



Violent crime victimization and mental health among adolescents in Mexico

Jose Balmori-de-la-Miyar^{a,*}, Sharon Tennyson^b, Adan Silverio-Murillo^c, José A. Pagán^d

^a Anahuac Business School, Universidad Anahuac Mexico, Mexico

^b Jeb E. Brooks School of Public Policy, Cornell University, USA

^c School of Government, Tecnológico de Monterrey, Mexico

^d School of Global Public Health, New York University, USA

ARTICLE INFO

Keywords:

Adolescent
Mental health
Depression
Suicide
Violence
Crime
Victimization
Aggressiveness

ABSTRACT

Objectives: To understand the association between violent crime victimization and mental health outcomes among adolescents in Mexico, and to define the link between the nominal classification of violent crime and mental health outcomes.

Methods: We used fixed-effects linear and logistic regressions and survey data from the 2018–2019, 2021, 2022, and 2023 National Health and Nutrition Survey ($n = 26,187$). Survey waves were conducted in all 32 Mexican states during: July 2018–June 2019, July–December 2021, July–December 2022, and July–October 2023.

Results: Violent crime victimization was associated with higher scores of having depressive symptoms (CESD-7) ($b = 1.93$ points, ± 0.26), and greater likelihood of suicidal ideation (adjusted odds ratio (aOR) = 5.32, ± 0.86) and suicide attempts in the last twelve months (aOR = 6.87, ± 2.74). More serious classes of violent crime relate to worse mental health outcomes among adolescents. Specifically, kidnapping, the most serious class of violent crime in our data, correlates with worse mental health outcomes when compared to robbery or aggravated assault.

Conclusions: Violent crime victimization is linked to increased depressive symptoms, suicidal ideation, and suicide attempts among adolescents. More serious classes of violent crime are associated with worse mental health outcomes in this population.

1. Introduction

Interpersonal violence is a major global challenge among the adolescent population between 10 and 19 years of age (IHME, 2024). By continent, America has the worst death rate from violence among youth, with 11.78 deaths per 100,000 adolescents, followed by Africa with a rate of 3.85, Asia with a rate of 1.32, and Europe with a rate of 0.89 (IHME, 2024). Brazil, Mexico, Venezuela, the United States (US), and Colombia, have the highest number of deaths among adolescents in the continent; the US and Mexico being the only countries with upward trends in the number of adolescent deaths attributable to interpersonal violence during the 2015–2021 period (IHME, 2024).

Unlike the US, where interpersonal violence among adolescents is in large part driven by firearm injury (Roberts et al., 2023), in Mexico much of the violence experienced by adolescents is driven by crime

(Frías and Finkelhor, 2017). Recent crime victimization surveys among Mexican adolescents indicate that close to three million minors have been subject to various forms of violence, including bullying, theft, physical assault, threats, robbery, and extortion (Frías and Finkelhor, 2017). School surveys among Mexican youth aged 15–19 years old also point to high levels of crime victimization in the community, with robbery scoring a victimization rate of 10.9 %; aggravated assault 2.1 %, and kidnapping 0.1 % (Sonia Frías Martínez, 2022).

Social-ecological theories of health consider crime as a factor that impacts health, both directly and indirectly (Lorenc et al., 2014). Direct impacts include the physical and psychological health of victims (Robinson and Keithley, 2000). Early research in this topic identifies the effects of crime on psychological health as *crime-related post-traumatic stress disorder* (Riggs et al., 1995). While most symptoms disappear over time without clinical intervention (Riggs et al., 1995), some victims

* Corresponding author.

E-mail addresses: jose.balmori@anahuac.mx (J. Balmori-de-la-Miyar), sharon.tennyson@cornell.edu (S. Tennyson), adan.sm@tec.mx (A. Silverio-Murillo), jose.pagan@nyu.edu (J.A. Pagán).

<https://doi.org/10.1016/j.pmedr.2025.103062>

Received 17 December 2024; Received in revised form 4 April 2025; Accepted 4 April 2025

Available online 6 April 2025

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may experience persistent symptoms requiring specialist help (Solomon and Davidson, 1997). Indirect impacts of crime, which extend beyond direct victims, include changes to the *built environment* of a geographical area that may enhance or undermine public health (Gergő Baranyi, Martín Hernán Di Marco, Tom C Russ, Chris Dibben, and Jamie Pearce., 2021). For instance, neighborhood social disorganization, manifested as violent crime, increases population mortality (Wilkinson et al., 1998), coronary heart disease (Sundquist et al., 2006) and adverse birth outcomes (Messer et al., 2006), while decreasing mental health in affected communities (Balmori and de la Miyar., 2020). However, most studies associating crime and health focus on the adult population.

Recent theory examines the association of violent crime and mental health among adolescents. For instance, exposure to violence is associated with lower mental health outcomes (Cuartas and Roy, 2019), and substance use among this population in low and middle-income countries (Puno et al., 2024), as well as in high income countries (De la Peña-Arteaga et al., 2021). Further, violence exposure at a young age is associated with several types of morbidity later in life such as poor self-rated health, high-risk HIV behavior, obesity, diabetes, myocardial infarction, coronary heart disease, and disability due to poor health (Olofsson et al., 2012; Campbell et al., 2016). Other emerging literature about health-related outcomes of violence in adolescents focuses on physical violence and self-harm injuries (Buggs et al., 2022; Hoffmann et al., 2023).

Whereas most of the existing literature for the adolescent population concentrates on sexual violence victimization (Kilpatrick et al., 1985), domestic violence victimization (Lagdon et al., 2014), and child abuse victimization (Barth et al., 2013), many of the factors identified by this literature such as age, race, gender, disability, and socio-economic factors also applied to violent crime (Kilpatrick and Acierno, 2003). Further, the vast majority of studies are not able to infer causality, with exception of two studies employing data from twin families (Connolly et al., 2022; Gonggrijp et al., 2023). These studies are not without limitations, as confounding factors, such as built environments and victimization rates in mentally ill populations, may introduce bias into the results (Lorenc et al., 2014; Maniglio, 2009). Hence, empirical evidence on this matter mostly maintains results at the association-level.

One important gap in the existing literature lies in defining the link between the nominal classification of violent crime and different health outcomes among adolescents. This gap is interdisciplinary, drawing on theories from criminology and legal studies. From a criminological perspective, theories of aggression and deviance often portray crime as instrumental (Sampson et al., 1997). This viewpoint posits that individuals employ violence as a rational choice, calculating the costs and benefits of their actions, and prioritizing their perceived rewards over the potential harm to the victim (Felson, 2009). In legal theory, felonies aggravated by physical violence are generally classified by the type of violence, with most prosecutors' offices worldwide prioritizing charges in ascending order: aggravated assault (class C), robbery (class C/B), kidnapping (class A), and murder (class A/A1) (United States, 2008). This prioritization aims to deter the most violent types of crime (Jack, 1968).

The objective of this study is to estimate the association between crime violence victimization and mental health outcomes among adolescents in Mexico, and to define the link between the nominal classification of violent crime and mental health outcomes (we can only classify crimes by felony class, not by degree of violence). We focus on depressive symptoms and suicide-related outcomes given the existence of valid, broadly-used measures and indicators, as well as their usefulness in the development of potential policy solutions to address mental health in different populations, including adolescents. We include a scope of felonies such as aggravated assault, robbery, and kidnapping, to represent varying classes of physical violent crime present in our data.

2. Methods

Survey data from the National Institute of Public Health (INSP) in Mexico was used to estimate the relation between violent crime victimization and mental health outcomes among the adolescent population, and to define the link between the nominal classification of violent crime and mental health outcomes. The INSP periodically conducts the National Health and Nutrition Survey (ENSANUT), a nationwide health survey that is representative at the state and area (rural, suburban, and urban) levels. ENSANUT includes a broad range of health and nutrition topics, including questions on mental health outcomes, violent crime victimization, and socioeconomic background for the adolescent population between 10 and 19 years of age.

We used survey data from the following ENSANUT waves: 2018–2019 (this wave was conducted over two years; in this paper, we take the interview date as the survey year), 2021, 2022, and 2023. We did not use data from the 2020 ENSANUT wave given that some mental health questions were excluded for the adolescent population. Response rates for the adolescent population in the ENSANUT survey were 97 % for the 2018–2019 wave (Romero-Martínez et al., 2019), 84 % for the 2021 wave (Romero-Martínez et al., 2021), 83 % for the 2022 wave (Romero-Martínez et al., 2022), and 82 % for the 2023 wave (Romero-Martínez et al., 2024). We employ these different waves to ensure sufficient temporal and geographical variation in violent crime victimization.

Mental health status for the adolescent population was measured using a brief version (seven items) of the Center for Epidemiological Studies Depression Scale (CESD7). The CESD is used to assess depressive symptoms (during the past week) employing the following items: (1) I felt that I could not shake off the blues; (2) I had trouble keeping my mind on what I was doing; (3) I felt depressed; (4) I felt that everything I did was an effort; (5) my sleep was restless; (6) I enjoyed life, and (7) I felt sad. The responses to these items could be (i) rarely or none of the time (less than 1 day), for which zero points are assigned to the assessment score; (ii) some or a little of the time (1–2 days), for which one point is assigned; (iii) occasionally or a moderate amount of time (3–4 days), for which two points are assigned, and (iv) most or all of the time (5–7 days), for which three points are assigned. Points assigned are inverted for the sixth item (I enjoyed life). The CESD-7 score is the sum of these points, which may range from zero to 21. This assessment of the self-reported severity of depressive symptoms has been validated for its use with adolescents in Mexico (Vázquez-Salas et al., 2023).

ENSANUT also gathers information about suicidal ideation (have you thought about committing suicide?) and suicide attempts (have you ever purposely hurt, cut, intoxicated or harmed yourself in order to take your life?) during the last twelve months (was this in the last 12 months?). Respondents also reported if they experienced physical violence incidents during the last twelve months (in the last 12 months, have you been the victim of any incident in which you were physically attacked?), as well as about the motive of violence (what was the main reason?). Certain responses to these questions were categorized as violent crime, and further classified (nominally) by crime type into aggravated assault, robbery, and kidnapping.

Other variables included in our analyses were age, sex, whether or not the respondent speaks an indigenous language, vision impairment, hearing impairment, mobility disabilities, whether they are currently attending school, whether both parents live in the same house as the adolescent interviewee, health insurance coverage, household poverty (defined as poor if they live in a house lacking concrete or wooden flooring, a sewage or septic connection, a flushing toilet, a washing machine or clothes dryer), car ownership, and household crowding (number of household residents per bedroom).

Survey respondents who reported experiencing physical violence other than violent crime during the last twelve months were excluded from the sample, to limit the comparison to respondents who did not experience any physical violence. The final sample ($n = 26,187$)

included observations with complete information for the aforementioned variables measuring mental health outcomes, violent crime victimization, disabilities, and socioeconomic background. The dataset is representative of a 80 million adolescent-year population over the years 2018, 2019, 2021, 2022, and 2023, covering all 32 Mexican states. Because this study utilized publicly accessible data, it was exempt from institutional review board (IRB) approval.

Fixed-effects linear and logistic regression models were used to estimate the relation between violent crime and mental health outcomes among the adolescent population in Mexico, and to define the link between the nominal classification of violent crime and mental health outcomes. The fixed-effects specification controls for time invariant state-level characteristics and nationwide survey-year characteristics. State fixed-effects account for differences such as geography, short-term economic development, legal institutions (e.g. police, criminal groups, local norms), and human capital including education and healthcare infrastructure. Survey-year fixed-effects control for time-varying shocks that may affect mental health in adolescents nationwide, such as the COVID-19 pandemic or changes in federal policies. Linear regression was used to estimate the relation between violent crime and the CESD-7 score, and logistic regression was used to estimate the relation between violent crime victimization and suicidal ideation, and violent crime victimization and suicide attempts during the last twelve months.

Sampling weights were used to obtain all estimates. Standard errors were clustered at the state-level. All statistical analyses were conducted using Stata 18.5. All dofiles and replication databases are available on Harvard Dataverse.

3. Results

Table 1 provides summary statistics of mental health outcomes and violent crime victimization among the adolescent population (10–19 years old) in Mexico. Summary statistics correspond to weighted means and standard deviations. The overall mean CESD-7 score in the adolescent population was 3.1 (standard deviation [SD] = 3.3). During the whole period of analysis, 6.4 % of all adolescents reported having suicidal ideation. The proportion of adolescents attempting suicide over the last twelve month was 2.2 %.

In terms of violent crime victimization in the last twelve months, the proportion of adolescents in Mexico reporting exposure to crime violence was 1.9 %. The most common type of violent crime reported was aggravated assault, with a 1.1 % victimization percentage among the adolescent population. Violence associated with robbery accounts for a 0.7 % incidence, while 0.1 % of adolescents were exposed to kidnapping. These levels of victimization mostly coincide with recent literature studying rates of victimization among individuals aged 15–19 years old (Sonia Frías Martínez, 2022).

Table 2 reports the results from the fixed-effects linear and logistic

Table 1
Descriptive Statistics on Violent Crime Victimization and Mental Health among Adolescents in Mexico, 2018–2023.

	All	
	Mean	Std. Dev.
CESD-7 Score Last Week	3.1	3.3
Suicidal Ideation (%)	6.4	24.5
Suicide Attempts in Last 12 Months (%)	2.2	14.7
Crime Victim in Last 12 Months (%)	1.9	13.6
Agg. Assault Victim in Last 12 Months (%)	1.1	10.5
Robbery Victim in Last 12 Months (%)	0.7	8.6
Kidnapping Victim in Last 12 Months (%)	0.1	1.0
Observations	26,187	
Adolescents Represented (Millions)	87.0	

SOURCE: 2018–2019, 2021, 2022, and 2023 National Health and Nutrition Survey, National Institute of Public Health of Mexico (INSP).

NOTES: Statistics factored by survey weights.

regression models estimating the relation between violent crime victimization and mental health outcomes. All specifications contain individual controls, household controls, and baseline fixed-effects, as indicated by the symbol “X”. Violent crime victimization was associated with a 1.93-point (± 0.26) difference in CESD-7 scores (Column (1)). By type of violent crime, being a victim of aggravated assault was associated with a 1.79-points (± 0.29) difference in CESD-7 scores (Column (2)), whereas robbery victimization was associated with a 2.11-point(± 0.49) difference in CESD-7 scores. Kidnapping violence was associated with a 5.25-point (± 2.10) difference in CESD-7 scores.

Adolescents exposed to any violent crime were more likely to have suicidal thoughts than non-exposed adolescents (Column (3)) (aOR = 5.32, ± 0.86). In terms of nominal classification of violent crime, each specific type of violent crime (Column (4)) was associated with higher odds of suicidal ideation, with adjusted odds ratios of 6.57 (± 1.49) for aggravated assault, 4.02 (± 1.56) for robbery, and 14.02 (± 8.86) for kidnapping.

Adolescent victims of violent crime were more likely to have attempted suicide in the last twelve months than adolescents not exposed to crime violence (Column (5)) (aOR = 6.87, ± 2.74). By type of violent crime, Column (6) indicates the following adjusted odds ratios for the association between crime violence victimization and suicide attempts: 5.10 (± 1.36) for adolescents exposed to aggravated assaults, 8.81 (± 6.26) for adolescents exposed to robbery, and 48.25 (± 33.41) for adolescents exposed to kidnapping in the last twelve months.

Table 3 shows the association between violent crime victimization and mental health by survey wave. This table also contains individual controls, household controls, and baseline fixed-effects, as denoted by the symbol “X”, for all specifications. For the most part, the strength of the association is constant across waves. The coefficients of the association of violent crime victimization and CESD-7 scores fall in the 1.60–2.33 range, with all coefficient being statistically significant at the 95 % level of confidence or higher. Similarly, the range between the association of violent crime victimization and suicidal ideation is [1.58,1.84], with all coefficient being statistically significant but for 2023-wave (aOR = 1.58). Finally, the coefficients for the association of violent crime and suicide attempts ranges between 3.58 and 25.31, with coefficients being statistically significant but for 2022-wave (aOR = 3.58). A caveat for this last range is that the survey sample size and response rate decreased over time, and the extreme values within this range correspond to the last two waves (2022 and 2023).

4. Discussion

The results of this study indicate a strong association between violent crime victimization and mental health outcomes among Mexican adolescents. Experiencing violent crime within the past twelve months was associated with an increase in current CESD-7 scores and with higher odds of suicidal ideation and suicide attempts in the last twelve months. Findings also suggest a clear direct relationship between the nominal classification of violent crime and mental health outcomes. In particular, the coefficients for aggravated assault and robbery, which are classified in a lower felony class than kidnapping, were less than half the coefficients for kidnapping. This indicates that as violence increases, so does the association with worse mental health outcomes among adolescents in Mexico.

The evidence in this study relates to the findings of an expanding literature studying physical violence and mental health outcomes among adolescents. Namely, our findings coincide with the direction and significance of the association between gun violence and depressive symptoms in the US (Buggs et al., 2022; Leibbrand et al., 2020; Lennon et al., 2024), as well as outpatient mental health visits and hospitalizations (Hoffmann et al., 2023). The results derived from the present study are also similar to the conclusions of other research looking at mental distress in El Salvador (Clariana et al., 2021) and Turkey (Büken et al., 2009). Our findings of an association between physical violence

Table 2

Violent Crime Victimization and Mental Health Outcomes among Adolescents by Type of Crime and Overall, 2018–2023.

	CESD-7 Score (Pts.) (1)	CESD-7 Score (Pts.) (2)	Suicidal Ideation (aOR) (3)	Suicidal Ideation (aOR) (4)	Suicide Attempts (aOR) (5)	Suicide Attempts (aOR) (6)
Crime Victim in Last 12 Months	1.93*** (0.26)		5.32*** (0.86)		6.87*** (2.74)	
Agg. Assault Victim in Last 12 Months		1.79*** (0.29)		6.57*** (1.49)		5.10*** (1.36)
Robbery Victim in Last 12 Months		2.11*** (0.49)		4.02*** (1.56)		8.81*** (6.26)
Kidnapping Victim in Last 12 Months		5.25** (2.10)		14.02*** (8.86)		48.25*** (33.41)
Individual Controls	X	X	X	X	X	X
Household Controls	X	X	X	X	X	X
Baseline Fixed-effects	X	X	X	X	X	X
Observations	26,187	26,187	26,187	26,187	26,187	26,187
Adjusted/Pseudo R-squared	0.0	0.0	0.1	0.1	0.1	0.1

SOURCE: 2018–2019, 2021, 2022, and 2023 National Health and Nutrition Survey, National Institute of Public Health of Mexico (INSP).

NOTES: Individual controls are age, sex, indigenous status, vision impairment, hearing impairment, mobility disabilities, and school attendance information of the interviewee. Household covariates include cohabitation of both parents, healthcare insurance, poverty status, car ownership, and household overcrowding. Baseline fixed-effects are included at the state and survey-year levels. The connotation “X” means that a set of controls or fixed-effects are included in a given specification. Robust standard errors are clustered at the state level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results present coefficients from ordinary least squares (OLS) and logit regression models factored by survey weights population. Coefficients correspond to linear points (Pts.) and adjusted odds ratios (aOR).

victimization and suicide ideation are consistent with those of smaller survey studies of Swedish women (Palm et al., 2016) and teens in Mexico (Casas-Muñoz et al., 2024). Conversely, our results are not consistent with the findings of a study of Colombian youth, which suggested no links between experiences of physical violence and mental health outcomes (Vahedi et al., 2024).

Our study has several limitations. First, we are unable to infer causality given our data source (survey data collected from different respondents over time). There is also the potential for victim-offender overlap in the data; because studies have found that some victims of violence are also offenders, links between victimization and mental health problems could be confounded (Jennings et al., 2012). While evidence suggests adolescents with mental health problems are more susceptible to violence victimization, the current research mainly concentrates on peer and sexual victimization, leaving other forms of crime under-explored (Azimi and Daigle, 2021; Kemal et al., 2023).

Despite these limitations the present study contributes to this literature by analyzing crime victimization using a nationally representative sample of adolescents in Mexico over the last few years. This paper also defines the link between the nominal classification of violent crime and mental health outcomes, filling the gap in the existing literature analyzing this topic. We also used a relatively large sample that provided substantial variation in mental health outcomes and violent crime victimization for a country with a high prevalence of physical violence against adolescents such as Mexico.

5. Conclusion

Adolescence is a pivotal stage of life, marked by significant social, emotional, and physical development. During this period, many factors that shape lifelong well-being become well established (Avedissian and Alayan, 2021). A disruption of these development factors by stressors may have serious consequences (Ross et al., 2020). Violence is one of the modern stressors that affect mental health, along with other factors such as technology, loneliness, and peer pressure. Adolescents disproportionately experience violence and crime relative to other age groups (Morgan and Thompson, 2021).

Social-ecological theories of health predict a strong association between crime and health outcomes (Lorenc et al., 2014), particularly among adolescents (Cuartas and Roy, 2019; Puno et al., 2024; Olofsson et al., 2012; Campbell et al., 2016). This paper also finds a strong relation between violent crime victimization and mental health outcomes

among adolescents in Mexico, drawing on a nationally representative surveys conducted in recent years. Further, this paper fills the existing gap in the literature by suggesting a direct relation between the nominal classification of violent crime and mental health outcomes, in which more serious types of violent crimes correlate to worse health outcomes (e.g. kidnapping vs. aggravated assault or robbery).

Mental health problems are widespread among adolescents globally, affecting 10 to 20 % of adolescents in high-income, middle-income, and low-income countries alike (Kieling et al., 2011). Understanding the complex interplay of social determinants of health and structural violence risk factors at the individual, interpersonal, community, institutional, and societal levels, is essential to addressing mental health problems among adolescents. By targeting these underlying factors, we can develop more effective strategies to promote health equity in the adolescent population.

Disclosure of ethical compliance and availability of data and materials

This study did not require IRB approval as data comes from a publicly available source. The dofiles and data that support the findings of this study are available on Harvard Dataverse at <https://doi.org/10.7910/DVN/G5QEAV>. These data were derived from the following resources available in the public domain of the National Institute of Public Health of Mexico (INSP).

CRedit authorship contribution statement

Jose Balmori-de-la-Miyar: Writing – review & editing, Writing – original draft, Validation, Methodology, Formal analysis, Data curation, Conceptualization. **Sharon Tennyson:** Writing – original draft, Validation, Supervision, Methodology, Investigation, Conceptualization. **Adan Silverio-Murillo:** Writing – review & editing, Validation, Resources, Methodology, Investigation. **José A. Pagán:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Conceptualization.

Funding

This work was funded by a seed grant from Universidad Anahuac Mexico.

Table 3
Violent Crime Victimization and Mental Health Outcomes among Adolescents by Survey Wave, 2018–2023.

	CESD-7 Score	Suicidal Ideation	Suicide Attempts
	(Pts.)	(aOR)	(aOR)
	(1)	(2)	(3)
Crime Victim in Last 12 Months (2018–2019)	1.92*** (0.19)	1.67*** (0.16)	8.00*** (1.69)
Individual Controls	X	X	X
Household Controls	X	X	X
Baseline Fixed-effects	X	X	X
Observations	16,652	16,652	16,652
Adjusted/Pseudo R-squared	0.1	0.1	0.1
Crime Victim in Last 12 Months (2021)	1.66*** (0.57)	1.70*** (0.48)	8.42*** (4.67)
Individual Controls	X	X	X
Household Controls	X	X	X
Baseline Fixed-effects	X	X	X
Observations	4120	4120	3734
Adjusted/Pseudo R-squared	0.1	0.1	0.1
Crime Victim in Last 12 Months (2022)	2.33** (1.07)	1.84** (0.79)	3.58 (3.32)
Individual Controls	X	X	X
Household Controls	X	X	X
Baseline Fixed-effects	X	X	X
Observations	3512	3490	3340
Adjusted/Pseudo R-squared	0.1	0.1	0.1
Crime Victim in Last 12 Months (2023)	1.60** (0.64)	1.58 (1.00)	25.31** (39.41)
Individual Controls	X	X	X
Household Controls	X	X	X
Baseline Fixed-effects	X	X	X
Observations	1903	1772	1642
Adjusted/Pseudo R-squared	0.1	0.2	0.3

SOURCE: 2018–2019, 2021, 2022, and 2023 National Health and Nutrition Survey, National Institute of Public Health of Mexico (INSP).

NOTES: Individual controls are age, sex, indigenous status, vision impairment, hearing impairment, mobility disabilities, and school attendance information of the interviewee. Household covariates include cohabitation of both parents, healthcare insurance, poverty status, car ownership, and household overcrowding. Baseline fixed-effects are included at the state level. The connotation “X” means that a set of controls or fixed-effects are included in a given specification. Robust standard errors are clustered at the state level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results present coefficients from ordinary least squares (OLS) and logit regression models factored by survey weights population. Coefficients correspond to linear points (Pts.) and adjusted odds ratios (aOR).

Declaration of competing interest

The authors declare no relevant or material financial interests that relate to the research described in this paper.

Acknowledgment

The authors wish to thank Alejandro Noguez for his research assistant on this project.

Data availability

The data is already in Harvard Dataverse

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