Article

Prevalence of Mental Illness in Immigrant and Non-Immigrant U.S. Latino Groups

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Objective: Although widely reported among Latino populations, contradictory evidence exists regarding the generalizability of the immigrant paradox, i.e., that foreign nativity protects against psychiatric disorders. The authors examined whether this paradox applies to all Latino groups by comparing estimates of lifetime psychiatric disorders among immigrant Latino subjects, U.S-born Latino subjects, and non-Latino white subjects.

Method: The authors combined and examined data from the National Latino and Asian American Study and the National Comorbidity Survey Replication, two of the largest nationally representative samples of psychiatric information.

Results: In the aggregate, risk of most psychiatric disorders was lower for Latino subjects than for non-Latino white subjects. Consistent with the immigrant paradox, U.S.-born Latino subjects reported higher rates for most psychiatric disorders than Latino immigrants. However, rates varied when data were stratified by nativity and disorder and adjusted for demographic and socioeconomic differences across groups. The immigrant paradox consistently held for Mexican subjects across mood, anxiety, and substance disorders, while it was only evident among Cuban and other Latino subjects for substance disorders. No differences were found in lifetime prevalence rates between migrant and U.S.-born Puerto Rican subjects.

Conclusions: Caution should be exercised in generalizing the immigrant paradox to all Latino groups and for all psychiatric disorders. Aggregating Latino subjects into a single group masks significant variability in lifetime risk of psychiatric disorders, with some subgroups, such as Puerto Rican subjects, suffering from psychiatric disorders at rates comparable to non-Latino white subjects. Our findings thus suggest that immigrants benefit from a protective context in their country of origin, possibly inoculating them against risk for substance disorders, particularly if they emigrated to the United States as adults.

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Studies show that Latino immigrants report lower rates of anxiety and substance use disorders than U.S.-born Latino individuals and non-Latino white individuals (1–3). These findings are consistent with the so-called "immigrant paradox," i.e., that foreign nativity protects against psychiatric disorders (4), despite the stressful experiences and poverty often associated with immigration. The immigrant paradox remains an enigma; explaining it might shed light on the factors involved in resiliency to psychiatric disorders.

In 2005, the National Comorbidity Survey Replication (NCS-R) reported that Latino subjects had significantly lower risk of lifetime anxiety and mood disorders but similar risk of substance use disorders when compared with non-Latino white subjects (5). However, NCS-R data on Latino subjects was limited to English-speaking Latino subjects and was not disaggregated into ethnic subgroups, obscuring variations for immigration status and national origin.

Alegría et al. (6) disaggregated data from the National Epidemiologic Survey on Alcohol and Related Conditions into Latino ethnic subgroups and found differences in rates of psychiatric disorders; e.g., Puerto Rican subjects frequently exhibited higher rates of disorders when compared with groups such as Mexican-Americans. Disaggregating by ethnicity may provide clues to explain differences in nativity effects.

In this study, we addressed the common problem of inadequate sample size in investigating subgroup differences by combining two major national surveys, the NCS-R and the National Latino and Asian American Study (NLAAS), using complementary sampling and assessments. We then tested whether the immigrant paradox applies to all Latino groups by comparing national lifetime prevalence of DSM-IV psychiatric disorders among immigrant Latino subjects, U.S-born Latino subjects, and non-Latino white subjects.

Methods

Sample

The NCS-R was conducted from February 2001 to April 2003 with a 70.9% response rate (5). Respondents were English-speaking, noninstitutionalized civilian adults age 18 or older living in

TABLE 1. Sociodemographic and Immigration Characteristics of NCS-R Non-Latino White Subjects and NLAAS Latino Subjects

	NCS-R Non-Latino White Subjects[b] (N=4,222)		NLAAS Latino Subjects[c] (N=2,554)		Analysis[d]
Characteristic[a]	%	SE	%	SE	p
Age (years)					
18–34	49.0	1.7	49.0	1.6	
35–49	29.3	1.3	29.7	1.1	
50–64	14.2	0.9	13.8	0.8	
≥65	7.5	0.5	7.5	1.2	
Sex					
Male	51.5	1.1	51.5	1.3	
Female	48.5	1.1	48.5	1.3	
Education (years)					<0.001
≤11	11.6	0.8	44.2	2.0	
12	30.4	1.6	24.5	1.0	
13–16	47.0	1.6	26.6	1.3	
≥17	11.0	1.0	4.7	0.7	
Household income					<0.001
≤$14,999	12.4	1.0	28.3	2.5	
$15,000–$34,999	18.7	1.4	28.5	1.3	
$35,000–$74,999	38.0	1.2	27.4	1.9	
≥$75,000	30.9	1.9	15.7	1.2	
Marital status					0.312
Married	48.9	1.7	52.0	2.0	
Divorced/separated/widowed	33.0	2.1	29.6	1.6	
Never married	18.1	0.9	18.5	1.2	
Nativity					<0.001
Born in United States	96.6	0.5	41.6	2.6	
Born outside United States	3.4	0.5	58.4	2.6	
Geographic region of residence					<0.001
Northeast	20.1	3.8	17.3	1.7	
Midwest	27.5	2.5	8.7	1.8	
South	32.8	2.8	32.1	4.9	
West	19.5	3.0	41.8	4.4	
Primary residence					
United States			84.7	1.3	
Country of origin			15.3	1.3	
Number of parents born in United States					<0.001
0	4.5	0.6	68.9	1.7	
1	4.8	0.5	10.0	0.6	
2	90.7	0.9	21.1	1.7	
Language spoken at home as a child					
English			18.3	1.7	
Other			81.7	1.7	
Ratio of life lived in United States					
<0.3			19.2	1.7	
0.3–0.7			28.0	1.3	
>0.7			52.8	2.4	
Proficiency in English language					
Poor/Fair			48.4	2.8	
Good/Excellent			51.6	2.8	
Citizenship					
Born U.S. citizen			46.0	2.8	
Naturalized U.S. citizen			15.7	1.1	
Not U.S. citizen			38.3	2.3	

[a] Adjusted for age and gender.
[b] Data drawn from the National Comorbidity Survey Replication. Lifetime prevalence of disorders for white subjects differs from previously published NCS-R data as the present analysis was limited to non-Latino white subjects and excluded racial/ethnic minorities.
[c] Data drawn from the National Latino and Asian American Study. NLAAS composite diagnostic categories were restricted to any depressive disorder, any anxiety disorder, any substance disorder, and any disorder.
[d] Pearson chi-square test for contingency tables with second-order Rao-Scott adjustments.

the coterminous United States. The NCS-R alone had too few Latino respondents to make subgroup comparisons by ethnicity. Since Spanish-speaking Latino subjects were not represented in the NCS-R, we only used data on non-Latino white respondents for this study.

NLAAS data were collected from May 2002 to November 2003 with a 75.5% Latino response rate. Respondents were English- and Spanish-speaking adults (age 18 or older) in the noninstitutionalized population of the coterminous United States (7). Latino respondents (N=2,554) consisted of four ethnic subgroups: Mexican, Puerto Rican, Cuban, and other Latino (mainly from the Dominican Republic, Colombia, El Salvador, Ecuador, Guatemala, Honduras, Peru, and Nicaragua). The sample was designed to be representative of the total U.S. Latino population and to allow for comparisons stratified by ethnic subgroup. The NLAAS weighted sample was similar to the 2000 U.S. Census in sex, age,

NLAAS Latino Subjects by Ethnic Subgroup								
Puerto Rican (N=495)		Cuban (N=577)		Mexican (N=868)		Other (N=614)		Analysis[d]
%	SE	%	SE	%	SE	%	SE	p
49.0	3.8	49.5	3.3	49.0	2.3	49.0	2.5	
29.7	2.5	29.5	2.2	29.5	1.7	30.1	1.9	
13.7	2.0	14.4	1.8	13.9	1.0	13.4	1.6	
7.5	3.4	6.6	1.0	7.5	1.8	7.5	1.8	
51.5	2.7	51.6	2.1	51.5	1.8	51.5	1.9	
48.5	2.7	48.4	2.1	48.5	1.8	48.5	1.9	
								<0.001
32.4	2.3	20.1	2.2	52.9	2.3	33.4	2.1	
28.3	1.8	28.6	2.2	23.7	1.3	24.1	1.9	
34.8	2.8	38.7	2.6	20.1	1.6	36.2	2.1	
4.5	0.8	12.6	2.3	3.3	1.0	6.3	1.0	
								0.036
28.2	2.6	23.2	3.9	30.6	3.8	23.9	2.1	
22.6	2.6	24.6	3.0	30.7	2.2	26.4	3.1	
29.9	2.3	27.3	3.1	25.5	2.5	31.2	3.2	
19.2	2.4	24.9	4.9	13.1	1.3	18.5	2.5	
								<0.001
35.1	2.9	52.7	3.3	57.6	3.0	45.0	2.4	
39.8	3.2	27.1	2.9	26.7	2.2	32.9	2.6	
25.1	3.5	20.2	2.0	15.7	1.4	22.1	1.8	
								<0.001
55.5	4.4	13.0	2.4	43.3	3.9	37.8	3.6	
44.5	4.4	87.0	2.4	56.7	3.9	62.2	3.6	
								<0.001
58.5	5.9	4.7	2.1	2.2	0.4	40.0	4.5	
13.5	4.7	0.0	0.0	9.7	2.7	6.1	1.5	
21.2	2.8	93.4	2.4	31.7	8.6	23.8	3.9	
6.8	1.4	1.8	1.2	56.4	7.7	30.1	4.9	
								<0.001
90.5	1.4	92.7	2.0	81.7	2.0	88.0	1.8	
9.5	1.4	7.3	2.0	18.3	2.0	12.0	1.8	
								<0.001
62.9	3.5	95.9	1.5	66.4	2.4	71.3	3.0	
13.2	2.1	2.6	1.1	11.3	0.9	7.1	1.1	
23.9	3.2	1.5	0.8	22.3	2.3	21.6	3.1	
								0.028
22.2	2.5	5.0	1.2	18.5	2.6	19.2	2.0	
77.8	2.5	95.0	1.2	81.5	2.6	80.8	2.0	
								<0.001
9.4	2.8	41.1	5.9	17.3	2.2	22.9	2.5	
17.1	3.1	24.1	3.0	29.7	2.0	29.5	2.3	
73.5	3.7	34.8	4.5	53.0	3.6	47.6	3.1	
								<0.001
29.8	2.7	48.1	4.9	54.0	3.7	42.7	3.2	
70.2	2.7	51.9	4.9	46.0	3.7	57.3	3.2	
								<0.001
97.2	0.9	13.1	2.5	43.2	4.0	38.4	3.7	
2.8	0.9	33.8	3.6	13.6	1.4	22.2	2.7	
0.0	0.0	53.2	5.4	43.2	3.3	39.4	3.0	

education, marital status, and geographical distribution but different in nativity and household income. The NLAAS sample contained more immigrant and lower-income respondents, possibly because of the undercounting of immigrants (8, 9) and the noninclusion of undocumented workers (10) in the 2000 Census. As a result of these findings, we used U.S. Census sample weights for age, gender, and education adjustments but NLAAS sample weights for household income adjustments in later analyses.

The NLAAS and NCS-R collected epidemiological information on risk factors for mental health disorders among the general population (11). Both samples were developed using integrated methodology as part of the National Institute of Mental Health's (NIMH) Collaborative Psychiatric Epidemiology Survey program, which allowed for the pooling of datasets. The program allowed integration of design-based analysis weights and variance estimation codes to permit analysis of the combined datasets as though they were a

TABLE 2. Bayesian Lifetime Prevalence of Psychiatric Disorders for NCS-R Non-Latino White Subjects and NLAAS Latino Subjects

	Prevalence[a]				
	NCS-R Non-Latino White Subjects[b] (N=4,222)		NLAAS Latino Subjects[c] (N=2,554)		Analysis
Disorder	%	95% CI	%	95% CI	p
Any depressive disorder	22.3	20.5–24.0	15.4	13.8–17.1	<0.001
Dysthymia	4.3	3.5–5.1	2.6	1.9–3.4	0.003
Major depressive episode	22.1	20.5–24.0	15.2	13.5–16.8	<0.001
Any anxiety disorder	25.7	23.8–27.6	15.7	14.0–17.5	<0.001
Agoraphobia without panic disorder	2.5	1.9–3.1	3.2	2.4–4.0	
Generalized anxiety disorder	8.6	7.5–9.8	4.1	3.2–5.1	<0.001
Panic disorder	5.2	4.3–6.1	2.8	2.0–3.6	<0.001
Posttraumatic stress disorder	7.3	6.3–8.4	4.4	3.5–5.3	<0.001
Social phobia	14.3	12.8–15.8	7.5	6.2–8.8	<0.001
Any substance disorder	17.7	16.0–19.4	11.2	9.7–12.7	<0.001
Alcohol abuse	9.0	7.7–10.3	5.9	4.7–7.0	<0.001
Alcohol dependence	7.0	5.8–8.1	4.3	3.3–5.3	<0.001
Drug abuse	6.6	5.5–7.7	3.6	2.7–4.5	<0.001
Drug dependence	4.0	3.2–4.9	2.0	1.4–2.7	<0.001
Any disorder	43.2	41.1–45.3	29.7	27.4–31.9	<0.001

[a] Bayesian lifetime prevalence adjusted for age and gender.
[b] Data drawn from the National Comorbidity Survey Replication. Lifetime prevalence of disorders for white subjects differs from previously published NCS-R data as the present analysis was limited to non-Latino white subjects and excluded racial/ethnic minorities.
[c] Data drawn from the National Latino and Asian American Study. NLAAS composite diagnostic categories were restricted to any depressive disorder, any anxiety disorder, any substance disorder, and any disorder.

single, nationally representative study by using an adaptation of a multiple frame approach to estimation and inference for population characteristics (12, 13). The University of Michigan's Survey Research Center developed sample weights for the pooled NLAAS/NCS-R dataset. Design and methodological information regarding the combined NLAAS/NCS-R dataset can be found at the Collaborative Psychiatric Epidemiology Survey web site (14).

Data Collection

NCS-R data were collected by 342 certified English-speaking interviewers (15). NLAAS interviews for the Latino sample were administered by 275 certified bilingual Latino interviewers (15). Approximately half of the NLAAS participants were monolingual Spanish speakers or had limited English proficiency and requested to be interviewed in Spanish. The majority of both samples were interviewed face-to-face by trained interviewers from the University of Michigan's Institute for Social Research; the remaining few were interviewed via telephone. Written informed consent was obtained for all participants. The Internal Review Board Committees of Cambridge Health Alliance, the University of Washington, Harvard Medical School, and the University of Michigan approved all recruitment, consent, and interviewing procedures (16).

Measures

In both studies, presence of psychiatric disorders was evaluated with the World Health Organization's World Mental Health version of the Composite International Diagnostic Interview (WMH-CIDI) (17). The WMH-CIDI generates lifetime and 12-month diagnoses with organic exclusion rules according to DSM-IV and ICD-10 diagnostic systems. Each diagnostic section of the interview included new questions assessing lifetime persistence of the focal disorder, intensity and duration of distress, and disorder-associated impairment. The disorders included in this study were classified in one of four composite diagnostic categories: any depressive disorder (dysthymia or major depressive episode); any anxiety disorder (agoraphobia, social phobia, generalized anxiety disorder, posttraumatic stress disorder, or panic disorder); any substance disorder (drug abuse, drug dependence, alcohol abuse, or alcohol dependence); or any disorder. DSM-IV diagnoses based on the WMH-CIDI showed good concordance with Structured Clinical Interview for DSM-IV (SCID) diagnoses for major depressive disorder (kappa=0.46) and substance disorders (kappa=0.49) but not for most anxiety disorders (18), which is consistent with findings within the general population (19).

Statistical Analysis

Standard weighted estimates were used to describe sociodemographic characteristics and immigration measures (e.g., Latino ethnic subgroup and nativity) (7). Significance of differences between groups was assessed using Rao-Scott statistic for Pearson chi-squared tests for contingency tables (20, 21). Models were adjusted for sampling design using a first-order Taylor series approximation, and analysis of significance was performed using design-adjusted Wald tests (21–23).

Sociodemographic distributions for all ethnicity groups were computed using age- and gender-adjusted weights to match those of the U.S. Census. The total Latino sample was weighted to reflect the relative proportions of each Latino ethnic subgroup in the U.S. population in 2003 (60% Mexican, 10% Puerto Rican, 6% Cuban, and 24% other Latino). We used Bayesian estimates when comparing prevalence rates of psychiatric disorders for Latino subjects with non-Latino subjects and within each Latino ethnic subgroup, and we additionally adjusted for socioeconomic status (education and household income). Bayesian estimates address the problems of small sample size and large sample weights. The statistical significance of the differences between estimates was analyzed using Bayesian inference (i.e., using posterior probability distribution instead of weighted probability distribution). It should be noted that it is possible to have statistically significant differences between groups despite overlapping confidence intervals because examining the overlap of confidence intervals is a more conservative approach to testing for significance (24). More details, including modeling strategies and fitting algorithms, are documented elsewhere (25). These same methods were used for further comparisons among immigrant and non-immigrant groups.

NLAAS Latino Subjects by Ethnic Subgroup								
Puerto Rican (N=495)		Cuban (N=577)		Mexican (N=868)		Other (N=614)		Analysis
%	95% CI	%	95% CI	%	95% CI	%	95% CI	p
19.6	15.8–23.4	19.2	14.7–23.7	14.7	12.2–17.2	14.4	11.5–17.4	0.066
4.2	2.5–6.2	4.0	2.3–5.7	2.4	1.4–3.5	2.0	0.9–3.3	
19.4	15.7–23.6	18.6	14.2–23.1	14.7	12.3–17.2	13.7	10.6–16.8	0.065
21.7	17.5–26.0	14.4	10.8–18.4	15.5	12.8–18.1	14.1	11.1–17.1	0.030
6.0	3.6–8.3	2.5	1.4–4.0	3.2	2.0–4.5	2.1	1.1–3.2	0.034
7.3	4.6–10.1	5.4	3.6–7.6	3.7	2.5–5.2	3.5	2.0–5.0	0.059
4.9	3.0–7.1	2.5	1.3–3.9	2.7	1.6–3.9	2.2	1.0–3.3	
6.8	4.3–9.2	4.1	2.3–6.0	4.3	3.0–5.8	3.5	2.1–5.0	
10.3	7.0–13.5	7.2	4.5–10.2	7.3	5.6–9.2	6.7	4.6–8.9	
13.8	10.6–17.4	6.6	4.3–9.1	11.8	9.6–13.9	9.8	7.2–12.4	0.002
7.1	4.8–9.5	3.1	1.3–5.1	6.0	4.3–7.6	5.7	3.6–7.8	0.056
5.5	3.4–7.9	2.4	1.1–3.6	4.7	3.2–6.1	3.1	1.6–4.6	0.025
3.8	2.0–5.6	1.0	0.2–2.1	3.7	2.4–5.1	3.8	2.1–5.8	0.002
3.7	2.0–5.6	1.5	0.6–2.8	2.1	1.1–3.0	1.1	0.2–2.2	0.096
37.4	32.4–42.7	28.2	23.4–33.5	29.5	26.4–32.8	27.0	23.2–31.0	0.012

Results

Sociodemographic and Immigration Characteristics

Table 1 examines sociodemographic and immigration characteristics among non-Latino white subjects and Latino subjects, including the four Latino ethnic subgroups, using age- and gender-adjusted weights. Despite these adjustments, we still found differences between Latino subjects and non-Latino white subjects. Most striking was that Latino subjects reported lower levels of education and household income ($p<0.001$) and were more likely to be born outside the United States and not have U.S.-born parents ($p<0.001$).

When disaggregating the Latino sample into ethnic subgroups, we found significant subgroup variability for all sociodemographic characteristics. Puerto Rican subjects were more likely than other subgroups to be born in the United States, spend more than 70% of their lifetime on the U.S. mainland, and live in the Northeast. Mexican subjects were more likely to be in the lowest income group (≤$14,999) and live in the West. Cuban subjects reported higher household incomes and more years of education and were more likely to spend 30% or less of their lifetime in the United States. Other Latino subjects resembled Mexican subjects in age distribution, nativity status, and percentage of lifetime spent in the United States.

Age- and Gender-Adjusted Lifetime Prevalence Estimates

Table 2 presents age- and gender-adjusted lifetime prevalence rates of psychiatric disorders for all Latino subgroups and non-Latino white subjects. Latino subjects reported lower prevalence rates than non-Latino white subjects for all disorders except agoraphobia without panic disorder. Most striking was that 43.2% of non-Latino white subjects reported any lifetime disorder, compared to 29.7% of Latino subjects. Similarly, 25.7% of non-Latino white subjects reported any anxiety disorder, compared to 15.7% of Latino subjects. For any substance disorder, lifetime prevalence rates were 17.7% for non-Latino white subjects and 11.2% for Latino subjects. All tests of difference for aggregated disorders were significant at $p<0.001$.

Although these results suggest that Latino individuals are at uniformly lower risk than non-Latino white individuals for almost all psychiatric disorders, the findings are far less homogeneous when Latino subjects are disaggregated into ethnic subgroup. The rate for any lifetime disorder among Puerto Rican subjects was 37.4%, followed by Mexican subjects (29.5%), Cuban subjects (28.2%), and other Latino subjects (27%; $p=0.012$). Rates for any depressive disorder were not found to be significantly different between subgroups. Lifetime prevalence rates of any anxiety disorder ranged from 21.7% for Puerto Rican subjects to 14.1% for other Latino subjects ($p=0.03$). For substance disorders, prevalence estimates for Puerto Rican subjects (13.8%) were almost double those of Cuban subjects (6.6%; $p=0.002$).

Lifetime Prevalence Estimates Compared by Ethnicity and Nativity

Table 3 and Table 4 present age-, gender-, and socioeconomic-adjusted lifetime prevalence estimates for non-Latino white subjects, all Latino subjects, and the four Latino subgroups stratified by nativity. When considering the aggregated Latino category, we found evidence in support of the immigrant paradox. U.S.-born Latino subjects were at significantly higher risk than immigrant Latino subjects for

TABLE 3. Bayesian Lifetime Prevalence of Psychiatric Disorders for NCS-R Non-Latino White Subjects and NLAAS Latino Subjects According to Immigrant Status[a]

	NCS-R Non-Latino White Subjects[b]					NLAAS Latino Subjects[c]				
	U.S.-Born (N=4,088)		Immigrant (N=134)		Analysis[d]	U.S.-Born (N=924)		Immigrant (N=1,630)		Analysis[d]
Disorder	%	95% CI	%	95% CI	p	%	95% CI	%	95% CI	p
Any depressive disorder	27.6	25.1–30.5	21.4	15.2–28.2	0.0885	19.8	17.3–22.5	14.8	12.6–17.0	0.003
Dysthymia	6.2	4.7–7.8	5.4	2.5–8.9		3.4	2.2–4.5	3.1	2.1–4.1	
Major depressive episode	26.9	24.2–29.8	17.5	11.3–23.9	0.008	18.6	16.1–21.1	13.4	11.6–15.4	0.001
Any anxiety disorder	30.8	28.0–33.7	23.3	17.8–29.1	0.0225	18.9	16.2–21.5	15.2	13.2–17.3	0.033
Agoraphobia without panic disorder	4.0	2.8–5.4	4.1	1.2–8.0		3.7	2.5–5.1	3.7	2.7–4.8	
Generalized anxiety disorder	10.0	8.3–11.8	8.1	4.7–11.7		4.4	3.1–5.6	4.7	3.6–5.8	
Panic disorder	6.0	4.7–7.4	6.0	2.5–10.3		4.5	3.1–6.0	3.5	2.2–4.6	
Posttraumatic stress disorder	9.5	7.9–11.3	7.0	3.8–10.9		5.9	4.4–7.5	4.0	3.0–5.1	0.048
Social phobia	16.9	14.7–19.0	8.8	4.6–13.7	0.0022	8.5	6.5–10.2	6.0	4.6–7.2	0.037
Any substance disorder	26.4	23.6–29.0	13.6	7.0–20.6	<0.001	20.4	18.0–22.9	7.0	5.4–8.5	<0.001
Alcohol abuse	12.1	9.6–14.4	5.9	2.7–9.8	0.007	9.3	7.4–11.2	3.5	2.3–4.8	<0.001
Alcohol dependence	10.1	8.2–12.0	4.0	0.9–7.5	0.0032	6.9	5.2–8.6	2.8	1.9–3.8	<0.001
Drug abuse	7.7	6.0–9.5	4.1	1.0–7.3	0.0586	6.1	4.5–7.8	2.2	1.4–3.1	<0.001
Drug dependence	6.4	4.7–8.0	3.5	1.0–6.7	0.0998	5.1	3.6–6.8	1.7	0.9–2.6	<0.001
Any disorder	52.5	49.5–55.3	30.9	23.8–38.0	<0.001	37.1	33.9–40.0	24.9	22.5–27.2	<0.001

[a] Bayesian lifetime prevalence adjusted for age, gender, and socioeconomic status (education and household income).
[b] Data drawn from the National Comorbidity Survey Replication. Lifetime prevalence of disorders for white subjects differs from previously published NCS-R data as the present analysis was limited to non-Latino white subjects and excluded racial/ethnic minorities.
[c] Data drawn from the National Latino and Asian American Study. NLAAS composite diagnostic categories were restricted to any depressive disorder, any anxiety disorder, any substance disorder, and any disorder.
[d] Wald chi-square test.

major depressive episode (18.6% versus 13.4%, p=0.001), any depressive disorder (19.8% versus 14.8%, p=0.003), social phobia (8.5% versus 6.0%, p=0.037), posttraumatic stress disorder (5.9% versus 4%, p=0.048), any anxiety disorder (18.9% versus 15.2%, p=0.033), alcohol dependence (6.9% versus 2.8%, p<0.001), alcohol abuse (9.3% versus 3.5%, p<0.001), drug dependence (5.1% versus 1.7%, p<0.001), drug abuse (6.1% versus 2.2%, p<0.001), and any disorder (37.1% versus 24.9%, p<0.001). Results were most striking for any substance disorder, with 20.4% of U.S.-born Latino subjects reporting lifetime prevalence compared to 7% of immigrants (p<0.001). Similarly, U.S.-born non-Latino white subjects reported significantly higher rates of major depressive episode, social phobia, any anxiety disorder, alcohol dependence and abuse, any substance disorder, and any disorder compared with non-Latino white immigrants. Overall, U.S.-born non-Latino white subjects reported higher rates of disorders compared with U.S.-born Latino subjects, including major depressive episode, dysthymia, any depressive disorder, generalized anxiety disorder, social phobia, posttraumatic stress disorder, any anxiety disorder, alcohol dependence, any substance disorder, and any disorder.

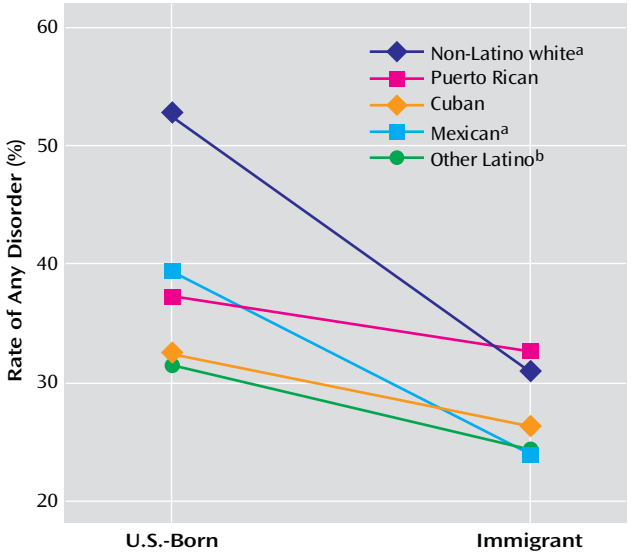
When examined in aggregate, a clear effect of immigration emerged for all Latino subjects, yet this finding was not uniform when these individuals were disaggregated into ethnic subgroups. The immigrant paradox was only consistently observed for Mexican subjects, with Mexican immigrants reporting significantly lower prevalence of major depressive episode, any depressive disorder, social phobia, any anxiety disorder, alcohol dependence and abuse, drug dependence and abuse, any substance disorder, and any disorder compared with U.S.-born Mexican subjects (Table 4). Among Cuban and other Latino subjects, foreign nativity only demonstrated a protective effect for substance disorders. Other Latino immigrants also reported significantly lower prevalence of any disorder compared with their U.S.-born counterparts. No significant differences were found in risk of any lifetime disorder between migrant and U.S.-born Puerto Rican subjects.

To illustrate the most substantial differences in lifetime prevalence among the disaggregated Latino sample, we plotted prevalence rates for any disorder (Figure 1) and any substance disorder (Figure 2) according to nativity and ethnicity. These prevalence rates correspond to the Bayesian estimates (Table 3 and Table 4).

Discussion

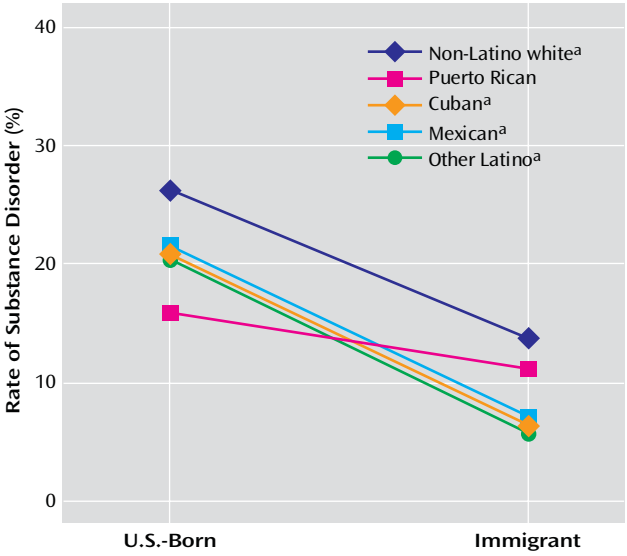
When lifetime prevalence estimates of psychiatric disorders are examined for the aggregated Latino sample, our findings are consistent with existing literature. First, Latino subjects were at lower risk of all lifetime psychiatric disorders compared with non-Latino white subjects, ex-

FIGURE 1. Lifetime Prevalence Rates of Any Disorder According to Nativity and Ethnicity



[a] p<0.001.
[b] p<0.05.

FIGURE 2. Lifetime Prevalence Rates of Any Substance Disorder According to Nativity and Ethnicity



[a] p<0.001.

cept for agoraphobia without panic disorder. Second, consistent with the immigrant paradox, U.S.-born Latino subjects reported higher lifetime rates for most disorders than Latino immigrants. These higher rates are not surprising, given that psychiatric disorders are more prevalent in the United States than in many other parts of the world (26). Contexts and lifestyles unique to the United States appear to result in higher rates of psychiatric disorders.

However, when our sample was disaggregated into ethnic subgroups and by nativity, a more complicated picture of Latino mental health emerged, exhibiting a more limited application of the immigrant paradox. Overall, the immigrant paradox was only reliably observed for Mexican subjects, and only evident for depressive and anxiety disorders. However, the paradox was consistently observed among Mexican, Cuban, and other Latino subjects for substance disorders. No evidence for the immigrant paradox was found among Puerto Rican subjects. These findings have significant implications for the assessment and treatment of psychiatric disorders within the U.S. Latino population. Our findings emphasize the importance of not generalizing the protective effect of nativity for all Latino individuals and the differential effect of nativity, depending on the type of disorder.

The immigrant paradox was most strongly apparent for substance disorders. The protective impact of foreign nativity on lifetime prevalence of substance disorders for most immigrants, particularly Latino immigrants, could be related to strong social control against alcohol and drug use in their countries of origin (27). International comparisons of prevalence rates of substance use disorders across different cultures indicate that cultural and social assimilation and longer stays in cultures with high rates of drug use accelerate the rates of substance use disorders for immigrant groups from nations with lower rates (27). Puerto Rican individuals are U.S. citizens, which makes their migratory patterns and exposure to U.S. culture different from those of other Latino groups. Our findings thus suggest that immigrants benefit from a protective effect in their country of origin, which possibly inoculates them against risk for substance disorders, particularly if they emigrate as adults. Recent findings also suggest that where Latino immigrants reside in the United States is an important influence on risk of substance disorders (28). For example, a higher perceived level of neighborhood safety is associated with lower risk for substance use disorders, even after controlling for individual-level socioeconomic status (28).

The question that remains to be answered is what factors in U.S. society place the U.S.-born population and those who emigrate early in childhood at greater risk for substance abuse. The easy availability of drugs in the United States may be one contributing factor. However, greater availability of drugs in the United States alone cannot explain these results, since countries like Mexico, with extensive drug production and trafficking, consistently show low rates of substance use disorders (6, 29). One hypothesis involves the U.S. societal convention of self-medicating as a way of coping with hardship (30). U.S. cultural norms, such as pressure to be productive at work and overprescription of medication, are thought to fuel recent increases in self-medication in the United States (31). In other countries, different coping mechanisms may be socially prescribed. In one study, Mexican citizens were found more likely than non-Hispanic white individuals to use positive reframing, denial, and religion and less likely

TABLE 4. Bayesian Lifetime Prevalence of Psychiatric Disorders for NLAAS Latino Subjects According to Ethnic Subgroup and Immigrant Status[a]

	Puerto Rican					Cuban				
	U.S.-Born (N=278)		Migrant (N=217)		Analysis[b]	U.S.-Born (N=76)		Immigrant (N=501)		Analysis[b]
Disorder	%	95% CI	%	95% CI	p	%	95% CI	%	95% CI	p
Any depressive disorder	21.0	16.8–25.5	19.9	16.1–23.7		20.3	13.7–27.2	19.7	15.3–24.1	
Dysthymia	4.0	1.8–6.2	5.5	3.0–8.1		4.2	1.4–7.6	4.0	2.2–5.9	
Major depressive episode	20.2	16.3–24.2	17.6	14.1–21.6		17.9	11.9–25.1	18.5	14.5–22.8	
Any anxiety disorder	21.6	17.9–25.7	21.8	16.9–26.7		16.7	10.7–22.6	14.1	10.8–17.5	
Agoraphobia without panic disorder	4.0	1.9–6.1	6.9	4.1–9.9		5.1	1.9–8.7	3.7	1.7–6.3	
Generalized anxiety disorder	6.9	4.5–9.4	7.7	4.9–10.7		5.2	1.9–9.0	5.1	3.3–7.0	
Panic disorder	4.8	2.8–7.0	5.3	2.7–8.0		4.5	1.4–8.2	3.3	1.5–5.9	
Posttraumatic stress disorder	6.5	4.0–9.1	7.2	4.2–9.9		7.0	3.3–11.0	5.0	2.3–8.2	
Social phobia	8.1	5.5–10.9	10.0	6.8–13.4		6.1	2.9–9.9	6.6	4.3–9.2	
Any substance disorder	15.9	12.4–19.5	11.1	7.5–14.9	0.070	20.9	13.5–28.1	6.4	3.4–9.5	<0.001
Alcohol abuse	7.7	5.2–10.4	4.6	2.5–7.1	0.092	6.5	3.1–10.4	3.4	1.4–5.5	
Alcohol dependence	5.6	3.1–8.3	5.3	2.5–8.4		8.2	3.8–12.8	2.2	0.4–4.2	0.018
Drug abuse	4.6	2.2–7.0	4.3	1.8–7.0		3.6	0.7–6.8	2.2	0.4–4.8	
Drug dependence	4.3	2.6–6.4	3.6	1.3–6.3		5.7	2.6–9.3	1.9	0.3–3.8	0.062
Any disorder	37.2	32.5–42.2	32.6	27.0–38.5		32.2	24.5–39.8	26.2	21.1–31.1	

[a] Bayesian lifetime prevalence adjusted for age, gender, and socioeconomic status (education and household income). Data drawn from the National Latino and Asian American Study. NLAAS composite diagnostic categories were restricted to any depressive disorder, any anxiety disorder, any substance disorder, and any disorder.
[b] Wald chi-square test.

to use substances (30).

Table 4 presents evidence that, for depressive and anxiety disorders, only Mexican subjects experienced the immigrant paradox. There could be several explanations for this. Mexican immigrants experience relative deprivation and inequality in their country of origin (32). These experiences may decrease the likelihood of demoralization among Mexican immigrants in their new environment (1, 4) and increase resignation to negative outcomes, resulting in lower risk of depression and anxiety. Traditional family values of affiliation, as well as fatalism, may serve as protective factors against psychiatric morbidity in the Mexican population (1, 4, 33). However, the buffering effect of these factors does not translate to other Latino ethnic subgroups (6). In these groups, confronting social injustice, low opportunities for social mobility, and hardship may be internalized as personal failures (34), thereby leading to depression and anxiety. An alternative explanation is that Mexican families, because of their proximity to Mexico, have less intergenerational conflict between family members (35) than other Latino subgroups, allowing for a sustained sense of belonging that can buffer adversity. Another explanation is that Mexican immigrants, because of their high numbers in the United States and because they tend to arrive at an older age, may be less likely to intermingle with non-Latino individuals in multiple settings, decreasing exposure to cultures different from their own and possibly reducing the likelihood of incidents of discrimination (36). This decreased exposure to perceived discrimination may relate to lower rates of depression and anxiety when compared with other Latino groups such as Puerto Rican migrants, who come to the mainland United States earlier and tend to live in more ethnically diverse neighborhoods.

In addition to providing valuable data on the presence of the immigrant paradox, our findings also provide insight into the large subgroup variability within the U.S. Latino population. The data presented in Table 1 and Table 2 show significant variation by ethnic subgroup for sociodemographic characteristics and for lifetime risk of psychiatric disorders, with Puerto Rican subjects as a particularly vulnerable group. In contrast to the other Latino groups, the Puerto Rican population has lived with more than a century of influence from the United States and is more likely to be bilingual and to have adopted many U.S. lifestyle patterns (37). This high degree of integration into U.S. culture may explain the similarity in rates of disorders between Puerto Rican subjects and non-Latino white subjects. Furthermore, the first Puerto Rican migrants, although U.S. citizens, came into the United States stigmatized by the public perception that they emigrated because of massive unemployment and the desire to be supported by welfare (6), which perhaps subjected them to more discrimination and stereotyping than other Latino ethnic subgroups (6), resulting in higher rates of psychiatric disorders. Our findings provide further evidence that the common practice of aggregating Latino ethnic subgroups into a single group masks great variability in the prevalence and risk of psychiatric disorders.

This study has certain limitations. Our results are based on cross-sectional comparisons of Latino and non-Latino white subgroups, which could mask cross-generational differences that explain some ethnic subgroup differences. The reported lifetime prevalence rates in this study could

Mexican					Other				
U.S.-Born (N=380)		Immigrant (N=488)		Analysis[b]	U.S.-Born (N=190)		Immigrant (N=424)		Analysis[b]
%	95% CI	%	95% CI	p	%	95% CI	%	95% CI	p
20.4	16.6–24.1	12.9	9.9–16.0	0.003	17.3	13.4–21.7	15.8	12.2–19.2	
3.3	1.8–4.8	2.8	1.3–4.5		3.3	1.2–5.8	2.7	1.4–4.4	
19.2	15.7–22.7	11.8	9.1–14.5	0.001	16.2	12.2–20.1	14.1	10.9–17.4	
20.0	16.2–23.8	14.2	11.3–17.1	0.017	14.1	10.3–18.8	16.0	12.5–19.5	
4.0	2.2–6.2	3.4	1.9–5.0		2.5	0.8–4.3	3.4	1.8–5.2	
3.8	2.2–5.5	4.8	3.2–6.5		4.2	1.4–7.2	3.5	1.9–5.3	
4.8	2.8–6.8	3.4	1.6–5.1		3.7	1.5–5.9	3.2	1.6–4.9	
5.9	3.8–8.3	3.5	2.1–5.0	0.076	5.4	2.5–8.7	3.8	1.9–5.7	
10.0	7.2–12.8	4.7	2.9–6.6	0.003	4.5	2.1–7.1	7.3	4.8–10.0	
21.4	17.9–25.0	7.0	4.7–9.5	<0.001	20.4	15.6–25.3	5.7	3.3–8.0	<0.001
9.4	6.6–12.1	3.5	1.9–5.4	<0.001	10.4	7.0–13.7	3.2	1.4–5.0	<0.001
7.7	5.5–10.1	2.8	1.4–4.2	<0.001	5.3	2.2–8.4	2.2	0.9–3.5	0.081
5.8	3.7–7.8	2.0	0.8–3.4	0.003	8.4	5.0–11.8	2.1	0.8–3.5	<0.001
5.3	3.2–7.4	1.7	0.5–3.0	0.004	5.2	1.9–8.7	1.0	0.1–2.1	0.025
39.2	34.7–43.6	23.9	20.6–27.2	<0.001	31.4	25.7–36.5	24.2	19.9–28.2	0.0421

be even higher if Latino subjects with severe mental illness were overrepresented in the nonresponse group, since severe disorders such as bipolar disorder and schizophrenia were not included in this study. We did not measure the prevalence of schizophrenia or bipolar disorder because lay-administered diagnostic interviews substantially overestimate the prevalence of schizophrenia (38), and meaningful estimates for bipolar disorder were considered too difficult due to low prevalence in community samples (39). Another potential limitation is that the diagnostic interview seems to require substantial education to comprehend some of the more elaborate probes. If Latino respondents with low levels of education and literacy did not understand the questions, they might have reported not having the symptom; thus the prevalence rates reported here may be conservative estimates of psychiatric disorders in the Latino population. However, this seems unlikely since we found the same differences after adjusting for education. Finally, as with many studies in which many specific comparisons are made, one must be mindful of the nature of multiple comparisons and be careful not to focus too much on a particular finding, since the probability that the finding is due to statistical chance is non-negligible.

In the field of mental health research, it is commonly believed that Latino populations are at lower risk of psychiatric disorders than the foreign-born non-Latino white population. As a result, Latino individuals, in particular Latino immigrants, have been largely ignored in mental health research and the development of treatment interventions (40). However, our results demonstrate that within the Latino population, some subgroups suffer from psychiatric disorders at rates comparable to non-Latino white individuals. Therefore, we urge caution in generalizing the immigrant paradox to all Latino groups, since the protective effect of nativity varies by type of psychiatric disorder and subethnicity. Studies that fail to disaggregate into Latino subgroups may be inaccurately reporting the immigrant paradox as a universal phenomenon, thereby overlooking the risk experienced by some immigrant groups. In order to guide effective and culturally appropriate prevention and treatment efforts, it is critical to identify and understand the specific components of various cultures that are protective against psychopathology, as well as those factors that increase risk of psychiatric morbidity.

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