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Perceptions of Neighborhood Mediate the Relationship Between PTSD Symptoms and Coping in a Neighborhood-Matched Substance-Using Sample

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Abstract

Objectives—People with substance use problems living in neighborhoods with high levels of disorder are disproportionately likely to experience trauma and develop PTSD symptoms. We sought to evaluate the relationships between objective neighborhood disorder, perceptions of neighborhood, and the use of maladaptive coping behaviors among both non-substance-using and substance-using participants with and without PTSD symptoms.

Methods—Participants [(255 Non-Drug Users (NDUs), 168 Marijuana and/or Alcohol Users (MAUs), and 273 Opioid and/or Stimulant Users (OSUs)] completed the Addiction Severity Index, PTSD Checklist - Civilian Version, The COPE Inventory, and the Perceived Neighborhood Scale. The Neighborhood Inventory of Environmental Typology (NIfETy) was used to objectively assess neighborhood disorder at participants' home addresses. Regression modeling was used to assess within-group predictors of PTSD and test for mediation in the relationships between PTSD, perceptions of neighborhood, and coping behaviors.

Results—In NDUs, lower sense of community partially mediated the relationship between PTSD symptoms and using mental disengagement to cope. In MAUs, higher levels of perceived crime partially mediated the individual relationships between PTSD symptoms and using mental disengagement, focusing on and venting emotions, and using substances to cope. OSUs with PTSD symptoms reported using higher levels of mental disengagement, focusing on and venting emotions, and substances to cope and perceived a higher degree of crime; no mediation was inferred.

Conclusion—Perceptions of community and crime may be more predictive of PTSD symptoms than objectively measured neighborhood disorder. These perceptions partially mediate the relationship between maladaptive coping behaviors and PTSD symptoms.

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INTRODUCTION

After experiencing a traumatic event, people are susceptible to developing PTSD symptoms that may cause significant functional impairment. PTSD is a psychiatric disorder characterized by re-experiencing symptoms, avoidance, negative attributions of the trauma, and heightened arousal and reactivity (American Psychiatric Association, 2013). The etiology of PTSD is likely explained by independent, competing, and interacting genetic, environmental, and psychological factors. A large body of research has been dedicated to assessing coping behaviors as they relate to PTSD symptoms and substance use, and there is a growing body of work on neighborhood-level factors related to objective and perceived characteristics of a neighborhood in relation to PTSD.

Understanding the relationship between specific coping behaviors and PTSD is a critical component in predicting the development and maintenance of PTSD symptoms, especially when evaluating self-medication behaviors. According to the Emotion Processing Theory, PTSD symptoms arise when a complex fear memory develops, which is highly reactive to any stimuli that is perceived to be associated with the traumatic event, and is accompanied by a perceived lack of control or inability to cope effectively (Rauch and Foa, 2006). The use of avoidance coping strategies, in which the individual does not confront trauma-related stimuli that activate the fear memory, prevents the extinction of heightened reactivity towards these stimuli. Consequently, PTSD symptoms are maintained, or even exacerbated. Attempts to suppress, control, and avoid processing thoughts and emotions can also be defined as disengagement behaviors, which have been shown to both maintain PTSD symptoms and predict at-risk substance use behaviors (Allbaugh et al., 2016; Hetzel and Meads, 2016; McConnell et al., 2014).

One risk factor for PTSD is neighborhood disorder, defined as a set of cues indicating a local breakdown of social control, and typically measured in terms of physical decay, homelessness, and crime (Ross and Mirowsky, 1999; Sampson and Raudenbush, 2005). Nearly half of all people living in disordered neighborhoods meet criteria for a lifetime diagnosis of PTSD (Schwartz et al., 2005). Risk for psychiatric disorders- PTSD in particular- has been found to be predicted geographically by the residential location at the time of birth, regardless of the reported address 10 years later (Hoffman et al., 2015). These associations are partially mediated by low social cohesion and neighborhood dissatisfaction (Gapen et al., 2011; Johns et al., 2012).

People who report higher rates of perceived stress in response to their neighborhood are also more likely to use substances to cope (Brenner et al., 2013). Among individuals living in disadvantaged neighborhoods, engaging in at-risk substance use presents additional risk of experiencing trauma and developing PTSD (Jacobsen et al., 2001). At-risk substance use may coincide with the expression of PTSD symptoms through an increase in drug cravings in response to trauma-related stimuli (Coffey et al., 2005). Self-medication via at-risk substance use may temporarily alleviate PTSD symptoms in the moment, while functioning as a form of avoidance coping in the long-term.

Evidence supporting the mediating effects of neighborhood factors on psychological factors, such as coping behaviors, in PTSD is sparse. The degree to which PTSD-associated coping behaviors may be triggered by perceptions of likely environmental stressors, such as visible signs of social disorder or material deprivation, is unclear. To fill these gaps, we conducted within-group comparisons testing the following hypotheses by substance-use category: (1) those with current PTSD symptoms would have more negative perceptions of their neighborhood than those without current PTSD symptoms, despite living in objectively analogous neighborhoods; (2) PTSD symptoms would predict the use of certain coping behaviors; (3) perceptions of neighborhood would predict the use of PTSD-associated coping behaviors; and (4) perceptions of neighborhood would mediate the relationship between PTSD symptoms and its associated coping behaviors (Fig.1)

METHODS

Procedures

The secondary analysis presented here uses data collected at the baseline visit of a longitudinal study of the impact of neighborhood on social and health outcomes. Using a cross-sectional design, participants were assessed at baseline for current at-risk substance use, PTSD symptoms, perceptions of neighborhood, and coping behaviors. Each participant was then assigned an objective neighborhood disorder score based on their home address. We conducted parallel analyses on three substance-using groups [(1) non-drug users, (2) marijuana/alcohol users, and (3) opioid/stimulant users] to determine whether neighborhood characteristics mediate the relationship between coping behaviors and PTSD symptoms among people who use substances and those who do not.

Participants

All participants included in the analysis enrolled in a 1-year observational study assessing health outcomes among neighborhood-matched people who use substances and those who do not. The Institutional Review Board of the NIDA Intramural Research program approved the study, and participants gave written informed consent before enrollment.

Inclusion criteria were: (1) being at least 18 years old, and (2) living in Baltimore City or one of its surrounding counties. Exclusion criteria were: (1) current enrollment in opioid-agonist treatment, (2) inability to provide informed consent or valid self-report, and (3) medical illness severe enough to compromise study participation.

Materials

Addiction Severity Index (ASI)—The drug use section of the ASI was used to assess at-risk substance use (Leonhard et al., 2000). Participants reported past-30-day substance use and identified which substance they perceived to be the most problematic. All participants who reported problems associated with using marijuana or alcohol in the past 30 days, but no past-30-day opioid/stimulant use, were grouped together as marijuana/alcohol users (MAUs). Any participant reporting past-30-day alcohol use above the NIH guidelines for at-risk alcohol use (4 drinks a day for women and 5 for men, or more than 7 drinks a week for women and 14 for men) in the absence of self-reported problems was placed in the MAU

group. All people reporting problems associated with heroin, other opioids, cocaine, or other stimulant use in the past 30 days, whether or not they also endorsed marijuana or alcohol use, were grouped together as opioid and/or stimulant users (OSUs).

We categorized MAUs together because of the lower average PTSD symptom rate (23%) and number of participants (43%) that used both alcohol and marijuana. OSUs were categorized together for the same reasons: there was a higher average PTSD symptom rate (31%) and 67% of OSUs reported both opioid and stimulant use. Participants who did not report past 30-day use of any substance were classified as non-drug users (NDUs). All participants provided observed urine toxicology at screening and at the time of the study visit. Both self-reported NDUs and those reporting negative status of any drug were cross-referenced with urine results to reduce the potential for false negative self-reports; positive urine specimens were not required for classification in the MAU or OSU groups.

The psychiatric section of the ASI was used to assess for co-occurring depression and anxiety symptoms.

The PTSD Checklist – Civilian Version (PCL-C)—The PCL-C was used to assess the presence of PTSD symptoms within the past 30 days. The PCL-C is a 17-item screening tool (Weathers et al., 1991). Response options ranged from 1 (not at all) to 5 (extremely). Scores range from 17 to 85. Probable PTSD was dichotomized based on the recommended cut-off score of 38 or greater.

The Neighborhood Inventory for Environmental Typology (NIfETy)—The NIfETy (Furr-Holden et al., 2010) is an observer-rated instrument that assesses urban environmental indicators of social and physical disorder in Baltimore City. The NIfETy has been shown to have good interrater reliability and internal consistency. We utilized it as an objective measure of neighborhood disorder. The NIfETy value was based on the latitude and longitude of the home address of each participant. We assessed this value according to both a single block face and the aggregate of the values within the neighborhood census tract. The methods used to calculate this value have been reported in detail in another study (Sarker et al., 2016).

Perceived Neighborhood Scale (PNS)—Perceptions of neighborhood were assessed using the 34-item self-reported PNS (Martinez et al, 2002). The PNS has 4 domains: perceived crime, sense of community, satisfaction with neighborhood, and social embeddedness. Each item is answered on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree).

The COPE Inventory—Using the 60-item COPE Inventory, participants rated how they respond to challenging or stressful life events (Carver et al., 1989). Response options ranged from 0 (I usually don't do this at all) to 3 (I usually do this a lot). Scores for sub scales, with four items each were summed to create each sub scale score ranging from 0 to 12. Subscales included mental disengagement (i.e. "I sleep more than usual"), behavioral disengagement, using substances to cope (i.e. "I drink alcohol or take drugs, in order to think about it less"),

focusing on and venting emotions (i.e. “I get upset, and am really aware of it”), active coping, denial, humor, use of emotional social support, etc.

Data Analysis—The sample was categorized into NDUs, MAUs, and OSUs, and the three groups were compared with respect to demographic characteristics, using Pearson chi-square tests for categorical variables and analysis of variance (ANOVA) for continuous variables.

Parallel analyses were conducted on each of the three groups to evaluate the relationships between PTSD symptoms, perceptions of neighborhood, and coping behaviors. The approach proposed by Baron and Kenny (1986) was used to investigate mediation, in which a series of regression analyses are conducted and the statistical significance of the coefficients are evaluated at each of the four steps: (1) the independent variable (PTSD symptoms) predicting the mediator (perceptions of neighborhood) (2) the independent variable (PTSD symptoms) predicting the dependent variable (coping behaviors) (3) the mediator (perceptions of neighborhood) predicting the dependent variable (coping behaviors) and (4) the independent variable (PTSD symptoms) and the mediator (perceptions of neighborhood) predicting the dependent variable (coping behaviors). Steps 1 through 3 are assessed to determine whether zero-order relationships exist among the variables. Bivariate associations with a p-value ≤ 0.05 were included in Step 4 of the mediation analysis. Partial mediation was inferred when both PTSD symptoms and perceptions of neighborhood showed a significance level of ≤ 0.05 . If the effect of PTSD symptoms was no longer significant at the 0.05 level after controlling for perceptions of neighborhood, full mediation was inferred. Logistic regression was used when the outcome was dichotomous and linear regression was used when the outcome was continuous. Prior to regression modeling, demographic correlates of PTSD symptoms were assessed using either Pearson chi-square tests or Fisher exact tests (if conditions for use of a chi-square were not met) for categorical variables, and two-sample t tests for continuous variables; demographic variables that were associated at $p < 0.10$ with PTSD symptoms were used as covariates in regression analyses. All analyses were done using R version 3.2.2. (2015, The R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Between-group Characteristics of All Participants (Table 1)

A total of 696 participants had complete data and were included in the analysis: 255 (37%) NDUs, 168 (24%) MAUs, and 273 (39%) OSUs. In the NDUs, 21 (8%; 7 men, 14 women) self-reported PTSD symptoms. In the MAU group, 39 (23%; 28 men, 11 women) self-reported PTSD symptoms. Among OSUs, 85 (31%; 62 men, 23 women) self-reported PTSD symptoms. The three groups differed significantly in terms of gender ($\chi^2=68.9$, $df=2$, $p < 0.05$), race ($\chi^2=7.82$, $df=2$, $p < 0.05$), education ($\chi^2=58.2$, $df=2$, $p < 0.05$), and months at current residence ($F_{1,694}=4.83$, $p < 0.05$). Women and men were equally likely to have PTSD symptoms in all three groups. There were no statistical differences in number of lifetime traumas, type of trauma, anxiety, and depression in any of the three groups.

Within-Group PTSD Comparisons in Non-drug-using Participants (NDUs)

Demographics—Among NDUs, 8.2% met criteria for clinically significant PTSD symptoms. PTSD symptoms were associated with only one demographic variable, months at current residence ($t=5.22$, $df=118$, $p=0.001$); this variable was included as a covariate in regression analyses to evaluate predictors of PTSD symptoms.

Neighborhood Variables—The objective measure of neighborhood disorder was not bivariately associated with PTSD at either the block face or the census tract level [(OR=1.25, 95% CI 0.88–1.83, $p=0.22$); (Fig. 2, panel A)]. Sense of community in participants with PTSD was 17.9 ± 8.5 ; without PTSD 21.7 ± 7.5 ; OR=0.94, 95% CI 0.88–0.995, $p=0.05$ (Fig. 2, panel B). This association remained similar in magnitude but no longer reached statistical significance when months at current residence was added to the model (adjusted OR=0.95, 95% CI 0.89–1.01, $p=0.088$).

PTSD-associated Coping Behaviors—Participants with PTSD reported higher levels of mental disengagement [(6.00 $\pm$ 2.86 vs. 4.02 $\pm$ 2.47; OR=1.33, 95% CI 1.12–1.59, $p=0.001$); (Fig. 3, panel A)] and higher levels of focusing on and venting emotions [(6.14 $\pm$ 2.76 vs. 3.32 $\pm$ 2.38; OR=1.47, 95% CI 1.25–1.76, $p=0.001$); (Fig. 3, panel B)]. These associations remained significant after months at current residence was added to the models (adjusted OR=1.29, 95% CI 1.08–1.54, $p=0.01$ and adjusted OR=1.46, 95% CI 1.23–1.75, $p=0.001$, respectively).

Mediation Analysis—Low sense of community showed a significant bivariate association with higher levels of mental disengagement ($\beta=-0.062$, $SE=0.021$, $p=0.01$), but not with focusing on emotions and venting. In a multiple linear regression model, both sense of community and PTSD were significantly associated with mental disengagement ($p=0.05$ and $p=0.005$ respectively). This indicates that low sense of community partially mediates the relationship between PTSD symptoms and the use of mental disengagement (Fig 4., Panel A).

Within-Group PTSD Comparisons in Marijuana/alcohol using participants (MAUs)

Demographics—Among MAUs, 23.2% met criteria for clinically significant PTSD symptoms. Participants with PTSD were significantly less likely to be Caucasian ($\chi^2=5.63$, $df=1$, $p=0.05$) and were younger ($t=1.70$, $df=69$, $p=0.094$); these variables met our threshold ($p=0.10$) to be included as covariates in regression analyses to evaluate predictors of PTSD symptoms.

Neighborhood Variables—The objective measure of neighborhood disorder was not bivariately associated with PTSD at either the single block face or the census tract level [(unadjusted OR=1.11, 95% CI 0.88–1.43, $p=0.38$); (Fig. 2, panel A)]. Participants with PTSD had lower sense of community [(18.1 $\pm$ 7.1 vs. 21.0 $\pm$ 7.3; unadjusted OR=0.95, 95% CI 0.90–0.998, $p=0.05$); (Fig. 2, panel B)] and higher perceptions of crime [(26.5 $\pm$ 7.6 vs. 23.2 $\pm$ 8.0; unadjusted OR=1.06, 95% CI 1.01–1.12, $p=0.05$); (Fig. 2, panel C)]. These associations remained similar in magnitude but were no longer statistically significant when

age and race were added to the models (adjusted OR=0.95, 95% CI 0.90–1.00, $p=0.056$; adjusted OR= 1.05, 95% CI 1.00–1.11, $p=0.057$, respectively).

PTSD-associated Coping Behaviors—Participants with PTSD symptoms showed higher levels of mental disengagement [(6.03 $\pm$ 2.88 vs. 4.77 $\pm$ 2.57; OR=1.19, 95% CI 1.04–1.36, $p=0.05$); (Fig. 3, panel A)], higher levels of focusing on and venting emotions [(5.28 $\pm$ 3.03 vs. 4.12 $\pm$ 2.84, OR=1.14, 95% CI 1.01–1.29, $p=0.05$); (Fig. 3, panel B)], and higher levels of using substances to cope [(6.15 $\pm$ 4.04 vs. 2.70 $\pm$ 3.08, OR=1.30, 95% CI 1.17–1.45, $p=0.001$); (Fig. 3, panel C)]. These associations remained significant when age and race were added to the models (adjusted OR=1.18, 95% CI 1.03–1.36, $p=0.05$; adjusted OR=1.15, 95% CI 1.02–1.30, $p=0.05$; adjusted OR=1.27, 95% CI 1.14–1.42, $p=0.001$, respectively).

Mediation Analysis—Heightened perceptions of crime bivariately predicted higher levels of mental disengagement (beta=0.07, SE=0.03, $p=0.01$), higher levels of focusing on and venting emotions (beta=0.08, SE=0.03, $p=0.01$), and higher levels of using substances to cope (beta=0.14, SE=0.03, $p=0.001$). In multiple linear regression models, both perceived crime and PTSD were significantly associated with all three coping behaviors. This indicates that heightened perceptions of crime partially mediate the relationship between PTSD and all three coping behaviors (Fig. 4; panel B–D).

Within-Group PTSD Comparisons in Opioid/stimulant using participants (OSUs)

Demographics—Among OSUs, 31.1% reported clinically significant PTSD symptoms. People with PTSD were significantly younger ($t=2.08$, $df=172$, $p=0.05$) and less likely to be married ($\chi^2=2.93$, $df=1$, $p=0.087$); these variables were included as covariates in subsequent regression analyses to evaluate predictors of PTSD symptoms.

Neighborhood Variables—The objective measure of neighborhood disorder was not bivariately associated with PTSD at either the single block face or census tract level [(unadjusted OR=1.03, 95% CI 0.84–1.27, $p=0.77$) (Fig. 2, panel A)]. Participants with PTSD had higher levels of perceived crime than those without PTSD [(26.4 $\pm$ 8.1 vs 23.7 $\pm$ 8.2; OR=1.04, 95% CI 1.01–1.08, $p=0.05$) (Fig. 2, panel B)]. This association became stronger when age and marital status were added to the model (adjusted OR=1.05, 95% CI 1.02–1.09, $p=0.01$).

PTSD-associated Coping Behaviors—Participants with PTSD showed higher levels of mental disengagement [(5.49 $\pm$ 2.49 vs. 4.35 $\pm$ 2.46; OR= 1.20, 95% CI 1.08–1.34, $p=0.001$); (Fig. 3, panel A)], higher levels of focusing on and venting emotions [(5.62 $\pm$ 2.69 vs. 4.03 $\pm$ 2.88; OR=1.21, 95% CI 1.11–1.34, $p=0.001$); (Fig. 3, panel B)], and higher levels of using substances to cope [(8.82 $\pm$ 3.37 vs. 5.95 $\pm$ 3.85, OR=1.24, 95% CI 1.15–1.34, $p=0.001$); (Fig. 3, panel C)]. These associations remained significant when age and marital status were added to the models (adjusted OR 1.19, 95% CI 1.07–1.33, $p=0.005$; adjusted OR 1.20, 95% CI 1.10–1.33, $p=0.001$; adjusted OR 1.22, 95% CI 1.14–1.33, $p=0.001$, respectively).

DISCUSSION

To our knowledge, this is one of the first studies to investigate how perceptions of neighborhood may affect the use of maladaptive coping behaviors to maintain PTSD symptoms among participants with substance use problems living in objectively analogous neighborhoods. As in the studies cited in the Introduction, PTSD symptoms were disproportionately present in our substance-using participants. Of the 441 participants who reported at-risk substance use, 124 (28%) reported past 30-day PTSD symptoms. As predicted, people with PTSD symptoms compared to those without had different perceptions of their community and crime despite living in neighborhoods that appeared similar to objective outside raters. In general, participants with PTSD symptoms perceived a lower sense of community and higher degree of crime than those without PTSD symptoms. Participants with PTSD showed higher levels of mental disengagement, focusing on and venting emotions, and using substances to cope. In NDUs, lower levels of sense of community was the significant mediating variable, whereas higher levels of perceived crime partially mediated the relationship between PTSD symptoms and specific coping behaviors in MAUs. In OSUs, we found no such mediating roles for perceptions of the environment, even though OSUs with PTSD symptoms did perceive a higher degree of crime and did report higher levels of PTSD-associated coping behaviors.

The decision to group marijuana and alcohol users together, and to separate this group from the opioid/stimulant group, was based on PTSD rates and the actual patterns of use in our sample. The pharmacological differences between opioid and stimulants, and between marijuana and alcohol, are obvious, but, especially for users, the legal and social statuses of substances of abuse support conceptual taxonomies that cut across pharmacological classes (Fabricius et al., 1997). Even in places where marijuana use remains illegal (one of which is Baltimore City), marijuana use and alcohol use are less stigmatized than heroin use (Lang and Rosenberg, 2017).

NDUs were the only group in which people with PTSD symptoms were living at their current residence for a significantly shorter period than those without PTSD symptoms. We do not know in which neighborhood the trauma-causing PTSD symptoms occurred or if the person moved to their current residence after experiencing a trauma. Given the fact that lower sense of community was the mediating variable for NDUs only, it is plausible that sense of community and more negative perceptions of neighborhood is less important in regards to substance use behavior than it is for maintaining PTSD symptoms (Davey-Rothwell et al., 2015). This could explain why the relationship between perceptions of neighborhood and PTSD-associated coping behaviors was non-significant among OSUs despite OSUs with PTSD reporting higher levels of negative perceptions of neighborhood and more frequent utilization of PTSD-associated coping behaviors. OSUs are typically more experienced substance users and use substances that are more universally illicit; it is plausible that the primary link between PTSD symptoms and substance use may be the use of maladaptive coping behaviors, rather than neighborhood-level factors (Fabricius et al., 1997; Lang and Rosenberg, 2017).

Rumination, venting, and disengagement behaviors have been shown to predict the development and maintenance of PTSD and problems related to substance use (Read et al., 2014; Caselli et al., 2008; Riolli and Savicki, 2010). Some researchers have shown these behaviors to be adaptive (Ciarocco et al., 2010; Eisma et al., 2014; Kim et al., 2015; Pfeiler et al., 2015). However, the mechanisms associated with maladaptive rumination, specifically asking “what if” types of questions (i.e., “what if I had walked my regular route home the night I was mugged instead of taking a shortcut?”), may function as a form of cognitive avoidance (Michael et al., 2007). In other words, an undue focus on what could have been done differently may serve as a distraction from focusing on the actual traumatic event. This type of avoidance decreases the likelihood of exposing oneself to trauma-related stimuli as a means of decreasing PTSD symptoms.

Environmental stress has been shown to predict negative health outcomes (Genberg et al., 2011; King et al. 2011). However, for PTSD, the perceptions of neighborhood may be more important than the composite score of disorder calculated by an impartial passer-by. Rauch and Foa (2006) note that PTSD symptom development relies on the perceived threat of a stressor to exceed the perceived ability to cope with the stressor. Perceived threat and risk of harm of a single trauma is a greater risk factor for PTSD symptom severity than having multiple exposures to trauma (Lancaster et al., 2016). Furthermore, intractability of PTSD symptoms in treatment has been associated with deficits in discriminating non-threatening stimuli from threatening stimuli (Cisler et al., 2015). We postulate that it is likely that PTSD symptoms are maintained by having negative perceptions of crime and community, as opposed to living in objectively disordered neighborhoods, due to deficits in accurately identifying threat, risk of harm, and likelihood of receiving help. As such, these perceptions may be maintained by maladaptive coping: attempts to avoid processing trauma-related stimuli may increase the likelihood of ascribing more neutral cues as threatening.

Several limitations are noted. First and foremost, our data were cross-sectional, and we cannot determine the order in which effects occurred. Second, the PCL-C is designed to be a self-report screening tool and not a diagnostic instrument (Harrington and Newman, 2007). Conceivably, without a trained clinician’s evaluation, PTSD symptoms may have been underreported. Third, while we did not find any statistical difference among objectively assessed indicators of neighborhood disorder between those with and without PTSD symptoms, identifying one’s neighborhood based on home address may not be a sufficient indicator of activity space. Fourth, the significant domains of the PNS only partially mediated the relationship between certain coping behaviors and PTSD symptoms. Additionally, identifying when each coping behavior is used specifically in response to neighborhood disorder and PTSD symptoms, as opposed to general stressful situations, was beyond the scope of this analysis. Lastly, due to sample size we were unable to make within-group comparisons among participants based on each individual substance. Therefore, substance use groups were combined into MAUs and OSUs.

CONCLUSIONS

People with greater negative perceptions of their neighborhood and maladaptive coping behaviors may be at a greater risk of experiencing chronic PTSD symptoms. Building

community relationships as well as developing more adaptive coping skills may ultimately decrease the need to cope with negative perceptions of neighborhood using the same behaviors that have been shown to maintain PTSD symptoms. Future research is needed to elucidate the complicated relationships between substance use, visible neighborhood disorder, perceptions of neighborhood, coping, and PTSD symptoms. Implications of these findings could improve PTSD treatment outcomes through restructuring coping behaviors to account for negative perceptions of neighborhood.

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Fig. 1. Hypothesis Model

All variables showing a thick arrow reflect the main mediation analysis. All variables showing a thin arrow reflect possible confounding variables. These variables were controlled for when significant within a substance-using group.

Fig. 2. Environmental stress by PTSD and Substance Use Group

The objective measure of environmental stress (NifETy) (A), perceived sense of community scores (B), and perceived crime scores (C) are shown for NDUs, OSUs, and MAUs. PTSD groups for each substance use group are shown on the x-axis. PTSD groups are the reference group (1) on each box plot; the No PTSD groups are shown as 0. On each box plot, the bolded line is the median, the box itself is the interquartile range (IQR), and the vertical lines are whiskers showing the most extreme data points within 1.5 times the length of the IQR away from the box.

Fig. 3. Coping by PTSD AND Substance Use Group

Mental disengagement scores (A), scores for focusing on and venting emotions (B), and scores for using substances to cope (C) are shown for NDUs, OSUs, and MAUs. Note: using substances to cope includes occasional, low to moderate alcohol use; therefore, NDUs may endorse this. PTSD groups for each substance use group are shown on the x-axis. PTSD groups are the reference group (1) on each box plot; the No PTSD groups are shown as 0. On each box plot, the bolded line is the median, the box itself is the interquartile range (IQR), and the vertical lines are the whiskers showing the most extreme data points within 1.5 times the length of the IQR away from the box.

Fig. 4. Mediation Relationships

(A) Sense of community partially mediates PTSD symptoms and mental disengagement among NDUs. (B) Perceived crime partially mediates PTSD symptoms and mental disengagement among MAUs. (C) Perceived crime partially mediates PTSD symptoms and focusing on and venting emotions among MAUs. (D) Perceived crime partially mediates PTSD symptoms and using substances to cope among MAUs. Coefficients indicate $\pm$ SE.

Table 1

Participant characteristics

All groups (N=696):	Non-Drug Users (NDU)	Marijuana/Alcohol Users (MAU)	Opioid/Stimulant Users (OSU)	p-value
Age [mean (SD)]	37.5 ± 11.6	34.4 ± 10.1	44.9 ± 10.4	--
Months at current residence [mean (SD)]	56.0 ± 83.6	76.4 ± 91.9	69.5 ± 110.2	p .05*
Gender (n% Female)	58.0%	32.7%	23.1%	p .05*
Race (n% Caucasian)	20.4%	19.6%	29.3%	p .05*
Education (n% >HS)	59.5%	43.4%	27.5%	p .05*
Marital status (n% Married)	9.8%	7.1%	9.9%	--
NDU Characteristics (n=255):				
	PTSD (n=21) (8%)	No PTSD (n=234)		
Age [mean (SD)]	37.9 ± 10.4	37.5 ± 11.7		--
Months at current residence [mean (SD)]	22.0 ± 19.7	59.1 ± 86.5		p .05*
Gender (n% Female)	66.7%	57.3%		--
Race (n% Caucasian)	9.5%	21.4%		--
Education (n% >HS)	52.4%	61.1%		--
Marital status (n% Married)	9.5%	9.8%		--
MAU Characteristics (n=168):				
	PTSD (n=39) (23%)	No PTSD (n=129)		
Age [mean (SD)]	32.2 ± 9.1	35.1 ± 10.3		p .10#
Months at current residence [mean (SD)]	67.6 ± 89.4	79.1 ± 92.9		--
Gender (n% Female)	28.2%	34.1%		--
Race (n% Caucasian)	5.1%	24.0%		p .05*
Education (n% >HS)	33.3%	46.5%		--
Marital status (n% Married)	5.1%	7.8%		--
OSU Characteristics (n=273):				
	PTSD (n=85) (31%)	No PTSD (n=188)		
Age [mean (SD)]	43.0 ± 9.9	45.7 ± 10.6		p .05*
Months at current residence [mean (SD)]	64.2 ± 116.6	71.9 ± 107.4		--
Gender (n% Female)	27.1%	21.3%		--
Race (n% Caucasian)	34.1%	27.1%		--
Education (n% >HS)	25.9%	28.2%		--
Marital status (n% Married)	4.7%	12.2%		p .10#

All p-values reaching significance (0.05) are indicated with an asterisk, those reaching significance (<0.10) are indicated with a pound sign. Any variable that was associated with PTSD symptoms at a significance level of <0.10 was included as a covariate in regression models that evaluated predictors of PTSD symptoms.