Examining psychological distress across intersections of immigrant generational status, race, poverty, and gender

Amanda Mancenido

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Anjum Hajat

Emily Williams

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University of Washington

Abstract

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Amanda Mancenido

Chair of the Supervisory Committee:
Anjum Hajat
Department of Epidemiology

Introduction: While many studies have documented the health outcomes of immigrants, little is known about the direct and intersectional influences of generational status on mental health.
Methods: We conducted a population-based cross-sectional study using data from the California Health Interview Survey from 2015-2016 (N=41,754) to examine the prevalence of psychological distress (self-reported experience in the past 12 months) across generational status. We used log-binomial regression models adjusted for demographic and health-related factors to compare the likelihood of psychological distress among first-generation immigrants and non-immigrants relative to second-generation immigrants, overall and across intersections of race, poverty status, and gender.
Results: Second-generation and non-immigrant respondents had a significantly higher prevalence (10.1% and 9.4%, respectively) of psychological distress compared to first-generation immigrants (5.9%). Generational status was not statistically significantly associated with psychological stress; estimates for first-generation and non-immigrants relative to second-generation immigrants were 0.81 (95% CI 0.63-0.04) and 1.12 (95% CI 0.84-1.50), respectively.
Discussion: Though no statistically significant association was shown between generational

status and psychological distress, the direction of estimates across iteratively adjusted models suggests a protective effect for first-generation immigrants. Further research is needed in bigger samples to explore associations between generational status and psychological distress, overall and across intersections of the population.

INTRODUCTION

First-generation immigrants and second-generation immigrants, or U.S.-born individuals with one or more foreign-born parents, currently comprise almost 27% of the United States population, and this percentage is continuing to increase.[1] Previous studies focused on immigrant health suggest that first-generation immigrants are healthier and more resilient than non-immigrants, with first-generation immigrant youth showing fewer depressive symptoms and a lower likelihood of attempting suicide than their U.S.-born peers.[2,3] Other studies suggest that, compared to non-immigrant populations, second-generation immigrants may experience greater stress, and consequently greater prevalence of poor mental health outcomes, due to their limited material and social resources and greater exposure to discrimination.[4,5] While these studies suggest that the stressors associated with being a second-generation immigrant may negatively influence health, few studies have evaluated the direct influence of immigrant generational status on the prevalence of psychological distress using a population-based sample of adults.

Second-generation immigrants may face significantly different historical, economic, and sociocultural factors than first-generation and non-immigrant populations. First-generation immigrants often keep strong ties to their cultural community, including language, spirituality, and cultural traditions.[6] The non-immigrant population, or those who are born in the U.S. and have U.S.-born parents, is a heterogenous group that is more likely to be accustomed to American culture and norms, whether their families immigrated more recently or hundreds of years ago.[6] Second-generation immigrants, on the other hand, may have bicultural identities that encompass characteristics from both heritage and mainstream American culture and are often discussed as living “between two worlds”.[6] In addition to greater exposure to interpersonal and institutional stress, second-generation immigrants may struggle to balance the conflicting

societal norms and expectations of their cultures, which could contribute to a higher prevalence of poor mental health outcomes compared to other immigrant generations.[6]

The influence of immigrant generational status on psychological distress may be even more pronounced among those of minority race, poverty status, and gender. Numerous studies have shown a greater prevalence of poor mental health outcomes among racial and ethnic minorities as compared to white individuals.[7,8] Similarly, both women and individuals living in poverty have consistently been found to have higher rates of poor mental health than their privileged counterparts.[9,10] While it is important to examine the health of each of these minority populations separately, examining mental health in the context of one social category only reveals the partial effect of minority stress on health and obscures the existence of multiple intersecting identities.[11] Minority race, poverty status, and gender may interact with immigrant generational status in ways that create different lived experiences and ability to cope with stress for those holding minority positionalities.[7] The social and income inequalities experienced by these individuals may create different levels of risk for negative mental health outcomes. [7] Thus, to gain a better understanding of the mental health needs of these populations, it is crucial that we more thoroughly examine the lived experiences of immigrants by exploring mental health outcomes across intersections of generational status, race, poverty status, and gender.

The minority stress model proposes that individuals with marginalized social positions have greater exposure to psychosocial stressors, such as discrimination and internalized oppression (Figure 1).[12] Minority stress processes influence health behaviors, health care utilization, and resiliency and coping resources in complex ways that lead to health disparities.[12] This model suggests that differences in mental health are socially patterned and determined not only by individual factors, but also by the sociocultural context in which people live.[12] Studies have demonstrated a greater prevalence of negative mental health outcomes among racial/ethnic minorities as compared to white individuals.[9] Additionally, immigrants and

racial/ethnic minorities have historically held stigmatized views of mental illness and lacked access to culturally appropriate and affirming health care, which may discourage them from addressing their mental health needs.[8,13] This lack of care, in combination with the daily life stressors they encounter, act together to contribute to the mental health disparities for these populations.

The intersectionality framework posits that people who inhabit multiple social categories of "identity, difference, and disadvantage" experience the simultaneous and interlocking systems of oppression of each of their identities.[11,14] Thus, to gain a richer understanding of mental health outcomes across generations of immigrant health, we must consider how race, poverty status, and gender hierarchies may be acting to simultaneously and synergistically burden immigrant health.[15] Utilizing the minority stress model in combination with the intersectionality framework in examining generational status and psychological distress will allow us to elucidate and address health disparities that occur across the diverse spectrum of immigrants and their children.

In order to better understand mental health outcomes across generations of immigrants, the present study – conducted in a statewide sample of U.S. residents – aimed to describe direct and intersectional influences of immigrant generational status on psychological distress. Specifically, we evaluated the association between generational status and psychological distress and assessed variation across subgroups based on race, poverty status, and gender. We hypothesized that second-generation immigrants would have a higher prevalence of psychological distress than first-generation and non-immigrant populations and that the influence of generational status would be greater for those of minority racial/ethnic groups, women, and those living in greater poverty. Findings have potential to contribute to the evidence base needed to understand the unique mental health needs of immigrants across generational status, including identifying key vulnerable subgroups.

METHODS

Study Setting and Subjects

We conducted a population-based cross-sectional study using data from the California Health Interview Survey from 2015-2016. The CHIS annually samples approximately 21,000 randomly selected adults from all 58 counties of California. With nearly 27% of the U.S. population comprised of first- and second-generation immigrants, and Hispanic and Asian Americans making up between 50 to 70% of this population, the CHIS' large representation of these groups makes it an ideal dataset to look at the intersection of generational status, race, poverty status, and gender.[16,17]

Using respondents to the CHIS in the years 2015-2016, we examined a total of 41,754 non-institutionalized civilian adults 18 years and older living in California. Individuals living in California with a household telephone or with a cell phone were eligible for selection for this survey. CHIS respondents who refused to answer or were missing data on immigrant status and generation, psychological distress, or included covariates were excluded from this study.

Data Collection

The CHIS sampled California residents using a random digit-dialing method, including telephone numbers assigned to both landline and cellular service. Counties were grouped into geographic sampling strata, residential and cellular phone numbers were selected within each stratum, and then within each household, one adult (age 18 and over) respondent was randomly selected. The sample was designed such that the number of completed adult interviews would come from approximately 50% landline and 50% cellular phone numbers. To capture California's diverse population, racial/ethnic minorities were oversampled, and interviews were conducted in six languages (English, Spanish, Chinese, Vietnamese, Korean, and Tagalog) using a computer-assisted telephone interviewing system. Data are publicly available for

download on the UCLA Center for Health Policy Research website. Response rates among adults for the 2015 and 2016 surveys were 41.8% and 41.3%, respectively.

Measurement

Dependent variable: Generational status. Immigrant generational status was defined by the place of birth of the respondent and the respondent's parents. Respondents were defined as first-generation if they were born outside of the U.S., second-generation if they were born in the U.S. with one or more foreign-born parents, and non-immigrant if the respondent and both parents were born in the U.S. Additional data on grandparent birth place was not available, therefore we could not distinguish third or later generation immigrants.

Outcome of Interest: Psychological distress. The outcome of interest was non-specific psychological distress in the past 12 months based on self-report on the Kessler Psychological Distress Scale (K6).[18] This 6-item scale assessed psychological distress through self-report of how frequently respondents experienced the following six symptoms: felt nervous, hopeless, restless or fidgety, worthless, depressed, and felt that everything was an effort. Responses to these six items were measured on a scale of 0-4 from "none of the time" to "all of the time." Responses were summed and those with scores greater than 12 were classified as having psychological distress.

Demographic Measures/Intersectional Effect Modifiers. Race was categorized into five groups (Asian, Hispanic, other, white, non-white), percent of federal poverty level (<100%, 100-199%, ≥200%) was used as a measure of poverty status, and gender was classified as either female or male.

Other demographic characteristics. Age in years at time of survey was categorized into: 18-25, 26-44, 45-64, and 65+ years. Current marital status was categorized as: married, never married, and other (living with partner, divorced, separated, widowed). Time spent in the U.S.

and English use and proficiency were both highly correlated with immigrant generational status and were thus not measured as potential confounders.

Health-related factors. Body mass index was categorized as: underweight, normal, overweight, and obese. Current smoking status was defined as non-smoker or smoker.

Socioeconomic factors. Educational attainment (less than high school, high school graduate, some college, college degree or higher), employment status (employed, not in labor force, unemployed), and health insurance status (yes/no) were included as factors related to socioeconomic status.

Data Analysis

Descriptive statistics were calculated to estimate proportions of first-generation, second-generation, and non-immigrant California adults, overall and across sociodemographic and health-related characteristics. In order to accurately estimate variance and obtain point estimates that represent the California population, we used sample weights provided by CHIS that accounted for complex survey design. Unweighted sample sizes and weighted percentages are reported, and chi-squared tests of independence were used to test for differences in proportions of respondents reporting psychological distress by immigrant generational status. Multivariable log binomial regression models were used to calculate prevalence ratios and 95% confidence intervals of the association between psychological distress and immigrant generational status. For each measure of psychological distress, prevalence ratios were adjusted for pre-specified confounders and precision variables (Figure S1) using four adjustment models.

In Model 1, we calculated the crude prevalence ratio between generational status and psychological distress. Model 2 adjusted for demographic confounders including age, race, gender, and marital status. Model 3 adjusted for demographic factors included in Model 2 plus

health-related factors including body mass index and smoking status. Model 4 was adjusted for all variables in Model 3, as well as socioeconomic factors (educational attainment, employment status, poverty status, and health insurance status) that may mediate the association between generational status and psychological distress. Model 3 is designated as our primary model because it includes all pre-specified confounders but does not include factors that are on the causal pathway between immigrant generational status and psychological distress.

We presented results from our primary model stratified by race, poverty status, and gender to examine our association of interest at these various intersections. Specifically, we estimated the association between immigrant generational status and psychological distress within each race, poverty, and gender subgroup, including assessment of the prevalence ratio and 95% confidence interval of experiencing psychological distress for first-generation and non-immigrant populations relative to second-generation immigrants. In a sensitivity analysis, we used generalized linear models to examine the influence of immigrant generational status on the continuous variable for psychological distress (K6 scale, 0-24) as shown in the supplementary material.

All statistical analyses were carried out using Stata version 14 (StataCorp, College Station, TX).[19] This research was considered exempt from review by the University of Washington Institutional Review Board because all data were de-identified.

RESULTS

Among 42,025 respondents to the CHIS in 2015 and 2016, 41,754 persons met inclusion criteria for this analysis. Among those, 10,465 (25.1%) were first-generation immigrants, 6,863 (16.4%) were second-generation immigrants, and 24,426 (58.5%) were non-immigrants. 3,158 respondents reported psychological distress in the past 12 months, among whom 688 (24.2%) were first-generation, 555 (23.5%) were second-generation, and 1,915 (52.3%) were non-immigrants.

Sample characteristics are presented across immigrant generational status in Table 1. The majority of first-generation immigrants were between the ages of 26-64 years, female, Hispanic, married, in the U.S for greater than 40% of their life, and proficient in English. Most first-generation immigrants obtained a high school degree or less, were employed, had a household income above the 100% federal poverty level, and had health insurance. The majority of second-generation immigrants were between the ages of 18-44, male, Hispanic, married or of other marital status, and proficient in English. Second-generation immigrants were mostly employed, attended some college, had an income greater than 199% of the federal poverty level, and had health insurance. The majority of non-immigrant respondents were 45 years or older, female, white, never married or of other marital status, and proficient only in English. Most non-immigrant respondents attended some college, were employed, had income greater than 199% of the federal poverty level, and had health insurance. The majority of all respondents s were non-smokers and were overweight or obese with little variation across generational status.

As shown in Table 2, psychological distress was more common among second-generation immigrants (10.1%) and non-immigrant respondents (9.4%) than first-generation immigrants (5.9%). Prevalence of psychological distress among second-generation and non-immigrant respondents was significantly different from that of first-generation immigrants, but there was no significant difference for second-generation immigrants relative to non-immigrant respondents. Among first-generation immigrants, respondents age 26-64, with less than a high school education, employed, with income less than 100% of the federal poverty level, married, and non-smokers were more likely to report psychological distress. Among second-generation immigrants, those 18-25 years old, employed, with income greater than 200% of federal poverty level, of other marital status, and non-smoking were more likely to report psychological distress in the past 12 months. Among non-immigrant respondents, those 26-44 years old, white, had

attended some college, employed, with income greater than 200% of poverty level, of other marital status, and non-smoking were more likely to report psychological distress.

Prevalence ratios for first-generation and non-immigrant respondents relative to second-generation immigrants are presented in Figure 2. No significant association was observed between generational status and psychological distress in the primary model (Model 3, adjusted for age, race, gender, and marital status). Estimates for the association comparing first-generation immigrants to second-generation immigrants showed a prevalence ratio less than 1.0 across all four models, with the magnitude of the effect varied depending on which confounders were included in the model. No differences in prevalence of psychological distress were observed between non-immigrants and second-generation immigrants in any model. Iteratively adjusted linear regression models examining continuous changes in psychological distress by generational status are shown in Table S1 and are similar in magnitude and direction to the results from the binomial models presented in Figure 2.

Table 3 shows prevalence ratios for first-generation and non-immigrant respondents compared to second-generation immigrants across intersections of race, poverty, and gender. Among all non-white respondents combined (Asian, Hispanic, and other races), first-generation immigrants had a lower prevalence of psychological distress than second-generation immigrants (PR, 95% CI: 0.73, 0.56-0.97). However, no differences in prevalence of psychological distress were found between first-generation and non-immigrant respondents relative to second-generation immigrants when stratified by poverty status, gender, or undichotomized subgroups of race (i.e. Asian, Hispanic, other, white).

DISCUSSION

In this statewide sample of U.S. residents, psychological distress in the past 12 months was common, particularly among second-generation and non-immigrant respondents, with 9.4 to 10.1% reporting psychological distress compared to 5.9% of first-generation immigrants.

Though no significant differences in prevalence of psychological distress were observed between generations in fully adjusted models, the direction of the estimates are suggestive of a protective effect of generational status for first-generation immigrants, relative to second-generation immigrants.

Previous studies evaluating mental health among immigrant communities have focused mainly on first-generation immigrants, and studies that have examined the health of second-generation immigrants have focused mostly on youth, adolescent, and college-age groups.[3,5,20,21] Studies evaluating the mental health of these groups have had mixed results possibly because they neglected to examine these associations across multiple intersecting identities.[10] Furthermore, many studies collapse all U.S.-born generations into one category and thus lose the distinction between second-generation and non-immigrant subgroups.[22] Our study adds to the literature by examining the effects of first-generation, second-generation and non-immigrant status on psychological distress across intersections of race, poverty, and gender.

Our findings support studies that have found second-generation and non-immigrants to have higher prevalence of mental illness than first-generation immigrants.[6,23] This research theorizes that because of increased exposure to discrimination in combination with fewer protective cultural ties, second-generation and non-immigrant populations may have greater prevalence of poor mental health outcomes.[6,23] Unlike previous studies suggesting that second-generation immigrants may have higher levels of mental illness than non-immigrants, our analysis showed that second-generation immigrants have a similar prevalence of psychological distress as non-immigrant respondents.[3] One possible explanation for these findings could be that second-generation immigrants' cultural ties are not strong enough to influence the stress processes in either a protective or detrimental manner.[6] However, further research is needed to understand the role of cultural identity and social support as buffers to minority stress.

Unlike previous studies that observed an association between immigrant generational status and negative mental health outcomes, we found no statistically significant differences in likelihood of psychological distress across immigrant generations, overall and stratified by race, poverty status, and gender.[3] However, when examining the association between generational status and psychological distress using iteratively adjusted models, a protective effect was shown for first-generation immigrants across all four models. The direction of these estimates, while not statistically significant, were consistently below 1.0 and are thus suggestive of a protective effect of generational status on psychological distress for first-generation immigrants compared to second-generation immigrants. Examining this association across multiple intersections of identities resulted in insufficient sample sizes to detect statistically significant results. Further research is needed in larger and more diverse samples to confirm these effects and explore associations between generational status and psychological distress, overall and across intersections of the population.

This study has several features that may limit the interpretation of our findings. The variation in experiences throughout the life course due to age, experiences of a population during a specific period, and social and historical changes affecting specific cohorts may all impact an individual's risk of psychological distress. However, due to the cross-sectional design of the survey, we were limited in our ability to distinguish between these age, period, and cohort effects. Measures of social support, alcohol use, diet and exercise patterns, and health care utilization were not included in this analysis, and study results may have been affected by these unmeasured confounders and mediators. Furthermore, the study design does not allow us to determine causation. Finally, the study sample was restricted to California residents and therefore may not be generalizable to the rest of the U.S. population, as California is one of the most racially diverse states in the nation.

Despite these limitations, our findings showed a higher prevalence of psychological distress among second-generation and non-immigrant respondents relative to first-generation immigrants. Further, though there was no statistically significant association between generational status and prevalence of psychological distress, the direction of our results suggest a protective effect for first-generation immigrants. Previous literature suggests that, while second-generation immigrants will assimilate to the language and culture of the U.S., whether they join the mainstream middle class or the marginalized and racialized population at the bottom of the socioeconomic hierarchy may differentially affect their health.[24] Thus, in addition to using bigger sample sizes, future studies should examine the association between immigrant generational status and mental health across various measures of socioeconomic status, cultural connectedness, and social support. Potential findings could help elucidate what factors contribute to the increased prevalence of psychological distress observed among second-generation and non-immigrant populations.

Our findings, in conjunction with previous literature showing increased prevalence of psychological distress among second-generation immigrants, suggest that generational status may be useful for primary care and mental health care providers to include in patient family histories as a marker to screen for psychological distress. This marker could remind providers to initiate conversations with patients about stress and coping strategies and could help reduce stigma in communities which historically disregard mental health. With an ever-growing population of second-generation immigrants, further elucidating the influence of immigrant generational status on psychological distress across intersections of social identities has the potential to impact mental health care and thus public health.

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Tables and Figures

Figure 1. Conceptual model of minority stress and mental health among first-generation, second-generation, and non-immigrant status.

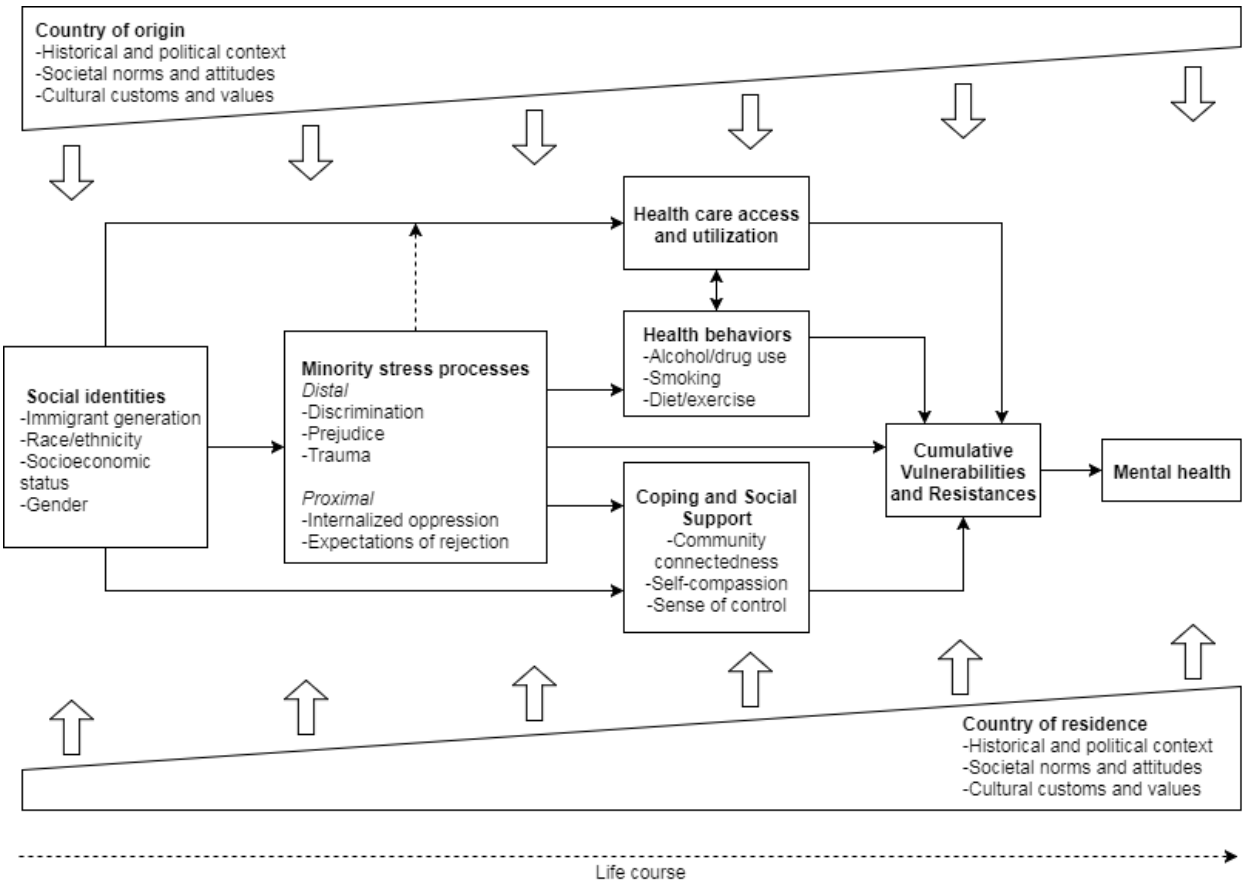


Table 1. Demographic characteristics of adults in California, age 18 years or older, by immigrant generational status, California Health Interview Survey (2015-2016).

	First-generation (N=10,465)		Second-generation (N=6863)		Non-Immigrant (N=24,426)		Total sample (N=41,754)	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Age (years)								
18-25	629	7.2	1544	33.7	1747	12.5	3920	14.8
26-44	2852	39.8	1548	36.7	3795	29.0	8195	34.2
45-64	4095	38.6	1458	16.6	9066	37.1	14,619	33.6
65+	2889	14.4	2313	13.1	9818	21.4	15,020	17.4
Gender								
Female	5940	51.8	3743	49.7	13,937	51.4	23,620	51.2
Male	4525	48.2	3120	50.3	10,489	48.6	18,134	48.8
Race								
Asian	2965	28.7	941	19.9	396	1.3	4302	10.3
Hispanic	5501	57.9	2858	51.4	1851	12.2	10,210	24.4

Other	231	1.9	331	5.0	3178	14.8	3740	8.9
White	1768	11.6	2765	23.7	19,001	71.7	23,502	56.4
Non-white	8697	88.4	4130	76.3	5425	28.3	18,252	58.2
Educational attainment								
Less than high school	3236	37.6	363	6.5	1098	6.5	4697	17.1
High school graduate	2239	18.1	1894	26.5	5484	22.7	9617	21.9
Some college	1534	12.6	1910	29.4	7292	29.4	10,736	23.6
College degree or higher	3456	31.7	2696	37.6	10,552	41.4	16,704	37.4
Employment status								
Employed	5820	66.9	3651	68.8	11,833	61.6	21,304	64.8
Not in labor force	4220	28.3	2855	24.1	11,921	34.3	18,996	30.3
Unemployed	425	4.7	357	7.1	672	4.1	1455	4.9
% of federal poverty level								
<100	2940	27.2	966	14.3	2864	12.3	6770	17.8
100-199	2690	26.4	1248	18.8	3669	13.5	7607	18.9
≥ 200	4835	46.4	4649	66.9	17,893	74.2	27,377	63.3
Marital status								
Married	5740	58.6	2436	34.3	10,621	45.3	18,797	47.7
Never married	1669	23.5	2369	18.5	4801	28.2	14,118	24.7
Other	3056	17.8	2058	47.1	9004	26.5	8839	27.6
Health insurance								
Yes	9098	83.9	6459	92.1	23,426	94.3	39,983	90.3
No	1367	16.1	404	7.9	1000	5.7	2771	9.7
% life in US								
0-20	1005	11.4	N/A	N/A	N/A	N/A	1005	3.9
21-40	2269	21.2	N/A	N/A	N/A	N/A	2269	7.3
41-60	3340	32.0	N/A	N/A	N/A	N/A	3340	10.9
61-80	2497	22.6	N/A	N/A	N/A	N/A	2497	7.7
81+	1354	12.7	6863	100.0	24,426	100.0	32,643	70.2
English use and proficiency								
Only English	1563	11.4	3829	44.1	22,460	90.5	27,852	54.5
Very well/well	4256	44.2	2934	54.6	1943	9.4	9133	30.1
Not well/not at all	4646	44.4	100	1.3	23	0.1	4769	15.5
Smoking status								
Non-smoker	9561	89.9	6238	89.2	21,051	85.1	36,850	87.5
Smoker	904	10.1	625	10.8	3375	14.9	4904	12.5
Body mass index								
Underweight	231	1.9	132	2.3	454	1.7	817	1.9
Normal	3789	33.5	2630	39.0	8615	35.3	15,034	35.4
Overweight	3699	36.1	2298	31.1	8509	35.2	14,506	34.7
Obese	2746	28.5	1803	27.6	6848	27.7	11,397	28.0

Note: N = Sample Size; N/A = Not Applicable; All percents are weighted to account for complex survey design, but numbers of respondents are unweighted

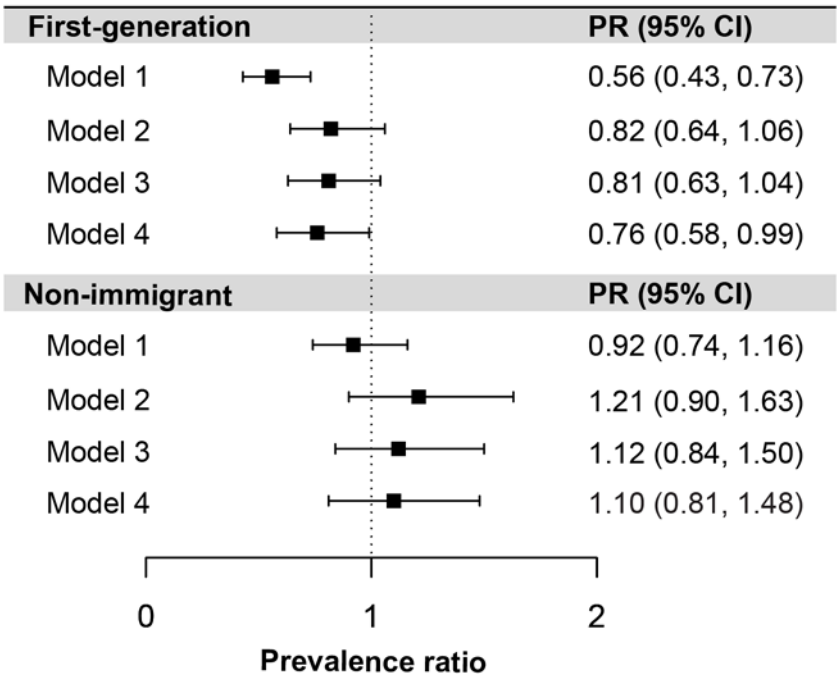
Table 2. Prevalence of psychological distress in the past 12 months overall and across respondent characteristics, stratified by immigrant generational status.

	First-generation (N=10,465)		Second-generation (N=6863)		Non-Immigrant (N=24,426)		Total (N=41,754)	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Overall	688	5.9	555	10.1	1915	9.4	3158	8.3
Overall group comparison, *p-value*								<0.001
Age (years)								
18-25	65	0.8	228	5.0	285	1.9	578	2.1
26-44	182	2.2	155	3.6	511	3.7	848	3.1
45-64	292	2.1	114	1.0	860	3.1	1266	2.4
65+	149	0.7	58	0.4	259	0.7	466	0.7
Within group comparison, *p-value*		0.03		<0.01		<0.001		<0.001
Gender								
Female	462	3.6	326	5.5	1220	5.4	2008	4.8
Male	226	2.4	229	4.6	695	4.0	1150	3.6
Within group comparison, *p-value*		0.14		0.45		0.09		0.06
Race								
Asian	142	1.3	67	2.2	15	0.1	224	0.9
Hispanic	417	3.6	290	5.4	192	1.4	899	2.9
Other	14	0.2	40	0.4	350	1.8	404	1.0
White	115	0.8	158	2.1	1358	6.1	1631	3.5
Within group comparison, *p-value*		0.33		0.81		0.18		0.07
Non-white	573	5.1	397	8.0	557	3.3	1527	4.8
Within group comparison, *p-value*		0.35		0.53		0.04		0.87
Educational attainment								
Less than high school	283	2.6	33	0.4	202	1.4	518	1.6
High school graduate	148	1.0	204	3.4	567	2.4	919	2.1
Some college	117	1.1	177	3.5	657	3.1	951	2.5
College degree or higher	140	1.3	141	2.9	489	2.5	770	2.2
Within group comparison, *p-value*		0.03		0.07		<0.001		<0.001
Employment status								
Employed	304	3.1	313	6.7	830	5.2	1447	4.8
Not in labor force	339	2.4	176	2.0	966	3.5	1481	2.9
Unemployed	45	0.4	66	1.4	119	0.7	230	0.7
Within group comparison, *p-value*		<0.01		0.04		<0.01		<0.001

% of federal poverty level								
<100	316	2.4	149	2.0	545	2.4	1010	2.4
100-199	189	1.6	152	2.8	450	1.9	791	2.0
≥ 200	183	1.9	254	5.2	920	5.1	1357	4.0
Within group comparison, *p-value*		<0.01		<0.01		<0.001		<0.001
Marital status								
Married	258	2.3	83	1.5	457	2.2	798	2.1
Never married	134	2.1	322	1.9	635	3.3	1091	2.6
Other	296	1.5	150	6.7	823	3.9	1269	3.6
Within group comparison, *p-value*		<0.01		<0.001		<0.001		<0.001
Health insurance								
Yes	590	4.9	515	9.2	1796	8.8	2901	7.6
No	98	1.0	40	0.9	119	0.6	257	0.8
Within group comparison, *p-value*		0.77		0.83		0.74		0.80
Smoking status								
Non-smoker	581	4.9	438	8.0	1291	6.5	2310	6.2
Smoker	107	1.1	117	2.1	624	2.9	848	2.1
Within group comparison, *p-value*		0.02		<0.001		<0.001		<0.001
Body mass index								
Underweight	17	0.0	17	0.5	49	2.0	83	0.2
Normal	241	2.1	207	4.2	670	3.5	1118	3.1
Overweight	207	2.8	149	2.3	530	2.7	886	2.3
Obese	223	1.9	182	3.2	666	3.0	1071	2.7
Within group comparison, *p-value*		0.46		0.12		0.28		0.04

Note: N = Sample Size; All percents are weighted to account for complex survey design, but numbers of respondents are unweighted

Figure 2. Prevalence ratio of psychological distress in the past 12 months for first-generation and non-immigrants relative to second-generation immigrants: results from iteratively adjusted models.



Note: PR = Prevalence ratio; CI = Confidence interval; psychological distress defined as K6 score ≥13; referent group is second-generation immigrants; Model 1: log-binomial regression unadjusted for confounding factors; Model 2: log-binomial regression adjusted for demographic factors (age, race, gender, marital status); Model 3: log-binomial regression adjusted for demographic and other health-related factors (body mass index, smoking status); Model 4: log-binomial regression adjusted for demographic factors, other health-related factors, and socioeconomic factors (education, employment status, poverty status, health insurance status)

Table 3. Association between immigrant generational status and psychological distress, stratified by race, poverty status, and gender.

	Psychological distress, past 12 months		
	n	Prevalence ratio	(95% CI)
Race			
Asian	224		
First-generation	142	0.70	(0.36, 1.36)
Second-generation	67	Ref.	Ref.
Non-immigrant	15	1.55	(0.39, 6.24)
Hispanic	899		
First-generation	417	0.72	(0.50, 1.03)

Second-generation	290	Ref.	Ref.
Non-immigrant	192	1.20	(0.70, 2.05)
Other	404		
First-generation	14	2.13	(0.54, 8.39)
Second-generation	40	Ref.	Ref.
Non-immigrant	350	1.71	(0.77, 3.78)
White	1631		
First-generation	115	0.77	(0.41, 1.45)
Second-generation	158	Ref.	Ref.
Non-immigrant	1358	0.85	(0.52, 1.37)
Non-white*	1527		
First-generation	573	0.73	(0.56, 0.97)
Second-generation	397	Ref.	Ref.
Non-immigrant	557	1.27	(0.89, 1.83)
Poverty status			
0-99%	1010		
First-generation	316	0.74	(0.44, 1.27)
Second-generation	149	Ref.	Ref.
Non-immigrant	545	1.26	(0.62, 2.56)
100-199%	791		
First-generation	189	0.51	(0.26, 1.00)
Second-generation	152	Ref.	Ref.
Non-immigrant	450	1.03	(0.61, 1.75)
≥200%	1357		
First-generation	183	0.76	(0.48, 1.19)
Second-generation	254	Ref.	Ref.
Non-immigrant	920	1.05	(0.67, 1.66)
Gender			
Female	2008		
First-generation	462	0.85	(0.60, 1.21)
Second-generation	326	Ref.	Ref.
Non-immigrant	1220	1.03	(0.67, 1.58)
Male	1150		
First-generation	226	0.76	(0.48, 1.22)
Second-generation	229	Ref.	Ref.
Non-immigrant	695	1.24	(0.84, 1.84)

Note: PR = prevalence ratio; CI = confidence interval; psychological distress defined as K6 score ≥13; Race-stratified models are adjusted for age, gender, body mass index, smoking status, and marital status; Poverty status-stratified models are adjusted for age, race, gender, marital status, body mass index, and smoking status; Gender-stratified models are adjusted for age, race, marital status, body mass index, and smoking status; *Non-white group is Asian, Hispanic, and other categories of race combined.

Supplementary material

Figure S1. Directed acyclic graph displaying confounders and precision variables of the association between immigrant generational status and psychological distress.

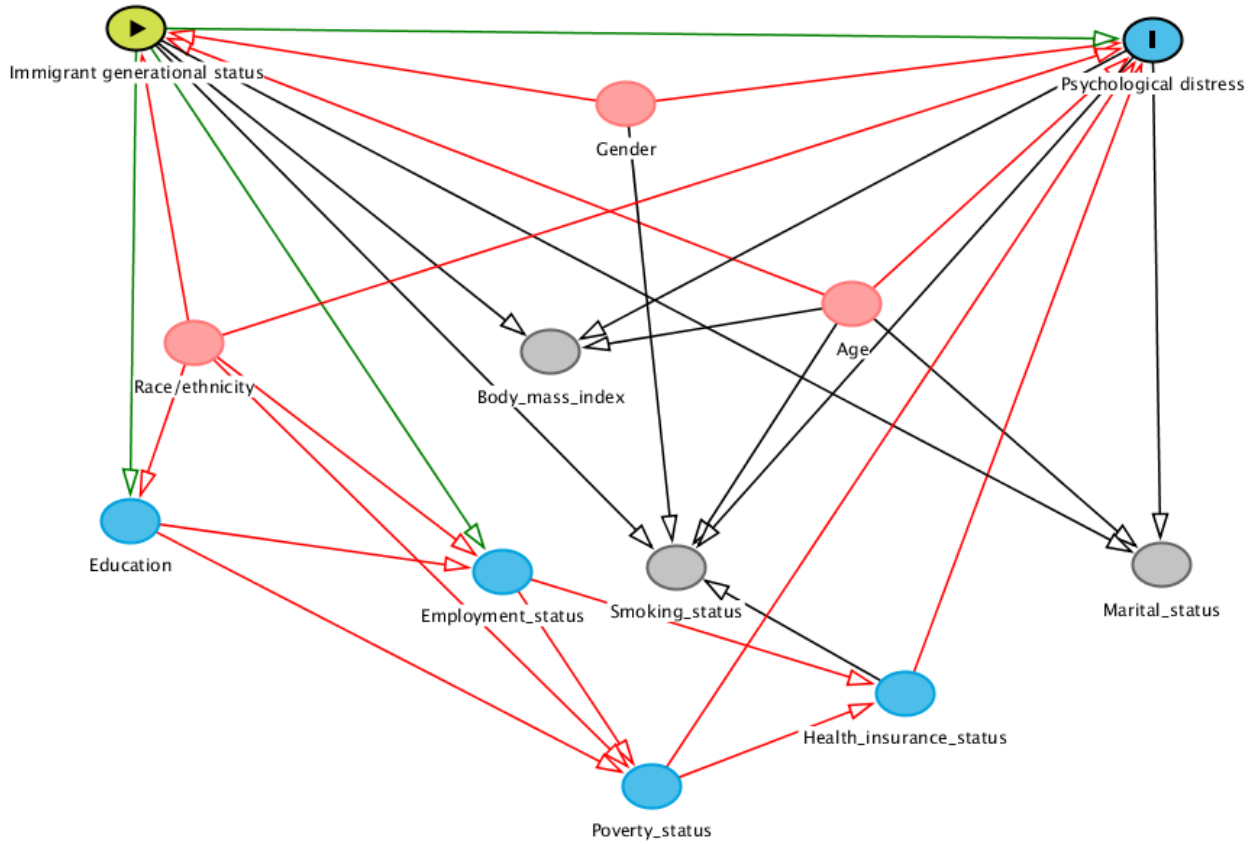


Table S1. Association between immigrant generational status and non-specific psychological distress in the past 12 months using the continuous K6 score, CHIS (2015-2016).

		Psychological distress, past 12 months			
		Model 1	**Model 2**	**Model 3**	**Model 4**
	%	**PR (95% CI)**	**PR (95% CI)**	**PR (95% CI)**	**PR (95% CI)**
First-generation	5.9	0.46 (0.33, 0.64)	0.67 (0.48, 0.93)	0.85 (0.61, 1.19)	0.72 (0.51, 1.02)
Second-generation	10.1	Referent	Referent	Referent	Referent
Non-Immigrant	9.4	0.77 (0.55, 1.07)	1.50 (1.00, 2.25)	1.27 (0.87, 1.87)	1.24 (0.84, 1.84)

Note: PR = Prevalence ratio, CI = confidence interval; All percents are weighted to account for complex survey design; psychological distress measured as a continuous K6 score (0-24); Model 1: linear regression model unadjusted for confounding factors; Model 2: linear regression

adjusted for demographic factors (age, race, gender, marital status); Model 3: linear regression adjusted for demographic and other health-related factors (body mass index, smoking status); Model 4: linear regression adjusted for demographic factors, other health-related factors, and socioeconomic factors (education, employment status, poverty status, health insurance status)