Drug and Alcohol Dependence 200 (2019) 1–5

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Short communication

The relationship between social inequalities, substance use and violence in border and non-border cities of northern Mexico

Guilherme Borges[a,*], E. Anne Lown[b], Ricardo Orozco[a], Cheryl J. Cherpitel[c]

[a] Instituto Nacional de Psiquiatría, Calzada México Xochimilco No 101, Col. San Lorenzo Huipulco, 14370, CDMX, Mexico
[b] Department of Social and Behavioral Sciences, University of California, San Francisco, CA, USA
[c] Alcohol Research Group, Public Health Institute Emeryville, California, USA

ARTICLE INFO

Keywords:
Alcohol use disorders
Drug use
Violence
Epidemiology
Mexico
Border

ABSTRACT

We know little about determinants of violence and drug use in Mexican northern cities, places considered to be at high risk for alcohol, drug use, and violence, including crimes and homicides.

Methods: Data are from the US-Mexico Study on Alcohol and Related Conditions (2011–2013), a survey of respondents living in the border metropolitan areas of Nuevo Laredo (n = 828) and Reynosa and Matamoros (n = 821) and in the non-border metropolitan area of Monterrey (n = 811). Associations between violence (interpersonal, direct community [such as physical attack] and indirect community violence [such as heard gunshots]), drug related activities and neighborhood insecurity with alcohol use disorders (AUD), drug misuse (illicit and out of prescription) and area-level disadvantage (ALD) were estimated with multilevel logistic models, controlling for covariates.

Results: Substance use was generally related to violence regardless of ALD in these northern cities in Mexico (statistically significant odds ratios range: 0.68–4.24). AUD was associated with 3 forms of violence and also with drug-related activities, but not with neighborhood insecurity. Both illicit drug use and misuse prescription medicines seem to act in unison and were related only to indirect community violence and drug related activities. ALD in these cities was associated with physical violence and neighborhood insecurity. An inverse relationship between illicit drug use and neighborhood insecurity was an unexpected finding.

Conclusions: AUD and drug use were associated with violence and drug involvement regardless of ALD. Neighborhood insecurity depended mainly on ALD and to an inverse relationship with illicit drug use that needs further study.

1. Introduction

The Mexican border cities with the United States have been considered places of high risk for alcohol, drug use (Rojas et al., 2009) and violence, including crimes and homicides (Calderón et al., 2018; Kilburn et al., 2013). Results from the U.S.-Mexico Study on Alcohol and Related Conditions (UMSARC) (Cherpitel et al., 2015) have shown high rates of comorbid alcohol and drug use in Mexican border cities of Nuevo Laredo and Reynosa/Matamoros and in the non-border city of Monterrey (Borges et al., 2015). High rates of both illicit and misuse prescription drug use (Borges et al., 2018) and a strong association of interpersonal violence with hazardous drinking (Lown et al., 2017) have been reported. A key factor in understanding the high prevalence of alcohol use disorders among men in these cities was an index of urban marginalization that encompasses ten indicators of social disadvantage (Orozco et al., 2017).

The association of substance use with violence is complex and probably reciprocal. On the one hand, violence may cause further substance use and substance use disorders (Lown et al., 2017) or, on the other hand, substance use and disorders of use can lead to acts of violence (Fagan, 1993; Pridemore, 2016). A key factor associated with both violence and substance use is the presence of social inequalities (Karriker-Jaffe, 2011). Much of prior research in this area comes from the United States, but studies from low-middle income countries, such as Mexico, with high rates of violence (as judged for example by homicide rates) can be particularly informative. The present study utilizes data from the UMSARC to examine if violence outcomes are influenced by substance abuse (illicit and off prescription drug misuse and alcohol use disorders) and a measure of social disadvantage or inequality, the area level disadvantage (ALD). Our hypothesis is that, for Mexican

* Corresponding autor.
E-mail address: guibor@imp.edu.mx (G. Borges).

https://doi.org/10.1016/j.drugalcdep.2019.02.029
Received 14 December 2018; Received in revised form 22 February 2019; Accepted 25 February 2019
Available online 30 April 2019
0376-8716/

Table 1
Twelve-month exposure to interpersonal physical violence, community violence, drug related violence and neighborhood insecurity, by northern area. Mexican sample of the UMSARC.(2011–2013)

	Monterrey (n = 811)	Nuevo Laredo (n = 828)	Reynosa / Matamoros (n = 821)	Total (n = 2460)[†]	Test	
Variable	%	%	%	%	χ^2_2 / F	*p*
Interpersonal physical violence[a]	2.3	5.3	1.6	3.1	21.1	***
Direct exposure to community violence						
Theft or break-in to your home	9.1	18.5	5.9	11.2	71.8	***
Theft or break-in to your car	11.8	23.2	3.5	12.8	143.0	***
Mugging where you were robbed	11.9	7.5	3.8	7.7	37.6	***
Physical attack where you were not robbed	3.8	3.9	3.3	3.7	0.6	
Racist attack (either verbal or physical)	3.4	5.5	1.9	3.6	16.2	*
Any direct community violence	24.4	38.5	12.5	25.2	147.3	***
Number of direct exposures (mean)[d]	0.4	0.6	0.2	0.4	47.0	***
Indirect exposure to community violence						
Heard gun shots[a]	77.9	82.7	66.9	75.9	58.9	***
Seen somebody arrested[a]	30.6	32.2	17.0	26.6	58.9	***
Seen drug deals[c]	15.8	24.4	28.7	23.0	39.6	***
Seen someone beaten up[b]	27.7	17.5	15.2	20.1	44.9	***
Seen somebody get stabbed[a]	3.2	1.8	2.5	2.5	3.1	
Seen somebody get shot[a]	2.4	1.9	3.3	2.5	3.1	
Seen someone pull a gun on another person[b]	8.0	9.8	6.1	8.0	7.6	
Seen violence related to drugs or gangs[c]	31.3	21.2	11.9	21.4	91.0	***
Any indirect community violence[a]	82.4	85.2	72.7	80.1	44.4	***
Number of indirect exposures (mean)[e]	2.0	1.9	1.5	1.8	10.4	***
Drug subscale						
Was approached to sell him/her an illegal drug[c]	3.2	4.2	2.7	3.4	3.0	
Seen drug deals[c]	15.8	24.4	28.7	23.0	39.6	***
Seen violence related to drugs or gangs[c]	31.3	21.2	11.9	21.4	91.0	***
Any drug subscale[a]	36.0	31.7	33.8	33.8	3.4	
Neighborhood insecurity						
Feeling unsafe walking alone during the daytime[a]	18.8	22.6	12.5	18.0	28.9	**
Feeling unsafe walking alone during after dark	61.4	59.4	44.1	54.9	59.2	***
Any	61.7	59.5	44.3	55.1	59.6	***
Substance use						
Any illicit drug use (IDU)[f]	1.5	4.3	2.4	2.7	12.4	**
Any prescription drug misuse (PDM)[g]	1.5	3.4	3.2	2.7	6.7	
DSM-5 Alcohol use disorder (AUD)[h]	9.3	7.8	4.1	7.1	17.7	***
Area-level disadvantage (mean)[i]	−0.7	−0.5	−0.6	−0.6	5.5	**

* $p < .05$; ** $p < .01$; *** $p < .001$.
[†] One person in Nuevo Laredo did not respond any of the questions.
[a] One missing value.
[b] Two missing values.
[c] Three missing values.
[d] Range [0..5], means and F-tests are reported in row.
[e] Range [0..8], means and F-tests are reported in row.
[f] Illicit drugs are 1) marijuana, 2) cocaine/crack, 3) heroin/opium, 4) methamphetamines, 5) hallucinogens and 6) other recreational drugs.
[g] Use of prescription drugs that were not prescribed for R or that was not taken as prescribed. Prescription drugs are 1) pain relievers, 2) sedatives, 3) stimulants and 4) other prescription drugs.
[h] Two or more DSM-5 AUD symptoms.
[i] Measured on a continuous scale on which negative values represent a lesser degree of disadvantage and positive values a greater degree, means and F-tests are reported in row.

border and non-border cities, the prevalence of substance use will be related to violence (interpersonal and community violence), drug related activities and insecurity, regardless of ALD.

2. Methods

2.1. Participants

The UMSARC is a cross-sectional survey that interviewed randomly selected respondents from 2011 to 2013 in metropolitan areas on both sides of the US-Mexico border and has been described previously (Cherpitel et al., 2015). Briefly, household face-to-face interviews of about 45 min in length were conducted. Eight households per primary sampling unit (PSU) were randomly selected, with eligible residents defined as those aged 18–65. In Mexico we surveyed respondents living in the respective border metropolitan areas of Nuevo Laredo (*n=828*) and Reynosa and Matamoros (*n=821*) and in the non-border metropolitan area of Monterrey (*n=811*), reflecting a combined cooperation rate of 71.4% (63.3% response rate).

2.2. Weights and variables

We used weights developed for the UMSARC as described previously and all bivariate analyses reflect the multistage clustered sampling design (Borges et al., 2015). We further adjusted those weights for use in multilevel models (Carle, 2009; Rabe-Hesketh and Skrondal, 2006).

2.3. Substance use variables

Drug use in the past 12 months was assessed with items adapted from the Mexican National Addiction Survey 2008 (Consejo Nacional contra las Adicciones et al., 2009). Illicit drugs (IDU) included marijuana, cocaine or crack, heroin or opium, methamphetamines,

hallucinogens and other recreational drugs. Prescription drugs misuse (PDM) (i.e. that were not prescribed for the respondent or that were not taken as prescribed) included pain relievers, sedatives, stimulants and other prescription medicines (Borges et al., 2018).

Alcohol use disorder (AUD) was defined according to the DSM-5 (American Psychiatric Association, 2013), using a version of the Composite International Diagnostic Interview (CIDI) (World Health Organization, 1999). Participants with two or more symptoms in the previous 12 months were classified as having symptoms consistent with a clinical diagnosis of AUD (NIAAA, 2013; Orozco et al., 2017).

2.4. Area-level disadvantage

The area-level disadvantage (ALD) is a summary measure of ten indicators from the 2010 Mexican Census related to urban deprivation, representing lack of access to four essential life domains: education, health services, adequate housing and basic appliances. It is a measure of disadvantage for 302 neighborhoods that represents relative disparities that exist between urban neighborhoods within cities and between urban zones. ALD is measured on a continuous scale on which negative values represent a lesser degree of marginalization and positive values a greater degree. It was first calculated by the Mexican Population Council about 20 years ago using the principal component analysis approach on the standardized indicators, and since them extensively used in health research (Orozco et al., 2017; Colchero et al., 2014; Urquieta et al., 2006; CONAPO, 2012).

2.5. Violence, drug related activities and insecurity

As defined before on a prior report from our group (Lown et al., 2017), two measures of violence were used: interpersonal physical violence (Straus, 1990) and direct and indirect exposure to community violence. (Martinez and Richters, 1993; Richters and Martinez, 1993). These are two separate (and sometimes overlapping) constructs. The interpersonal violence measure is widely used and provides comparability with previous studies. The measurement of community violence provides new and unique data to better understand the impact of violence in a surrounding community.

Interpersonal violence is adult physical assault in the past year. Direct community violence assessed whether you personally have been a victim of a list crimes in your neighborhood in the last 12 months. Indirect exposure to violence included incidents that were “seen or heard around your neighborhood” in the past 12 months. We created a “drug-related activity subscale” that included the 3 items on drugs. Finally, neighborhood insecurity included “Feeling unsafe walking alone during the daytime” and “Feeling unsafe walking alone during after dark” (see Table 1 for the full list and prevalence of items).

2.6. Analyses

Data from the UMSARC was combined (nested) within data on ALD at the PSU (neighborhood) level obtained from the Mexican National Council on Population. Therefore, associations between violence, drug related activities and insecurity with AUD, drug use and ALD were estimated with multilevel logistic regression analysis with random intercepts (Rabe-Hesketh and Skrondal, 2005). This technique models the dichotomous outcome (for example, any interpersonal physical violence), considering the effect of grouping among the observations and the magnitude of the independent variables (Zheng and Rabe-Hesketh, 2007), as well as the presence of covariates (Diez-Roux, 2000). The analysis was carried out using observations with valid information for all variables, using Stata version 13.1 (Stata Corp, 2014). The multilevel models were fitted with the GLLAMM module (Rabe-Hesketh et al., 2011). The standard errors (SE) of the coefficients were calculated with the robust method, as conventional methods (based on the model) are not appropriate for weighted surveys (Rabe-Hesketh and Skrondal, 2012).

We fitted a full model, without interaction terms, to study simultaneously all 4 exposures of interest: Area-level disadvantage (ALD); Any illicit drug use (IDU); Any prescription drug misuse (PDM) and DSM-5 Alcohol use disorder (AUD) on violence, drug related activities and insecurity. The model also included a set of control variables (sex, age (continuous), education (at least college vs. other), occupation (unemployed and other vs. employed), born in surveyed city (yes vs. no), financial strain (continuous index) and area (Nuevo Laredo and Matamoros/Reynosa vs. Monterrey).

2.7. Ethical approval

All persons surveyed gave written consent to participate in the study. The survey procedures, informed consent process and questionnaire were approved by the ethics committee of the National Institute of Psychiatry Ramon de la Fuente Muñiz, Mexico City.

3. Results

Interpersonal violence (3.1% 12-month prevalence for the total sample), direct community violence (25.2%), indirect community violence (80.1%), drug related activities (33.8%) and neighborhood insecurity (55.1%) was very commonly reported in these cities (Table 1). While all measures of violence were more frequently reported in Nuevo Laredo, the drug subscale and insecurity were more often reported in Monterrey. The 12-month prevalence of illicit drug use was larger in Nuevo Laredo, but AUD was more often reported in Monterrey. ALD was lower (meaning fewer with social-disadvantage) in Monterrey, with increasing ALD in Matamoros/Reynosa and finally Nuevo Laredo.

Table 2 presents multilevel models adjusted for the associations of area-level disadvantage and past-year substance use as predictors of: twelve-month interpersonal physical violence, direct and indirect community violence, drug related activities and neighborhood insecurity. Our measure of social disadvantage was significantly associated with both interpersonal physical violence and neighborhood insecurity, even when controlling for substance use variables in the model. Illicit drug use was related to increases in indirect community violence and drug related activities, and, surprisingly, to a decrease in neighborhood insecurity. Prescription drug misuse increased the presence of indirect community violence and drug related activities. Finally, AUD was strongly and significantly associated with 4 out of 5 outcomes: AUD increased the presence of interpersonal physical violence, direct and indirect community violence and drug related activities.

4. Discussion

In summary, substance use was, for the most part, related to violence regardless of social disparities in these northern cities of Mexico. We found differences on the role of 3 types of substances on 5 outcomes. AUD was related to all forms of violence and also to drug-related activities, but not to neighborhood insecurity. Both illicit drug use and misuse of prescription medicines seems to act in unison and were related only to indirect community violence and drug related activities. ALD in these cities were only related to physical violence and neighborhood insecurity. The inverse relationship between illicit drug use and neighborhood insecurity was an unexpected finding.

These basic findings should be viewed in the light of study’s limitations. First, while we found suggestive cross sectional associations, further research would be needed to determine whether these are causal relationships. While our study design guarantees the representativeness of the respondents within cities, those cities are not necessarily representative of other border and non-border northern cities in Mexico. Finally, drug use and criminal violence are illicit behaviors likely to be underreported, especially in an area that has

Table 2
Adjusted associations of area-level disadvantage and past-year substance use variables (any illicit drug use, any prescription drug misuse and alcohol use disorder) as predictors of twelve-month interpersonal physical violence, community violence, drug related violence and neighborhood insecurity[a].

Outcome (in bold)		
Predictors	OR[b]	95% CI
Interpersonal physical violence		
Area-level disadvantage (ALD)	2.40*	(1.38-4.18)
Any illicit drug use (IDU)	1.23	(0.82-1.85)
Any prescription drug misuse (PDM)	0.71	(0.07-6.98)
DSM-5 Alcohol use disorder (AUD)	3.86*	(1.58-9.47)
Any direct community violence		
Area-level disadvantage (ALD)	0.97	(0.55-1.70)
Any illicit drug use (IDU)	0.77	(0.46-1.30)
Any prescription drug misuse (PDM)	1.79	(0.99-3.20)
DSM-5 Alcohol use disorder (AUD)	1.90*	(1.40-2.58)
Any indirect community violence		
Area-level disadvantage (ALD)	0.82	(0.61-1.11)
Any illicit drug use (IDU)	4.24*	(1.49-12.08)
Any prescription drug misuse (PDM)	2.96*	(1.62-5.42)
DSM-5 Alcohol use disorder (AUD)	1.70*	(1.50-1.93)
Any drug subscale		
Area-level disadvantage (ALD)	1.09	(0.51-2.36)
Any illicit drug use (IDU)	3.36*	(2.49-4.53)
Any prescription drug misuse (PDM)	1.65*	(1.11-2.47)
DSM-5 Alcohol use disorder (AUD)	2.51*	(1.72-3.68)
Neighborhood insecurity		
Area-level disadvantage (ALD)	1.15*	(1.04-1.26)
Any illicit drug use (IDU)	0.68*	(0.46-1.00)
Any prescription drug misuse (PDM)	1.25	(0.58-2.68)
DSM-5 Alcohol use disorder (AUD)	0.90	(0.68-1.18)

[a] Each model includes as covariates: sex, age (continuous), education (at least college vs other), occupation (unemployed and other vs employed), born in surveyed city (yes vs no), financial strain (continuous index) and area (Nuevo Laredo and Matamoros/Reynosa vs Monterrey).
[b] ORs were computed by multilevel analysis, with neighborhood as the aggregate level.

recently suffered from much violence.

In spite of these limitations, our study shows that over and above ALD, AUD and drug misuse (both illicit and out of prescription) are significantly and strongly related to violence and drug activities in 3 northern cities of Mexico. These results are in line with prior research showing the paradigmatic role that alcohol use disorders have on community and interpersonal violence, a role that is well beyond measures of socio-economic status (Karriker-Jaffe, 2011; Treno et al., 2008) and homicides (Pridemore, 2016). Drug use, on the other hand may lead to violence that goes beyond physiological influences and includes social systemic factors related to the trafficking of illicit drugs (Fagan, 1993). Findings from the present study are consistent with drug trafficking and cartel activities, which are well known to have led to violence, crimes and homicides in this area of the country (Calderón et al., 2018).

ALD were related to neighborhood insecurity, which in turn may impact other health conditions, as also reported elsewhere (Ross and Mirowsky, 2001; Luo et al., 2014).

The results pointing to neighborhood insecurity being inversely related to illicit drug use were unexpected and need further study. This finding may be due to the use of a neighborhood insecurity measure limited to the subjective feelings of security while walking alone. A broader measure that assesses feeling secure while driving, shopping, etc., may result in different results. Also, it is possible that more wealthy people obtain drugs in unsafe neighborhoods but consume them in a safer place, which could give rise to this inverse association. In a review of studies on the influence of neighborhoods on drug use, it was reported that some studies described the protective influence of affluent neighborhoods but sometimes also risks for increasing drug use, which may depend on the specific drug and age groups (Karriker-Jaffe, 2011). Finally, self-reported insecurity could be biased as young males using drugs are unlikely to feel threatened and may report more feelings of security. More research is clearly needed here.

Violence, insecurity, poverty and substance use produces mutual effects on each other (Begle et al., 2011), leading to an escalating vicious cycle. Our results show that reducing alcohol and drug use and disorders, together with measures to support social equality may help to ameliorate the heavy burden of violence in some cities in northern Mexico.

Role of funding source

Nothing declared.

This study was supported by a grant from the U.S. National Institute on Alcohol Abuse and Alcoholism (NIAAA)R01AA01836540.

Contributors

G. Borges originated the study, collected data in Mexico, participated in planning and data analyses, and wrote the initial draft and the final version of the article.

C. J. Cherpitel and E.A. Lown originated the study, collected data in the United States, wrote drafts, and reviewed and approved the final version of the article.

R. Orozco collected data in Mexico, participated in planning, analyzed the data, wrote drafts, and reviewed and approved the final version of the article.

Conflict of interest

No conflict declared.

References

American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental Disorders DSM-5. Washington, D.C.. . (Accessed 24 April 2019). https://www.psychiatry.org/psychiatrists/practice/dsm.

Begle, A.M., Hanson, R.F., Danielson, C.K., MacCart, M.R., Ruggiero, K.J., Amstadter, A.B., Resnick, H.S., Sauders, B.E., Kilpatrick, D.G., 2011. Longitudinal pathways of victimization, substance use, and delinquency: findings from the national survey of adolescents. Addict. Behav. 36, 682–689.

Borges, G., Zemore, S.E., Orozco, R., Cherpitel, C., Ye, Y., Bond, J., Maxwell, J.C., Wallisch, L., 2015. 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. 39, 679–687.

Borges, G., Zemore, S., Orozco, R., Cherpitel, C., Martínez, P., Wallisch, L., 2018. Drug use on both sides of the US-Mexico border. Salud Pública Mex. 60, 451–461.

Calderón, L., Rodríguez, F.O., Shirik, D.A., 2018. Drug Violence in México Data and Analysis Through 2017. Department of Political Science and International Relations. University of San Diego (Accessed 24 April 2019). https://justiceinmexico.org/wp-content/uploads/2018/04/180411_DrugViolenceinMexico-12mb.pdf.

Carle, A.C., 2009. Fitting multilevel models in complex survey data with design weights: recommendations. BMC Med. Res. Methodol. 9, 49.

Cherpitel, C., Ye, Y., Bond, J., Zemore, S.E., Borges, G., Greenfield, T.K., 2015. Border effects on DSM-5 alcohol use disorders on both sides of the U.S.-Mexico border. Drug Alcohol Depend. 148, 172–179.

Colchero, M.A., Caro-Vega, Y., Kaufer-Horwitz, M., 2014. Socioeconomic status and misperception of body mass index among Mexican adults. Salud Pública Mex. 56, 251–258.

CONAPO, 2012. Índice de marginación urbana 2010. http://www.conapo.gob.mx/en/CONAPO/Indice_de_marginacion_urbana_2010.

Consejo Nacional contra las Adicciones, Instituto Nacional de Psiquiatría, Secretaria de Salud, Consejo Nacional contra las Adicciones, Fundación Gonzalo Rio Arronte, 2009. Encuesta Nacional de Adicciones 2008. D.F. Instituto Nacional de Salud Pública, Cuernavaca, México.

Diez-Roux, A.V., 2000. Multilevel analysis in public health research. Annu. Rev. Public Health 21, 171–192.

Fagan, J., 1993. Interactions among drugs, alcohol, and violence. Health Aff. Millwood 12, 65–79.

Karriker-Jaffe, K.J., 2011. Areas of disadvantage: a systematic review of effects of area level socioeconomic status on substance use outcomes. Drug Alcohol Rev. 30, 84–95.

Kilburn, J., San Miguel, C., Kwak, D., 2013. Is fear of crime splitting the sister cities? The case of Los Dos Laredos. Cities 34, 30–36.

Lown, E.A., Cherpitel, C.J., Zemore, S.E., Borges, G.L., Greenfield, T.K., 2017. Hazardous

drinking and exposure to interpersonal and community violence on both sides of the U.S. -Mexico border. Hispanic J. Behav. Sci. 39, 528–545.
Luo, Z., Breslau, J., Gardiner, J.C., Chen, Q., Breslau, N., 2014. Assessing interchangeability at cluster levels with multiple-informant data. Stat. Med. 33, 361–375.
Martinez, P., Richters, J.E., 1993. The NIMH community violence project: II. Children's distress symptoms associated with violence exposure. Psychiatry 56, 22–35.
NIAAA, 2013. Alcohol Use Disorder: A Comparison between DSM-IV and DSM-5. National Institute on Alcohol Abuse and Alcoholism. http://pubs.niaaa.nih.gov/publications/.
Orozco, R., Benjet, C., Velasco-Acosta, S., Altamirano, L., Karriker-Jaffe, K., Zemore, S., Cherpitel, C., Borges, G., 2017. Area-level disadvantage and alcohol use disorder in northern Mexico. Drug Alcohol Depend. 175, 219–226.
Pridemore, W.A., 2016. Hazardous drinking and violent mortality among males: evidence from a population-based case-control study. Soc. Probl. 63, 573–589.
Rabe-Hesketh, S., Skrondal, A., 2005. Multilevel and Longitudinal Modeling Using Stata. Berkeley. .
Rabe-Hesketh, S., Skrondal, A., 2006. Multilevel modeling of complex survey data. J. R. Stat. Soc. 169, 805–827.
Rabe-Hesketh, S., Skrondal, A., 2012. Solutions to Selected Exercises. Volume II: Categorical Responses, Counts, and Survival. TX. Stata Press, College Station.
Rabe-Hesketh, S., Skrondal, A., Pickles, A., 2011. Stata Program to Fit Generalized Linear Latent and Mixed Models (Gllamm). (Accessed 24 April 2019). http://www.gllammm.org/.
Richters, J.E., Martinez, P., 1993. The NIMH community violence project: I. Children as victims of and witnesses to violence. Psychiatry 56, 7–21.
Rojas, G.E., Fleiz, B.C., Villatoro, J., Gutiérrez, L.M., Medina-Mora, M.E., 2009. 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. 32, 13–19.
Ross, C.E., Mirowsky, J., 2001. Neighborhood disadvantage, disorder, and health. J. Health Soc. Behav. 42, 258–276.
Stata Corp, 2014. Stata Statistical Software. Release 13.1. StataCorp LP, College Station, TX.
Straus, M., 1990. Measuring intrafamily conflict and violence: the Conflict Tactics (CT) Scale. In: Straus, M., Gelles, R.J. (Eds.), Physical Violence in American Families, Risk Factors and Adaptations to Violence in 8,145 Families. Transaction Books, New Jersey, pp. 29–47.
Treno, A.J., Gruenewald, P.J., Remer, L.G., Johnson, F., Lascala, E.A., 2008. Examining multi-level relationships between bars, hostility and aggression: social selection and social influence. Addiction 103, 66–77.
Urquieta, J.E., Hernández-Ávila, M., Hernández, B., 2006. Tobacco and alcohol consumption among youth in marginalized urban zones in Mexico. Analysis of related decisions. Salud Pública Mex. 48, 30–40.
World Health Organization, 1999. Composite International Diagnostic Interview (CIDI – Authorize core Version 1.0). World Heath Organization, Geneva.
Zheng, Z., Rabe-Hesketh, S., 2007. Estimating parameters of dichotomous and ordinal item response models with gllamm. Stata J. 7, 313–333.