Published in final edited form as:

Ann Epidemiol. 2019 June ; 34: 71–74. doi:10.1016/j.annepidem.2019.04.004.

Racial and ethnic differences in associations of community violence with self-harm: A population-based case-control study

Ellicott C. Matthey, PhD MPH^{1,*}, Kriszta Farkas, MPH², and Jennifer Ahern, PhD MPH²

¹Center for Health and Community, University of California, San Francisco

²Division of Epidemiology & Biostatistics, School of Public Health, University of California, Berkeley

Keywords

self-harm; suicide; community violence; case-control; social environment; social epidemiology; epidemiologic methods

Introduction

Self-harm is a leading cause of deaths and injuries in the United States, and rates are increasing for reasons that are not fully understood. Community violence is one feature of the social environment that may contribute to self-harm risk and variation in risk across populations. Exposure to community violence is associated with greater risk of substance use [1,2], psychological symptoms [3–8], social isolation [9], and norms permissive of violence [10,11], which are all strong risk factors for self-harm [10–21].

Prior research documents associations between community violence and self-harm [22–30], but this association may also vary by race/ethnicity. Previous epidemiologic research documents substantial differences in rates of self-harm and self-harm risk factors such as substance use by race/ethnicity [31,32]. Moreover, Blacks, American Indians, and Hispanics are disproportionately exposed to community violence [33,34], and thus may disproportionately experience the health consequences of such exposure. To our knowledge, no studies have examined whether community violence differentially affects racial/ethnic groups with respect to self-harm. This study seeks to fill this gap.

*Corresponding author: ellicott.matthey@ucsf.edu, Division of Epidemiology and Biostatistics, Box 0560, 550 16th Street, Second Floor, San Francisco, CA 94143.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Publisher's Disclaimer: Disclaimer

The analyses, interpretations, and conclusions of this article are attributable to the authors, and not to the California Department of Public Health or the National Institutes of Health.

The authors have no conflicts of interest to report.

Rapid Report format: a new fact, method, observation for quick presentation—≤1000 words; no abstract; maximum of one table, figure, or other illustrative materials. For Article Type at submission, please select Short Communication, then Rapid Reports as the manuscript category.

Materials and Methods

The methods follow those of a study of community violence and both fatal and nonfatal self-harm in a general population [29]. Briefly, we conducted a population-based, density-sampled case-control study of all Californians [35,36]. Cases were all deaths and hospital visits due to deliberate self-harm in statewide death and hospital discharge records, 2006-2013. Controls were sampled from California resident participants of the American Community Survey [29,37]. Exposure to community violence was defined as the average past-year rate of death due to homicide and injury due to assault in the community of residence. We defined five non-Hispanic race groups (White, Black, American Indian, Asian, and Multiracial) and one Hispanic group of any race.

We estimated the association of community violence with self-harm using two rate difference parameters designed to avoid extrapolation beyond the observed data: (1) an overall rate difference, contrasting self-harm rate if individuals were exposed to the highest versus the lowest violence levels observed within each of their communities [38]; (2) a population attributable rate difference contrasting the observed self-harm rate to that if individuals were exposed to the lowest violence levels observed within each of their communities. When stratified by race/ethnicity, the first parameter captures differential responsiveness to community violence (given the range among the individuals in each covariate group), while the second reflects differential extent of exposure to community violence.

We weighted all analyses to be population-representative [39], and estimated marginal, additive-scale associations[38]. We used generalized additive models [40] to flexibly model the rate of fatal or nonfatal self-harm in each racial/ethnic group and to adjust for individual- and community-level confounders (Appendix), with the nonparametric bootstrap for confidence intervals [38].

Ethical review was conducted by the State of California and University of California, Berkeley Committees for the Protection of Human Subjects. See Appendix for additional methodological details.

Results

We identified 27,027 self-harm fatalities and 331,203 nonfatal self-harm injuries resulting in hospital visits, 2006–2013. Appendix Table 2 presents sample sizes and descriptive statistics on self-harm and community violence exposure by race/ethnicity. Fatal self-harm rates were highest among American Indians and Whites; nonfatal self-harm rates were highest among Blacks, Whites, and American Indians.

Community violence exposure was generally highest for Blacks and American Indians. Cases experienced greater violence exposure than controls.

Table 1 presents the adjusted associations of past-year community violence with fatal and non-fatal selfharm. Although community violence was generally associated with greater self-harm, there were substantial differences in estimates across racial/ethnic groups. For

fatal self-harm, both the overall rate difference and population attributable rate difference were substantially larger for Blacks than any other racial/ethnic group. In contrast, associations for Asians, Hispanics, and Multiracial individuals were null or slightly negative, and estimates for American Indians were unstable and are not reported.

For nonfatal self-harm, estimates were largest and nearly identical for Blacks and Whites. The overall rate difference was smaller for American Indians than Blacks and Whites, but the population attributable rate difference was larger, reflecting their greater exposure to community violence. Associations for Asians, Hispanics, and Multiracial individuals were positive, but substantially smaller than for Blacks/Whites.

Conclusions

We identified large, positive associations of exposure to community violence with self-harm that varied substantially by racial/ethnic group. These differences highlight the importance of considering heterogeneity in the effects of neighborhood exposures, and in particular risk factors for self-harm, that may be masked by overall population estimates.

The reasons for differences in associations across racial/ethnic groups will require more research. Large associations for Blacks may imply that the psychological experience of community violence or the mechanisms are different for this group. Historical and intergenerational experiences of violence and trauma [41,42] and the interaction between police activity and community violence in predominantly black communities [43] merit further investigation. For American Indians, similar explanations [44] as well as the greater prevalence of mental and substance use disorders [45] should be explored. Smaller associations for Hispanics and Asians may reflect the lower rates of self-harm, lower prevalence of self-harm risk factors, or the protective effects of ethnic enclaves (e.g. Hispanic paradox [46]).

This study had several limitations. First, although we controlled for numerous confounders, confounding control was limited by the covariates available in the data. However, we improve on previous studies by using objective rather than self-reported measures, both fatal and nonfatal outcomes, parameters that do not rely on extrapolation, and a large, diverse sample which allowed examination of understudied racial/ethnic minority populations. Second, we used distinct data sources for cases and controls, and measurement of covariates may differ across sources. Third, death and hospital visit data are imperfect and do not capture violent events not resulting in death or serious injury. Race/ethnicity may be misclassified, particularly for certain races/ethnicities in hospital data, but this misclassification is expected to be nondifferential [47–49], and any resulting bias is expected to be towards the null. Fourth, we did not account for repeated hospital visits by the same individuals [50]; thus, standard errors may be underestimated. Finally, there is substantial heterogeneity within racial/ethnic groups; future studies would benefit from further disaggregation.

Community violence is an important, under-studied, and potentially modifiable [51–54] feature of the social environment that disproportionately affects poor, racially and ethnically

segregated urban neighborhoods [55–57]. This study enhances our understanding of the contextual factors driving selfharm and builds on a growing body of literature documenting the health consequences and health equity concerns of exposure to community violence and the potential benefits of investing in violence prevention.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements and funding

The authors thank the following funding sources: Eunice Kennedy Shriver National Institute of Child Health and Human Development and the National Institutes of Health Office of the Director (Grant DP2HD080350); Committee on Research, University of California, Berkeley; Robert Wood Johnson Health and Society Scholars Program; Harry Frank Guggenheim Foundation.

List of abbreviations:

White:	White race, non-Hispanic ethnicity
Black:	Black or African American race, non-Hispanic ethnicity
American Indian:	American Indian or Alaska Native race, non-Hispanic ethnicity
Asian:	Asian or Pacific Islander race, non-Hispanic ethnicity
Multiracial:	Multiple and other races, non-Hispanic ethnicity
Hispanic:	Any race, Hispanic ethnicity

References

- [1]. Vermeiren R, Schwab-Stone M, Deboutte D, Leckman PE, Ruchkin V. Violence exposure and substance use in adolescents: findings from three countries. *Pediatrics* 2003;111:535–40. [PubMed: 12612233]
- [2]. Stockdale SE, Wells KB, Tang L, Belin TR, Zhang L, Sherbourne CD. The importance of social context: Neighborhood stressors, stress-buffering mechanisms, and alcohol, drug, and mental health disorders. *Soc Sci Med* 2007;65:1867–81. doi:10.1016/j.socscimed.2007.05.045. [PubMed: 17614176]
- [3]. Margolin G, Gordis EB. The Effects of Family and Community Violence on Children. *Annu Rev Psychol* 2000;51:445–79. doi:10.1146/annurev.psych.51.1.445. [PubMed: 10751978]
- [4]. Clark C, Ryan L, Kawachi I, Canner MJ, Berkman L, Wright RJ. Witnessing Community Violence in Residential Neighborhoods: A Mental Health Hazard for Urban Women. *J Urban Health* 2007;85:22–38. doi:10.1007/s11524-007-9229-8. [PubMed: 17965940]
- [5]. Astell-Burt T, Feng X, Kolt GS, Jalaludin B. Does rising crime lead to increasing distress? Longitudinal analysis of a natural experiment with dynamic objective neighbourhood measures. *Soc Sci Med* 2015;138:68–73. doi:10.1016/j.socscimed.2015.05.014.
- [6]. Mair C, Diez Roux AV, Shen M, Shea S, Seeman T, Echeverria S, et al. Cross-sectional and longitudinal associations of neighborhood cohesion and stressors with depressive symptoms in the multiethnic study of atherosclerosis. *Ann Epidemiol* 2009;19:49–57. doi:10.1016/j.annepidem.2008.10.002. [PubMed: 19064189]

- [7]. Fowler PJ, Tompsett CJ, Braciszewski JM, Jacques-Tiura AJ, Baltes BB Community violence: a metaanalysis on the effect of exposure and mental health outcomes of children and adolescents. *Dev Psychopathol* 2009;21:227–59. doi:10.1017/S0954579409000145. [PubMed: 19144232]
- [8]. Ahern J, Matthay EC, Goin DE, Farkas K, Rudolph KE. Acute Changes in Community Violence and Increases in Hospital Visits and Deaths From Stress-responsive Diseases. *Epidemiology* 2018;29:684. doi:10.1097/EDE.0000000000000879. [PubMed: 29889688]
- [9]. Wolfer TA. Coping With Chronic Community Violence: The Variety and Implications of Women's Efforts. *Violence Vict* 2000;15:283–301. [PubMed: 11200103]
- [10]. McGirr A, Renaud J, Bureau A, Seguin M, Lesage A, Turecki G. Impulsive-aggressive behaviours and completed suicide across the life cycle: a predisposition for younger age of suicide. *Psychol Med* 2008;38:407–17. doi:10.1017/S0033291707001419. [PubMed: 17803833]
- [11]. Guerra NG, Rowell Huesmann L, Spindler A. Community Violence Exposure, Social Cognition, and Aggression Among Urban Elementary School Children. *Child Dev* 2003;74:1561–76. doi: 10.1111/1467-8624.00623. [PubMed: 14552414]
- [12]. Hall-Lande JA, Eisenberg ME, Christenson SL, Neumark-Sztainer D. Social Isolation, Psychological Health, and Protective Factors in Adolescence. *Adolescence* 2007;42:265–86. [PubMed: 17849936]
- [13]. Bell S, Russ TC, Kivimäki M, Stamatakis E, Batty GD. Dose-Response Association Between Psychological Distress and Risk of Completed Suicide in the General Population. *JAMA Psychiatry* 2015;72:1254–6. doi:10.1001/jamapsychiatry.2015.2107. [PubMed: 26560886]
- [14]. Cavanagh JTO, Carson AJ, Sharpe M, Lawrie SM. Psychological autopsy studies of suicide: a systematic review. *Psychol Med* 2003;33:395–405. [PubMed: 12701661]
- [15]. Kryszynska K, Lester D. Post-traumatic stress disorder and suicide risk: a systematic review. *Arch Suicide Res Off J Int Acad Suicide Res* 2010;14:1–23. doi:10.1080/13811110903478997.
- [16]. Harris EC, Barraclough B. Suicide as an outcome for mental disorders. A meta-analysis. *Br J Psychiatry J Ment Sci* 1997;170:205–28.
- [17]. Khan A, Leventhal RM, Khan S, Brown WA Suicide risk in patients with anxiety disorders: a meta-analysis of the FDA database. *J Affect Disord* 2002;68:183–90. [PubMed: 12063146]
- [18]. Liu RT, Miller I. Life events and suicidal ideation and behavior: A systematic review. *Clin Psychol Rev* 2014;34:181–92. doi:10.1016/j.cpr.2014.01.006. [PubMed: 24534642]
- [19]. Kaplan MS, McFarland BH, Huguet N, Conner K, Caetano R, Giesbrecht N, et al. Acute alcohol intoxication and suicide: a gender-stratified analysis of the National Violent Death Reporting System. *Inj Prev* 2012;injuryprev-2012-040317. doi:10.1136/injuryprev-2012-040317.
- [20]. Nock M, Hwang I, Sampson N, Kessler R. Mental Disorders, Comorbidity and Suicidal Behavior: Results from the National Comorbidity Survey Replication. *Mol Psychiatry* 2010;15:868–76. doi:10.1038/mp.2009.29. [PubMed: 19337207]
- [21]. Trout DL. The Role of Social Isolation in Suicide. *Suicide Life Threat Behav* 1980;10:10–23. doi:10.1111/j.1943-278X.1980.tb00693.x. [PubMed: 7361340]
- [22]. Vermeiren R, Ruchkin V, Leckman PE, Deboutte D, Schwab-Stone M. Exposure to Violence and Suicide Risk in Adolescents: A Community Study. *J Abnorm Child Psychol* 2002;30:529–37. doi:10.1023/A:1019825132432. [PubMed: 12403155]
- [23]. Lambert SF, Copeland-Linder N, Ialongo NS. Longitudinal associations between community violence exposure and suicidality. *J Adolesc Health* 2008;43:380–6. doi:10.1016/j.jadohealth.2008.02.015. [PubMed: 18809136]
- [24]. Van Dulmen M, Mata A, Claxton S, Klipfel K, Schinka K, Swahn M, et al. Longitudinal associations between violence and suicidality from adolescence into adulthood. *Suicide Life Threat Behav* 2013;43:523–31. doi:10.1111/sltb.12036. [PubMed: 23725554]
- [25]. Farrell CT, Bolland JM, Cockerham WC. The Role of Social Support and Social Context on the Incidence of Attempted Suicide Among Adolescents Living in Extremely Impoverished Communities. *J Adolesc Health* 2015;56:59–65. doi:10.1016/j.jadohealth.2014.08.015. [PubMed: 25438969]
- [26]. Thompson R, Litrownik AJ, Isbell P, Everson MD, English DJ, Dubowitz H, et al. Adverse experiences and suicidal ideation in adolescence: Exploring the link using the LONGSCAN samples. *Psychol Violence* 2012;2:211–25.

- [27]. Zimmerman GM. Does Violence toward Others Affect Violence toward Oneself? Examining the Direct and Moderating Effects of Violence on Suicidal Behavior. *Soc Probl* 2013;60:357–82. doi: 10.1525/sp.2013.60.3.357.
- [28]. Colson KE, Galin J, Ahern J. Spatial Proximity to Incidents of Community Violence Is Associated with Fewer Suicides in Urban California. *J Urban Health Bull N Y Acad Med* 2016;93:770–96. doi:10.1007/s11524-016-0072-7.
- [29]. Matthay EC, Farkas K, Skeem J, Ahern J. Exposure to Community Violence and Self-harm in California: A Multilevel, Population-based, Case–Control Study. *Epidemiology* 2018;29:697. doi:10.1097/EDE.0000000000000872. [PubMed: 29889134]
- [30]. Matthay E, Farkas K, Skeem J, Ahern J Within-community variation in violence and risk of self-harm in California: a population-based rcase–crossover study. *Epidemiology* 2018;in press.
- [31]. Centers for Disease Control and Prevention. CDC Web-based Injury Statistics Query and Reporting System (WISQARS) 2018 <https://www.cdc.gov/injury/wisqars/index.html> (accessed December 5, 2018).
- [32]. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, Severity, and Comorbidity of 12-Month DSM-IV Disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 2005;62:617–27. doi:10.1001/archpsyc.62.6.617. [PubMed: 15939839]
- [33]. Crouch JL, Hanson RF, Saunders BE, Kilpatrick DG, Resnick HS. Income, race/ethnicity, and exposure to violence in youth: Results from the national survey of adolescents. *J Community Psychol* 2000;28:625–41. doi:10.1002/1520-6629(200011)28:6<625::AID-JCOP6>3.0.CO;2-R.
- [34]. Stein BD, Jaycox LH, Kataoka S, Rhodes HJ, Vestal KD. Prevalence of Child and Adolescent Exposure to Community Violence. *Clin Child Fam Psychol Rev* 2003;6:247–64. doi:10.1023/B:CCFP.0000006292.61072.d2. [PubMed: 14719637]
- [35]. Wacholder S, Silverman DT, McLaughlin JK, Mandel JS. Selection of Controls in Case-Control Studies: II. Types of Controls. *Am J Epidemiol* 1992;135:1029–41. [PubMed: 1595689]
- [36]. Wacholder S, Silverman DT, McLaughlin JK, Mandel JS. Selection of Controls in Case-Control Studies: III. Design Options. *Am J Epidemiol* 1992;135:1042–50. doi:10.1093/oxfordjournals.aje.a116398. [PubMed: 1595690]
- [37]. Li C, Matthay E, Rowe C, Bradshaw P, Ahern J. Conducting case-control studies using survey data with complex sampling designs: A simulation study. *Prep* n.d..
- [38]. Ahern J, Hubbard A, Galea S. Estimating the Effects of Potential Public Health Interventions on Population Disease Burden: A Step-by-Step Illustration of Causal Inference Methods. *Am J Epidemiol* 2009;169:1140–7. doi:10.1093/aje/kwp015. [PubMed: 19270051]
- [39]. van der Laan MJ. Estimation based on case-control designs with known prevalence probability. *Int J Biostat* 2008;4:Article 17.
- [40]. Hastie T, Tibshirani RJ. *Generalized Additive Models*. New York, NY: Chapman & Hall; 1990.
- [41]. Sotero M A Conceptual Model of Historical Trauma: Implications for Public Health Practice and Research. Rochester, NY: Social Science Research Network; 2006.
- [42]. Widom CS, Wilson HW. Intergenerational Transmission of Violence In: Lindert J, Levav I, editors. *Violence Ment. Health Its Manifold Faces*, Dordrecht: Springer Netherlands; 2015, p. 27–45. doi:10.1007/978-94-017-8999-8_2.
- [43]. Smith BW, Holmes MD. Police Use of Excessive Force in Minority Communities: A Test of the Minority Threat, Place, and Community Accountability Hypotheses. *Soc Probl* 2014;61:83–104. doi:10.1525/sp.2013.12056.
- [44]. Evans-Campbell T Historical Trauma in American Indian/Native Alaska Communities: A Multilevel Framework for Exploring Impacts on Individuals, Families, and Communities. *J Interpers Violence* 2008;23:316–38. doi:10.1177/0886260507312290. [PubMed: 18245571]
- [45]. Whitesell NR, Beals J, Crow CB, Mitchell CM, Novins DK. Epidemiology and Etiology of Substance Use among American Indians and Alaska Natives: Risk, Protection, and Implications for Prevention. *Am J Drug Alcohol Abuse* 2012;38:376–82. doi:10.3109/00952990.2012.694527. [PubMed: 22931069]
- [46]. Markides KS, Eschbach K. Aging, Migration, and Mortality: Current Status of Research on the Hispanic Paradox. *J Gerontol Ser B* 2005;60:S68–75. doi:10.1093/geronb/60.Special_Issue_2.S68.

- [47]. Gomez SL, Lichtensztajn DY, Parikh P, Hasnain-Wynia R, Ponce N, Zingmond D. Hospital practices in the collection of patient race, ethnicity, and language data: a statewide survey, California, 2011. *J Health Care Poor Underserved* 2014;25:1384–96. doi:10.1353/hpu.2014.0126. [PubMed: 25130247]
- [48]. Gomez SL, Kelsey JL, Glaser SL, Lee MM, Sidney S. Inconsistencies between self-reported ethnicity and ethnicity recorded in a health maintenance organization. *Ann Epidemiol* 2005;15:71–9. doi:10.1016/j.annepidem.2004.03.002. [PubMed: 15571996]
- [49]. Blustein J The reliability of racial classifications in hospital discharge abstract data. *Am J Public Health* 1994;84:1018–21. doi:10.2105/AJPH.84.6.1018. [PubMed: 8203669]
- [50]. Carroll R, Metcalfe C, Gunnell D. Hospital Presenting Self-Harm and Risk of Fatal and Non-Fatal Repetition: Systematic Review and Meta-Analysis. *PLOS ONE* 2014;9:e89944. doi: 10.1371/journal.pone.0089944. [PubMed: 24587141]
- [51]. Braga AA, Weisburd D. The Effects of “Pulling Levers” Focused Deterrence Strategies on Crime. Oslo, Norway: Campbell Collaboration; 2012.
- [52]. Butts JA, Roman CG, Bostwick L, Porter JR. Cure Violence: A Public Health Model to Reduce Gun Violence. *Annu Rev Public Health* 2015;36:39–53. doi:10.1146/annurev-publhealth-031914-122509. [PubMed: 25581151]
- [53]. Hahn R, Fuqua-Whitley D, Wethington H, Lowy J, Crosby A, Fullilove M, et al. Effectiveness of Universal School-Based Programs to Prevent Violent and Aggressive Behavior: A Systematic Review. *Am J Prev Med* 2007;33:S114–29. doi:10.1016/j.amepre.2007.04.012. [PubMed: 17675013]
- [54]. Tolan P, Henry D, Schoeny M, Bass A, Lovegrove P, Nichols E. Mentoring Interventions to Affect Juvenile Delinquency and Associated Problems: A Systematic Review. Campbell Collaboration; 2013.
- [55]. Lambert SF, Nylund-Gibson K, Copeland-Linder N, Jalongo NS. Patterns of community violence exposure during adolescence. *Am J Community Psychol* 2010;46:289–302. doi:10.1007/s10464-010-9344-7. [PubMed: 20878229]
- [56]. Stein BD, Jaycox LH, Kataoka S, Rhodes HJ, Vestal KD. Prevalence of child and adolescent exposure to community violence. *Clin Child Fam Psychol Rev* 2003;6:247–64. [PubMed: 14719637]
- [57]. O’Keefe M Adolescents’ exposure to community and school violence: prevalence and behavioral correlates. *J Adolesc Health Off Publ Soc Adolesc Med* 1997;20:368–76. doi:10.1016/S1054-139X(97)80131-0.

Table 1:

Adjusted associations of past-year community violence with fatal and non-fatal self-harm, for overall rate difference and population attributable rate difference parameters, by race/ethnicity

Race/ethnicity	Fatal self-harm		Nonfatal self-harm	
	Overall rate difference (95% CI)	Population attributable rate difference (95% CI)	Overall rate difference (95% CI)	Population attributable rate difference (95% CI)
White	5 (1, 10)	2 (0, 4) ^a	90 (87, 93)	45 (44, 46)
Black	76 (−7, 158)	3 (−3, 8)	88 (81, 95)	44 (40, 47)
American Indian	<i>b</i>	<i>b</i>	74 (50, 97)	56 (46, 66)
Asian	−2 (−4, 1)	−1 (−3, 0)	2 (−1, 4)	2 (1, 3)
Multiracial	−62 (−238, 113)	−67 (−238, 104)	65 (57, 74)	25 (21, 29)
Hispanic	0 (−1, 1)	0 (0, 1)	23 (21, 25)	12 (11, 13)

CI: confidence interval. White: White race, non-Hispanic ethnicity. Black: Black or African American race, non-Hispanic ethnicity. American Indian: American Indian or Alaska Native race, non-Hispanic ethnicity. Asian: Asian or Pacific Islander race, non-Hispanic ethnicity. Multiracial: Multiple and other races, non-Hispanic ethnicity. Hispanic: Any race, Hispanic ethnicity. Rate differences are annualized and reported per 100,000.

^aConfidence interval includes 0.

^bEstimates were unstable and are not reported.