, there is unlikely to be substantial recall bias.

This study's strength lies in the increased reliability from using three national surveys to corroborate immigration concern as a mediator of the white/non-white smoking difference. While the GSS and ANES are not specifically health surveys, they are two of the highest quality public opinion surveys in the U.S. and are used widely across the social sciences (Aldrich & McGraw, 2012). Also, NORC, the University of Michigan, and RTI International, the organizations that collected the data analyzed here, also collect data for three key national health surveys: the CDC's National Immunization Survey, the National Institute for Drug Abuse's annual Monitoring the Future survey, and SAMHSA's National Survey on Drug Use and Health, respectively. Since survey weights were used to cross-validate the unweighted models presented in the results section, the main relationships described in this study's results can be said to be generalizable to and representative of the continental U.S. population as a whole.

While reflecting upon the implications of the present study's core findings on group position theory and immigration concern, it became apparent that this study's findings could also provide a novel vantage point to consider both the "healthy immigrant effect" and the "Hispanic paradox" in relation to smoking. Studies examining mortality differences between immigrants vs. native-born, Hispanics vs. non-Hispanic whites, and Mexican-Americans (foreign and native-born) vs. non-Hispanic whites have traced these differences to the lower likelihood of smoking among the former group in each pair (Blue & Fenelon, 2011; Fenelon, 2013). If immigration concern is tied to an increased likelihood of smoking, this may partially explain the lower risk of smoking among immigrants or ethnic groups with a high concentration of immigrants (e.g. Mexican Americans); they may be less concerned about immigration than their native-born and non-Hispanic white counterparts. Supplementary analysis examined whether immigration concern partially mediated the healthy immigrant effect. Introducing a nativity dummy variable into the baseline models indicates that U.S.-born respondents across all three datasets were more likely to smoke than immigrants. However, immigration concern partially mediated this higher likelihood of current smoking for the U.S. born: GSS ($p < 0.05$), ANES ($p < 0.001$), PALS ($p < 0.01$), using the KHB mediation test (two-tailed). The same mediating factor accounted for the smoking differences between Hispanics and non-Hispanic whites as well. Restricting the sample to non-Hispanic whites and Hispanics alone revealed that immigration concern mediated the Hispanic vs. non-Hispanic white difference in current smoking according to the KHB test (two-tailed): GSS ($p < 0.01$), ANES ($p < 0.001$), PALS ($p < 0.01$). As supplementary findings demonstrating the present study's potential implications, these initial results regarding the healthy immigrant effect and the Hispanic paradox can motivate future studies that seriously consider intergroup attitudes as health risk factors, especially

because the cross-sectional data analyzed in the present study are ill-equipped to make causal claims.

5. Conclusion

This study builds on research examining associations between group-based attitudes and various health outcomes to propose that immigration concerns may partially account for the white/non-white smoking difference, the healthy immigrant effect, and the Hispanic paradox (Hatzenbuehler et al., 2013; Lee et al., 2015; Samson, 2015b; Leitner al., 2016). As such, it suggests an alternative social psychological approach to studying substance use than that employed by either perceived discrimination as a social stressor or ethnic identification as a protective factor (Chae, Takeuchi, Barbeau, Bennett, Lindsey & Stoddard, 2008). It may be possible that the immigrant health advantage and the Hispanic paradox have largely remained unsolved puzzles in part because they involve contentious attitudes as illness risk factors, attitudes that are not currently collected or studied on most health surveys.

The findings suggest a number of important implications to consider. First, as other researchers have already argued (Apfelbaum, Phillips, & Richeson, 2014), there is much to be gained by "reconsidering the baseline" in research involving multiple racial groups. The present study examines non-white minority groups as the healthier reference baseline, accounting for the higher incidence of a deleterious health behavior (smoking) found among U.S. whites. The present study thus flips the immigrant health advantage and Hispanic paradox puzzles on their heads, proposing a *native-born health disadvantage* and a *non-Hispanic white health disadvantage* tied to an attitudinal, health risk factor: immigration concern. Other multiracial samples in

which non-white minority groups present healthier outcomes and behaviors might also benefit from analytically establishing a non-white (or immigrant) group as the reference category. Such studies might better identify whether what would appear to be normative attitudes and behaviors among a majority group might actually be associated with poorer health outcomes if adopted or expressed by a healthier minority group. Second, by building upon an emerging set of population health studies that illuminate a connection between intergroup attitudes and health outcomes (Hatzenbuehler et al., 2013; Lee et al., 2015; Samson, 2015b; Leitner al., 2016), the present study invites future research drawing on mechanistic, basic science to determine whether actual biological mechanisms can be found linking the cognitive activity triggered by intergroup attitudes to the emotion and stress-related biological processes (e.g. hormones, biomarkers, etc.) that increase the risk of cardiovascular mortality and circulatory diseases. Building on the present study as an example, future research might contribute to breaking down silos between neuroscience, psychiatry, endocrinology, cardiology, and the social sciences (e.g. sociology and psychology). Future studies should re-examine these preliminary findings with a broader range of measures and methods.

Acknowledgements

Appendix A

See Table A1 and A2 here.

Table A1
Odds Ratios (ORs) and 95% confidence intervals (Cis) of ever smoking, by immigration concern (Survey weighted).

	General social survey		American national election study		Portraits of american life study	
	N=1063		N=5399		N=2527	
	(1)	(2)	(1)	(2)	(1)	(2)
White	**1.71 [1.21, 2.41]**	**1.57 [1.11, 2.24]**	**1.41 [1.19, 1.68]**	**1.35 [1.14, 1.61]**	**2.19 [1.67, 2.86]**	**2.05 [1.55, 2.72]**
Non-white	1.00		1.00		1.00	
Immigration Concern		**1.17 [1.01, 1.36]**		**1.16 [1.06, 1.28]**		**1.10 [1.01, 1.20]**
Age	1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.03 [1.02, 1.03]	1.027 [1.022, 1.031]	1.02 [1.017, 1.03]	1.02 [1.016, 1.03]
Education						
Less than high school	0.97 [0.56, 1.66]	0.99 [0.57, 1.70]	1.39 [1.03, 1.87]	1.39 [1.03, 1.87]	1.25 [0.92, 1.69]	1.27 [0.93, 1.72]
High School	1.00		1.00		1.00	
Some College	0.86 [0.59, 1.26]	0.90 [0.61, 1.32]	0.87 [0.72, 1.05]	0.88 [0.73, 1.06]	0.97 [0.74, 1.28]	0.96 [0.74, 1.26]
Bachelor's degree	0.47 [0.30, 0.74]	0.52 [0.33, 0.81]	0.50 [0.39, 0.63]	0.53 [0.42, 0.67]	0.52 [0.38, 0.72]	0.55 [0.39, 0.76]
Postgraduate degree	0.41 [0.24, 0.70]	0.47 [0.27, 0.81]	0.33 [0.25, 0.44]	0.36 [0.27, 0.48]	0.57 [0.40, 0.81]	0.60 [0.42, 0.85]
Income	0.999 [0.995, 1.00]	0.999 [0.995, 1.00]	0.999 [0.998, 1.00]	1.00 [0.998, 1.001]	0.999 [0.996, 1.00]	0.999 [0.996, 1.00]
Gender						
Female	0.51 [0.38, 0.69]	0.51 [0.38, 0.69]	0.62 [0.53, 0.72]	0.61 [0.53, 0.71]	0.65 [0.52, 0.81]	0.64 [0.51, 0.81]
Male	1.00		1.00		1.00	
Conservative	0.63 [0.46, 0.86]	0.61 [0.45, 0.84]	0.68 [0.58, 0.80]	0.66 [0.56, 0.77]	0.69 [0.55, 0.86]	0.69 [0.55, 0.87]
Non-conservative	1.00		1.00		1.00	
Unemployed	0.86 [0.44, 1.68]	0.83 [0.42, 1.63]	1.38 [1.04, 1.83]	1.37 [1.03, 1.82]	1.21 [0.70, 2.09]	1.19 [0.69, 2.04]
Other than unemployed	1.00		1.00		1.00	
F-statistic	5.69[***]	5.42[***]	29.41[***]	27.67[***]	17.77[***]	16.41[***]

For each sample, column (1) represents the model without the mediating variable, while column (2) represents the model with mediator.
Odds ratios of 1.00 indicate the reference category.
Missing data were recovered through multiple imputation with chained equations (MICE).
[***] $p < 0.001$ (two-tailed)

Table A2

Odds Ratios (ORs) and 95% confidence intervals (Cis) for current smoking, by immigration concern (Survey weighted).

	General social survey		American NAtional Election Study		Portraits of american life study	
	N=774		N=3667		N=2010	
	(1)	(2)	(1)	(2)	(1)	(2)
White	**1.89 [1.23, 2.92]**	**1.63 [1.03, 2.57]**	**1.83 [1.38, 2.42]**	**1.65 [1.24, 2.19]**	**2.39 [1.76, 3.24]**	**2.20 [1.61, 3.00]**
Non-white	1.00		1.00		1.00	
Immigration Concern		**1.30 [1.07, 1.58]**		**1.37 [1.20, 1.57]**		**1.12 [1.02, 1.23]**
Age	0.994 [0.98, 1.01]	0.993 [0.98, 1.01]	1.01 [1.00, 1.01]	1.01 [1.00, 1.01]	1.01 [0.998, 1.02]	1.006 [0.997, 1.02]
Education						
Less than high school	1.04 [0.58, 1.87]	1.06 [0.58, 1.92]	1.84 [1.25, 2.72]	1.81 [1.22, 2.69]	1.56 [1.09, 2.22]	1.59 [1.12, 2.28]
High School	1.00	1.00	1.00	1.00	1.00	1.00
Some College	0.71 [0.44, 1.13]	0.75 [0.46, 1.20]	0.71 [0.55, 0.92]	0.72 [0.55, 0.93]	0.88 [0.62, 1.25]	0.87 [0.62, 1.24]
Bachelor's degree	0.21 [0.095, 0.45]	0.23 [0.11, 0.51]	0.32 [0.22, 0.48]	0.37 [0.25, 0.55]	0.44 [0.27, 0.71]	0.47 [0.29, 0.76]
Postgraduate degree	0.14 [0.05, 0.39]	0.18 [0.07, 0.51]	0.17 [0.09, 0.31]	0.19 [0.10, 0.36]	0.19 [0.10, 0.37]	0.21 [0.11, 0.39]
Income	0.99 [0.985, 0.998]	0.99 [0.985, 0.998]	0.995 [0.991, 0.998]	0.995 [0.992, 0.998]	0.997 [0.992, 1.00]	0.997 [0.993, 1.00]
Gender						
Female	0.49 [0.33, 0.74]	0.50 [0.33, 0.75]	0.59 [0.47, 0.74]	0.60 [0.47, 0.73]	0.68 [0.52, 0.89]	0.68 [0.52, 0.89]
Male	1.00	1.00	1.00	1.00	1.00	1.00
Conservative	0.58 [0.38, 0.90]	0.57 [0.37, 0.87]	0.64 [0.50, 0.82]	0.60 [0.47, 0.77]	0.52 [0.39, 0.69]	0.52 [0.39, 0.70]
Non-conservative	1.00	1.00	1.00	1.00	1.00	1.00
Unemployed	0.96 [0.44, 2.08]	0.90 [0.40, 2.03]	1.49 [1.01, 2.21]	1.46 [0.98, 2.18]	1.36 [0.86, 2.16]	1.34 [0.84, 2.14]
Other than unemployed	1.00		1.00		1.00	
F-statistic	5.54[***]	5.80[***]	16.49[***]	16.09[***]	16.85[***]	15.65[***]

For each sample, column (1) represents the model without the mediating variable, while column (2) represents the model with mediator.

Odds ratios of 1.00 indicate the reference category.

Missing data were recovered through multiple imputation with chained equations (MICE)

[***] p < 0.001 (two-tailed)

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