



Symptoms of anxiety on both sides of the US–Mexico border: The role of immigration



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ARTICLE INFO

Article history:

Received 26 June 2014

Received in revised form

21 November 2014

Accepted 4 December 2014

Keywords:

Anxiety disorder
Behavioral symptom
Border crossing
Mexicans Americans
Immigration
Epidemiology
Ethnicity

ABSTRACT

Home to about 15 million people, the US–Mexico border area has suffered stresses from increased border security efforts and a costly drug war in Mexico. Whether immigration patterns add to increasing levels of anxiety for the Mexican population and the Mexican-origin individuals living in the US–Mexico border and near the border is unknown. We used the US–Mexico Study on Alcohol and Related Conditions (UMSARC), a cross-sectional survey (2011–2013) of individuals living in border and non-border cities of the US ($n = 2336$) and Mexico ($n = 2460$). In Mexico respondents were asked if they ever migrated to the US or have a family member living in the US (328) or not (2124), while in the US respondents were asked if they were born in Mexico (697), born in the US with no US-born parents (second generation, 702) or born in the US with at least one US-born parent (third generation, 932). The prevalence and risk factors for symptoms of anxiety using the Beck Anxiety Inventory (≥ 10) were obtained. Mexicans with no migrant experience had a prevalence of anxiety and adjusted prevalence ratio (PR) within the last month of 6.7% (PR = reference), followed by Mexicans with migration experience of 13.1% (PR = 1.8), Mexican-born respondents living in the US of 17.3% (PR = 2.6), US born Mexican-Americans of 2nd generation of 18.6% (PR = 3.3) and finally US born 3rd + generation of 25.9% (PR = 3.8). Results help to identify regions and migration patterns at high risk for anxiety and may help to unravel causal mechanisms that underlie this risk.

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1. Introduction

A lower prevalence of anxiety disorders among Mexican immigrants in the US than among US-born Mexicans has been consistently found throughout more than twenty years of epidemiologic research (Alegria et al., 2007; Breslau et al., 2007; Grant et al., 2004; Karno et al., 1989; Ortega et al., 2000; Vega et al., 1998). It is presumed that this difference reflects the intergenerational changes that occur as immigrant groups are immersed into US society. One important limitation in prior research is the lack of

an appropriate comparison group in Mexico for the Mexican immigrants in the US, as most studies compare the mental health of Mexican immigrants to those of US-born Mexican Americans or the general US population. Recently, a binational study using nationally representative samples in Mexico and in the US compared Mexican immigrants in the US with families of immigrants in Mexico (Breslau et al., 2011), a more suitable comparison group that permitted control of several possible sources of biases, including the healthy migrant bias (Abraido-Lanza, 1999). The authors concluded that Mexican immigrants were at higher risk for onset of anxiety disorders after migration, compared with family members of migrants who remained in Mexico, providing the first direct evidence that experiences as a migrant might lead to the onset of clinically significant mental health problems in this population. Another study, using population samples from 4 cities in the Mexican north border region, showed that the immigration process can potentially affect anxiety and depression symptoms for other

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important groups in Mexico, such as Mexican return migrants and the families of migrants (Familiar et al., 2011). The last study suggested that anxiety symptoms may be highest among relatives of migrants, possibly because of changes in the structure and arrangements in families due to the migration of one member, which may result in changes in family relationships and ultimately impact the mental health of relatives (De Snyder, 1993). Given the large number of Mexican immigrants to the US, estimated to be around 12 million or about 10% of the Mexican population in the year 2011 (Passel et al., 2014), findings from both studies are highly relevant to both countries but, to date, no other study has corroborated these findings of increased anxiety among Mexican immigrants to the US and families of migrants in Mexico. Such corroboration would require a study that includes data from both the sending (Mexico) and the receiving (US) population, which is rare.

Home to about 15 million people who live in the borderland of both countries (44 US counties and 94 Mexican municipalities), the US–Mexico border is a dynamic economic and cultural area striving to find its identity (Pan American Health Organization, 2012). Recently the entire border region has suffered added stresses derived from the United States' increasing border security efforts and a costly drug war in Mexico that has produced thousands of victims. Whether living in the border area is associated with increasing levels of anxiety is unknown, but it has become a matter of interest to health authorities in both countries (United States–Mexico Border Health, 2010).

Unlike most of the previous studies based only on US populations, we present here data from a new study that addresses the dynamic experience of contemporary Mexican immigration in the study of symptoms of anxiety. It includes a unique transnational dataset with assessment of migration experiences from samples of the Mexican general population and the Mexican-born population in the US–Mexico border and near the border. Our goal is to report the prevalence of and risk factors for anxiety symptoms along a continuum of immigration experiences in this transnational population. Based on prior work, we expect that with increasing immersion into the US culture, symptoms of anxiety will increase. We also expect residents in border cities to exhibit higher symptoms of anxiety when compared to residents of non-border cities.

2. Methods

The US–Mexico Study on Alcohol and Related Conditions (UMSARC) is a cross-sectional survey that interviewed probabilistically selected respondents during 2011–2013 in areas of the US–Mexico border. Household face-to-face interviews of about 45 min in length were conducted in the U.S. by the Public Policy Research Institute (PPRI) at Texas A&M University, and in Mexico by the National Institute of Psychiatry (INP) in Mexico City. Sampling was carried out using a multistage area-probability sampling design with stratification by city, simultaneously on each side. On the U.S. side, primary sampling units (PSU) were defined as census block groups with at least 70% Hispanic populations, with blocks serving as the secondary sampling unit (SSU). In Mexico, PSUs were defined using the catalog of the census Basic Geo-statistical Areas ("Áreas Geoestadísticas Básicas-AGEB"), similar to block groups in the U.S., with blocks within the AGEb serving as SSUs. On both sides, 3 households per SSU were randomly selected, with eligible residents defined as those aged 18–65 (both sides) who were of Mexican-origin (U.S. side only). Eligible respondents were then enumerated, selecting the resident with the most recent birthday as the respondent. Each household was visited at least three times on different days of the week and hours of the day. If the randomly selected respondent was not immediately available for interview, up to three additional attempts were made to locate and interview

this person. All interviewing was conducted by trained interviewers using a face-to-face, computer-assisted interview. These complex design features were taken into consideration in the generation of weights and the analyses described below.

2.1. Response rate

On the U.S. side, the border sample consisted of $n = 751$ respondents from the three Texas border metropolitan areas of Laredo (Webb County) and $n = 814$ respondents from McAllen/Brownsville (Cameron/Hidalgo Counties); the non-border sample consisted of $n = 771$ respondents from the metropolitan area of San Antonio (San Antonio county). Together, the U.S. samples reflected a combined cooperation rate of 84% (53.1% response rate). Parallel sampling was carried out in Mexico on respondents living in the respective border sister metropolitan areas (sister cities) of Nuevo Laredo ($n = 828$) and Reynosa/Matamoros (state of Tamaulipas) ($n = 821$) and in the non-border metropolitan area counterpart of Monterrey (state of Nuevo Leon) ($n = 811$), reflecting a combined cooperation rate of 71.4% (63.3% response rate), all defined according to the American Association for Public Opinion Research (The American Association for Public Opinion Research., 2011). On both sides of the border, the denominator used for estimation of cooperation rates includes only those households in which enumeration indicated that an eligible respondent was confirmed to reside. In contrast, response rate estimates included in the denominator the fraction of those households in which enumeration was not conducted that were estimated to contain eligible residents.

2.2. Weights

The approach to weighting the sample was to first calculate the weights appropriate for the cluster sample design and then modify these weights to adjust for demographic differences between the population and the sample. In both the US and Mexico, data were first weighted to reflect the multistage clustered sampling design. Then a raking algorithm (Deville et al., 1993; Izrael et al., 2004) approach was used to iteratively adjust the sampling weights to match Census marginal distributions of education and the combined gender by age distribution, separately within each site. To adjust for design effects inherent in multistage clustered sampling, Stata's (Stata Corp, 2013) svy commands were used for all model parameter estimation.

2.3. Instruments and variables

Face-to-face interviews in the respondent's home were used to obtain data via a computer interviewer-administered questionnaire, after informed consent was verbally obtained and a consent form was signed. IRBs from the Alcohol Research Group- Public Health Institute in the US and the IRB from the INP in Mexico revised and approved the research protocol and questionnaire. For this paper, we used two outcomes variables that measured the prevalence of symptoms of anxiety using the Beck Anxiety Inventory (BAI) (Beck et al., 1988), weekly and monthly anxiety symptoms. The BAI is a 21-item Likert scale, designed to measure common symptoms of anxiety over the past week and the last month. Total scores range from 0 to 63, with higher scores corresponding to higher levels of anxiety. A Spanish version of the BAI has been validated for use in the Mexican population (Robles et al., 2001) and the BAI was previously used in another survey of border cities in Mexico, with good performance (Familiar I et al., 2011). The reliability coefficient (α) of the BAI in this study was 0.92 for anxiety in the last month and within the last week. Anxiety was deemed

positive for those respondents with a cut-off point of 10 or more, in the last month and within the last week, to indicate mild-moderate anxiety symptomatology (Kabacoff et al., 1997).

2.4. Independent variables

Our main independent variable for these analyses was a variable with 5 mutually exclusive groups representing a continuum of migration experience in the Mexican and Mexican-American populations. In Mexico, respondents were asked if they ever migrated to the US or have a family member living in the US (for which we only considered direct family members, that is, father, mother, son or daughter, siblings, spouse or partner) (Mexican migrant background, 328 respondents) or not (Mexicans with no migrant experience, 2124), while in the US, respondents were asked if they were born in Mexico (Mexican immigrants, 697), born in the US with no US-born parents (2nd generation, 702), or born in the US with at least one US born parent (3rd generation, 932) (Borges et al., 2011, 2007). Thus, the first two groups represent Mexicans interviewed in Mexico, while the other 3 groups came from Mexican immigrants and Mexican-Americans interviewed in the US. For this variable, Mexicans with no migrant experience was the reference group.

A dichotomous variable was created based on whether the interview was conducted in a border city or not. In the US the border cities were Laredo and McAllen/Brownsville, while in Mexico the respective border cities were the metropolitan areas of Nuevo Laredo and Reynosa/Matamoros; the non-border sample in the US consisted of the metropolitan area of San Antonio County and in Mexico the non-border metropolitan area counterpart of Monterrey.

Other variables known or suspected to influence the prevalence of the anxiety were included here as controls for our main models. The demographic variables were sex, age, education, marital status. We also included variables related to the mobility of this border population that could affect the prevalence of anxiety. They were whether or not the respondent was a native of the surveyed city (and in the case of international immigrants, whether they had lived in that city since their arrival) and whether the respondent visited the neighbor country (lifetime and last 12 months).

2.5. Data analyses

After estimating the prevalence of key demographic and mobility variables and the prevalence of anxiety among immigrant groups in the UMSARC, prevalence rate ratios estimated with Generalized Linear Models (GLM) with log link and binomial distribution (Cummings, 2009) were used to examine the associations between immigrant experience and presence of anxiety, overall and adjusted for sociodemographic and mobility variables. We used weights developed for the UMSARC as described above. Significance tests of cross-tabulations were conducted using design-based Pearson χ^2 tests. We estimated GLM's standard errors and 95% confidence intervals (CIs) of coefficients by the Taylor series method with STATA version 13.1 (Stata Corp LP, 2013) to adjust for the design effects, stratification, clustering, and unequal weighting of the observations (Stata Corp, 2013).

3. Results

A total of 2336 Mexican Americans from Texas (771 in a non-border city and 1565 from 3 border cities) and 2460 Mexicans from the States of Nuevo Leon and Tamaulipas (811 in a non-border city and 1649 from 3 Mexican cities that have a border with Texas) participated. Table 1 presents the basic demographic information

for the sample by migration status. All variables showed significant differences across migration groups. Mexicans with no migration experience were younger while Mexican immigrants were older; 2nd-generation Mexican-Americans had the highest level of educational attainment, while Mexicans with migration experience had the lowest; and single people were more common among 3rd-generation Mexican-Americans, while married people were more common in the Mexican immigrant group. The highest prevalence of residing in a border city was among Mexicans with migration experience and the lowest among 3rd-generation. Regarding mobility factors, Mexican-Americans, Mexican immigrants were more likely to visit the neighbor country within the last 12 months and 3rd-generation Mexican-Americans the least likely; and Mexicans with migration experience were more likely to be non-native to the surveyed city, while 3rd-generation Mexican-Americans were more likely to be a native.

The prevalence of anxiety, both within the last month and within the last week, increased sharply with increasing migration experience (Fig. 1). For instance, among Mexicans with no migration experience, the prevalence of anxiety was 6.7% in the last month and 2.8% in the last week, while for 3rd-generation Mexican-Americans it was 25.9% and 14.0%, respectively. Prevalence of anxiety was higher for those living in non-border cities. For those living in the border cities the prevalence of anxiety in the last month was 11.3% and 5.8% within the last week; for those living in non-border cities the equivalent prevalence's were 19.3% and 9.5%.

The PRs estimates with 95% CIs from a multivariate model that takes into consideration demographic and mobility factors from Table 1 are presented in Table 2, and in Graph 2 for our main independent variable, the migration experience. An increase in the PR's with increase in migration experience is apparent, adjusting for all potentially confounding variables. All migration groups, when compared to Mexicans with no migration experience, showed increased PR's of anxiety, both monthly and weekly.

As shown in Table 2, PRs were all statistically significant with only one exception (anxiety within the last week for the Mexicans with a migration experience), with PRs ranging from 1.8 to 3.8, for anxiety in the last month, to 1.6 and 5.3, for anxiety within the last week. Other exposure variables tended to have a similar effect on past-month and past-week anxiety, with females, older respondents, and those with lower educational attainment having higher PR's, while married respondents had lower PR's for last month. Those residing in border cities had lower PR's, with PR in the last month of 0.63 (95%CI = 0.53–0.74) and within the last week PR = 0.67 (95%CI = 0.53–0.85). Non-natives of the surveyed cities had higher PR's.

We inspected for a possible interaction between living in border cities and migration experience, to test whether the increase in PRs among migration groups was equally present in both areas. In general, in both areas we found similar increases in PRs for anxiety across migrant groups. There was no difference in the PRs for anxiety within the last week among those living in the border compared to PRs of anxiety among those further away from the border; for anxiety in the last month we only found that immigrants of the 1st generation living in the border cities were a little more affected in symptoms of anxiety (PR = 3.4, 95% CI = 2.4–4.7) than were immigrants of the 1st generation living in the non-border cities (PR = 1.8, 95% CI = 1.1–3.0).

4. Discussion

Findings suggest large differences in the association of migration with anxiety for the population of Mexican ancestry living in the Mexico-US border and near the border. These findings were generally consistent with the hypothesized association between

Table 1

Sociodemographic, migration and cross border mobility variables by migration status. U.S.-Mexico Study on Alcohol and Related Conditions (2011–2013).

	Mexicans with no migrant experience (n = 2124)		Mexicans with migrant experience (n = 328)		Living in the U.S. 1st generation (n = 697)		U.S. born 2nd generation (n = 702)		U.S. born 3rd + generation (n = 932)		X ²	p-value
	n	%	n	%	n	%	n	%	n	%		
Sex											9.67	0.045
Male	1216	49.4	187	49.5	316	43.6	364	50.0	468	49.3		
Female	908	50.6	141	50.5	381	56.4	338	50.0	464	50.7		
Age category											186.23	<0.001
18–29	773	35.3	49	14.1	150	18.9	260	35.0	333	35.4		
30–49	942	48.4	158	56.1	351	49.9	318	48.1	378	40.6		
50–65	409	16.3	121	29.8	196	31.2	124	16.9	221	24.1		
Education											1029.64	<0.001
Less than high school grade		67.8	235	77.8	373	60.9	178	23.4	234	22.0		
High school graduate	424	15.7	45	10.7	115	11.6	166	20.3	248	26.0		
Some college	126	5.3	11	2.3	116	12.4	239	30.6	321	34.1		
College graduate	277	11.2	36	9.3	91	15.1	119	25.8	129	17.9		
Marital status											163.92	<0.001
Single	664	30.6	56	16.3	116	16.3	233	32.4	329	35.4		
Married/living together	1127	53.4	198	60.1	467	69.1	340	48.1	415	44.9		
Separated/divorced	236	11.8	47	18.3	92	11.3	113	16.6	167	16.7		
Widowed	94	4.1	25	5.2	22	3.3	16	2.9	20	3.0		
Border area											185.90	<0.001
No	752	35.0	58	19.4	167	26.4	159	20.9	441	48.8		
Yes	1372	65.0	270	80.6	530	73.6	543	79.1	491	51.2		
Ever in neighbor country											2035.62	<0.001
No	1523	74.4	106	38.3	0	0.0	43	5.9	198	22.0		
Yes	601	25.6	222	61.7	697	100.0	659	94.1	734	78.0		
In neighbor country last 12 m											479.23	<0.001
No	1770	85.6	227	71.4	383	54.7	445	60.4	818	88.3		
Yes	348	14.4	101	28.6	314	45.3	257	39.6	113	11.7		
Native of survey city											40.74	<0.001
Yes	1469	67.0	198	59.5	511	71.7	475	65.1	713	75.5		
No	654	33.0	130	40.5	186	28.3	227	34.9	219	24.5		

greater anxiety and more intensive exposure to the American society. Also, we found here that the migration process affects Mexicans with a direct or indirect migration experience that showed increased prevalence in symptoms of anxiety. We report here for the first time decreased prevalence of anxiety among those living in border cities (in comparison with cities further away from the border).

The finding that immigration to the US has such a profound and extensive effect on different segments of this Mexican transnational population mirrors our two prior reports (Breslau et al.,

2011; Familiar I et al., 2011) and it is unlikely that this finding can be solely attributed to a single factor. More likely, behind these different populations may lie different mechanisms affecting groups in Mexico and the US. In Mexico, migration-related factors may include changes in the domestic arrangements because of a missing family member (De Snyder, 1993) and possible return of sick individuals (Abraido-Lanza, 1999). In the US, risk for anxiety may be affected by experiences of discrimination against ethnic minorities (Williams and Mohammed, 2009, 2013), fear of law enforcement among those without legal status (Heeren et al., 2014),

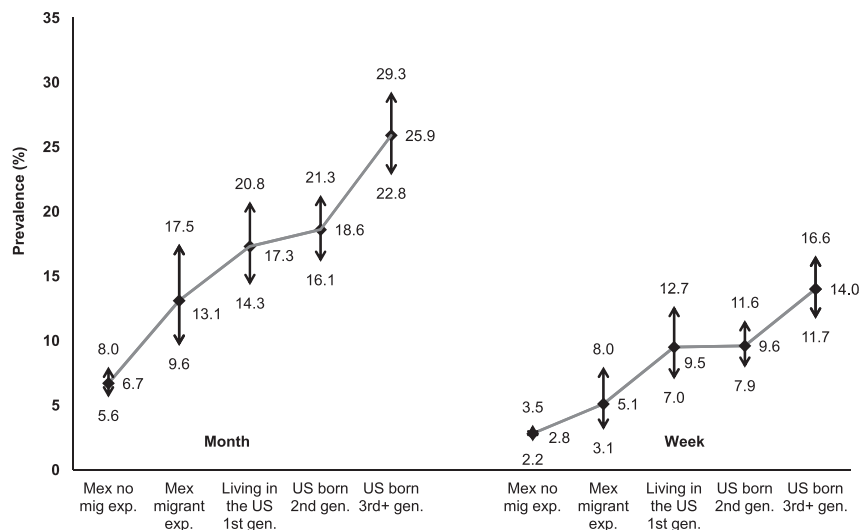


Fig. 1. Prevalence and 95% confidence interval for anxiety (month and week) by migration status. US–Mexico Study on Alcohol and Related Conditions (2011–2013).

Table 2

Association of anxiety with migration status and adjusted by sociodemographic and border variables. U.S.–Mexico Study on Alcohol and Related Conditions (2011–2013).

	Anxiety month		Anxiety week	
	PR	95% CI	PR	95% CI
Migration status				
Mexicans with no migrant experience	1.00	—	1.00	—
Mexicans with migrant experience	1.84	(1.34–2.54)	1.60	(0.93–2.75)
Living in the U.S. 1st generation	2.57	(1.97–3.36)	3.26	(2.10–5.04)
U.S. born 2nd generation	3.26	(2.59–4.11)	4.22	(3.02–5.90)
U.S. born 3rd + generation	3.83	(3.06–4.81)	5.30	(3.92–7.16)
Sex				
Male	1.00	—	1.00	—
Female	1.57	(1.37–1.80)	1.50	(1.22–1.85)
Age				
[18,65]	1.01	(1.01–1.02)	1.02	(1.01–1.02)
Education				
High school graduate or more	1.00	—	1.00	—
Less than high school grade	1.30	(1.12–1.51)	1.50	(1.21–1.86)
Marital status				
Non married/living together	1.00	—	1.00	—
Married/living together	0.83	(0.72–0.96)	0.83	(0.67–1.03)
Border area				
No	1.00	—	1.00	—
Yes	0.63	(0.53–0.74)	0.67	(0.53–0.85)
In neighbor country last 12 m				
No	1.00	—	1.00	—
Yes	1.09	(0.93–1.29)	1.04	(0.81–1.34)
Native of survey city				
Yes	1.00	—	1.00	—
No	1.37	(1.18–1.58)	1.46	(1.19–1.78)

PR – Prevalence ratios computed with a generalized linear model with a log link and binomial distribution (standard errors were corrected using Stata's svy module).

CI – Confidence interval.

A cut-off score equal or greater than 10 was used to define anxiety symptomatology. Each column is a full model with anxiety as the outcome variable and all row variables as predictors.

and/or the perceived differential social status attainment of US-born Mexican Americans (Rumbaut and Komaie, 2010). It is also important to consider that though the US-born Mexican-Americans have levels of anxiety that are much higher than Mexicans in Mexico, evidence from other studies suggests that they do not differ substantially from other US-born groups, including US-born Non-Hispanic Whites (Breslau et al., 2009). This suggests that the factors contributing to the high level of anxiety among Mexican-

Americans relative to Mexicans in Mexico may not be distinctive exposures associated with migration, but rather to exposures broadly shared within the US population, regardless of ethnicity. While alternative explanations of our findings favoring biased sample selection of health immigrants or selective return of immigrants are possible, new literature in this topic has shown that these biases could not fully explain the findings reported here for the increase in symptoms of anxiety and migration patterns in the transnational population of Mexican ancestry (Aguila et al., 2013; Borges et al., 2011, 2009; Breslau et al., 2011; Nobles and Rubalcava, 2013). It is unknown whether the possibility of ethnic attrition described for the third-generation of Mexican-Americans, where better off descendants of Mexican ancestry are more likely to be lost from follow-up, would bias our estimates upwards and this is a matter for further research (Duncan and Trejo, 2011).

To our knowledge, this is the first study to report on possible differences in anxiety levels on both sides of the US–Mexico border. While it is sometimes assumed that those living in the US–Mexico border area may be subject to more stress because of the harsh conditions in these cities, potentially leading to an increase in anxiety disorders, our finding that border residents appear to be lower on anxiety symptomatology than Mexicans and Mexican-Americans living in off-border areas is novel and contradicts these assumptions. Although we could find no prior study on anxiety disorders among those living at the border, an inquiry sponsored by the United States–Mexico Border Health Commission (United States-Mexico Border Health, 2010) found no differences in levels of psychological distress between Hispanics living in the US border counties compared to Hispanics living in other areas of the US, and non-significant differences among Hispanic immigrants living in border areas (12.4% in 12-month prevalence of psychological distress) and Hispanic immigrants nationwide (8.8% prevalence). Given the differences between the prevalence of anxiety disorders among Hispanic ethnic groups in the US (Polo et al., 2011), with those of Mexican origin showing the lowest rates, more study is needed before we can reach any definitive conclusion in this area.

Our results should be viewed within the scope of some limitations. First, the sister-cities in the Texas-Tamaulipas border were selected to increase homogeneity of the comparisons and are not representative of other sister-cities in these states or in other sister-cities of other states in the US/Mexico border, such as San Diego and

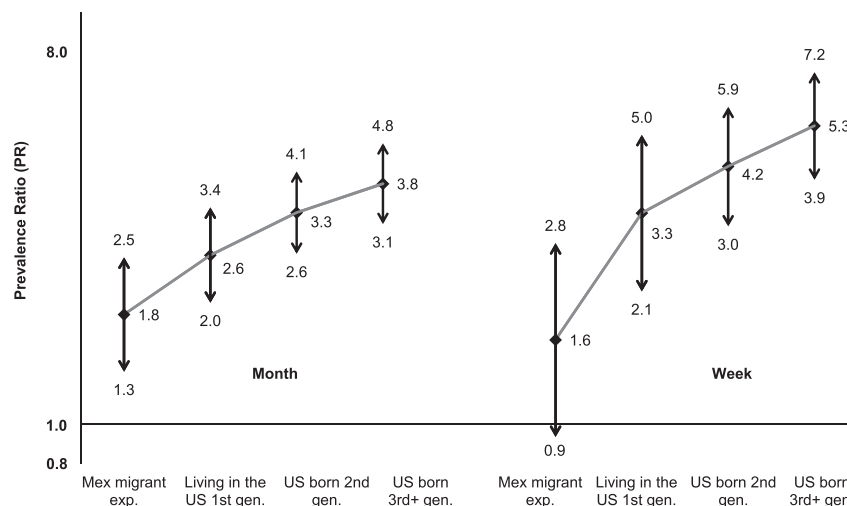


Fig. 2. Adjusted Prevalence Ratios and 95% Confidence Intervals for migration status and anxiety (month and week). US–Mexico Study on Alcohol and Related Conditions (2011–2013). The reference category is Mexican with no migrant experience. PR's were adjusted by sex, age, education, marital status, border city, native of survey city and being in neighbor country in the last 12 months.

Tijuana, for example. Our study, nevertheless, included a survey design that guarantees a representative sample of eight cities, and is the first bi-national study on this topic, and the largest border/non border comparative study to date. The measure of symptoms of anxiety, while commonly used and validated for the Mexican population should not be equated with clinical anxiety. Although both the studies in Mexico and in the US were conducted simultaneously, using the same methodology and questionnaire in both countries, the political, economic, and security situation in Mexico was in particular turmoil during the period of data collection. Some of our sub-groups of migrants (i.e. Mexicans with migration experience) are small and estimates are imprecise to perform other between-groups comparisons. Finally, the present study is cross-sectional, and while we found some associations of interest, we cannot claim causality in these associations.

In spite of these limitations, this study is the first to examine the prevalence of symptoms of anxiety in a bi-national context, and suggests that the Mexican immigration process largely and broadly affects this prevalence. Mechanisms associated with this increased prevalence are speculative at this moment, and should be empirically investigated for each of the specific population described here. For further research, it will be necessary to combine populations from sending and receiving countries, followed longitudinally and to cover as many specific migration experiences as possible, such as reasons for migration as an example. This will require much more complex research designs that will call for true international collaboration.

The role of the sponsors

None.

Contributors

Authors Borges and Cherpitel and Zemore designed and wrote the protocol, collected data and obtained funds (Cherpitel, PI). Authors Zamora and Orozco trained interviewers and collected data in Mexico while author Garcia performed data control quality in Mexico. Authors Borges, Breslau and Zamora discussed the report plan, managed the literature searches and analyses. Authors Borges, Orozco and Garcia undertook the statistical analysis, and author Borges wrote the first draft of the manuscript and subsequent versions with inputs from author Breslau and all others. All authors contributed to and have approved the final manuscript.

Conflict of interest disclosure

None.

Acknowledgment

NIAAA #R01AA018365; Cheryl Cherpitel (PI).

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