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Article

Neighborhood Contexts and Alcohol Use Disorder Among Mexican Americans Living in the US-Mexico Border Region

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Abstract

Aims: This study assessed contributions of exposure to neighborhood stressors (violent victimization, witnessing crime, greater alcohol and drug availability) to variation in alcohol use disorder (AUD) symptoms among drinkers in three cities in Texas, USA.
Methods: We used data from interviews conducted from 2011 to 2013 with Mexican-origin adults (ages 16–65) in the US-Mexico Study of Alcohol and Related Conditions who were past-year drinkers ($N = 1960$; 55% male) living in two cities in the Texas-Mexico border region (Laredo, $n = 751$ and Brownsville/McAllen, $n = 814$) and one interior comparison site (San Antonio, $n = 771$). Analyses (conducted in 2018 and 2019) examined overall and gender-stratified multilevel mediated effects of each border site (versus San Antonio) on AUD symptoms through the neighborhood-level factors, adjusting for individual- and neighborhood-level covariates.
Results: Overall, drinkers in Laredo reported more AUD symptoms than drinkers in the other cities, and their neighborhoods had more witnessing of crime and greater perceived drug availability, as well as higher levels of disadvantage and a lower proportion non-Hispanic White residents, than neighborhoods in San Antonio. Witnessing neighborhood crime was associated with increased AUD symptoms, while neighborhood disadvantage and proportion non-Hispanic White residents each were negatively associated with AUD symptoms. Perceived neighborhood insecurity, crime victimization, perceived neighborhood drug availability and neighborhood alcohol availability (off- and on-premise) were not significantly associated with AUD symptoms. Stratified models suggested possible gender differences in indirect effects through witnessing neighborhood crime.
Conclusion: Reducing witnessing of neighborhood crime may help reduce AUD symptoms among adults living in the US border region.

INTRODUCTION

The US-Mexico border region is home to the highest concentration of Mexican-origin individuals in the USA, but to date, there have been just a handful of large-scale epidemiological studies examining alcohol use and problems in this region. These studies have found US residents in the border region are at elevated risk for alcohol problems despite equivalent or lower levels of alcohol use (Wallisch and Spence, 2006), with some evidence suggesting risk is unequally distributed across border communities (Spence and Wallisch, 2007) and across residents in the border region (Vaeth *et al*., 2012; Caetano *et al*., 2013). The US-Mexico Study of Alcohol and Related Conditions (UMSARC) is an epidemiological study of alcohol outcomes among Mexican-origin individuals in the Texas border region that enables examination of heterogeneity across communities. Prior analyses of UMSARC data showed marginally higher rates of alcohol use disorder (AUD) among current drinkers in the USA living in the border region compared to an interior site (Cherpitel *et al*., 2015), as well as greater problems at lower levels of consumption (Greenfield *et al*., 2017). However, analyses have also shown rates of AUD are higher only in one border site, despite generally comparable demographic profiles across sites (Zemore *et al*., 2016). This confirms earlier studies finding risk is unequally distributed across communities (Spence and Wallisch, 2007). The present study examines neighborhood-level factors that might help explain the elevated risk for alcohol problems in certain US-Mexico border communities.

Mechanisms increasing risk for alcohol problems in border populations

Prior research suggests several potential mechanisms that may increase risk for alcohol problems in certain communities in the US border region, such as differential exposure to neighborhood-level stressors. In prior analyses of the UMSARC data, Zemore *et al*. (2016) examined differences in AUD prevalence across the border sites compared to the interior city, finding site effects on AUD were partially mediated by effects on respondents' self-reported stress exposures and a permissive climate. Using data from a different study of Mexican Americans living in the border region, Mills *et al*. (2013) explored mechanisms driving elevations in acute alcohol problems among young border residents versus young interior residents and found greater bar attendance by young border residents was the primary driver of their increased alcohol problems. Using those same data, Vaeth *et al*. (2015) found lower perceived neighborhood violence was associated with higher perceived collective efficacy and less binge

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drinking among some border residents. To date, however, no known studies have specifically examined whether community stressors such as perceived drug availability or alcohol availability contribute to elevations in alcohol problems among border populations compared to residents of interior sites, which is our focus.

Study aims and hypotheses

The current study aimed to extend our knowledge about why certain border communities are especially vulnerable to alcohol problems, capitalizing on key strengths of the UMSARC, including a clustered sampling design that facilitates neighborhood-level analysis. We tested a conceptual model of geographic hotspots for problems in the US-Mexico border region that emphasizes neighborhood risk factors linked to alcohol problems. We expected higher rates of AUD found in Laredo (Zemore *et al*., 2016) to be attributable to greater exposure to stressors, including more *neighborhood-level violent victimization and crime* (Vaeth *et al*., 2015), as well as greater *neighborhood alcohol and drug availability* (Freisthler *et al*., 2005; West *et al*., 2010), compared to San Antonio.

We first describe site differences in the hypothesized neighborhood-level mediators, then, we determine the extent to which the neighborhood factors contribute to symptoms of AUD in the UMSARC data. Finally, we examine whether differences in neighborhood factors explain previously observed differences in AUD across UMSARC sites. These analyses accounted for additional neighborhood factors, including *neighborhood socioeconomic disadvantage* (Karriker-Jaffe, 2011) and *proportion of non-Hispanic White residents* to represent ethnic enclave status (Bécares *et al*., 2012; Stroope *et al*., 2015), which we expected would be associated with AUD as well as with the hypothesized mediators, but which we did not expect to vary significantly across the study's border sites given the similar demographics of the two sampled locations. We analyzed the data separately for men and women, because other border studies have shown evidence of gender differences (Vaeth *et al*., 2012; Caetano *et al*., 2013; Reininger *et al*., 2015; Zemore *et al*., 2016).

METHODS

Dataset

We used US data from the US-Mexico Study of Alcohol and Related Conditions, or UMSARC ($N = 2336$). The study design involved in-person interviews conducted in 2011–2013 with Mexican-origin adults (ages 16–65) in two pairs of metropolitan areas ('sister cities') across the Texas-Mexico border and one adjacent non-border metropolitan area on each side of the border. In the USA, sampling was carried out in two cities on the Texas-Mexico border (Laredo, $n = 751$ and Brownsville/McAllen, $n = 814$), and in one interior comparison site (San Antonio, $n = 771$). Following an informed consent process, computer-assisted personal interviews were conducted in either English or Spanish, depending on the respondent's preference. Participants were offered a $25 gift card as a token of appreciation for their time spent completing the interview (average length was ~45 min). Fieldwork protocols and informed consent procedures for UMSARC were reviewed and approved by the Institutional Review Board of the Public Health Institute, Oakland, CA. Additional details about the study design and interview protocols are provided elsewhere (Cherpitel *et al*., 2015). Across interview sites, there was a combined cooperation rate of 84% (responses from households with a confirmed-eligible respondent), and a response rate of 53.1% (responses from households estimated to contain at least one eligible resident) (The American Association for Public Opinion Research, 2011). Because of differences in neighborhood effects on abstinence compared to effects on drinking patterns and alcohol problems among drinkers (Karriker-Jaffe *et al*., 2012), analyses are limited to past-year drinkers ($N = 1690$; 55% male).

Measures

Neighborhood variables

Interview data were linked with neighborhood-level data at the tract and block group level from three sources. First, we developed ecometric measures (Raudenbush and Sampson, 1999; Mujahid *et al*., 2007) to describe respondents' neighborhoods in terms of perceptions of general insecurity, crime victimization, witnessing crime and perceived drug availability. Second, data on alcohol availability from the state Alcohol Beverage Control Agency were added. Finally, we added neighborhood sociodemographic factors from the US Census Bureau's American Community Surveys. Methodological details are provided below.

Ecometric measures of perceived neighborhood insecurity, drug availability and crime

Four neighborhood-level ecometric measures were constructed using survey data from all respondents in a given census tract, including non-drinkers. Specifically, four non-linear, three-level, random-intercept models (Raudenbush and Sampson, 1999) controlling for individual characteristics (Mujahid *et al*., 2007) were fitted, using the dichotomous items as repeated measures of each domain. Thus, the items for a domain (level 1) clustered within individuals (level 2), who were clustered within neighborhoods (level 3). Each model accounted for respondents' age, gender, education, employment, income, religion and whether they had crossed the border for drugs or nightlife in the past year (level 2 covariates). The resulting random neighborhood effects (level 3) were used as the ecometric measures of each neighborhood's context.

Neighborhood insecurity was assessed using two items about how safe the respondents felt walking alone in their neighborhoods during the daytime and after dark (Ruston and Akinrodoye, 2002). *Crime victimization* was measured by five items asking whether the respondents had experienced theft, mugging or physical attack (Walker *et al*., 2000/2001). *Witnessing crime* was measured by seven items assessing whether the respondents had heard gun shots; seen someone being arrested, beaten up, stabbed or shot; seen someone pull a gun on another person; and seen violence related to drug dealing or gang activity (Hunter *et al*., 2002). *Perceived drug availability* was assessed with two questions asking whether the respondents had been approached by someone wishing to sell drugs in the past 30 days and whether they had seen drug deals in the past 12 months. The items on general insecurity were dichotomized (secure versus insecure

Table 1. US-Mexico Study of Alcohol and Related Conditions, demographics of past-year drinkers

	Current drinkers ($N = 1690$)	Male drinkers ($N = 937$)	Female drinkers ($N = 753$)
Alcohol Use Disorder Symptoms			
Overall mean (SD)	1.025 (0.05)	1.377 (0.08)	0.601 (0.06)***
San Antonio	0.881 (0.08)	1.141 (0.12)	0.572 (0.09)***
Laredo	1.379 (0.11)	1.964 (0.17)	0.682 (0.11)***
Brownsville/McAllen	0.806 (0.08)	1.018 (0.12)	0.545 (0.11)**
Neighborhood Variables			
General insecurity, Mean (SD)	−0.078 (0.03)	−0.098 (0.04)	−0.055 (0.05)
Crime victimization, Mean (SD)	−0.012 (0.01)	−0.009 (0.01)	−0.017 (0.01)
Witnessing crime, Mean (SD)	0.005 (0.03)	0.017 (0.04)	−0.009 (0.05)
Drug availability, Mean (SD)	0.004 (0.02)	−0.005 (0.03)	0.016 (0.03)
Off-premise alcohol outlet Density, Mean (SD)	32.552 (0.66)	33.660 (0.92)	31.214 (0.94)†
On-premise alcohol outlet density, Mean (SD)	16.647 (0.41)	17.081 (0.57)	16.124 (0.58)
Disadvantaged residents, Mean% (SD)	26.320 (0.20)	26.205 (0.27)	26.460 (0.32)
White/non-Hispanic, Mean% (SD)	6.034 (0.18)	6.022 (0.22)	6.047 (0.31)
Residential instability, Mean% (SD)	34.143 (0.28)	34.105 (0.37)	34.189 (0.42)
Individual-level Variables			
Age, Mean (SD)	37.224 (0.37)	37.466 (0.51)	36.934 (0.54)
Employment			***
Full-time, %	49.3	54.3	43.3
Part-time or self-employed, %	20.9	20.9	20.9
Other, %	29.8	24.8	35.9
Income			*
Less than $15 K, %	28.1	24.2	33.0
Between $15 K and 30 K, %	25.7	26.3	25.0
Between $30 K and 60 K, %	28.9	30.9	26.5
Over $60 K, %	17.3	18.7	15.5
Protestant, %	16.1	16.8	15.4
Foreign-born, %	30.2	30.3	30.2
Crossing border for drugs/nightlife, %	14.6	14.0	15.3

*$P < 0.05$. **$P < 0.01$. ***$P < 0.001$. †$P < 0.10$ for gender difference.

neighborhood) from the original four-point Likert scale, so that all items used in the ecometric modeling were binary and higher scores indicated greater neighborhood risk factors. The tract-averaged reliability values of the four ecometric measures were calculated as the ratio of tract-level variance to total variance, averaged over each respondent in the neighborhood, as implied by the estimated three-level model for each domain (Raudenbush and Sampson, 1999). Ecometric reliability values were 0.64 for general insecurity, 0.33 for crime victimization, 0.76 for witnessing crime and 0.62 for perceived drug availability. The low reliability for crime victimization was due in part to the low frequency of each of the types of crime included in the dichotomous indicators, which limited variance within and across individuals and neighborhoods. Scale means and standard deviations are in Table 1.

Neighborhood alcohol availability

Data on 6301 businesses with active alcohol licenses (including 11 different license types that can be classified as off- or on-premises retail locations) located in the three sampled counties were obtained from Texas Alcohol Beverage Control. Retail addresses were geocoded using ArcGIS software v.10.4.1 (ESRI, Redlands, CA). We used the block group centroid to calculate objective measures of alcohol availability for each neighborhood. The number of outlets within 1.5 roadway miles of each centroid were calculated separately for *on-premise outlets* (bars and restaurants; $M = 19.4$, $SD = 15.4$) and *off-premise outlets* (liquor stores, convenience stores and grocery stores; $M = 36.9$, $SD = 24.7$). This distance represents approximately a 15-min walk.

Neighborhood sociodemographics

Respondent interviews also were linked with data from the 2009–2014 American Community Surveys (United States Census Bureau, 2014). We used census tract data for the neighborhood demographics. *Neighborhood disadvantage* was a composite based on the average percentage of female-headed families, percentage of residents with incomes below the federal poverty level, percentage of adults over age 25 without a high school diploma, male unemployment rate (for men ages 16 and older), percentage holding blue collar jobs (including work in fields such as healthcare support, food preparation and serving, building/grounds cleaning and maintenance, personal care, construction and extraction, and transportation and material moving), and percentage of residents without access to a car. Reliability was high (Cronbach's alpha = 0.77; $M = 27.0$, $SD = 6.6$). *Proportion non-Hispanic white* was based on the corresponding percentage of tract residents ($M = 6.1$, $SD = 6.0$), which ranged from <1.0 to 44.0%. *Residential instability* was based on the percentage of tract residents who had moved in the past 5 years ($M = 34.5$, $SD = 10.1$).

Outcome variable

AUD symptoms were the outcome. Respondents were asked about symptoms of AUD using an adapted version of the alcohol section of the Composite International Diagnostic Interview (CIDI) (World Health Organization, 1993). In this measure, 18 items assessed AUD criteria included in the Diagnostic and Statistical Manual, 5th edition (DSM-5) (American Psychiatric Association, 2013). We used a count variable of

AUD symptom criteria endorsed, with scores ranging from 0 to 11.

Individual-level control variables

Models accounted for each respondent's *gender* (female versus male), *age* (continuous), *employment status* (part-time/self-employed, or unemployed/other versus employed full-time), *income* ($15,000–30,000; $30,001–60,000; or greater than $60,000 versus less than $15,000), *religion* (Protestant versus all others, as Protestants typically endorse more restrictive norms against drinking than other religious groups; Michalak *et al*., 2007), *nativity status* (foreign-born versus US-born), and *crossing the border for drugs or drinking/nightlife* (yes versus no). To create the latter, respondents were asked whether they had crossed the US-Mexico border in the past 12 months and, if so, they reported the main reason for crossing (for visiting family or friends, shopping, health or medical care, obtaining over-the-counter or prescription drugs, nightlife/drinking, work/study/other). Crossing the border to obtain drugs and/or for nightlife is associated with higher rates of alcohol and drug use (Cherpitel, 2016). Demographic characteristics are presented overall and separately by gender in Table 1.

Analyses

Descriptive statistics included bivariate tests of gender differences in the outcome, neighborhood variables and individual-level control variables. Then, the total effect of each border site (Laredo or Brownsville/McAllen versus San Antonio) on AUD symptoms was assessed using a multilevel regression model that accounted only for individual-level variables.

To test the primary study hypotheses, mediated effects of each border site (Laredo or Brownsville/McAllen versus San Antonio) on the outcome through the neighborhood-level factors were assessed using a 2-2-1 multilevel mediation model (Krull and MacKinnon, 2001), adjusting for all covariates at the individual and neighborhood levels. The 2-2-1 structure indicates that the key exposure variable (site) was measured at the environmental level, as were the hypothesized neighborhood mediators, but the outcome was measured at the individual level. This model was estimated as a generalized structural equation model with fixed effects for each site. Then, based on the maximum likelihood estimation with robust standard errors, the product of coefficients approach was used to calculate the standard errors, using the delta method to evaluate the indirect effects. Model interpretability and goodness of fit tests (Akaike Information Criterion and Bayesian Information Criterion) were also used to guide final model selection. All analyses were weighted to reflect the multistage clustered sampling design, using Stata version 15 (StataCorp., 2017).

RESULTS

Descriptive statistics

As shown in Table 1, residents of the border site of Laredo reported more current AUD symptoms than residents of the other two locations. Overall and in each site, male drinkers consistently reported significantly more current AUD symptoms than female drinkers. There also were significant gender differences in markers of socioeconomic status, as men were more likely than women to report being employed full-time, and women were more likely than men to be unemployed. Similarly, men also reported higher incomes than women.

Associations of border sites with AUD symptoms

Initial multilevel models showed that, compared to residence in the interior site, residence in the border site of Laredo was associated with significantly more reported AUD symptoms in the past year, but residence in Brownsville/McAllen was not. In the full sample of drinkers, the unstandardized coefficients (standard errors in parentheses) were 0.413 (0.125), $p = 0.001$ for Laredo and − 0.094 (0.120), $P = 0.44$ for Brownsville/McAllen versus San Antonio. For male drinkers, the coefficients were 0.706 (0.210), $P = 0.001$ for Laredo and −0.193 (0.171), $P = 0.44$ for Brownsville/McAllen versus San Antonio. For female drinkers, the coefficients were 0.106 (0.124), $P = 0.39$ for Laredo and 0.045 (0.146), $P = 0.76$ for Brownsville/McAllen versus San Antonio. These direct-effect models accounted for individual-level demographic variables (full models not shown). Coefficients for the individual-level characteristics in relation to AUD symptoms can be seen in the multilevel mediation models (Table 3).

Multilevel mediation models

Table 2 shows site effects on the hypothesized neighborhood mediators. Compared to San Antonio, neighborhoods in Laredo had more witnessing of crime and greater perceived drug availability, as well as higher levels of disadvantage and a lower proportion non-Hispanic White residents. Neighborhoods in Brownsville/McAllen had less perceived neighborhood insecurity, less crime victimization, less witnessing of crime and lower perceived drug availability, and also a lower proportion non-Hispanic White residents, compared to San Antonio.

These site effects were estimated simultaneously with associations of the neighborhood variables and individual-level covariates with AUD symptoms (Table 3). In the full sample of past-year drinkers, witnessing neighborhood crime was positively associated with AUD symptoms. Among the neighborhood control variables, the proportions disadvantaged residents and non-Hispanic White residents each were negatively associated with AUD symptoms. At the individual level, crossing the border for drugs or nightlife was positively associated with AUD symptoms, while female gender, older age, higher income, Protestant religious affiliation and being foreign-born (versus US-born) each were negatively associated with AUD symptoms.

Indirect effects (Table 4) suggested the association between residence in Laredo with AUD symptoms was partially mediated by two control variables (neighborhood disadvantage and proportion non-Hispanic White residents), while the association between residence in Brownsville/McAllen with AUD symptoms was partially mediated by neighborhood crime witnessing. Some of these effects were counter to our hypotheses, however. As shown in Figure 1, Laredo had higher rates of neighborhood disadvantage and lower proportions of White/non-Hispanic residents than San Antonio. Neighborhood disadvantage and proportion White residents each were significantly negatively associated with alcohol AUD symptoms. Thus, there was a significant indirect effect of living in Laredo on increased AUD symptoms through reduced proportion White/non-Hispanic residents ($ab = 0.205$; $P = 0.01$) that was offset somewhat by the counter-intuitive indirect effect on *reduced* AUD

Table 2. Border site differences[a] in the neighborhood variables, from multilevel mediation models

	Current drinkers ($N = 1690$)		Male drinkers ($N = 937$)		Female drinkers ($N = 753$)	
	B (SE)	*P*-value	B (SE)	*P*-value	B (SE)	*P*-value
General Neighborhood Insecurity						
Laredo	−0.110 (0.20)	0.589	−0.210 (0.21)	0.323	0.010 (0.21)	0.961
Brownsville/McAllen	**−0.992 (0.21)**	**0.000**	**−1.063** (0.20)	**0.000**	**−0.907** (0.23)	**0.000**
Neighborhood Crime Victimization						
Laredo	−0.001 (0.04)	0.990	0.004 (0.05)	0.930	−0.006 (0.04)	0.888
Brownsville/McAllen	**−0.134 (0.04)**	**0.000**	**−0.146** (0.04)	**0.001**	**−0.120** (0.03)	**0.001**
Witnessing Neighborhood Crime						
Laredo	**0.346 (0.16)**	**0.032**	**0.362** (0.16)	**0.022**	*0.327* (0.18)	*0.073*
Brownsville/McAllen	**−1.029 (0.17)**	**0.000**	**−1.011** (0.17)	**0.000**	**−1.052** (0.19)	**0.000**
Neighborhood Drug Availability						
Laredo	**0.299 (0.15)**	**0.039**	*0.264* (0.15)	*0.078*	**0.341** (0.15)	**0.028**
Brownsville/McAllen	**−0.415 (0.12)**	**0.000**	**−0.431** (0.12)	**0.000**	**−0.396** (0.13)	**0.002**
Off-premise Alcohol Outlet Density						
Laredo	1.514 (4.46)	0.734	1.733 (4.58)	0.705	1.253 (4.80)	0.794
Brownsville/McAllen	−5.955 (4.78)	0.213	−7.203 (5.30)	0.174	−4.479 (4.54)	0.324
On-premise Alcohol Outlet Density						
Laredo	−1.710 (2.78)	0.538	−1.865 (2.94)	0.526	−1.525 (2.96)	0.606
Brownsville/McAllen	−0.240 (2.75)	0.930	−0.916 (3.03)	0.762	0.562 (2.83)	0.843
Disadvantaged Residents						
Laredo	**3.307 (1.26)**	**0.009**	**2.880 (1.25)**	**0.022**	**3.815** (1.41)	**0.007**
Brownsville/McAllen	−1.029 (1.41)	0.465	−1.971 (1.42)	0.165	0.121 (1.53)	0.937
Residential Instability						
Laredo	1.727 (2.02)	0.393	2.577 (2.06)	0.212	0.716 (2.19)	0.744
Brownsville/McAllen	2.555 (1.90)	0.179	**4.801 (1.87)**	**0.010**	−0.176 (2.09)	0.933
% White/non-Hispanic						
Laredo	**−7.350 (1.10)**	**0.000**	**−6.771** (1.03)	**0.000**	**−8.040** (1.26)	**0.000**
Brownsville/McAllen	**−2.688 (1.35)**	**0.047**	−1.658 (1.33)	0.214	**−3.936 (1.48)**	**0.008**

[a]Compared to San Antonio. Notes. Coefficients in Table 2 were estimated simultaneously with the coefficients in Table 3. Bold font indicates *P*-value < 0.05; italics indicate *P*-value <0.10.

Table 3. Neighborhood and individual variables as predictors of AUD symptoms in multilevel mediation models

	Current drinkers ($N = 1690$)		Male drinkers ($N = 937$)		Female drinkers ($N = 753$)	
	B (SE)	*P*-value	B (SE)	*P*-value	B (SE)	*P*-value
Neighborhood Variables						
General neighborhood insecurity	0.074 (0.07)	0.319	0.054 (0.11)	0.626	*0.116* (0.06)	*0.065*
Neighborhood crime victimization	*−0.478 (0.25)*	*0.059*	*−0.749* (0.40)	*0.063*	−0.355 (0.28)	0.198
Witnessing neighborhood crime	**0.155 (0.07)**	**0.033**	**0.255** (0.13)	**0.041**	0.050 (0.07)	0.484
Neighborhood drug availability	0.104 (0.10)	0.298	*0.282 (0.16)*	*0.076*	−0.112 (0.11)	0.295
Off-premise alcohol outlet density	0.002 (0.00)	0.706	0.001 (0.01)	0.889	0.002 (0.01)	0.794
On-premise alcohol outlet density	−0.003 (0.01)	0.583	−0.008 (0.01)	0.371	0.004 (0.01)	0.674
Disadvantaged residents	**−0.028 (0.01)**	**0.031**	−0.020 (0.02)	0.355	**−0.035** (0.01)	**0.000**
Residential instability	0.005 (0.01)	0.308	0.010 (0.01)	0.187	0.002 (0.00)	0.707
% White/non-Hispanic	**−0.028 (0.01)**	**0.009**	*−0.034* (0.02)	*0.053*	**−0.027** (0.01)	**0.009**
Individual-level Variables						
Female gender	**−0.810 (0.10)**	**0.000**				
Age	**−0.585 (0.13)**	**0.000**	**−0.602** (0.19)	**0.001**	**−0.537** (0.14)	**0.000**
Employment (Part-time/self-employed)[a]	−0.109 (0.16)	0.489	−0.192 (0.24)	0.418	−0.043 (0.17)	0.801
Employment (Unemployed/Other)[a]	−0.043 (0.13)	0.737	0.165 (0.21)	0.433	−0.177 (0.13)	0.183
Income (between $15 K and 30 K)[b]	−0.084 (0.14)	0.545	−0.003 (0.22)	0.989	−0.059 (0.18)	0.743
Income (between $30 K and 60 K)[b]	**−0.319 (0.12)**	**0.009**	−0.227 (0.21)	0.289	**−0.322** (0.15)	**0.030**
Income (over $60 K)[b]	**−0.396 (0.16)**	**0.013**	−0.117 (0.28)	0.673	**−0.713** (0.14)	**0.000**
Protestant	**−0.331 (0.13)**	**0.013**	*−0.342* (0.20)	*0.085*	−0.190 (0.14)	0.164
Foreign-born	**−0.333 (0.13)**	**0.013**	**−0.454** (0.20)	**0.020**	−0.154 (0.12)	0.214
Crossing border for drugs/nightlife	**0.421 (0.16)**	**0.008**	**0.866** (0.28)	**0.002**	−0.072 (0.19)	0.710
Constant	2.840 (0.43)	0.000	2.440 (0.65)	0.000	2.278 (0.38)	0.000

Notes. Coefficients in Table 3 were estimated simultaneously with the coefficients in Table 2. Bold font indicates *P*-value < 0.05; *italics* indicate *P*-value < 0.10. [a]Full-time employment as referent. [b]Income below $15,000/year as referent.

Table 4. Indirect effects of border site residence on alcohol use disorder symptoms via neighborhood risk factors

	Current drinkers ($N = 1690$)		Male drinkers ($N = 937$)		Female drinkers ($N = 753$)	
	B (SE)	*P*-value	B (SE)	*P*-value	B (SE)	*P*-value
Laredo (versus San Antonio)						
General neighborhood insecurity	−0.008 (0.02)	0.606	−0.011 (0.02)	0.632	0.001 (0.02)	0.961
Neighborhood crime victimization	0.000 (0.02)	0.990	−0.003 (0.03)	0.930	0.002 (0.02)	0.890
Witnessing neighborhood crime	0.054 (0.04)	0.146	0.092 (0.06)	0.140	0.016 (0.03)	0.511
Neighborhood drug availability	0.031 (0.04)	0.396	0.074 (0.07)	0.276	−0.038 (0.04)	0.356
Off-premise alcohol outlet density	0.003 (0.01)	0.817	0.001 (0.01)	0.901	0.002 (0.01)	0.858
On-premise alcohol outlet density	0.006 (0.01)	0.679	0.015 (0.03)	0.595	−0.006 (0.02)	0.745
Disadvantaged residents	*−0.094 (0.05)*	*0.054*	−0.057 (0.06)	0.354	**−0.135 (0.06)**	**0.018**
Residential instability	0.009 (0.01)	0.481	0.026 (0.03)	0.329	0.001 (0.01)	0.805
% White/non-Hispanic	**0.205 (0.08)**	**0.012**	*0.229 (0.13)*	*0.068*	**0.216 (0.08)**	**0.008**
	B (SE)	*P*-value	B (SE)	*P*-value	B (SE)	*P*-value
Brownsville/McAllen (versus San Antonio)						
General neighborhood insecurity	−0.074 (0.07)	0.325	−0.057 (0.12)	0.627	*−0.105 (0.06)*	*0.086*
Neighborhood crime victimization	*0.064 (0.04)*	*0.087*	0.110 (0.07)	0.108	0.043 (0.03)	0.206
Witnessing neighborhood crime	**−0.160 (0.08)**	**0.040**	*−0.258 (0.13)*	*0.050*	−0.053 (0.08)	0.484
Neighborhood drug availability	−0.043 (0.04)	0.307	*−0.122 (0.07)*	*0.090*	0.044 (0.05)	0.328
Off-premise alcohol outlet density	−0.010 (0.03)	0.714	−0.006 (0.04)	0.888	−0.007 (0.03)	0.794
On-premise alcohol outlet density	0.001 (0.01)	0.932	0.007 (0.03)	0.774	0.002 (0.01)	0.862
Disadvantaged residents	0.029 (0.04)	0.467	0.039 (0.05)	0.428	−0.004 (0.05)	0.937
Residential instability	0.013 (0.02)	0.410	0.048 (0.04)	0.254	−0.000 (0.00)	0.935
% White/non-Hispanic	0.075 (0.05)	0.117	0.056 (0.06)	0.332	**0.106 (0.05)**	**0.040**

Notes. Bold font indicates *P*-value < 0.05; italics indicate *P*-value < 0.10.

symptoms through increased neighborhood disadvantage (ab = −0.094; $P = 0.05$). Brownsville/McAllen had lower rates of witnessing crime than San Antonio, and witnessing crime was significantly positively associated with AUD symptoms. Thus, there was a marginally significant indirect effect of living in Brownsville/McAllen on reduced AUD symptoms through reduced witnessing of crime (ab = 0.064; $P < 0.10$).

Gender-stratified models

For *male drinkers* (Table 2), site differences in the neighborhood variables were similar to those in the full sample. As shown in Table 3, for male drinkers, witnessing neighborhood crime was positively associated with AUD symptoms. The proportion of non-Hispanic White residents was negatively associated with AUD symptoms. As in the full sample, crossing the border for drugs or nightlife was positively associated with AUD symptoms, and older age and being foreign-born each were negatively associated with AUD symptoms. Indirect effects (Table 4) suggested the association between residence in Brownsville/McAllen with fewer AUD symptoms for male drinkers was partially mediated by reduced witnessing crime (ab = −0.258; $P = 0.05$) compared to San Antonio.

For *female drinkers*, site differences in the neighborhood variables also were similar to those in the full sample (Table 2). As shown in Table 3, for female drinkers, neighborhood disadvantage and the proportion of non-Hispanic White residents each were negatively associated with AUD symptoms. Older age and having a higher income also were negatively associated with AUD symptoms. Indirect effects (Table 4) suggested there was a significant indirect effect of living in Laredo on increased AUD symptoms for female drinkers through reduced proportion White/non-Hispanic residents (ab = 0.216; $P < 0.01$) that was offset somewhat by the counter-intuitive indirect effect on reduced AUD symptoms through increased neighborhood disadvantage (ab = −0.135; $P < 0.05$) compared to San Antonio. There also was a significant indirect effect in of living in Brownsville/McAllen on increased AUD symptoms through the reduced proportion White/non-Hispanic residents (ab = 0.106; $P < 0.05$) compared to San Antonio.

DISCUSSION

Study results showed neighborhoods in one border community had more witnessing of crime and greater perceived drug availability, as well as higher levels of disadvantage and lower proportions of non-Hispanic White residents, than neighborhoods in the interior comparison city. This pattern contrasts with the finding that neighborhoods in the other border community (which also had lower proportions of non-Hispanic White residents) had less perceived neighborhood insecurity, less crime victimization, less witnessing of crime and lower perceived drug availability than the interior comparison city.

Of the proposed mediators of the observed site differences in AUD symptoms, only witnessing neighborhood crime was positively associated with increased AUD symptoms reported by past-year drinkers; two neighborhood control variables—disadvantage and proportion non-Hispanic White residents—each were negatively associated with AUD symptoms. The positive association of witnessing crime and increased AUD symptoms in our study is consistent with the study by Vaeth *et al*. (2015) showing an association between perceptions of neighborhood violence with increased binge drinking for both women and men over age 30. Although AUD symptoms did not differ significantly for respondents of Brownsville/McAllen compared to San Antonio, there was a significant indirect effect suggesting partial mediation through witnessing neighborhood crime for male drinkers, consistent with our

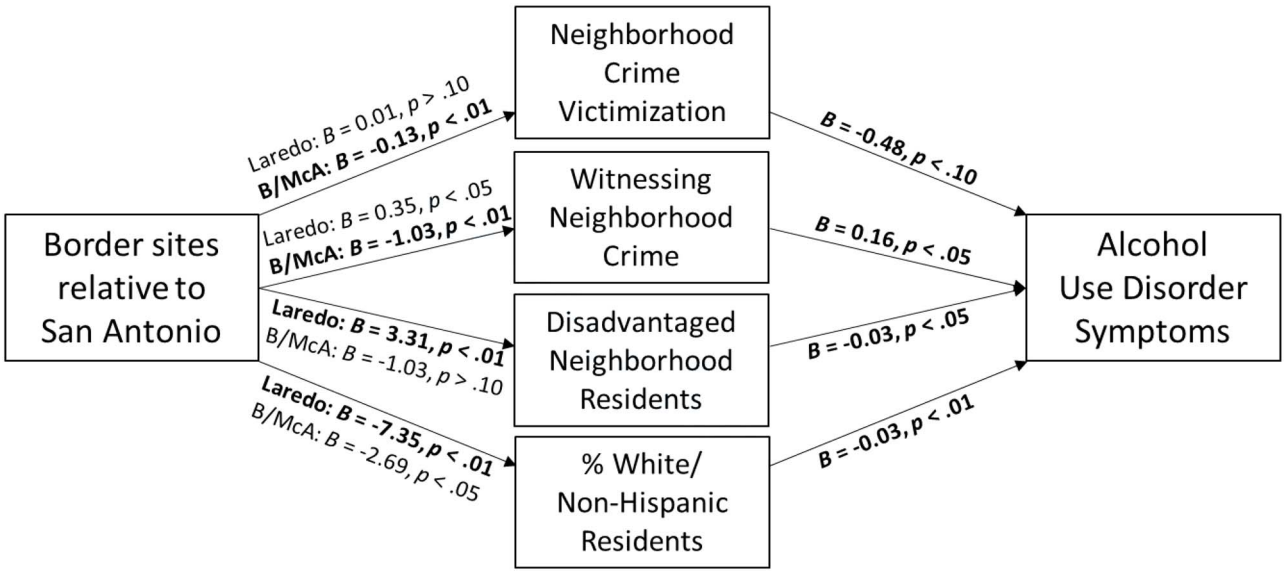

Fig. 1. Mediation results. Notes. Significant indirect effects of border site residence on AUD symptoms (range: 0–11 domains) are in bold font. B/McA = Brownsville/McAllen.

hypotheses. Further research would be helpful for understanding possible location and gender differences in the relationship between witnessing crime and development of AUD.

We expected observed variation across sites in symptoms of AUD to be attributable to greater exposure to stressors in Laredo. Instead, mediation analyses showed the association between residence in Laredo with increased AUD symptoms (compared to San Antonio) was due to differences in neighborhood disadvantage and proportion non-Hispanic White residents, with no indirect effects of residence in Laredo through neighborhood stressors including general neighborhood insecurity, neighborhood crime victimization, witnessing neighborhood crime, perceived neighborhood drug availability and alcohol availability, which were the hypothesized mediators. In the stratified sample, higher levels of neighborhood disadvantage were associated with reduced AUD symptoms for women but not men. Future studies to examine mechanisms through which neighborhood disadvantage may impact AUD symptoms among Mexican American and other Hispanic/Latina women could be informative. Of note, associations with neighborhood disadvantage observed here were adjusted for other neighborhood characteristics, including the proportion non-Hispanic White residents, which was protective for male drinkers in Laredo and for female drinkers in Brownsville/McAllen. This pattern of results is somewhat counter to the extant literature on protective enclave effects among Hispanics/Latinos (Bécares *et al*., 2012; Stroope *et al*., 2015). In the US-Mexico border region, it is possible that living in areas with a higher density of Hispanics could be associated with stigma associated with lower social status (Cook *et al*., 2009; Nicklett and Burgard, 2009) or with other stressors unique to the border context, including factors unmeasured in our study.

There was a marked lack of effects of neighborhood insecurity and alcohol availability on AUD symptoms among this sample of Mexican American adults living in the US-Mexico border region. In ecological models, Snowden *et al*. (2017) found neighborhood alcohol outlet density (both on- and off-premise density per square mile, measured at the block group level) was associated with violent victimization of both men and women. In our models, effects of neighborhood alcohol availability were assessed simultaneously with effects of both witnessing violence and violent victimization on AUD symptoms. It is possible that there is a more complicated relationship between these different neighborhood risk factors that we were unable to account for in our analyses. A study by West *et al*. (2010) found that distance to the nearest retail alcohol outlet was significantly related to alcohol and tobacco use by Hispanic/Latino youth. We explored using distance measures of alcohol availability (such as distance to nearest bar in roadway miles) instead of, and in addition to, the density measures presented here, but these variables also were not significantly associated with AUD symptoms in our sample of Mexican American adult drinkers. Environmental influences on risk behaviors and AUD may differ by age and developmental period, and this deserves further study.

Study strengths and limitations

We used data from a large, diverse sample of Mexican Americans collected both on and off the US-Mexico border. This allowed us to test our hypotheses and to compare AUD symptoms of past-year drinkers by gender. However, the UMSARC sampled only two border sites in Texas, which limits generalizability. It is possible that some of our ecometric measures of neighborhood context may not have sufficiently captured the intended domains due to the limited number of items available for some of the constructs. Despite low reliability (particularly for the crime victimization variable, which was based on relatively rare events captured by dichotomous indicators), the ecometric measures did show variability across the study sites that was consistent with our hypotheses, supporting their validity as indicators of the neighborhood environment. Future research should seek to replicate our findings using additional data from neighboring cities in Mexico and including other variables that might mediate neighborhood differences in heavy drinking and AUD, such as community norms about drinking.

CONCLUSION

We found heterogeneity across border sites in AUD symptoms, and indirect effects suggest that reducing witnessing of neighborhood crime may help reduce AUD symptoms. Our results also highlight important gender differences. For men, reducing crime witnessing in the neighborhood, and for women, increasing general neighborhood security may be important goals for future interventions to reduce AUD, particularly among adults living in the US border region.

DATA AVAILABILITY

There are no new data associated with this article. Data from the US-Mexico Study of Alcohol and Related Conditions (UMSARC) may be available upon reasonable request to the study's Principal Investigator, Dr Cheryl Cherpitel.

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CONFLICT OF INTEREST

The authors report no conflicts of interest with regard to the research.

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