



Violence exposure and mental health consequences among urban youth

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Accepted: 21 July 2021

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Abstract

Urban residents are disproportionately affected by violence exposure and mental health consequences as compared to non-urban residents. The present study examined the prevalence of violence exposure and associated mental health consequences among urban and non-urban youth. Urban participants were drawn from Detroit, Michigan, a city that has led the nation for most of the last decade as one of the most violent big cities in the U.S. Participants included 32 Detroit youth and 32 youth recruited from the surrounding non-urban areas, matched on age ($M = 10.4 \pm 2.8$ years) and sex (49% male). Youth completed validated measures of violence exposure, anxiety, and depression symptoms. Urban youth reported more violence exposures than their non-urban counterparts, including hearing gunshots (69% vs. 19%, respectively), witnessing a shooting (24% vs. 6%), and witnessing an arrest (58% vs. 27%). Overall, greater violence exposure was associated with more anxiety symptoms, particularly among urban youth. Although violence exposure was not associated with depressive symptoms overall, urban youth reported significantly higher depressive symptoms than non-urban youth. Exposure to specific violence types, particularly hearing gunshots, was associated with higher anxiety and depressive symptoms among urban but not non-urban youth. Being beat up predicted depressive symptoms among non-urban but not urban youth. Household income and community distress did not predict mental health outcomes. Taken together, urban youth have more exposure to violence, particularly firearm violence, and associated mental health problems than their non-urban counterparts. Targeted community-wide initiatives to prevent violence and identify exposed youth are needed to improve mental health in at-risk communities.

Keywords Violence · Gun violence · Urban · Mental health · Detroit · Adolescents

Introduction

The burden of mental health problems is immense and widespread, particularly for individuals residing in urban settings. Indeed, research suggests that urban residents are disproportionately affected by psychological trauma exposure and mental health consequences. One study of 1600 adults reporting to an urban public hospital found that 88% reported significant

lifetime trauma, and the lifetime prevalence of posttraumatic stress disorder (PTSD) and major depressive disorder was 46% and 37%, respectively (Gillespie et al., 2009). One factor that is thought to contribute to elevated rates of trauma exposure among urban residents is crime (Jenkins et al., 2008). In fact, annual violent crime rates in urban regions are 74% and 37% higher than rural and suburban rates, respectively (McCart et al., 2007). Individuals living in neighborhoods

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with higher ambient crime levels may be exposed to violence in their communities at higher rates and may be disproportionately affected by mental health consequences as compared to non-urban residents (Cuartas & Leventhal, 2020).

Violence exposure among children is a chief public health concern (Goodrum et al., 2020; Wamser-Nanney et al., 2019). Violence exposure can include witnessing or experiencing acts of violence or crimes within the home or neighborhood, such as drug deals, beatings, shootings, stabbings, and hearing gunshots (DeCou & Lynch, 2017). These exposures frequently involve a weapon, such as a knife or a firearm, and can have dire consequences. Indeed, firearm-related injuries are the second leading cause of death among 1- to 19-year-olds in the U.S. (Fowler et al., 2017). Death is the most extreme outcome; however, non-fatal exposures are widespread and have lasting effects on youth.

A growing body of research has demonstrated the detrimental effects of stress and psychological trauma, including violence exposure, on youth's health and development. During childhood, violence exposure is linked to various negative consequences, including poorer attention and academic performance, school disengagement, more aggressive and delinquent behaviors, suicidality, anxiety, depression, and PTSD (Borofsky et al., 2013; Guerra et al., 2003; Hurt et al., 2001; Johnsona et al., 2002; Patchin et al., 2016). Neuroimaging research by our group and others has linked violence exposure to alterations in brain structure and function, particularly within brain regions implicated in anxiety and threat detection, such as the amygdala and hippocampus (Thomason et al., 2015; Saxbe et al., 2018; Reda et al., 2021). Moreover, children and adolescents exposed to violence are also at risk of mental health problems during adulthood, highlighting the enduring effects of these early experiences (Lee et al., 2020). Taken together, exposure to violence is associated with mental health and neurodevelopmental implications among youth that persists into adulthood.

Despite the wealth of literature on the effects of childhood violence exposure, there is still a notable absence in understanding the complexity of violence exposure in broader contexts. Indeed, individuals' developmental outcomes vary as a function of environmental characteristics (Bronfenbrenner & Ceci, 1994). The bioecological model of human development theorizes a greater influence of environmental processes on youth growing up in disadvantaged contexts than on youth in more advantaged contexts (Beyers et al., 2001). More socioeconomically distressed communities, such as urban regions, may be disproportionately affected by community violence and youth firearm violence (Tracy et al., 2019). Therefore, it is critical to understand how the impact of violence on children's wellbeing may differ between urban and non-urban settings.

Existing literature supports the multiple and complex nature of the theoretical links between crime, the

environment, and health and wellbeing (Lorenc et al., 2012). Similarly, children's exposure to violence is multifaceted, and prior research suggests a four-dimensional framework in which violence is experienced (Boxer & Sloan-Power, 2013). This includes the setting, the nature of the act, the mode of exposure (e.g., witnessing violence or victimization), and the frequency of violence exposure. Individually these factors may influence wellbeing, given that prior research suggests that *gun violence* exposure (e.g., hearing gunshots, witnessing gun violence) is a unique predictor of PTSD symptoms among youth (Turner et al., 2019). Together, this model serves as a descriptive foundation for understanding the complexity of childhood violence exposure, emphasizing the importance of understanding the impact of *specific* exposures on wellbeing.

The present study examined violence exposure and associated mental health outcomes among urban and non-urban youth. We present a conceptual framework to describe the relationship between violence exposure and the associated mental health outcomes by urbanicity (i.e., urban, non-urban; see Fig. 1). Urban participants were drawn from Detroit, Michigan, which is considered to be the most violent big city in the U.S. (Schiller, 2021). Consistent with this, Detroit ranks 8th in the U.S. for pediatric firearm homicides (Centers for Disease Control and Prevention, 2011). We hypothesized that (1) violence exposure would be greater among urban youth than youth living in non-urban areas, (2) greater violence exposure would be associated with higher anxiety and depressive symptoms among youth, and that (3) the association between violence and mental health outcomes would differ by urbanicity (i.e., urban, non-urban). Exploratory analyses examined the impact of specific types and modes of exposures on mental health (i.e., in the home or community; witness or victim), the spatial distribution of violence exposure across our Detroit sample, and whether household socioeconomic status (SES) and/or community distress also predicted youth mental health outcomes with and without accounting for violence exposure.

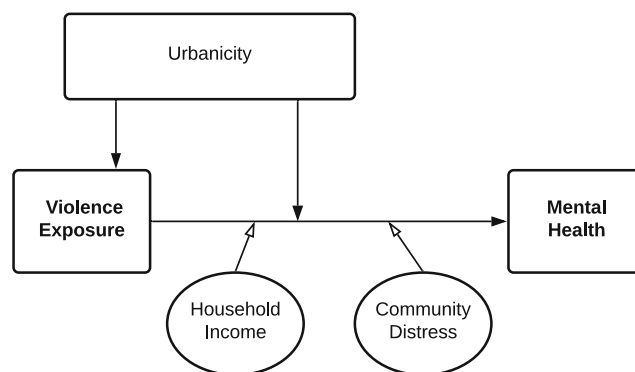


Fig. 1 Conceptual framework of the relationship between violence exposure and mental health outcomes by urbanicity

Methods

Participants

This study reports on 32 urban (Detroit) residents and 32 non-urban residents matched on sex and age (6–17 years). Participants were drawn from a larger neuroimaging study that examined the effects of childhood trauma exposure on brain development. The present study is a secondary analysis of data on violence exposure and mental health. Participants from Detroit and the surrounding suburbs were recruited through community-based advertisements (e.g., parent groups, university postings, flyers at local healthcare providers). Classification of urban vs. non-urban residents was based on the zip code of the current residential address. A parent or legal guardian provided written informed consent, and the youth provided assent. The local institutional review board approved all study procedures.

Measures

Participants completed validated measures of violence exposure and symptoms of anxiety and depression. Trained research staff assisted participants in completing these measures. Demographic data were collected from parents, including youth sex, age, race/ethnicity, zip code of residential address, and annual household income.

Violence Exposure Exposure to violence was measured using a modified 20-item version of the Things I Have Seen and Heard Scale (TIHSH; Richters & Martinez, 1993). This child self-report instrument measures exposure to violence and violence-related events in the home and community and demonstrates high internal consistency and good test-retest reliability (0.81; Richters & Martinez, 1992). The TIHSH has been validated for use in children as young as age 6 (Richters & Martinez, 1990; Richters & Martinez, 1992). Seventeen of the 20 TIHSH items correspond to violence exposure (e.g., “Have you heard gunshots?”) and 3 items to feelings of safety (e.g., “Do you feel safe at school”). Participants responded to each item with a dichotomous Yes/No answer choice to indicate whether they experienced the event in their lifetime (i.e., ‘exposed’) or not (i.e., ‘unexposed’). See Table 2 for the complete list of TIHSH items. Factor analysis was used to derive a measure of overall violence exposure, with higher scores corresponding to higher violence (see Supplemental Material for more information).

Anxiety Symptoms Anxiety symptoms were measured using the 41-item Screen for Child Anxiety-Related Emotional Disorders (SCARED; Birmaher et al., 1997). The SCARED demonstrates good internal consistency (Cronbach’s $\alpha = 0.9$), good test-retest reliability (0.70–0.90), and discriminant

validity (both between anxiety and other disorders and within anxiety disorders; Birmaher et al., 1999). Participants rated each item (e.g., “When I feel frightened, it is hard to breathe”) using a 3-point Likert-type scale (0 = not true, 2 = very true or often true). Cumulative scores greater or equal to 25 indicate the presence of an anxiety disorder (Birmaher et al., 1999).

Depressive Symptoms Depressive symptoms were measured using the 10-item Children’s Depression Inventory Short-Form (CDI-SF; Sitarenios & Kovacs, 1999). The CDI-SF demonstrates good internal consistency (Cronbach’s $\alpha = 0.8–0.94$) and has been validated for ages 7–15 years (Saylor et al., 1984). Participants selected one of the three descriptions that best apply to them in the last two weeks (e.g., “I am sad once in a while,” “I am sad all the time”). Higher sum scores indicate more depressive symptoms, and scores of 3 or more are suggested for detecting the risk of clinically significant depression (Sitarenios & Kovacs, 1999).

Data Analysis

All data analyses were performed in SPSS version 25. Results were considered significant using a two-tailed significance level of $p < 0.05$. Chi-square analyses or independent samples *t*-tests were conducted to describe demographic differences between urban and non-urban subgroups (Table 1). First, an independent samples *t*-test was conducted to compare overall violence levels (as measured by factor scores; see Supplemental Material for details) between urban and non-urban subgroups. Next, separate linear regressions were conducted to examine whether violence (factor scores) and urbanicity (urban, non-urban) predict anxiety and depressive symptoms across the sample. Pearson’s correlations or independent samples *t*-tests were calculated to show associations between age (continuous) or sex (coded as male vs. female) and mental health outcomes. Age and/or sex were added as covariates in regression analyses when they demonstrated bivariate associations with anxiety or depression. No outliers were detected ($z > 3$ or $z < -3$) for anxiety and depressive symptoms or violence factor scores.

Exploratory Analyses Regression analyses were used to explore the impact of specific types of exposure (i.e., TIHSH items) on anxiety and depression across the sample and within urban and non-urban subgroups separately. We additionally noted associations that reached significance using multiple comparisons correction (Bonferroni correction for 14 TIHSH violence items; $p < 0.0036$). For TIHSH items statistically associated with anxiety or depressive symptoms, binary logistic regression was subsequently used to predict the odds of anxiety or depression using cutoff scores associated with exposure to individual TIHSH items. To explore the spatial

Table 1 Participant demographics

	Urban youth (<i>N</i> =32)	Non-urban youth (<i>N</i> =30)	Comparison (<i>p</i> value)
Age (M±SD)	10.4±2.8	10.4±2.8	<i>p</i> =1
Sex, <i>N</i> (%)			<i>p</i> =0.62
Male	15 (47%)	17 (53%)	
Female	17 (53%)	15 (47%)	
Race/Ethnicity, <i>N</i> (%)			<i>p</i> <0.001
African American, Non-Hispanic	28 (88%)	6 (19%)	
Caucasian, Non-Hispanic	1 (3%)	23 (72%)	
Hispanic	2 (6%)	1 (3%)	
Other	1 (3%)	2 (6%)	
Annual Household Income, <i>N</i> (%) [§]			<i>p</i> <0.01
<\$30,000	17 (57%)	8 (26%)	
\$30,000-60,000	9 (30%)	8 (26%)	
>\$60,000	4 (13%)	15 (48%)	
Community Distress (M±SD)	91.8±10.8	38.5±32.7	<i>p</i> <0.001
Anxiety symptoms (M±SD)	24.5±19.5	20.3±14.2	<i>p</i> =0.34
Depressive symptoms (M±SD)	2.8±2.2	1.4±1.6	<i>p</i> <0.01

Anxiety measured using the Screen for Child Anxiety-Related Emotional Disorders (SCARED; 0–82; 0 = low anxiety, 82 = high anxiety); Depression measured using the Children’s Depression Inventory Short-Form (CDI-SFI; 0–20; 0 = low depression, 20 = high depression); [§]Income data missing for two Detroit residents and one non-urban resident. Community distress was measured using the Distressed Communities Index (0–100; 0 = low distress; 100 = high distress; see Supplemental Material). *p*-values were computed using independent samples *t*-test for continuous variables and chi-square analysis for categorical variables. Bold values indicate statistical significance

distribution of violence exposure across the urban subsample, we generated spatial maps of the city of Detroit by zip code. Violence factor scores were averaged by zip code and shown using the “Jenks” or natural breaks method to account for an unequal class width with varying frequency of observations per class. Finally, linear regression was run to examine the relative effects of household income (coded 1 = <\$30,000/year, 2 = \$30–60,000/year, 3 = >\$60,000/year; see Table 1) and community distress (continuous from 0 to 100; see Supplemental Material) on youth mental health outcomes with and without accounting for violence exposure.

Results

Sociodemographic Differences between Urban and Non-urban Youth

Consistent with the group selection process, urban and non-urban youth did not differ in age or sex distribution (Table 1). However, urban and non-urban youth did differ in race/ethnicity and annual household income, such that the majority of urban youth were African American. In contrast, the majority of non-urban youth were Caucasian. Further, most urban households reported an annual income of less than \$30,000, whereas most non-urban households reported more

than \$60,000 (Table 1). Similarly, on average, community distress was greater among Detroit youth than non-urban youth (Table 1). Overall, these sociodemographic differences are consistent with U.S. Census data from Detroit (U.S. Census Bureau, 2019) and the surrounding metropolitan area (U.S. Census Bureau, 2019). Therefore, the data are not considered to have sampling bias.

Potential Covariates: Impact of Sex and Age

Age was positively correlated with violence exposure across the sample ($r(63) = 0.035$, $p < 0.01$), but not with anxiety or depressive symptoms. There were no sex differences in violence exposure or depressive symptoms, but females reported greater anxiety than males ($t(60) = 2.7$, $p < 0.01$). Therefore, sex was added as a covariate in analyses that included anxiety.

Violence Exposure: Urban vs. Non-urban Youth

Compared to their non-urban counterparts, urban youth reported higher overall violence exposure (factor score; Table 2). Assessment of individual TIHS items demonstrated that the following items contribute to the greater frequency of violence exposure among urban youth: hearing gunshots, seeing someone arrested, seeing someone get beat up, seeing someone shot, and seeing a dead body outside (see Table 2).

Table 2 Violence exposure in urban vs. non-urban youth

	Urban youth (N=32)	Non-urban youth (N=32)	Comparison (p value)
Violence exposure (factor score), M±SD	0.25±1.06	-0.25±0.88	p =0.05
Violence items, n (%) endorsing lifetime			
Witnessing an arrest	19 (58%)	9 (27%)	p =0.02
Hearing gunshots	22 (69%)	6 (19%)	p <0.001
Grown-ups yelling in home	17 (53%)	10 (30%)	p=0.07
Seeing a gun in the home	12 (38%)	7 (21%)	p=0.17
Witnessing someone get beaten up	12 (36%)	5 (15%)	p =0.05
Being beaten up	7 (21%)	8 (24%)	p=0.77
Grown-ups hitting each other in the home	8 (24%)	3 (9%)	p=0.10
Witnessing a drug deal	7 (21%)	4 (13%)	p=0.32
Witnessing someone get shot	8 (24%)	2 (6%)	p =0.04
Seeing drugs in the home	7 (21%)	3 (9%)	p=0.17
Seeing a dead body outside	8 (24%)	2 (6%)	p =0.04
Threatened to be killed	5 (15%)	4 (12%)	p=0.72
Witnessing a stabbing	5 (15%)	2 (6%)	p=0.23
Grown-ups threatening to stab or shoot each other in the home	4 (12%)	2 (6%)	p=0.39

Violence exposure measured using the Things I Have Seen and Heard (TIHSH), P-values computed using independent samples t-test (urban vs. non-urban youth) for factor scores, and chi-square for endorsement of individual items Bold values indicate statistical significance

Hearing gunshots was the only TIHSH item that survived correction for multiple comparisons.

symptoms than males. The coefficient for urbanicity was not significant.

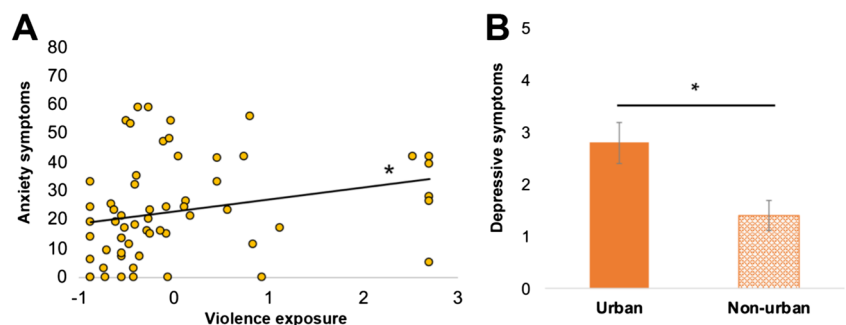
Impact of Violence Exposure and Urbanicity on Anxiety Symptoms

Regression analysis was run to predict anxiety symptoms from violence, urbanicity, and sex. These variables significantly predicted anxiety ($F[3,60] = 4.36, p < 0.01$) and accounted for 14.4% of the variation in anxiety symptoms. Violence was a significant predictor of anxiety symptoms ($b = 4.73, SE = 2.1, t[60] = 2.25, p = 0.03$), indicating that higher violence exposure was associated with higher anxiety symptoms across the sample (see Fig. 2A). The coefficient for sex was also significant ($b = 11.6, SE = 4.1, t[60] = 2.84, p < 0.01$), indicating that females reported higher anxiety

Impact of Violence Exposure and Urbanicity on Depressive Symptoms

Regression analysis was run to predict depressive symptoms from violence and urbanicity. These variables significantly predicted depression ($F[2,60] = 6.03, p < 0.01$) and accounted for 14.4% of the variation in depression symptoms. The coefficient for violence was not significant. Urbanicity was a significant predictor of depressive symptoms ($b = 1.37, SE = 0.5, t[60] = 2.77, p < 0.01$), indicating that urban residents reported greater depressive symptoms as compared to non-urban youth (see Fig. 2B). Further, a greater proportion of urban youth (53%) exceeded the threshold suggested for detecting

Fig. 2 Panel A: Association between violence exposure and anxiety symptoms across the sample. Panel B: Higher depressive symptoms in urban as compared to non-urban youth. *Denotes $p < 0.05$, derived from regression analyses. Error bars represent standard error



clinically significant depression (≥ 3 points) as compared to non-urban youth (23%), $\chi^2(2) = 5.79$, $p = 0.02$.

Exploratory Analyses

Exploratory analyses examined the (1) spatial distribution of violence exposure across urban youth, and whether endorsement of specific violence items (i.e., exposed vs. unexposed) was associated with (2) anxiety or (3) depressive symptoms. We also examined (4) whether household income and/or community distress predicted mental health outcomes.

Spatial Distribution of Violence across Urban Youth Violence differed spatially by zip code across the city of Detroit (see Fig. 3).

Individual Exposures and Anxiety Symptoms Across the entire sample, hearing gunshots, witnessing grown-ups in the home hit each other, witnessing an arrest, witnessing drug deals, and seeing drugs in the home were significant positive predictors of anxiety symptoms (p 's < 0.05 ; see Supplemental Material for full results). The association between hearing gunshots and anxiety, between witnessing grown-ups in the home hit each other and anxiety, and between witnessing drug deals and anxiety, was significant in the urban (p 's < 0.05) but not non-urban (p 's > 0.05) subgroup (see Fig. 4, Panels A–C). The association between hearing gunshots and anxiety symptoms survived correction for multiple comparisons. For urban youth who reported hearing gunshots, the odds of exceeding clinical thresholds for detecting anxiety were 13 times as large as the odds for their unexposed counterparts ($p = 0.02$). For

urban youth who reported witnessing grown-ups hit each other, the odds of exceeding clinical thresholds for detecting anxiety were 17 times as large as the odds for their unexposed counterparts ($p = 0.01$).

Individual Exposures and Depressive Symptoms Across the entire sample, hearing gunshots, witnessing grown-ups in the home hit each other, and witnessing grown-ups in the home yell at each other were significant positive predictors of depressive symptoms (p 's < 0.05 ; see Supplemental Material for full results). The association between hearing gunshots and depression, and between witnessing grown-ups yell at each other and depression, was significant in the urban (p 's < 0.05) but not non-urban (p 's > 0.05) subgroup (see Fig. 4 Panels D–E). Interestingly, in the non-urban subgroup only, being beaten up was a significant positive predictor of depressive symptoms ($p = 0.01$; see Fig. 4, Panel F). No associations between exposures and depression survived correction for multiple comparisons. See Supplemental Material for full results.

Impact of Household Income and Community Distress

Household income and community distress were not significant predictors of violence, anxiety, or depression (p 's > 0.05). When accounting for community distress, urbanicity (i.e., urban, non-urban) remained a significant predictor of violence exposure ($p < 0.01$), suggesting that there are unique effects of urbanicity. The association between violence and anxiety symptoms remained significant when controlling for household income ($p < 0.05$) and community distress ($p = 0.02$).

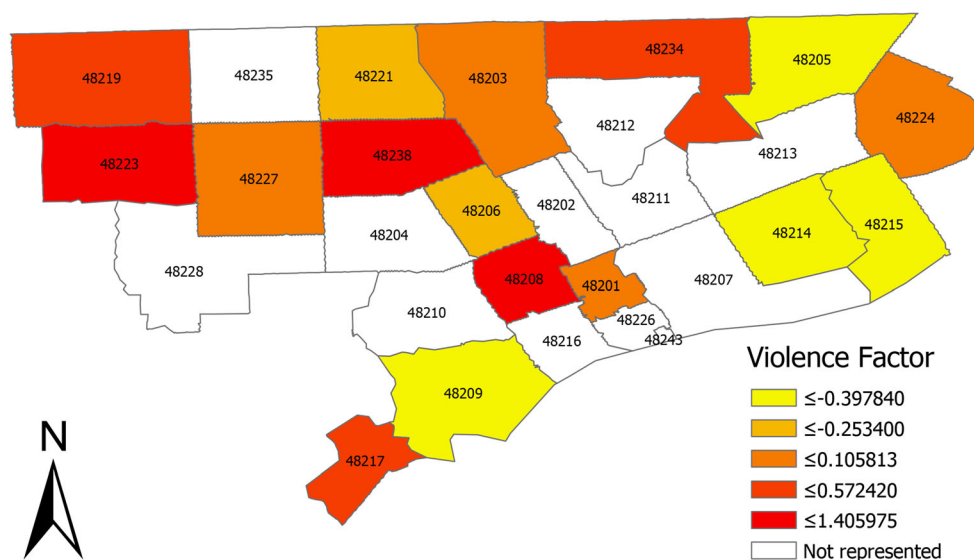


Fig. 3 Spatial distribution of violence exposure as reported by youth living in the city of Detroit. Violence was estimated using average factor scores derived from factor analysis of the Things I Have Seen and Heard

(TIHSH) questionnaire. Factor scores shown using the “Jenks” or natural breaks method to account for an unequal class width with varying frequency of observations per class

Discussion

This study investigated the distribution of violence exposure and associated mental health outcomes among youth living in urban and non-urban areas. We found that urban youth reported greater exposure to violence, particularly gun violence, than their non-urban counterparts. Urban youth also reported significantly higher depressive symptoms than non-urban youth, and greater violence exposure was associated with higher anxiety symptoms among urban youth. Individual exposures, particularly hearing gunshots, were significant predictors of anxiety and depressive symptoms in urban but not non-urban youth. Household income and community distress were not significant predictors of violence or mental health outcomes, highlighting the importance of identifying exposed youth who are at increased risk for mental health problems. Targeted community-wide initiatives to prevent violence and identify exposed youth are needed to improve mental health in at-risk neighborhoods.

Consistent with the bioecological model (Beyers et al., 2001), where youth reside can determine their exposures to violence. Accordingly, 88% of urban youth in our sample reported exposure to one or more forms of violence. This rate was 1.5 times higher than rates reported by their non-urban peers. Notably, hearing gunshots was the most commonly reported exposure among urban youth, with more than two-thirds endorsing this exposure. High rates of firearm-related exposures among urban youth fit our prior data on youth reporting to a Detroit children’s hospital for firearm-related injuries (Borg et al., 2019). In that study, the most common

causes of pediatric firearm-related injuries were drive-by and crime-related shootings, suggesting high levels of ambient violence exposure in the community (Borg et al., 2019). Taken together with the present findings that violence exposure, particularly hearing gunshots, is associated with increased anxiety, exposure to firearm-related violence may be a particularly salient threat among urban youth. Growing up in an environment with a high ambient violence level may sensitize youth to potential threats in their environments (Garbarino et al., 2002; Kilpatrick et al., 2003). Moreover, youth who experience firearm-related violence are often exposed to multiple violent contexts, such as direct threats or violence in the home (Turner et al., 2019).

This study illustrates the complexity of violence exposure among youth and that violence exposure and associated outcomes are context-dependent. Indeed, the distribution of specific exposure types and associations with mental health outcomes varied between urban and non-urban youth. These data also underscore the pathways through which contextual factors influence the relationship between violence exposure and mental health outcomes (Fig. 1). Consistent with the framework proposed by Boxer and Sloan-Power, we found evidence that specific experiences of violence influence mental health outcomes (Boxer & Sloan-Power, 2013). In the present study, hearing gunshots was the only exposure that passed multiple comparisons correction for demonstrating (1) a greater prevalence among urban vs. non-urban youth, and (2) an association with anxiety and depressive symptoms. Indeed, hearing gunshots carried a 13 times increased odds of exceeding thresholds for detecting clinically significant anxiety among Detroit youth. These results are

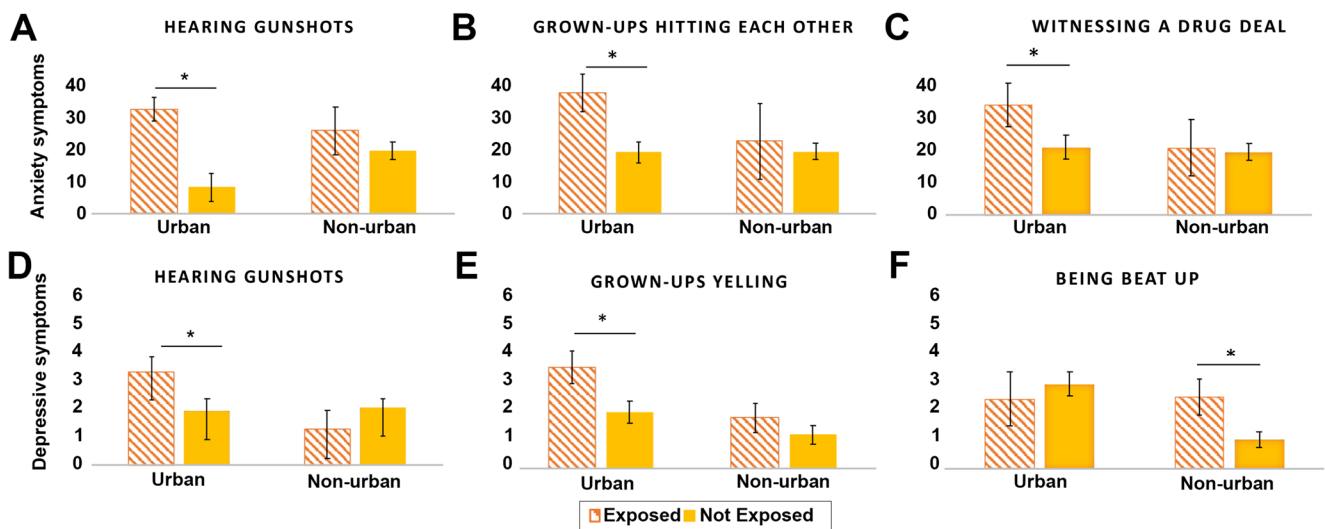


Fig. 4 Panels A–C: Endorsement of specific exposures associated with anxiety in urban but not non-urban youth. Panels A–B: Endorsement of specific exposure associated with depressive symptoms in urban but not non-urban youth. Panel C: Endorsement of being beat up associated with depressive symptoms in non-urban but not urban youth. Violence estimated using a factor score derived from

factor analysis of the Things I Have Seen and Heard (TIHSH) questionnaire. Anxiety symptoms measured using the Screen for Child Anxiety-Related Emotional Disorders (SCARED); Depressive symptoms measured using the Children’s Depression Inventory Short-Form (CDI-SF). *Denotes $p < 0.05$, derived from regression analyses. Error bars represent standard error

consistent with prior research suggesting that gun violence exposure is a unique predictor of PTSD symptoms among youth (Turner et al., 2019). Taken together, these data suggest that within urban contexts, specific contents (i.e., firearms) and channels (i.e., indirect witness) of violence exposure strongly predict mental health symptoms in youth. Such a theoretical approach of addressing the complexity of violence exposure and mental health outcomes is essential for developing youth violence interventions.

We also found that violence exposure was not spatially uniform across Detroit. Detroit is a unique urban city because it has a population density of 4880 persons per square mile, indicating a relatively small population spread over a large geographic area (Clery et al., 2020). Although preliminary, our data suggest a higher concentration of youth violence exposure in Northwest Detroit zip codes, which aligns with data collected on pediatric firearm injuries from a Detroit children's hospital (Borg et al., 2019) as well as violent crime reports (Federal Bureau of Investigation, 2019). Interestingly, exploratory analysis found that violence exposure was not associated with household income or community distress. Violence exposure predicted mental health outcomes with and without controlling for these factors. These data suggest that targeting the most socioeconomic distressed communities may not be the most effective approach for interventions in urban communities, such as Detroit. Instead, identifying 'hot spots' of youth violence exposure through surveys and crime reports may help direct targeted neighborhood-level interventions to reduce ambient violence exposure and provide mental health resources.

The findings from this study should be considered in the context of its limitations. This study focused on Detroit-area youth, and thus results may not be generalizable to other urban contexts. However, Detroit consistently ranks as the most violent big city in the U.S. and has a high incidence of pediatric firearm homicides, making it a critical context to understand the prevalence and mental health correlates of violence exposure in youth (Clery et al., 2020). The sample size was also relatively limited. However, the study design relied upon a matched cohort of urban and non-urban residents drawn from a larger study. Our sampling was also restricted to the larger dataset, and thus some zip codes were not represented or have a low number of participants contributing to specific zip codes. Future studies should use stratified sampling strategies to better examine spatial patterns across the city (e.g., neighborhood-level sampling; Borg et al., 2019; Clery et al., 2020).

Conclusion

To our knowledge, this study is the first to demonstrate that urban youth disproportionately experience violence and that specific exposures are more strongly predictive of mental health outcomes. Our findings suggest that interventions that identify exposed youth or target communities with high crime

rates may be more effective at reducing the burden of violence exposure on youth, as compared to focusing on communities with high levels of socioeconomic distress.

Data from the American Psychological Association suggest that community-based programs that aim to create healthy environments for children can effectively prevent violence (American Psychological Association, 2013). Violence prevention initiatives may also improve crime rates and neighborhood quality over time, as exposure to violence during childhood is a distal risk factor for later perpetration of violence (Wamser-Nanney et al., 2019). Further, interventions should aim to identify and provide mental health resources to violence-exposed youth at increased risk of adverse mental health outcomes (American Psychological Association, 2013). For example, pediatricians or school counselors may implement a violence exposure screening tool to identify at-risk youth and provide targeted evidence-based resources. Importantly, our data highlights that interventions should be tailored to the environment, or by urbanicity, as risk associated with urban contexts differs from non-urban contexts (e.g., gunshots v. bullying).

Our data highlight models of violence exposure, reflecting context and specificity, as valuable frameworks for understanding the various configurations of exposure. We offered theoretical integration to describe the relationship between violence exposure and the associated mental health outcomes. Living in areas with high ambient violence levels, particularly firearm violence, can be detrimental to young people's mental health, but also their physical health. Each year, an estimated 8000 youth are shot by a firearm in the U.S. (Gani & Canner, 2018). Youth who survive their injuries are left with scars, but youth who are exposed to violence may experience chronic mental health problems that goes unnoticed (Gani & Canner, 2018; Garbarino et al., 2002; Kilpatrick et al., 2003). Therefore, the impact of gun violence is largely underestimated. Permissive firearm laws in the U.S. create unsafe communities that can have deadly and/or life-long consequences for young people. Policies that prohibit high-risk individuals from possessing a firearm and promoting safe firearm ownership can reduce firearm violence (Zeoli & Webster, 2019). Health professionals should advocate for such policies and evidence-based initiatives that create safe and sustainable communities.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12144-021-02141-4>.

Acknowledgements The authors would like to thank Jessica Worley for assistance with the creation of Fig. 3.

Code Availability Not applicable.

Authors' Contributions All authors made substantial contributions to conception and design, and/or acquisition of data, and/or analysis and interpretation of data; participated in drafting the article or revising it critically for important intellectual content; and gave final approval of the version to be submitted and any revised version.

Funding This work was funded in part by NIH grant K01MH119241 to HM. All experimental procedures were approved by the local ethics committee, and all participants and their parents/caregivers gave written informed assent and consent.

Data Availability The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics Approval The local ethics committee approved all experimental procedures.

Consent to Participate All participants and their parents/caregivers gave written informed assent and consent.

Consent for Publication Not Applicable.

Conflicts of Interest/Competing Interests None of the authors have financial disclosures or conflicts of interest.

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