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Gender, Acculturation, and Smoking Behavior among U.S. Asian and Latino Immigrants*

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Abstract

In this paper we examine smoking prevalence and frequency among Asian and Latino U.S. immigrants, focusing on how gender differences in smoking behavior are shaped by aspects of acculturation and the original decision to migrate. We draw on data from 3,249 immigrant adults included in the 2002-2003 National Latino and Asian American Study. Findings confirm the gender gap in smoking, which is larger among Asian than Latino immigrants. While regression models reveal that gender differences in smoking prevalence, among both immigrant groups, are not explained with adjustment for measures of acculturation and migration decisions, adjustment for these factors does reduce gender differences in smoking frequency to non-significance. Following, we examine gender-stratified models and test whether aspects of migration decisions and acculturation relate more strongly to smoking behavior among women; we find that patterns are complex and depend upon pan-ethnic group and smoking measure.

INTRODUCTION

Smoking prevalence is higher among U.S. men than women, but the gender disparity varies by racial/ethnic identity (Centers for Disease Control and Prevention [CDC] 2012). Among non-Latino whites, 22.5% of men and 18.8% of women smoke cigarettes, a relatively small gender gap of just 3.7 percentage points. Comparable figures for other groups are an 8.7 percentage point gap among non-Latino blacks (24.2% for men and 15.5% for women), and an 8.4 percentage point gap among Latinos (17.0% for men and 8.6% for women). While comparatively few Asian Americans smoke, the gender gap of 9.4 percentage points among Asians (14.9% for men and 5.5% for women) is larger than all other groups (CDC, 2012). These expanded gaps among Latino and Asian adults may be due to the large proportion of these populations who are immigrants; as such, their smoking behavior is likely shaped by gendered smoking norms in their countries of origin, migration decisions and immigrant selectivity, and acculturation – or the adoption of the behavioral patterns and beliefs of a surrounding culture (Bethel & Schenker, 2005; Choi et al., 2008).

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Gender gaps in smoking may be substantial for Asian and Latino immigrants since many originate from nations where gender norms are more patriarchal and smoking among women is seen as socially unacceptable (Choi et al., 2008). U.S. immigrants generally adopt more unhealthy behaviors with increasing acculturation (Abraído-Lanza et al., 2005; Lopez-Gonzalez et al., 2005; Zhang & Wang, 2008), including increased smoking among women. However, among immigrant men, studies find either a weak but negative acculturation-smoking association (Kimbrow, 2009; Perez-Stable et al., 2001; Zhang & Wang, 2008), no association (Abraído-Lanza et al., 2005; Shelley et al., 2004), or a positive association similar to female immigrants (Sundquist & Winkleby, 1999). The status shifts that accompany U.S. migration, including diminished female conservatism, may explain why smoking patterns change as they do (Parrado & Flippen, 2005), as research demonstrates that subsequent reception and location in U.S. society differ for men and women migrants (Donato et al., 2006).

To investigate these relationships, we utilize data on foreign-born adults drawn from the 2002-2003 National Latino and Asian American Study (NLAAS), examining how smoking prevalence and frequency differs by gender. We begin by examining whether gender-smoking patterns among Latino and Asian pan-ethnic groups are explained by adjusting for acculturation status (including measures that reflect orientation toward both U.S. and native-country culture), plus measures that reflect health-selection processes regarding the original decision to migrate. This is an important contribution of our work, as migrant smoking research has focused almost exclusively on how patterns vary by indicators of acculturation toward U.S. culture (the set of loosely-organized practices, symbols, and norms associated with a particular population; see Sewell, 1999). Within each pan-ethnic group we also adjust for country-of-origin since U.S.-based studies find differences in smoking prevalence and frequency, as well as variation in the size of the gender-smoking gap, by county-of-origin (Baluja et al., 2003; Chae et al., 2006; Perez-Stable et al., 2001). And because of the gendered nature of smoking behavior and the migration/acculturation process more generally, we then run gender-stratified models and test whether relationships among acculturation, migration decisions, and smoking differ for men and women within each pan-ethnic group.

BACKGROUND

Acculturation and Migration Decisions

While early research conceptualized acculturation as a unidimensional process of assimilation, recent research emphasizes a bidimensional perspective that sees adoption of a new culture as a process occurring independently of origin-culture ties (Berry, 2003; Sam, 2006). Studies utilizing measures representing both new culture acquisition and culture-of-origin retention provide a more comprehensive assessment of the relationship between acculturation and health outcomes/behaviors (Abraído-Lanza et al., 2006). A bidimensional process offers several acculturation strategies that new immigrants may follow: assimilation strategies wherein migrants interact regularly with other cultures and separate from their origin-culture identity, separation strategies wherein migrants continue to value their origin culture and avoid interaction with others in the destination culture, and integration strategies

wherein migrants maintain origin-culture ties while simultaneously interacting with persons in the new culture (Berry, 2003; see related taxonomy developed by Levitt, 1998).

Acculturation can involve the adoption of health-compromising behaviors among U.S. migrants, including smoking (Abraído-Lanza et al., 2005; Choi et al., 2008; Lopez-Gonzalez et al., 2005; Zhang & Wang, 2008). However, due to limited information available in most U.S. health surveys, acculturation is typically assessed with measures that gauge acculturation relative only to U.S. culture (e.g., duration of U.S. residence), ignoring the potential influence of country-of-origin orientation among migrants to influence health behaviors. For example, language preference and ability is one of the most commonly assessed acculturation measures, and operationalizing acculturation through language allows observation of biculturalism (bilingualism) as opposed to an acculturated/un-accultured dichotomy (Epstein et al., 1998; Fu et al., 2003). Immigrants who are linguistically isolated may have fewer opportunities to discuss smoking cessation with physicians or pharmacists. Conversely, bilingual immigrants may be less inclined to smoke to deal with migration-related stresses if their bilingualism allows them to maintain connections with both origin and destination cultures (Lee et al., 2000).

Additionally, the non-random nature of the original decision to migrate may operate to shape smoking behavior. Migrants are atypical in their health profile, as they enter the U.S. exhibiting healthier behaviors and better health outcomes when compared to the native-born and non-migrants in sending nations (Jasso et al., 2004). If variation exists in how much the migration decision was influenced by factors relating to smoking and health status more generally (e.g., seeking medical care), then these factors may also influence smoking behavior across migrant groups.

Thus, we hypothesize (H1) that indicators of orientation toward U.S. and origin-country culture, and the decision to migrate in the first place, are independently related to smoking behavior.

Gender, Migration, and Smoking

Men and women routinely make decisions within a context of constrained choices; even if health is a priority, decisions are not always healthy (Bird & Rieker, 2008). The concept of “constrained choice” informs how acculturation might have different influences on health behavior for migrant men and women. Within countries of origin, men and women are likely subjected to different smoking norms, contrasted to a more balanced exposure in the U.S. (Lopez-Gonzalez et al., 2005). Men may feel smoking is appropriate when interacting with male kin and coworkers and reflective of high social status, while women may be forbidden from smoking since many view it as activity reserved for men (Ma et al., 2004). Gender difference in smoking is often greater among origin-country populations than among U.S. immigrants. For example, the gender gap in smoking prevalence for Chinese adults living in the U.S. is wide (14.6% among males and 3.8% among females; An et al., 2008) but not nearly as wide as the gap in China, where 47% of men and only 2% of women smoke (World Health Organization [WHO], 2013). In contrast, smoking prevalence among men in Mexico is more than three times greater than women (27% vs. 8%; WHO, 2013), while the

gender gap is smaller among Mexican Americans (although the size of the gap varies by study and sample; e.g., 25.0% vs. 10.4% in an 8-city study; Perez-Stable et al., 2001).

If women embrace enhanced independence after migrating, they may use increased freedoms and higher incomes to begin smoking despite the health risks. Female migrant networks often consist of similar-aged women who live in close proximity, where risky and nontraditional behaviors are encouraged (Curran & Saguy, 2001). Yet men typically do not experience the same enhancement in status after migration (and may face increased restrictions on tobacco use at work or social pressures to reduce/cease smoking). While previous studies demonstrate smoking increases with acculturation among women, studies find no concrete trend among Latino men – and even decreased smoking prevalence among Asian men (Bethel & Schenker, 2005; Zhang & Wang, 2008). We expand upon this literature by comparing how different dimensions of acculturation and smoking behavior operate for migrant men versus women, and how markers of original migration decision shape gender disparities as well.

Indeed, decisions regarding migration may vary by gender, and thus have implications for migrant smoking patterns. Even though female migration is increasing, more men migrate to the U.S. and often for different reasons (e.g., typically employment for men and family reunification for women) (Donato et al., 2006; Hondagneu-Sotelo, 1994). If women have less say over the migration decision than men, then women may be less selected on health and healthy behaviors. Thus, we hypothesize that measures of acculturation and migration decisions partially explain gender differences in immigrant smoking behavior (H2), and that smoking prevalence and frequency increase most strongly with acculturation among women (H3).

Controls

In order to isolate the acculturation-smoking relationship, models must adjust for confounding factors. These include socioeconomic status (SES), since for women U.S. migration often means greater employment opportunities and more egalitarian household labor and spending arrangements compared to non-migrant women (Kanaiaupuni, 2000; Parrado & Flippen, 2005), but these expanded socioeconomic opportunities can be harmful if they facilitate smoking. Alternatively, controlling for SES may explain little of the acculturation-smoking association since the SES-smoking gradient may be flatter or reversed for migrants compared to the U.S.-born (Chae et al., 2006). Smoking may also serve as a way to cope with acculturative stresses, while family, community, and religious-based support generally buffers against acculturative stress and promotes immigrant health (Finch & Vega, 2003; Hofstetter et al., 2010), although these processes may differ by gender.

METHODS

We examine data on immigrant adults from the 2002-2003 NLAAS, a nationally representative community household survey of U.S. Latinos and Asian Americans aged 18+. A multistage, stratified national area probability sample was drawn from the non-institutionalized U.S. population, with oversampling of areas with a moderate-to-high density of Latinos and Asian Americans. All interviewers were bilingual, and interviews

were conducted in person and in English, Spanish, Vietnamese, Chinese (Mandarin or Cantonese), or Tagalog. The response rate was 65.6% for Asian Americans and 75.5% for Latinos (see Heeringa et al., 2004 for sampling descriptions). We limit the initial NLAAS sample of 4,649 adults to foreign-born respondents ($n=3,265$) with valid information on smoking measures ($n=3,249$). Rates of item non-response on predictor measures are small ($<3\%$ for all measures). All missing data on predictor measures were imputed using the multiple imputation ICE command in Stata 12.0.

Measures

We examine two smoking behavior outcomes. First, we assess whether respondents currently smoke cigarettes (1=yes, 0=no, hereafter *smoking prevalence*). Second, among current smokers, we examine the number of cigarettes smoked each day last year (range: 1-20+, hereafter *smoking frequency*). All models control for *age at interview* and *gender* (or are gender-stratified). Models are also stratified by pan-ethnic *Latino/Asian identity*, adjusting for country-of-origin with dummy variables (for Asians: Vietnamese, Filipino, and “other Asians” are contrasted with Chinese adults; for Latinos: Cuban, Puerto Rican, and “other Latinos” are contrasted with Mexican adults). While Puerto Ricans are distinct from other migrants because of Puerto Rico’s commonwealth status, we include them because previous studies demonstrate that acculturation-related factors (and selective migration) shape health outcomes among Puerto Ricans who migrate from the island to the mainland (Arcia et al., 2001).

We measure acculturation as a bidimensional process in which orientation toward the host country, and the country-of-origin, are assessed simultaneously and independently of one another (see Abraído-Lanza et al., 2006; Berry, 2003). To gauge exposure to U.S. culture we include dummy variables for *duration of U.S. residence* (<5 , 5-10, 11-20, 21+ years), and *citizenship status* (1=U.S. citizen, 0=not a U.S. citizen). To gauge orientation toward native-country culture we include a measure of *how frequently they make return visits to their country-of-origin* (1=never, 2=rarely, 3=sometimes, 4=often).

English and native-language use also represent orientation toward U.S. and native-country culture. For *English language proficiency*, respondents rated their ability to read, write, and speak English on a four-point scale (1=poor and 4=excellent); we calculated their average ability across these three domains of use ($\alpha=.97$). Similarly, for *native language proficiency* respondents rated their ability to read, write, and speak their native language, and again we calculated their average ability ($\alpha=.89$). For each model presented, we also tested the interaction between ability in both languages to capture bicultural adults who are highly proficient (or not) in both languages; we include this interaction in models only if significant at $p<.05$.

We assess the original decision to migrate with two measures: (1) *age at U.S. migration* (1=migrated under age 18, 0=migrated 18+), since children migrate as a result of their parents decision to migrate, and thus represent a less select group than adults; and (2) the extent to which respondents agreed that they *migrated in search of medical attention* (1=not at all important, 2=somewhat important, 3=very important). (Note: respondents were also asked how important finding a job was to their migration decision; we tested this in

preliminary models, but it was never significant and thus dropped.) Given the multidimensional qualities of the acculturation process, compared to creating a global acculturation scale, including separate measures allows for maximum flexibility in measurement – respondents can be high on one measure and low on another. No measures were correlated at more than $r=.43$.

For control variables, SES includes *years of completed schooling*, *employment status* (1=currently working, 0=otherwise), *poverty status* (1=income below the 2001 federal poverty line, 0=higher), and *health insurance status* (1=no medical insurance, 0=insured). Measures of stress include *acculturative stress*, a summed index ($\alpha=.70$) based on responses to nine yes-no questions about stress experienced since migrating to the U.S. (e.g., “Have you felt guilty about leaving family or friends in your country of origin?”). We also include *family cultural conflict*, an averaged index ($\alpha=.77$) based on five questions addressing cultural/intergenerational conflict between respondents and their families (e.g., arguments over different customs), where 1=hardly ever or never, 2=sometimes, and 3=often. Lastly, measures of social network size and support include *marital status*, *attendance frequency at religious services* (1=never, to 5=more than once a week), and *family cohesion* (constructed from 10 questions, $\alpha=.93$, gauging family closeness and communication [e.g., family members like to spend free time with each other], where 1=hardly ever or never, 2=sometimes, and 3=often).

Analysis

After describing our analytic sample, we used a hurdle approach that (1) estimates the odds of being a current smoker (i.e., prevalence), using logistic regression, and then (2) given that a respondent reports smoking, estimates incidence rate ratios of the number of cigarettes smoked daily in the past year (i.e., frequency) using zero-truncated negative binomial regression. All analyses were weighted and run in Stata 12.0, using SVY commands to adjust for the complex NLAAS sample design.

RESULTS

Descriptive Statistics

Table 1 presents sample characteristics, stratified by gender and pan-ethnic identity. It shows significantly higher smoking prevalence among men – and among smokers, that men smoke more frequently than women. However, for both measures the gender gap is wider among Asian immigrants. Smoking prevalence among Asian immigrant men is over four times that of Asian immigrant women (30.4% vs. 7.1%), while among Latino immigrants men’s smoking prevalence is over twice that of women’s (29.5% vs. 12.6%). For smoking frequency, Asian men on average smoke 2.5 more cigarettes per day than women, compared to 1.5 more cigarettes per day among Latino men than women.

For acculturation status, men and women in both groups report a similar duration of U.S. residence and frequency of return trips home. While we see gender similarity in U.S. citizenship within both groups, over half of Asian immigrants are U.S. citizens compared to just over one-third of Latino immigrants. However, for language proficiency women of both

groups report greater native language proficiency (though this difference is only significant among Latinos), while men in both groups report significantly greater proficiency in English (though Latino immigrants report much poorer English ability than Asian immigrants). For migration decisions, the proportion migrating to the U.S. before age 18 does not differ by gender for either pan-ethnic group, although a higher proportion of Latino immigrants arrived in childhood. And among Latinos only, men agreed more strongly than women that they migrated to the U.S. to seek medical attention. Table 1 also shows significant gender difference in several control measures that are consistent with past research (e.g., Asian and Latino men generally report higher SES than women), as well as variation across pan-ethnic groups (e.g., Latinos report higher levels of acculturative stress than Asians).

Pooled Regression Models

We next present odds ratios and incidence rate ratios from logistic and negative binomial models that regress smoking prevalence and smoking frequency, respectively, on gender among Asian (Table 2) and Latino (Table 3) immigrants. Baseline models control for age and country-of-origin. We then test the mediating influence of acculturation and migration decision measures, followed by adjustment for potential confounders (full models available from authors by request).

Starting with Asian immigrants, Model 1 shows that adjusted for age and country-of-origin, smoking prevalence is 83% lower among women than men. In the models that follow, we see no evidence of a mediating effect on gender for any measures, although two acculturation measures have positive effects on smoking prevalence in Model 3: years lived in the U.S. and frequency of trips to their country-of-origin. Country-of-origin differences also emerge, with Chinese immigrants experiencing significantly lower smoking prevalence than all other groups.

In Models 4-6 we limited our sample to Asian immigrants who currently smoke and ran zero-truncated negative binomial models predicting smoking frequency. Smoking frequency among females is 27% lower than males in the baseline model (Model 4). However, adjusting for acculturation status in Model 5 reduces the gender difference to non-significance. In particular, smoking frequency among Asian immigrants increases with greater duration of U.S. residence – but at the same time, it is reduced among U.S. citizens and respondents who report higher levels of English proficiency.

Table 3 presents a similar model-building sequence for Latino immigrants, and we see the same gender pattern for both smoking measures as we saw for Asian immigrants. First, adjusting for acculturation, migration decisions, and controls explains none of the gender gap in smoking prevalence in Models 1-3; smoking is 65% lower among Latinas compared to men in Models 1 and 3. Second, adjusting for measures of acculturation in Model 5 reduces the gender difference in smoking frequency to non-significance.

That said, the measures of acculturation (and migration decisions) that significantly predict smoking behavior among Latino immigrants differs from what we found for Asian immigrants. For smoking prevalence, models show few associations between acculturation status and smoking among Latino immigrants, except for an interaction between country-of-

origin and English language proficiency. It indicates wide differences in smoking prevalence among Latino immigrants when Spanish language proficiency is poor: smoking is greatest when proficiency in English is also poor, and smoking is lowest when proficiency in English is excellent. However, when Spanish proficiency is high, English proficiency is unrelated to smoking prevalence (note: interaction figure available upon request).

For smoking frequency, Models 5-6 show that duration of U.S. residence positively predicts smoking frequency. However, after adjustment for controls in Model 6 two additional measures become significant: frequency of return trips to country-of-origin (which positively predicts smoking frequency), and age at migration (smoking frequency is lower among Latino immigrants who arrived before age 18). Table 3 also reveals significant country-of-origin differences, with Puerto Rican immigrants reporting higher smoking prevalence than Mexican immigrants. And among current smokers, Puerto Ricans and Cubans smoke more frequently, even after adjustment for acculturation, selection, and controls.

Gender-Stratified Models

Next, we present gender-stratified models for Asian (Table 4) and Latino (Table 5) immigrants. As in the pooled models, we suppress control measures since our interest here is in establishing whether the effects of these measures differ by gender in their relationship to smoking behavior (full models available by request). For each outcome we show two models: one that adjusts only for age, and another which adjusts for all control measures (fully-adjusted model). In addition to significance tests presented within each model, we confirm gender differences across models by including supplemental tests of the equality of coefficients between models for men and women (see Clogg et al., 1995).

Looking first to Asians in Table 4, we see both similarities and differences in how country-of-origin and acculturation relate to smoking prevalence by gender. Model 2 shows that Vietnamese men have higher smoking prevalence than Chinese men, while for women the contrast is not significant. And while frequency of return visits to the country-of-origin is positively associated with smoking prevalence among Asian men and women, the odds ratio is stronger among women. For smoking frequency, both measures of migration decisions are significant in Model 4, but only among Asian women: women smokers who migrated before age 18, and who more strongly agreed that they migrated to seek medical attention, smoke less frequently. Several measures of acculturation are also significant, as smoking frequency increases with duration of U.S. residence and declines with proficiency in their country-of-origin language — but again only among Asian women smokers. Among Asian men who smoke, Model 4 shows that smoking frequency is lower among U.S. citizens and men with higher levels of proficiency in English. Model 4 also shows that the association between frequency of country-of-origin trips and smoking frequency is positive among Asian immigrant women, but negative among men.

Lastly, in Table 5 we present gender-stratified models for Latino immigrants. Among women, we see no evidence that aspects of the decision to migrate, or acculturation, predict smoking prevalence, and among men the negative association between English language proficiency and smoking prevalence is explained-away with adjustment for control measures in Model 2. Otherwise, the only significant associations are country-of-origin differences

among Latina immigrants, with smoking prevalence more than seven times greater among Puerto Rican than Mexican women at interview.

However, for smoking frequency (Models 3 and 4), we see significantly higher use among Puerto Rican relative to Mexican women – but this same difference appears among men smokers as well. In addition, among men smoking frequency is higher among Cubans, who smoke at a significantly higher rate than men from Mexico (and Cuban women). Among Latinas, Model 4 shows little relationship between acculturation and smoking frequency, the lone exception being the negative relationship between country-of-origin visits and smoking frequency. This relationship is reversed for Latino men who smoke, among whom smoking frequency increases with trips to country-of-origin. Model 4 also shows that smoking frequency is significantly lower among Latino men who migrated during childhood (and while this measure is not significant among Latinas, the odds ratio is nearly identical to that of men).

DISCUSSION

Our analyses confirmed the gender-smoking pattern previously noted for both Asian and Latino groups (CDC, 2012), with lower smoking prevalence and frequency of daily cigarette use among immigrant women than men. This larger gender gap in smoking (and especially smoking prevalence) observed among Asian immigrants likely reflects the heightened gap in smoking between men and women who hail from countries in Asia vs. Latin America (WHO, 2013). We organized our multivariate analyses to study the role of migration decisions and acculturation in contributing to these gender differences, independent of control measures.

To begin, we found support for H1 in that indicators of orientation toward U.S. and origin-country culture, as well as aspects of the original decision to migrate, independently predicted smoking behavior – but patterns varied by pan-ethnicity and smoking measure. For acculturation measures reflecting U.S. orientation, pooled models showed that smoking increases with duration of U.S. residence among Asian immigrants (both prevalence and frequency), and among Latino immigrants (frequency only), reiterating past works documenting increased smoking among long-term migrants (Abraído-Lanza et al., 2005; Lopez-Gonzalez et al., 2005). However, pooled models also showed a protective effect of English proficiency, which negatively predicted smoking frequency among Asian immigrants. For Latino immigrants, however, we found an interaction between Spanish and English language proficiency. When Spanish proficiency is poor, smoking prevalence among Latinos is lowest when English ability is excellent (most acculturated group), and highest when English ability is also poor (least acculturated group). Our inclusion of bilingualism improves upon earlier studies that relied exclusively on an assimilated/unassimilated dichotomy (Epstein et al., 1998; Fu et al., 2003), as immigrants who are linguistically isolated may rely on smoking and other health risk behaviors to cope with weakened ties to their country of origin or acculturative discrimination (Lee et al., 2000). Combined with the negative association between U.S. citizenship and smoking frequency among Asian immigrants, these findings generally suggest that, independent of time spent in the U.S., immigrants who form strong connections to the U.S. through English-language proficiency

and citizenship acquisition benefit in terms of reduced smoking, perhaps because the stresses associated with U.S. adaption have declined. However, it is also possible that this finding reflects aspects of how education and SES more generally relate to smoking behavior (not captured by the measures included in our models). Future work would do well to more fully explore how language proficiency/use, in combination with SES, influences smoking behavior among migrant populations.

In terms of origin-culture orientation, pooled models also show that frequency of country-of-origin trips predicts higher smoking prevalence among Asian immigrants, and higher cigarette use among Latino immigrants who smoke. Since male smoking rates are particularly high among many (if not most) of the sending nations represented in our sample (WHO, 2013), it follows that smoking behavior would be elevated among men migrants who frequently return home. And finally for H1, we find limited evidence that migration decision measures predict smoking behavior in our pooled models: smoking frequency is lower among Latino immigrants who migrated before age 18 (a pattern seen in the gender-stratified models as well), perhaps reflecting less stress in the acculturation process due to easier identification with U.S. customs and norms compared to older migrants (Schwartz et al., 2010).

Moving to H2, we find mixed support for our prediction that acculturation and migration decision measures would partially explain gender differences in immigrant smoking behavior. For smoking prevalence, among both Asians and Latinos, we found no support for H2: odds ratios for gender were not reduced with adjustment for acculturation and migration decision measures. However, among Asian and Latino migrant smokers, adjusting for migration decision and acculturation measures reduced the effect of gender on smoking frequency to non-significance. Supplemental tests (not shown) indicated that no single measure was responsible for this reduction; rather, it was the combined influence of measures reflecting the migration decision and orientation toward U.S. and native-country culture that explained-away the gender gap in smoking frequency.

For H3, we ran gender-stratified models to test our prediction that smoking would increase more strongly with acculturation among women; we found weak or no support for this hypothesis. Among Asian immigrants, models showed that the effect of return visits on smoking prevalence was stronger among women, which does support our hypothesis. However, models of smoking frequency revealed that some measures of acculturation and the original decision to migrate were significant predictors only among Asian women (i.e., age at migration, migrating to seek medical attention, duration of U.S. residence, and native-language proficiency), while others were significant predictors only among Asian men (U.S. citizenship, English language proficiency, and frequency of return visits). And among Latino immigrants, all measures of migration decision and acculturation were non-significant in the fully-adjusted models predicting smoking prevalence for both genders, while models predicting smoking frequency found opposite effects for frequency of return visits (negative among women, but positive among men), in addition to a similar negative effect of migrating during childhood for men and women.

While by-and-large these findings do not support our prediction in H3, they illustrate the complicated manner by which gender shapes relationships among acculturation, migration decisions, and immigrant smoking behavior. For prevalence, we see little evidence that these measures are significant predictors for Latino men or women (after adjustment for controls), while for Asians we only see an opposite effect of return visits – more frequent visits positively predict smoking prevalence among women, and negatively predict smoking prevalence among men (note: return visits positively predict smoking frequency among Asian women as well). While somewhat counterintuitive, there are two main U.S migrant types – unauthorized “labor migrants” with little education and low-wage jobs (consisting largely of persons from Latin America), and highly skilled “human capital immigrants” (primarily from Asia) with higher educational and occupational levels who tend to fare better in the U.S. (Alba, 1997). In our sample, Asians report higher levels of schooling and naturalized citizenship than Latino immigrants, and we speculate that gender difference in the effect of return visits might reflect aspects of higher SES and status not captured by the controls in our models. Since distance travelled (and thus the expense) of return trips is substantial for many Asians in our sample, this measure may reflect women who have more employment experience and economic resources in the U.S.; as such, this might buffer against the influence of anti-smoking norms for women in their country-of-origin. That said, while return visits positively predicts smoking prevalence among Asian men, it is negatively related to smoking frequency (after we adjust for controls), which we are less able to explain.

Additionally, gender-stratified models show that frequency of return visits negatively predicts smoking frequency among Latina smokers, and positively predicts smoking frequency among men smokers. While opposite in effect from models of prevalence among Asians, we speculate that while Latino men return and spend time in contexts where smoking among men is normative, Latinas are exposed to more polarized gender roles and stronger social disapproval of female smoking than in the U.S. (Hondagneu-Sotelo, 1994; Lopez-Gonzalez et al., 2005) – and this occurs in the context of less socioeconomic protection (see Table 1). This may explain why their smoking behavior is negatively impacted by return visits, compared to a positive effect for Asian women – but this interpretation is speculative and needs replication before firm conclusions can be drawn.

Gender-stratified models of smoking frequency also show that nearly all measures of acculturation and migration decision differ by gender among Asian immigrants, net of control measures. Our sample size is small for these models, so effects should be interpreted with caution, but by-and-large our remaining acculturation measures relate to smoking behavior in the predicted manner. Among Asian women, smoking frequency is positively predicted by duration of U.S. residence and negatively predicted by native-language proficiency – suggesting that the least-acculturated Asian women smoke less frequently than the more-acculturated. And for Asian men we similarly see that smoking frequency is lower among naturalized citizens and those who report high English proficiency.

While an expansion on past research, readers should keep in mind the limits on causal inference that can be drawn using cross-sectional, self-reported data. While our data allow us to observe inter-individual patterns of smoking, we are unable to observe the intra-individual

change in smoking that unfolds throughout the acculturation process. In addition, while the NLAAS contains multiple indicators of acculturation, it contains no information on legal status, which is likely correlated with other acculturation measures and may therefore confound the acculturation-smoking association – and while we are able to consider measures that relate to the original decision to migrate, it is likely that our sample is still positively selected on health, leading to an unknown amount of bias in our sample composition. Finally, sample sizes for Latino and Asian groups were too small to divide and examine separately by both country-of-origin and gender (e.g., Cuban women vs. Cuban men). Given the differences documented in our models, future research would do well to examine how acculturation relates to smoking patterns across men and women in specific national-origin groups, particularly as the tobacco epidemic has expanded into immigrant-sending developing countries (Barry, 1991).

Indeed, while findings for smoking frequency are more tentative than those for prevalence given the small sample (especially for women, among whom relatively few reported smoking at interview), they do suggest both similarity and difference in how aspects of acculturation and the decision to migrate relate to immigrant smoking. Contrasts between Latino and Asian immigrants also demonstrated the danger of trying to broadly generalize from studies that focus solely on Latino migrants – and our attention to country-of-origin demonstrates how smoking behavior varies within pan-ethnic groups as well. Among Asian immigrants, models showed that immigrant men from China are less likely to smoke than other Asian men. And among Latino immigrants, men who hail from Cuba smoke much more frequently than Mexican men or Cuban women – while those who hail from Puerto Rico (especially women) are more likely to smoke and smoke frequently than migrants from Mexico. Since Puerto Ricans are U.S. citizens and freely able to travel between the island and U.S. mainland, and since over 70% of island-born Puerto Ricans are fluent in English, the high smoking frequency among Puerto Rican women in our sample may be due in part to their high level of acculturation into American society (Arcia et al., 2001).

In conclusion, our analysis illustrates the importance of operationalizing acculturation as more than an orientation toward U.S. culture when examining smoking (and likely other aspects of immigrant health behavior). Given the reliance in existing health research on U.S.-based acculturation measures (e.g., duration of residence), our findings indicate that past studies have likely presented an over-simplified description of the ways in which acculturation relates to health and health behavior. Other recent research documents the role of native-country orientation for contributing to the immigrant health advantage (Riosmena et al., 2013), and our study highlights the clear need for this attention in health behavior research as well. Furthermore, while our migration decision measures are limited and do not reflect all factors shaping whether and how a person enters the migration process, our results illustrate their role for smoking among migrants, calling for further study of how migration decisions, and selection processes more generally, impact migrant health behaviors.

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Research Highlights

Examines how immigrant smoking varies by acculturation and the decision to migrate

Gender gap in smoking behavior is larger among Asian than Latino immigrants

Lower female smoking prevalence not explained by acculturation or migration decisions

Gender moderates some effects of acculturation on smoking prevalence and frequency

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Table 1.

Sample Characteristics, Foreign-Born NLAAS Adults

	<u>Asian Immigrant Adults</u>		<u>Latino/a Immigrant Adults</u>	
	Women	Men	Women	Men
Smoking prevalence (current smoker)	7.1	30.4 ***	12.6	29.5 ***
Smoking frequency (# smoked daily)	6.4 (4.6)	8.9 (6.3) **	5.7 (6.5)	7.2 (7.3) *
<i>Demographic Characteristics</i>				
Age	43.1 (13.9)	41.7 (14.7)	40.2 (16.2)	38.2 (15.3) *
Asian country-of-origin				
Chinese	31.0	29.7	---	---
Vietnamese	16.5	16.0	---	---
Filipino	21.0	18.4	---	---
Other Asian	31.5	35.9	---	---
Latino country-of-origin				
Mexican	---	---	51.7	57.5
Cuban	---	---	6.8	7.0
Puerto Rican	---	---	7.6	8.1
Other Latino	---	---	33.9	27.4 *
<i>Migration and Acculturation Status</i>				
Migrated to U.S. before age 18	20.5	26.1	36.2	41.5
Migrated to U.S. to seek medical attention	1.5 (0.8)	1.4 (0.8)	1.2 (0.7)	1.3 (0.7) *
Years of U.S. residence				
<5	18.1	18.9	17.0	14.9
5–10	15.6	15.5	14.9	16.9
11–20	34.6	34.2	31.4	31.7
21+	31.7	31.4	36.7	36.5
U.S. citizen	61.1	57.7	34.8	34.3
How often returns to county-of-origin	2.2 (1.0)	2.2 (1.0)	2.3 (1.0)	2.4 (1.1)
Proficiency in county-of-origin language	3.2 (0.9)	3.1 (0.9)	3.2 (0.8)	3.0 (0.8) *
Proficiency in English	2.6 (1.0)	2.8 (1.0) **	1.7 (1.0)	1.9 (1.0) **
<i>Socioeconomic Status</i>				
Years of completed schooling	13.2 (3.7)	13.9 (3.2) ***	9.9 (3.9)	10.1 (3.8)
Employed	55.2	72.9 ***	48.1	78.9 ***
Poor	26.3	19.6 *	51.2	36.9 ***
No medical insurance	11.6	17.2 *	41.0	43.5
<i>Stress, Social Networks, and Support</i>				
Acculturative stress	1.7 (1.6)	1.9 (1.6)	2.4 (1.7)	2.3 (2.0)
Family cultural conflict	1.3 (0.4)	1.3 (0.3)	1.3 (0.4)	1.2 (0.3) **
Marital status				
Married/cohabiting	74.7	74.0	65.7	75.4 **

	<u>Asian Immigrant Adults</u>		<u>Latino/a Immigrant Adults</u>	
	Women	Men	Women	Men
Divorced/separated/widowed	11.2	4.0 ***	21.0	7.7 ***
Never married	14.2	22.0 **	13.4	16.9
Family cohesion	3.7 (0.4)	3.7 (0.4)	3.6 (0.5)	3.7 (0.4)
Attendance at religious services	2.6 (1.4)	2.5 (1.4)	3.0 (1.4)	2.6 (1.3) ***
Sample Size	867	767	900	715

NOTE: Standard deviations in parentheses.

*
p .05,

**
p .01,

p .001 (relative to same-group women).

Table 2.
Regression Models Predicting Smoking Prevalence and Smoking Frequency among Asian Immigrants.

	Smoking Prevalence ^a			Smoking Frequency ^b		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Female	0.17***	0.17***	0.16***	0.73**	0.80	0.85
Age	0.98***	0.96**	0.97**	1.01*	1.01	1.01
Country-of-origin (reference: Chinese)						
Vietnamese	1.37	1.65*	2.18***	1.25	1.34	1.31
Filipino	1.63	1.88**	3.03**	0.92	1.21	1.16
Other Asian	1.28	1.36	1.77*	1.23	1.30	1.30
<i>Migration and Acculturation Status</i>						
Migrated to U.S. before age 18		0.72	0.67		0.89	0.90
Migrated to U.S. to seek medical attention		0.98	0.98		0.89	0.91
Years of U.S. residence (reference: <5)						
5–10		1.74	1.46		0.96	1.03
11–20		2.76*	2.62*		1.49*	1.45*
21+		3.10**	2.80**		1.55*	1.55*
U.S. citizen		0.54*	0.63		0.71**	0.71**
How often returns to country-of-origin		1.19**	1.26***		0.92	0.90
County-of-origin language proficiency		0.87	0.87		0.95	0.97
English language proficiency		0.87	1.15		0.82**	0.86*

NOTE: Models 3 and 6 also adjust for SES, stress, and support measures.

^aOdds ratios from logit regression models predicting current smoking. n=1,634.

^bIncidence rate ratios from zero-truncated negative binomial models predicting number of cigarettes smoked daily last year (among smokers), n=286.

* p .05,

**

p .01,

p .001

Table 3.
Regression Models Predicting Smoking Prevalence and Smoking Frequency among Latino Immigrants.

	Smoking Prevalence ^a			Smoking Frequency ^b		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Female	0.35***	0.34***	0.35***	0.68**	0.74	0.88
Age	0.98*	0.97**	0.98	1.01	0.99	0.98**
Country-of-origin (reference: Mexican)						
Cuban	1.60	1.74	1.46	2.13***	3.39***	4.37***
Puerto Rican	2.19**	2.38*	2.30*	1.62**	2.29***	2.55***
Other Latino	1.08	1.25	1.30	0.94	1.18	1.27
<i>Migration and Acculturation Status</i>						
Migrated to U.S. before age 18		1.20	1.09		0.63	0.52**
Migrated to U.S. to seek medical attention		1.18	1.21		0.86	0.85
Years of U.S. residence (reference: <5)						
5–10		0.86	0.98		1.10	1.24**
11–20		1.02	1.33		1.40	1.32
21+		1.47	1.92		2.36*	2.14*
U.S. citizen		0.98	1.05		0.74	0.87
How often returns to country-of-origin		0.96	0.94		1.16	1.20**
County-of-origin language proficiency		0.78	0.78		0.89	0.91
English language proficiency		0.46*	0.42*		0.85	0.92
Country-of-origin * English language proficiency		1.22*	1.24*			

NOTE: Models 3 and 6 also adjust for SES, stress, and support measures.

^a Odds ratios from logit regression models predicting current smoking, n=1,615.

^b Incidence rate ratios from zero-truncated negative binomial models predicting number of cigarettes smoked daily last year (among smokers), n=346.

* p .05,

**

p .01,

p .001

Table 4.

Gender-Stratified Regression Models: Smoking Prevalence and Frequency among Asian Immigrants.

	Smoking Prevalence ^a		Smoking Frequency ^b	
	Model 1: Age-Adjusted	Model 2: Fully-Adjusted	Model 3: Age-Adjusted	Model 4: Fully-Adjusted
ASIAN FEMALES				
Country-of-origin (reference: Chinese)				
Vietnamese	0.47	0.45	1.24	2.98
Filipino	1.85	1.72	0.72	0.65
Other Asian	2.03	2.91	0.95	1.61
Migrated to U.S. before age 18	1.18	0.92	0.50	0.28 *
Migrated to U.S. to seek medical attention	1.05	1.03	0.74 *	0.63 **
Years of U.S. residence (reference: <5)				
5–10	1.82	1.20	1.34	2.24
11–20	4.19 *	3.63	2.59	4.39 *
21+	5.53 *	4.53	2.74	3.47 *
U.S. citizen	0.56	0.64	0.66	1.25
How often returns to country-of-origin	1.57 *	1.72 **	1.03	1.39 **
County-of-origin language proficiency	0.83	0.81	0.79	0.59 *
English language proficiency	1.28	1.13	0.94	1.11
ASIAN MALES				
Country-of-origin (reference: Chinese)				
Vietnamese	1.95**+	3.06***+	1.40	1.41
Filipino	1.88	3.31 *	1.39++	1.31+
Other Asian	1.09	1.44	1.45	1.49
Migrated to U.S. before age 18	0.58	0.49	0.94	0.99+
Migrated to U.S. to seek medical attention	1.00	0.99	0.92++	0.94+
Years of U.S. residence (reference: <5)				
5–10	1.74	1.53	0.94	0.99++
11–20	2.50	2.46	1.39	1.33+
21+	2.59	2.49	1.42	1.37++
U.S. citizen	0.50 *	0.62	0.74 *	0.71**+
How often returns to country-of-origin	1.09+	1.22*++	0.91	0.89*+
County-of-origin language proficiency	0.86	0.83	0.98++	1.00+
English language proficiency	0.75+	1.11	0.80 **	0.82**+

Note: Age-adjusted models control for age; fully-adjusted models control for all measures in Table 1.

^aOdds ratios from logit regression models predicting current smoking (n=867 women, n=767 men).^bIncidence rate ratios from zero-truncated negative binomial models predicting number of cigarettes smoked daily last year (n=55 women, n=231 men).

*
p .05,
**
p .01,

p .001

Bolded ratio differs significantly from the same measure in the corresponding model for women,

+
p .05,
++
p .10

Table 5.

Gender-Stratified Regression Models: Smoking Prevalence and Frequency among Latino Immigrants.

	Smoking Prevalence ^a		Smoking Frequency ^b	
	Model 1: Age-Adjusted	Model 2: Fully-Adjusted	Model 3: Age-Adjusted	Model 4: Fully-Adjusted
LATINA FEMALES				
Country-of-origin (reference: Mexican)				
Cuban	2.38	1.67	1.63	1.90
Puerto Rican	7.45***	7.55***	2.27*	2.21*
Other Latino	2.19*	2.23*	0.86	0.95
Migrated to U.S. before age 18	0.99	0.88	0.75	0.57
Migrated to U.S. to seek medical attention	1.13	1.17	1.30	1.09
Years of U.S. residence (reference: <5)				
5–10	0.70	0.97	0.89	1.14
11–20	0.82	1.20	0.93	0.93
21+	1.96	3.25	2.06	1.82
U.S. citizen	0.59	0.59	0.74	0.89
How often returns to country-of-origin	0.93	0.87	0.72**	0.79*
County-of-origin language proficiency	1.37	1.43	0.87	0.97
English language proficiency	1.27	1.19	0.80	0.82
LATINO MALES				
Country-of-origin (reference: Mexican)				
Cuban	1.52	1.39	4.58***+	6.62***+
Puerto Rican	1.20+	1.16+	2.20*	3.09**
Other Latino	0.90+	0.92+	1.44++	1.61***+
Migrated to U.S. before age 18	1.27	1.11	0.67	0.58*
Migrated to U.S. to seek medical attention	1.21	1.17	0.80+	0.80+
Years of U.S. residence (reference: <5)				
5–10	0.94	1.12	1.20	1.22
11–20	1.03	1.37	1.52	1.27
21+	1.14	1.53	2.38*	2.05
U.S. citizen	1.19++	1.25++	0.69	0.78
How often returns to country-of-origin	1.02	0.98	1.31**+	1.34***+
County-of-origin language proficiency	1.04	1.03	0.91	0.88
English language proficiency	0.70***+	0.75+	0.84	0.91

Note: Age-adjusted models control for age; fully-adjusted models control for all measures in Table 1.

^aOdds ratios from logit regression models predicting current smoking (1=yes, 0=no) (n=900 women, n=715 men).^bIncidence rate ratios from zero-truncated negative binomial models predicting number of cigarettes smoked daily last year (n=133 women, n=213 men).

*
p .05,
**
p .01,

p .001

Bolded ratio differs significantly from the same measure in the corresponding model for women,

+
p .05,
++
p .10