Drug Use on Both Sides of the U.S.-Mexico Border

Guilherme Borges, Sc.D.[1], **Sarah E. Zemore, PhD.**[2], **Ricardo Orozco, Sc.M.**[1], **Cheryl J. Cherpitel, PhD.**[2], **Priscilla Martinez, PhD.**[2], and **Lynn Wallisch, PhD.**[3]

[1]Instituto Nacional de Psiquiatría Ramón de la Fuente (Mexico City), Mexico

[2]Alcohol Research Group, Emeryville, California

[3]University of Texas, Austin, Texas

Abstract

Objective—There is a lack of epidemiological information on drug use in the U.S.–Mexico border.

Materials and Methods—Data are from the U.S.–Mexico Study on Alcohol and Related Conditions (UMSARC, 2011-2013), a survey of 4,796 randomly selected Mexican and Mexican origin **individuals** on both sides of the border.

Results—Higher rates of any past-year drug use and symptoms of drug use disorders were found only in the border city of Laredo, when compared to the non-border city of San Antonio; Nuevo Laredo and Reynosa/Matamoros showed higher rates of drug use than the non-border city of Monterrey. Much higher rates (OR's in the range of 4-11) were found in the U.S. cities when compared to their across-the-border Mexican counterparts.

Conclusions—Drug use is high on the border for the selected Mexican cities. Misuse of prescription drugs is nevertheless a concern in the south Texas border cities in our study.

Keywords

Hispanic Americans; border disease; epidemiology; survey; drug use

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The issue of drug use and its consequences in the U.S.-Mexico border region has attracted much interest for several reasons [1,2]. In Mexico, cities closer to the U.S. are relatively more affluent compared to other parts of the country [3,4], and in some of these cities norms and law enforcement for substance use tend to be more liberal in order to attract foreign customers [5,6]. Additionally, large border cities like Tijuana include in their population Mexicans seeking to immigrate to the U.S., return immigrants and deported Mexican nationals, a population mix conducive to a higher prevalence of drug use than in other parts of the country [7-10]. In the U.S., cities closer to the Mexican border are relatively poorer than the rest of the country [4,11], making the proximity to cheaper drug markets appealing [12]. Drug trafficking and associated violence in the border area has been a serious concern for law

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Corresponding author: Guilherme Borges, Instituto Nacional de Psiquiatría Ramón de la Fuente (Mexico City), Mexico, Calzada Mexico Xochimilco 101, Tlalpan, CP 14370, Mexico City, Mexico- Tel. 55-41605334, guibor@imp.edu.mx/ guilhermelgborges@gmail.com.

enforcement and public health officials in South Texas [13] and leads to the image of border cities as places with high levels of risk for alcohol, drug use and drug use problems [14,15], even if the epidemiological evidence so far does not confirm this image, at least on the U.S. side [16-19].

The physical environment in which individuals live is one of the social determinants of health and the relationship between socioeconomic inequalities of the neighborhoods and the consumption of illicit substances by the individuals who inhabit them has been studied for several years. Components of the environment are: the population structure that surrounds it (ie, demographic composition), physical environment (including housing quality, population density and infrastructure), social environment (including social networks, social support and social capital), as well as formal and informal health and social services[20] . Besides these general elements, the border area is distinctive from interior regions of the United States and Mexico in terms of exposure to stressors and other contributors to drug use and related problems. On the U.S. side, border counties have higher rates of unemployment and poverty than the rest of the country. In Mexico, border municipalities conversely show below average poverty rates when compared to the national average. Further, 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.

Surprisingly, only a handful of epidemiological, population-based studies have focused on the prevalence of illicit drug use along the U.S.-Mexico, either in U.S. border cities [16,18,19,21] or Mexican border cities [8,22-24]. In particular, to date no binational research on the topic has been conducted comparing the so called "twin" or "sister cities" in the region. These are legally separate cities, in both countries, that nevertheless share strong bi-national cultural ties, often with family members living on both sides of the border. Health-related issues for these sister cities have been a matter of relevance, with alcohol and drug use staring to gain attention [25] , but research is almost non-existent for drug use in sister cities. While some prior research has compared different cities along both sides of the border (especially [17,19], these comparisons suffer from the lack of a common target population, common measures and methodology, similar time frame and common covariates. Updated information on drug use in this region would be important for implementing new programs for prevention and treatment for drug use and disorders in the area.

In the present study, we use data from the recently completed U.S.–Mexico Study on Alcohol and Related Conditions (UMSARC), a cross-sectional survey of 4,796 randomly selected Mexican and Mexican-origin individuals interviewed between 2011 and 2013 in six metropolitan areas on both sides of the U.S.- Mexico border [26-28]. In these reports, border versus non-border comparisons suggest a complex mixture of effects. For instance, the co-occurrence of alcohol use disorder (AUD) and drug use disorder (DUD) symptoms was more common at the U.S. border than off-border, as well as at the Mexican border, compared to off-border. Nevertheless, among current drinkers, prevalence of AUD was marginally greater at the U.S. border compared to the non-border, but the opposite was true in Mexico. Cities within countries may also be different, as exemplified by the finding of very high rates of past-12-month AUD among Laredan men, which suggest the possibility of significant heterogeneity even within demographically similar border areas. No report from

the UMSARC has solely focused on drug use and symptoms of DUD. Our main goals are to compare drug use (illicit and non-medical use of prescription drugs) for border and non-border cities in each country and to compare pairs of cities ("sister cities") across countries. Our hypothesis is that, for both sides of the border, the prevalence of drug use will be higher in border than in non-border cities. A secondary goal is to put these prevalence estimates into the context of national prevalence estimates for both Mexico and the U.S. so that we can shed some light on the prevailing image of border communities as places with rampant rates of substance use.

Materials and methods

The UMSARC is a cross-sectional survey that interviewed randomly selected respondents during 2011 to 2013 in metropolitan areas on both sides of the U.S.–Mexico border. Household face-to-face interviews of about 45 minutes in length were conducted in the United States by the Public Policy Research Institute at Texas A&M University and in Mexico by the National Institute of Psychiatry (INP) in Mexico City. Sampling was carried out simultaneously on each side using a multistage area probability sampling design with stratification by city. On the U.S. side, primary sampling units (PSUs) were defined as census block groups with at least 70% Hispanic population, with blocks serving as the secondary sampling unit (SSU). In Mexico, PSU's were defined using the catalog of the census Basic Geo-statistical Areas ("Areas Geoestadísticas Básicas-AGEB"), similar to block groups in the United States, with blocks within the AGEB serving as SSU's. On both sides, three households per SSU were randomly selected, with eligible residents defined as those aged 18 to 65 (both sides) and 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. Interviews were conducted in either Spanish or English in the United States and in Spanish in Mexico.

Response Rate

On the U.S. side, the border sample consisted of respondents from the three Texas border metropolitan areas of Laredo (Webb County; *n= 751*) and McAllen and Brownsville (Hidalgo and Cameron counties; *n= 814*); the non-border sample consisted of *n= 771* respondents from the metropolitan area of San Antonio (Bexar county). Together, the U.S. samples reflected a combined cooperation rate of 84% (53.1% response rate) (as per[29]). We carried out parallel sampling in Mexico on respondents living in the respective border sister metropolitan areas (sister cities) of Nuevo Laredo (*n= 828*) and Reynosa and 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). By design, the cities of McAllen and Brownsville were sampled as a single stratum (as were Reynosa and Matamoros), so each was considered a single site.

Weights, Instruments and Variables

In both the United States and Mexico, we first weighted data to reflect the multistage clustered sampling design. Then we used a raking algorithm [30] approach to iteratively adjust the sampling weights to match Census marginal distributions of education and the combined gender-by-age distribution, separately within each site.

Drug use in the past 12 months was assessed with items adapted from the Mexican National Addiction Survey 2008 [31]. It included illicit drugs and the non-medical use of prescription drugs (*i.e.* that were not prescribed for the respondent or that were not taken as prescribed).

Illicit drugs included marijuana, cocaine or crack, heroin or opium, methamphetamines, hallucinogens and other recreational drugs. Prescription drugs included pain relievers, sedatives, stimulants and other prescription medicines. An indicator of 'any drug use' was created for the use of either illicit or prescription drugs. 'Polydrug use' was defined as using two or more of any of the drugs listed as illicit or prescription. Limited interview time precluded a comprehensive assessment of drug use disorders (DUD) so, as an alternative, we selected two items from the DSM-IV with a high prevalence of endorsement across different drugs [32,33]: Recurrent use in physically dangerous situations, such as while driving or operating machinery, or injury while drinking (=*hazardous use*); and persistent desire, or unsuccessful efforts, to reduce consumption (=*quit or control*). The report of these two symptoms of DUD can be interpreted here as a marker of heavier drug involvement or possible problem drug use, but not as a diagnosis of drug use disorder *per se*.

We included other demographic and mobility variables known or believed to influence the prevalence of drug use and problem use as statistical controls in our main models. These were sex, age, education, employment, religion, marital status, whether the respondent was a native of the surveyed city and whether the respondent had visited the neighbor country in the past 12 months.

Data analyses

After estimating the prevalence of the demographic and mobility variables and the prevalence of drug use and DUD symptoms for each study site in the UMSARC, we estimated odds ratios (*OR*) for drug outcomes in logistic regression models [34], with statistical adjustment for sociodemographic and mobility variables. We used weights developed for the UMSARC as described previously. We estimated all model parameters, standard errors and 95% confidence intervals (CI) of coefficients using the Taylor series method implemented in Stata version 13.1 survey commands to adjust for the design effects, stratification, clustering and unequal weighting of the observations [§].

Comparisons were made among cities within each country, with significance tests of cross-tabulations using the design-based Pearson X^2 test. Model-based comparisons for each pair of cities within each country and for each pair of sister cities across the border, were estimated by logistic regression using Stata's *pwcompare* command.[**]

[§]Stata Statistical Software:Release 13. College Station, TX: Stata Press; 2013.
[**]Stata 13. Base Reference Manual. College Station, TX: Stata Press; 2013.

Results

Table I shows the distribution across the sample sites of the demographic and mobility variables, which were used as covariates to examine drug use outcomes, focusing on comparisons between border and off-border cities within each country. In the United States, while the three locations had similar age and sex distributions, some differences were apparent: San Antonio had lower proportions of college graduates, higher proportions in "other" occupations (which includes unemployment) and a higher proportion of individuals who were separated, divorced or widowed. San Antonians were also less likely to have crossed the border in the past year; Laredo had a higher proportion of individuals identifying as Catholic; and respondents in Brownsville/McAllen were less likely to be natives of their city. On the Mexican side, the three locations also had similar age and sex distributions. However, Monterrey had a higher proportion of college graduates, fewer people working full time and more Catholics and single people and Monterrey residents were less likely to have crossed the border during the past year. Additionally, there was a higher proportion of non-natives in both Nuevo Laredo and Reynosa/Matamoros.

Table II shows the prevalence of past-year drug use and problems by study site. In the United States, the prevalence of any illicit drug use was similar across all sites, but prescription drug use, any drug use, polydrug use and symptoms of DUD were all higher in Laredo. While the marijuana prevalence rate was similar across sites, Laredo had higher rates of cocaine/crack and methamphetamines, while Brownsville/McAllen showed lower rates of heroin or opium use. In Mexico, site differences were found for any illicit drug use, any drug use and symptoms of DUD, which were all higher in Nuevo Laredo. The only individual illicit drug with a difference in rates across sites was marijuana, with higher rates also in Nuevo Laredo.

Table III presents border/non-border comparisons within country, adjusted by the demographic and mobility variables. Compared to the non-border site of San Antonio, all rates of past-year drug use and symptoms of DUD, with the exception of 'any illicit drug use', were higher in Laredo, but no differences were found in 'any illicit drug use' and symptoms of DUD for the comparison between Brownsville/McAllen and San Antonio. Among the border sites, Laredo, when compared to Brownsville/McAllen, had higher rates of drug use and symptoms of DUD (with the exception again of any illicit drug use). In Mexico, Nuevo Laredo had higher rates of drug use and symptoms of DUD (except for polydrug use) when compared to non-border Monterrey and Reynosa/Matamoros had higher rates of any prescription drug use and any drug use when compared to Monterrey. The two Mexican border sites differed only in Nuevo Laredo having higher rates of any illicit drug use when compared to Reynosa/Matamoros. Figure 1 presents graphically the adjusted estimates from Table III. This figure shows that in Mexico, most point estimate comparisons of drug use in border/non-border areas are above the null, while in the U.S. this is true only for the Laredo/San Antonio comparison. While we searched for possible differences in effects by sex and age groups (18-29 and 30-65) by study site, we couldn't find enough statistical support to report age or sex effects for all outcome variables. Especially for cities in Mexico, prevalence data became too sparse by sex and age groups for meaningful interpretations.

Table IV compares the rates of past-year use of any illicit drug, marijuana and cocaine/crack (the only substances whose sample size was large enough to compute reliable estimates) across "sister cities", using multivariate models to adjust for key risk factors across these cities. Substantially higher rates were found in the U.S. cities when compared to their Mexican counterparts across the border, ranging from a low $OR = 3.75$ (95% CI [2.53, 5.56], $p < .001$) for the comparison of any illicit drug use between Laredo and Nuevo Laredo to a high $OR = 11.01$ (95% CI [5.93, 20.46], $p < .001$) for the comparison between San Antonio and Monterrey in rates of marijuana use. Interestingly, with only one exception ($OR = 9.52$, 95% CI [3.27, 27.76], $p < .001$) for cocaine/crack in the comparison Brownsville/McAllen vs. Reynosa/Matamoros), OR's were lower for border sister cities than for the comparison of the two non-border cities.

The simple prevalence estimates of drug use shown in Table II can be used to make raw comparisons with national estimates of drug use in both countries using published data from other surveys (data not shown). In Mexico, using the National Addiction Survey of 2008, we computed national averages of past-year prevalence rates of 1.8% for any drug use, 1.6% for illicit drug use, 0.4% for prescription drug use and 1.1% for marijuana use [31]. All those rates are lower than the ones reported in Table II for Monterrey (except for illicit drug use) and much lower than the ones reported for our Mexican border cities.

In the U.S., using the 2014 National Survey on Drug Use and Health [35], the national past-year prevalence of any drug use among Hispanics aged 18 or older (Table 1.23B) was 15.0%, 5.6% for prescription drug misuse (Table 1.53B) and 10.9% for marijuana (Table 1.28B). While the national Hispanic prevalence of any drug use and of marijuana use is not too different compared to the three U.S. sites of the UMSARC as per Table II (with the exception of Laredo), data from the UMSARC suggest a higher prevalence of prescription drug use in all three sites (and especially Laredo) than nationally.

Discussion

To summarize our results: 1) In the U.S., higher rates of any past-year drug use and symptoms of DUD were found only in the border city of Laredo, when compared to the non-border city of San Antonio; in Mexico, both Nuevo Laredo and Reynosa/Matamoros showed higher rates of drug use than the non-border city of Monterrey; 2) Much higher rates (OR's in the range of 4-11) were found in the U.S. border and non-border cities when compared to their Mexican border and non-border counterparts; and 3) Compared to U.S. national estimates, a higher prevalence of prescription drug use was found in all U.S. UMSARC sites; in Mexico, the national comparison suggested that the three UMSARC sites had higher rates of use for all classes of drugs.

A main finding from this study is that the cities that we surveyed along the U.S.-Mexico border are not homogeneous regarding drug use and this heterogeneity has also been documented previously in the UMSARC for alcohol use and disorders [27]. The reason for this heterogeneity is yet unexplained and may be due to differences in preferences and availability of specific drugs, patterns of drug trafficking, violence and levels of stress in this dynamic region, all of which should be explored in more complex models than were possible

here. Our hypotheses for factors affecting drug use were based on our prior studies of U.S. border alcohol use and a future challenge would be to investigate the validity of these models on the Mexican side as well. The identification of Laredo as a high risk area, as shown both in this study and others [27], has potential important policy implications for the border area. Yet, the fact that some border cities in the U.S. have drug use rates that are comparable to, or even lower than, those of non-border cities suggests the danger of portraying the entire border with a broad brush stroke [12,14,22].

While a few previous comparisons of drug use [36-38] have suggested that drug use and disorders are much more common in the U.S. than in Mexico, to the best of our knowledge, this is the first time that representative epidemiological data from sister cities have been compared. Yet, this comparison is particularly relevant, as paired cities such as Laredo and Nuevo Laredo or Brownsville/McAllen and Reynosa/Matamoros are literally separated by only a bridge traversed by thousands every day. It was found that the sister cities of Laredo/ Nuevo Laredo were both highest on drug use and DUD symptoms in each country and both localities are known for activities of drug cartels and drug related violence. We have been able to contribute to knowledge of comparative drug use prevalence in these cities with a study sample, design and covariates that ensured good population homogeneity across the sites and controlled for a complex set of probable risk factors. The even larger differences noted (OR's of 9 - 11) between the non-border cities (San Antonio and Monterrey), as compared to the border sister cities, suggests that perhaps variations in social determinants are key to understanding differences in this otherwise demographically homogeneous population. More in-depth analyses of these differences in drug outcomes are needed to determine which factors drive them, but this study has made a start in ruling out some obvious ones. While nativity and immigration patterns have been shown in previous studies to be important in understanding drug use in this population [39], it is likely that inclusion of additional factors would enhance our understanding (e.g. [27]).

It would be especially important to further explore factors associated with the high prevalence of prescription drug misuse, particularly in Laredo (25%), which cannot be solely attributable to access to Mexican border pharmacies [6], since it persists even after border crossings are taken into account. Rates of prescription drug misuse were also somewhat higher in both Brownsville/McAllen and San Antonio (9% each) as compared with rates for the U.S. as a whole (5.6%, as per the 2014 National Household Survey cited above). It is possible that Mexican-origin border residents are accustomed to sharing prescription medications among household members both for expediency and cost and this kind of misuse may not represent an imminent danger of addiction *per se*. Yet, given the recent rise in prescription drug abuse and the severity of its consequences (fatal overdoses or progression to illicit drugs) observed nationally in the U.S., the high rates on the border are worrisome and worthy of further investigation.

Our findings that the border cities that we surveyed in Mexico were at high risk for drug use and symptoms of DUD as compared to elsewhere in the country are in line with other research findings [8,9]. Reasons for these higher rates are not immediately apparent, since the non-border city of Monterrey also showed some higher rates, so the finding seems applicable to the northern region of Mexico rather than only the border cities. It is possible

that greater levels of inequality in the relatively more affluent north may contribute to stresses and risks for substance use [40]. Our study is a first step towards greater understanding of the prevalence and patterns of drug use and problems in the binational border area, but many questions remain that deserve further research.

Public health actions on drug use and drug use disorders, that follows closely public health models that emphasizes drug use and health consequences of drug use beyond the mere prohibition and criminalization, is needed for the region[41]. These measures should be broad in the actions and the type of organizations that are needed to implement such policies, ranging from clinical attention of affected individuals, to public health preventive measures and efforts to make treatment services readily available, improvements in schooling and, when necessary, effective measures to reduce the availability of substances for the population[42]. While treatment for those in need is a central public health measure, but by no means should be an exclusive action, scarcity of resources in the US-Mexico border is especially worrisome. Previous work from our group has showed that in both countries, border substance users were about half as likely as non-border substance users to have wanted or obtained any kind of help, independent of predisposing, need and enabling factors, including migration status. Among those desiring help, however, about half had obtained it, both on and off the border in both countries[43]. Actions to improve this complex situation are sorely needed.

Limitations

Some limitations to our study should be borne in mind. First, our three sister cities in the Texas-Tamaulipas border area were selected to ensure homogeneity of comparisons and are not necessarily representative of other sister cities on the border, such as El Paso and Juarez or San Diego and Tijuana, or of non-Mexican/Mexican-American populations there. Similarly, the non-border cities were selected for comparison because they were the closest large cities within 150 miles of their respective borders, but they cannot be considered representative of the entire interior of each country. Additionally, even though this study was conducted at the same time with the same methodology and questionnaire in both countries, the political, economic and security situation in Mexico was in particular turmoil during data collection and conditions affecting drug use there may not be stable. Nevertheless, our comparisons between sister cities are relatively robust, since we used the same study design, instrument and covariates and the data collection took place at roughly the same time. The somewhat low response rates are a concern, but we have shown elsewhere that this did not affect the validity of our estimates of alcohol or drug use [26,28]. A further limitation is that our screening measure of DUD symptoms, which included only two of the 11 criteria of the new DSM-5 diagnostic, may underestimate the true prevalence of DUD, so our estimate of problem drug use should be considered a conservative one. Finally, our comparisons with national estimates are based on raw data (for Hispanics and not Mexican-Americans on the US side) and are not adjusted for key variables, so they should be regarded as suggestive only.

Conclusion

Despite these limitations, this study is the first to examine the prevalence of drug use and symptoms f DUD in a truly binational context. In the U.S., Laredo appears especially at risk for drug use, while in Mexico, Nuevo Laredo and Reynosa/Matamoros both show increased risk for drug use, yet lower risk than their U.S. counterparts. On the U.S. side, high rates of prescription drug misuse, especially in Laredo but also to some degree in the other study sites, are a concern and should be investigated further. **These findings highlight the urgent need for reducing public health actions for substance use and substance use disorders in the US-Mexico border area, where, unfortunately, limitations for the treatment of substance use disorders abound.**

Reference List

1. Lee E, Wilson CE, Lara-Valencia F, de la Parra CA, Van R, Patron-Soberano K. , et al. The state of the border report: a comprehensive analysis of the US-Mexico Border. Washington, DC: Wilson Center; 2013.

2. Molzahn C, Ríos V, Shirk DA. Drug violence in Mexico: Data and analysis through 2011. San Diego: Trans-Border Institute; 2012.

3. Consejo Nacional de Población (CONAPO). [Consultado 2016 February] Índice de Marginación por Localidad 2010. Consejo Nacional de Población. Disponible en: http://www.conapo.gob.mx/en/CONAPO/Indice_de_Marginacion_por_Localidad_2010

4. Wilson Center. A comprehensive Analysis of the US- Mexico Border. Washington, DC: Wilson Center; 2013. The State of the Border Report.

5. Lange JE, Voas RB, Johnson MB. South of the border: A legal haven for underage drinking. Addiction. 2002; 97(9):1195–1203. DOI: 10.1046/j.1360-0443.2002.00182.x [PubMed: 12199835]

6. Valdez A, Sifaneck SJ. Drug tourists and drug policy on the US-Mexican border: An ethnographic investigation of the acquisition of prescription drugs. J Drug Issues. 1997; 27(4):879–898. DOI: 10.1177/002204269702700413

7. Zhang X, Martínez-Donate AP, Nobles J, Hovell MF, Rangel MG, Rhoads NM. Substance use across different phases of the migration process: a survey of Mexican migrants flows. J Immigr Minor Health. 2015; 17(6):1746–1757. DOI: 10.1007/s10903-014-0109-5 [PubMed: 25595206]

8. Rojas GE, Fleiz BC, Villatoro J, Gutiérrez LM, Medina-Mora ME. Tendencias del consumo de drogas de 1998 a 2005 en tres ciudades de la zona norte de México: Ciudad Juárez, Monterrey y Tijuana. Salud Ment. 2009; 32(1):13–19.

9. Medina-Mora ME, Natera G, Borges G. Observatorio Mexicano en Tabaco, Alcohol y Otras Drogas. Vol. 2002. Mexico: CONADIC- Secretaría de Salud; Alcoholismo y abuso de bebidas alcoholicas; 15–25.

10. Bucardo J, Brouwer KC, Magis-Rodriguez C, Ramos R, Fraga M, Perez SG, et al. Historical trends in the production and consumption of illicit drugs in Mexico: implications for the prevention of blood-borne infections. Drug Alcohol Depend. 2005; 79(3):281–293. DOI: 10.1016/j.drugalcdep.2005.02.003 [PubMed: 16102372]

11. Lara F, Peña S. Washington, DC: Woodrow Wilson International Center for Scholars [Consultado; 2011. The challenge of poverty at the U.S.-Mexico border: Identifying policy opportunities. Disponible en: https://www.wilsoncenter.org/publication/the-challenge-poverty-the-us-mexico-border-identifying-policy-opportunities [Consultado 2011 July 7]

12. Volkmann T, Shin SS, Garfein RS, Patterson TL, Pollini RA, Wagner KD, et al. Border crossing to inject drugs in Mexico among injection drug users in San Diego, California. J Immigr Minor Health. 2012; 14(2):281–286. [PubMed: 21442300]

13. National Drug Intelligence Center. Washington, D.C: 2008. South Texas High Intensity Drug Trafficking Area Drug Market Analysis. Disponible en: https://www.justice.gov/archive/ndic/pubs27/27513/border.htm [Consultado 2008 August 18]

14. Kelley-Baker T, Mumford EA, Vishnuvajjala R, Voas RB, Romano E, Johnson M. A night in Tijuana: female victimization in a high-risk environment. J Alcohol Drug Educ. 2008; 52(3):46–71. [PubMed: 19194519]

15. Grissom B. Austin, Texas: 2009. Border Communities Lack Drug Abuse Treatment. Disponible en: https://www.texastribune.org/2009/11/09/border-communities-lack-drug-abuse-treatment/ [Consultado 2009 November 9]

16. Harrison LD, Kennedy NJ. Drug Use in the United States-Mexico Border Area: Is There an Epidemic Waiting to Happen? Hispanic J Behav Sci. 1994; 16(3):281–295. DOI: 10.1177/07399863940163006

17. Harrison LD, Kennedy NJ. Drug use in the high intensity drug trafficking area of the US Southwest border. Addiction. 1996; 91(1):47–61. DOI: 10.1046/j.1360-0443.1996.911478.x [PubMed: 8822014]

18. Wallisch LS. Survey of Substance Use on the Texas-Mexico Border and in Colonias. Austin, TX: Texas Commission on Alcohol and Drug Abuse; 1996. 1998

19. Wallisch LS, Spence RT. Alcohol and Drug Use, Abuse, and Dependence in Urban Areas and Colonias of the Texas-Mexico Border. Hispanic J Behav Sci. 2006; 28(2):286–307. DOI: 10.1177/0739986305286137

20. Galea S, Freudenberg N, Vlahov D. Cities and population health. Soc Sci Med. 2005; 60(5):1017–1033. DOI: 10.1016/j.socscimed.2004.06.036 [PubMed: 15589671]

21. Reingle J, Caetano R, Mills BA, Vaeth PA. The role of immigration age on alcohol and drug use among border and non-border Mexican Americans. Alcohol Clin Exp Res. 2014; 38(7):2080–2086. DOI: 10.1111/acer.12440 [PubMed: 24846850]

22. Zúñiga V. Uso de drogas e interacción transfronteriza en las ciudades fronterizas de Tamaulipas. Front Norte. 1990; 2(3):115–135.

23. Secretaria de Salud. Encuesta sobre el Consumo de Drogas en la Frontera Norte de México. México: Dirección General de Epidemiología; 1994.

24. Borges G, Medina-Mora ME, Orozco R, Fleiz C, Cherpitel C, Breslau J. The Mexican migration to the United States and substance use in Northern Mexico. Addiction. 2009; 104(4):603–611. DOI: 10.1111/j.1360-0443.2008.02491.x [PubMed: 19215601]

25. Country Volume ed. Washington, DC: Pan American Health Organization & World Health Organization; 2012. Health in the Americas, Pan American Health Organization. United States–Mexico Border Area.

26. Cherpitel C, Ye Y, Bond J, Zemore SE, Borges G, Greenfield TK. Border effects on DSM-5 alcohol use disorders on both sides of the U.S.-Mexico border. Drug Alcohol Depend. 2015; 148:172–179. DOI: 10.1016/j.drugalcdep.2015.01.003 [PubMed: 25649987]

27. Zemore SE, Cherpitel CJ, Ye Y, Borges G, Li L, Wallisch L. Factors explaining variation in alcohol use disorder prevalence across border and nonborder communities in Texas. Alcohol Clin Exp Res. 2016; 40(8):1707–1716. DOI: 10.1111/acer.13124 [PubMed: 27381753]

28. Borges G, Zemore SE, Orozco R, Cherpitel C, Ye Y, Bond J, et al. Co-Occurrence of Alcohol, Drug Use, DSM-5 Alcohol Use Disorder, and Symptoms of Drug Use Disorder on Both Sides of the U.S.-Mexico Border. Alcohol Clin Exp Res. 2015; 39(4):679–687. DOI: 10.1111/acer.12672 [PubMed: 25833029]

29. The American Association for Public Opinion Research. Standard definitions: final dispositions of case codes and outcome rates for surveys. 7th. Oakbrook Terrace, IL: American Association for Public Opinion Research; 2011.

30. Deville JC, Särnsal CE, Sautory O. Generalized raking procedures in survey sampling. J Am Stat Assoc. 1993; 88:1013–1020.

31. Encuesta Nacional de Adicciones. Cuernavaca: Instituto Nacional de Salud Pública; 2008. Consejo Nacional contra las Adicciones, Instituto Nacional de Psiquiatría, Instituto Nacional de Salud Pública, Secretaría de Salud.

32. Hasin DS, Fentom MC, Beseler C, Park J, Wall M. Analyses related to the development of DSM-5 criteria for substance use related disorders: 2. Proposed DSM-5 criteria for alcohol, cannabis, cocaine and heroin disorders in 663 substance abuse patients. Drug Alcohol Depend. 2012; 122(1-2):28–37. DOI: 10.1016/j.drugalcdep.2011.09.005 [PubMed: 21963333]

33. Saha T, Compton W, Chou S, Smith S, Ruan W, Huang B, et al. Analyses related to the development of DSM-5 criteria for substance use related disorders 1. Toward amphetamine, cocaine, and prescription drug use disorder continua using Item Response Theory. Drug Alcohol Depend. 2012; 122(1-2):38–46. DOI: 10.1016/j.drugalcdep.2011.09.004 [PubMed: 21963414]

34. Hosmer DW, Lemeshow S. Applied Logistic Regression. 2nd. New York, NY: Wiley & Sons; 2000.

35. Center for Behavioral Health Statistics and Quality. Behavioral Health Trends in the United States: Results from the 2014 National Survey on Drug Use and Health. (HHS Publication No. SMA 15-4927, NSDUH Series H-50) [Consultado 2016]. Disponible en: http://www.samhsa.gov/data/sites/default/files/NSDUH-FRR1-2014/NSDUH-FRR1-2014.pdf

36. Demyttenaere K, Bruffaerts R, Posada-Villa J, Gasquet I, Kovess V, Lepine JP, et al. Prevalence, severity and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. J Amer Med Assoc. 2004; 291(21):2581–2590. DOI: 10.1001/jama.291.21.2581

37. Degenhardt L, Chiu W, Sampson N, Kessler R, Anthony J, Angermeyer M, et al. Toward a global view of alcohol, tobacco, cannabis and cocaine use: findings from the WHO World Mental Health Surveys. PLoS Med. 2008; 5(7):e141.doi: 10.1371/journal.pmed.0050141 [PubMed: 18597549]

38. Vega WA, Kolody B, Aguilar-Gaxiola S, Alderete E, Catalano R, Caraveo-Anduaga J. Lifetime prevalence of DSM-III-R psychiatric disorders among urban and rural Mexican Americans in California. Arch Gen Psychiatry. 1998; 55(9):771–778. [PubMed: 9736002]

39. Borges G, Cherpitel CJ, Orozco R, Zemore SE, Wallisch L, Medina-Mora ME, et al. Substance Use and Cumulative Exposure to American Society: Findings From Both Sides of the US–Mexico Border Region. Am J Public Health. 2016; 106(1):119–127. DOI: 10.2105/AJPH.2015.302871 [PubMed: 26562124]

40. Galea S, Nandi A, Vlahov D. The social epidemiology of substance use. Epidemiol Rev. 2004; 26(1):36–52. DOI: 10.1093/epirev/mxh007 [PubMed: 15234946]

41. Babor T, Caulkins JP, Edwards G, Fischer B, Foxcroft DR, Humphreys K. , et al. New York: Oxford University Press; 2010. Drug Policy and the Public Good. Disponible en: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&gid=14583&Itemid=270&lang=en [Consultado 2017 September 26]

42. Strang J, Babor T, Caulkins JP, Fischer B, Foxcroft D, Humphreys K. Drug policy and the public good: evidence for effective interventions. Lancet. 2012; 379(9810):71–83. DOI: 10.1016/S0140-6736(11)61674-7 [PubMed: 22225672]

43. Wallisch L, Zemore SE, Cherpitel CJ, Borges G. Wanting and Getting Help for Substance Problems on Both Sides of the US-Mexico Border. J Immigr Minor Health. 2017; 19(5):1174–1185. [PubMed: 27286883]
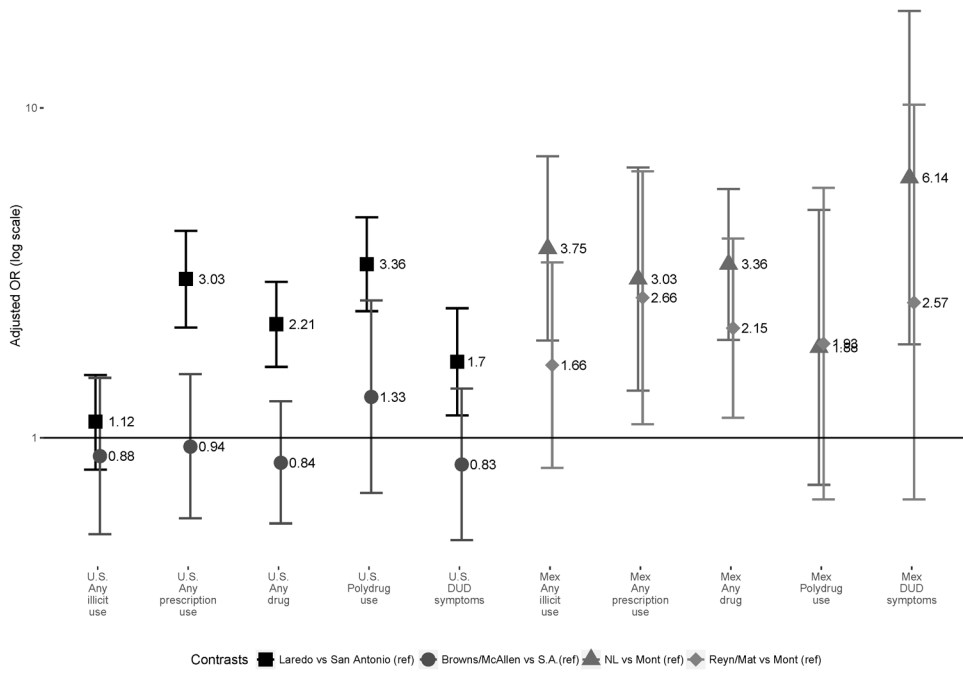
Figure 1.
Pairwise contrasts of past–year drug use and DUD symptoms with city, adjusted by sociodemographic variables, by country.

Table I

Distribution of sociodemographic variables across cities, by country. U.S.-Mexico Study on Alcohol and Related Conditions (UMSARC), 2011-2013

	United States				Mexico			
	San Antonio (*n*=771)	Laredo (*n*=751)	Brownsville / McAllen (*n*=814)	p^a	Monterrey (*n*=811)	Nuevo Laredo (*n*=828)	Reynosa / Matamoros (*n*=821)	p^a
	%	%	%		%	%	%	
Gender								
Female	51.0	53.0	53.4		50.4	50.5	50.6	
Male	49.0	47.0	46.6		49.6	49.5	49.4	
Age category, years								
18-29	30.7	29.6	28.2		30.3	32.5	35.0	
30-49	42.4	47.8	47.7		48.9	49.5	49.7	
50-65	26.9	22.6	24.1		20.8	18.1	15.3	
Education				***				***
Less than high school graduate	35.4	36.9	36.2		61.2	74.4	71.7	
High school graduate	21.6	20.6	16.0		11.8	15.5	17.9	
Some college	30.8	19.6	25.8		8.1	3.0	3.7	
College graduate	12.3	22.9	22.1		18.9	7.1	6.8	
Occupation				***				***
Working full time	43.3	48.0	40.7		46.3	62.1	51.7	
Working part time or seasonal worker	14.8	22.2	21.9		11.6	9.4	8.9	
Home making	9.1	7.1	10.1		22.1	16.0	22.6	
Other	32.9	22.7	27.2		20.0	12.4	16.8	
Religion				***				***
Catholic	66.6	79.1	67.5		87.5	76.7	75.4	
Other	23.5	12.0	25.9		7.5	16.1	14.3	
None	9.9	9.0	6.6		5.0	7.2	10.2	
Marital status				**				**
Single	29.4	26.9	27.1		33.0	25.1	28.6	

	United States				Mexico			
	San Antonio (*n*=771)	Laredo (*n*=751)	Brownsville / McAllen (*n*=814)	*p*[a]	Monterrey (*n*=811)	Nuevo Laredo (*n*=828)	Reynosa / Matamoros (*n*=821)	*p*[a]
	%	%	%		%	%	%	
Married or living together	49.0	57.8	56.2		50.6	54.1	57.7	
Separated or divorced or widowed	21.6	15.4	16.7		16.4	20.8	13.7	
Native of survey city								
No	29.6	21.8	34.4	***	22.3	38.6	41.1	***
Yes	70.4	78.2	65.6		77.7	61.4	58.9	
In neighbor country past 12 months								
No	86.1	63.1	56.7	***	92.0	76.1	83.2	***
Yes	13.9	36.9	43.3		8.0	23.9	16.8	

Note. Weighted column percentages. Missing values: United States: education (*n*=2), marital status (*n*=1), in neighbor country (*n*=1); Mexico: education (*n*=24), marital status (*n*=5), native of survey city (*n*=1), in neighbor country (*n*=7).

[a] Indicated *p* values are derived from chi-squared tests, adjusted for the survey design (within countries).

* *p* < .05

** *p* < .01

*** *p* < .001.

Table II

Prevalence of past-year drug use and DUD symptoms, by country and city. U.S.-Mexico Study on Alcohol and Related Conditions (UMSARC), 2011-2013

Drug outcome	United States				Mexico			
	San Antonio (n=771)	Laredo (n=751)	Brownsville / McAllen (n=814)		Monterrey (n=811)	Nuevo Laredo (n=828)	Reynosa / Matamoros (n=821)	
	%	%	%	p[e]	%	%	%	p[e]
Any illicit drug use[a]	12.1	13.8	10.4		1.5	4.3	2.4	a
Any prescription drug use[b]	9.3	25.4	9.4	***	1.5	3.4	3.2	
Any drug use	17.9	32.8	15.6	***	3.0	7.4	5.7	a
Polydrug use[c]	6.0	18.6	7.7	***	0.8	1.1	1.4	
DUD symptoms[d]	4.6	8.0	3.7	***	0.3	2.0	0.9	a
Any illicit drug use[a] - individual drugs								
Marijuana	10.8	12.5	9.2		1.3	3.2	2.4	*
Cocaine or crack	2.4	6.7	5.6	*	0.4	0.9	0.9	
Heroin or opium	0.8	0.9	0.0	a	0.0	0.1	0.0	
Methamphetamines	0.7	2.0	0.3	***	0.0	0.6	0.3	
Other (including hallucinogens)	0.5	0.2	0.1		0.0	0.0	0.0	

Note. DUD = Drug Use Disorder. Weighted percentages. Number of missing values ranging from $n=2$ (prescription drugs) to $n=43$ (DUD symptoms)

[a] Illicit drugs are 1) marijuana, 2) cocaine/crack, 3) heroin/opium, 4) methamphetamines, 5) hallucinogens and 6) other recreational drugs.

[b] Use of prescription drugs that were not prescribed for the respondent or that was not taken as prescribed. Prescription drugs are 1) pain relievers, 2) sedatives, 3) stimulants and 4) other prescription drugs.

[c] Polydrug use is defined as using two or more of any of the drugs listed as illicit or prescription.

[d] DUD symptoms assessed were hazardous use and quit/control.

[e] Indicated *p* values are derived from chi-squared tests, adjusted for the survey design (two *df*; i.e., within countries).

*
p < .05.

**
p < .01.

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***
$p < .001$.

Table III

Adjusted pairwise contrasts of past-year drug use and DUD symptoms by city, within countries. U.S.-Mexico Study on Alcohol and Related Conditions (UMSARC), 2011-2013

	United States									Mexico								
	Laredo vs. San Antonio (ref)			Brownsville/McAllen vs. San Antonio (ref)			Laredo vs. Brownsville / McAllen (ref)			Nuevo Laredo vs Monterrey (ref)			Reynosa / Matamoros vs Monterrey (ref)			Nuevo Laredo vs. Reynosa / Matamoros (ref)		
	aOR	95% CI[e]	p	aOR	95% CI[e]	p	aOR	95% CI[e]	p	aOR	95% CI[e]	p	aOR	95% CI[e]	p	aOR	95% CI[e]	p
Drug outcome																		
Any illicit drug use[a]	1.12	[0.80, 1.55]		0.88	[0.51, 1.52]		1.27	[0.70, 2.30]		3.75	[1.97, 7.14]	***	1.66	[0.81, 3.40]		2.26	[1.17, 4.38]	*
Any prescription drug use[b]	3.03	[2.16, 4.24]	***	0.94	[0.57, 1.56]		3.20	[2.01, 5.11]	***	3.03	[1.39, 6.60]	**	2.66	[1.10, 6.42]	*	1.14	[0.55, 2.36]	
Any drug use	2.21	[1.64, 2.97]	***	0.84	[0.55, 1.29]		2.64	[1.72, 4.04]	***	3.36	[1.98, 5.68]	***	2.15	[1.15, 4.02]	*	1.56	[0.93, 2.63]	
Polydrug use[c]	3.36	[2.42, 4.66]	***	1.33	[0.68, 2.61]		2.52	[1.23, 5.18]	*	1.88	[0.72, 4.91]		1.93	[0.65, 5.73]		0.97	[0.40, 2.39]	
DUD symptoms[d]	1.70	[1.17, 2.47]	**	0.83	[0.49, 1.41]		2.05	[1.22, 3.43]	**	6.14	[1.92, 19.67]	**	2.57	[0.65, 10.22]		2.39	[0.96, 5.92]	

Note. ref = Reference; *aOR* = Adjusted Odds Ratio; CI = Confidence Interval; DUD = Drug Use Disorder. Each row is a logistic model (for each country) with drug use or problem as dependent variable and city as independent, adjusted by sex, age (continuous), education (4 categories), employment (4 categories), religion (4 cat), marital status (3 cat), native of survey city and being in neighbor country in the past year.

[a] Illicit drugs are 1) marijuana, 2) cocaine/crack, 3) heroin/opium, 4) methamphetamines, 5) hallucinogens and 6) other recreational drugs.

[b] Use of prescription drugs that were not prescribed for the respondent or that was not taken as prescribed. Prescription drugs are 1) pain relievers, 2) sedatives, 3) stimulants and 4) other prescription drugs.

[c] Polydrug use is defined as using two or more of any of the drugs listed as illicit or prescription.

[d] DUD symptoms assessed were hazardous use and quit/control.

[e] Adjusted for the survey design.

* p < .05.

** p < .01.

*** p < .001.

Table IV

Adjusted pairwise contrasts of past-year drug use by city, between countries. U.S.-Mexico Study on Alcohol and Related Conditions (UMSARC), 2011-2013

	Pairwise contrasts between countries ("sister cities")								
	San Antonio vs Monterrey (ref)			Laredo vs Nuevo Laredo (ref)			Brownsville / McAllen vs. Reynosa / Matamoros (ref)		
Selected drug outcomes	aOR	95% CI[b]	p	aOR	95% CI[b]	p	aOR	95% CI[b]	p
Any illicit drug use[a]	10.81	[6.01, 19.45]	***	3.75	[2.53, 5.56]	***	6.25	[3.05, 12.83]	***
Marijuana	11.01	[5.93, 20.46]	***	4.42	[2.77, 7.06]	***	5.46	[2.53, 11.81]	***
Cocaine or crack	9.09	[2.76, 29.98]	***	7.97	[4.39, 14.45]	***	9.52	[3.27, 27.76]	***

Note. aOR = Adjusted Odds Ratio. Each row is a logistic model with drug use or problem as dependent variable and city as independent, adjusted by sex, age (continuous), education (4 categories), employment (4 cat), religion (3 cat), marital status (3 cat), native of survey city and being in neighbor country in the past year.

[a]Illicit drugs are 1) marijuana, 2) cocaine/crack, 3) heroin/opium, 4) methamphetamines, 5) hallucinogens and 6) other recreational drugs.

[b]Adjusted for the survey design.

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.