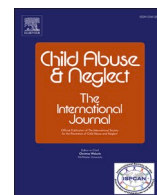




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Availability of community resources reduces the association among community violence exposure, negative emotionality, and substance use disorders[☆]

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ABSTRACT

Background: Exposure to community violence is associated with increased occurrence of substance use disorders (SUD). The self-medication hypothesis states that heightened negative emotionality may underlie the link between exposure to community violence and SUD. However, it is not well-understood if access to community resources, a broader public health approach, influences the purported psychological mechanisms underlying the link between community violence exposure and SUD.

Objective: We examined whether negative emotionality mediates the association between youth-onset community violence exposure and having a SUD and whether community resources (i.e., density of social services, health care services, healthy food) moderate the relationship between negative emotionality and having a SUD.

Methods: Moderated mediation analyses were used to test the indirect effect of negative emotionality and the moderating role of community resources on the association between negative emotionality and having a SUD.

Participants and Setting: A sample of 376 participants was collected from New Haven (ages 18–73, 45.7% Black, 44.1% White, 7.6% Hispanic).

Results: There was a significant indirect effect of negative emotionality on the association between youth-onset community violence and having a substance use disorder (indirect effect = 0.22, $SE = 0.07$, $p = .001$, 95 % CI [0.11, 0.38]; proportion mediated = 0.24). Further, increased density of community resources reduced the relationship between negative emotionality and having a substance use disorder ($\beta = -0.23$, $SE = 0.07$, $p = .001$, 95% CI [-0.36, -0.10]).

Conclusion: Increasing availability of community resources may play a role in alleviating the suffering resulting from violence exposure.

In 2023, 48.5 million individuals aged 12 or older in the United States, approximately 17% of the US population, met criteria for any substance use disorder (SAMHSA, 2023). The lifetime prevalence rate of alcohol or drug use disorders in the U.S. population is approximately 29% and 14%, respectively. Among the many factors that affect the development of substance use disorder (Volkow & Blanco, 2023), adverse neighborhood conditions are posited to impact the onset and severity of substance use disorders. For instance,

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adolescents living in communities with higher levels of disadvantage characterized by higher levels of poverty, higher levels of drug availability, and reduced safety were associated with a higher risk of having a substance use disorder compared to adolescents living in communities with lower levels of disadvantage (Handley, Rogosch, Guild, & Cicchetti, 2015). Children raised in neighborhoods with elevated residential instability show higher rates of alcohol and marijuana use disorder symptoms by late adolescence compared to children raised in neighborhoods with reduced residential instability, even after controlling for familial risk factors (Buu et al., 2009). Similarly, adults living in neighborhoods characterized by high physical and social disorder, including abandoned buildings, litter, or drug paraphernalia, are more likely to experience persistent substance use disorder symptoms a year later compared to adults living in neighborhoods with less physical and social disorder (Moran et al., 2023). Finally, individuals exposed to community violence (which encompasses witnessing or being a victim of acts such as assaults, shootings, and robberies, as well as hearing gunfire in one's community outside of the home) are at least twice as likely to develop substance use disorders than those not exposed (Motley, Sewell, & Chen, 2017; Zinzow et al., 2009; see also Löfving-Gupta et al., 2018; Sells, Rowe, Fisk, & Davidson, 2003). However, despite community violence exposure reaching endemic status in parts of the United States (DeCou & Lynch, 2017), research remains relatively limited in examining the effects of and processes by which community violence exposure relates to substance use disorders (Beharie et al., 2019).

In the United States, approximately 25% of individuals witness, learn about, or are victims of community violence (Finkelhor, Turner, Ormrod, & Hamby, 2010). Research with community-based samples across cross-sectional and longitudinal studies highlight that, in low-income Black and Hispanic communities, the rates of community violence exposure are disproportionately higher, with 80 to 100% of residents in these areas reporting exposure to such violence (Richards et al., 2014; for review, see Stein, Jaycox, Kataoka, Rhodes, & Vestal, 2003). Exposure to community violence has many long-term physical and mental health consequences (Brook, Lee, Brown, Finch, & Brook, 2012; Fowler, Tompsett, Braciszewski, Jacques-Tiura, & Baltes, 2009; Wright, Austin, Booth, & Klierer, 2016), including higher risk for developing substance use disorders (Löfving-Gupta et al., 2018; Sells et al., 2003; Zinzow et al., 2009). The question of *how* community violence exposure increases substance use disorders, though, remains largely unexplored.

Broadly speaking, one of the most prominent theories for understanding the development of substance use disorders is the self-medication hypothesis. The self-medication hypothesis suggests that heightened negative emotionality—characterized by anxiety, anger, and related negative emotional and behavioral engagement—mediates the relationship between traumatic or stressful experiences and having a substance use disorder. According to the self-medication hypothesis, individuals use substances to alleviate emotional or psychological distress as a means of coping with their distress (Khantzian, 1997). Substances may produce psychological effects that offset stress symptoms and negative emotions, thereby numbing awareness of these feelings and reducing the experience of distress (Khantzian, 1997). Consequently, addressing negative emotionality serves as a key intervention point (Bornova, Gratz, Daughters, Hunt, & Lejuez, 2012; Witkiewitz & Bowen, 2010), where disrupting the cycle of distress and maladaptive coping strategies can potentially reduce the risk of developing substance use disorders.

To date, research investigating the self-medication hypothesis largely has not specifically focused on community violence exposure (Tache, Lambert, & Ialongo, 2020); instead, researchers have grouped different types of trauma and stress together, such as poverty, maltreatment, or broadly defined adversity categories, in their examination of how distressing life events influence the psychosocial or emotional distress that leads to the development of substance use disorders (Hawn, Cusack, & Amstadter, 2020; Hong et al., 2019; Turner & Lloyd, 2003). However, there is some evidence that community violence exposure may operate differently from other forms of adversity (Cecil, Viding, Barker, Guiney, & McCrory, 2014; Cole, Jaccard, & Munson, 2020; Estrada et al., 2021; Estrada, Richards, Gee, & Baskin-Sommers, 2020; Sheridan, Peverill, Finn, & McLaughlin, 2017), making it important to empirically test whether this form of adversity and its relationship to substance use problems is captured within the self-medication hypothesis framework. Exposure to community violence can intensify distress, leading to heightened negative emotions such as anxiety, anger, depression, numbness, and avoidance behaviors (Cole et al., 2020; Haden & Scarpa, 2008; Scarpa, 2001). Consequently, individuals repeatedly exposed to community violence may turn to substance use for relief or escape from negative emotions, a behavior that may become reinforcing and lead to the development and maintenance of substance use disorders.

Given the challenges associated with community violence exposure, there is a growing push to adopt a public health approach to reduce its harms (Buggs, Kravitz-Wirtz, & Lund, 2022; Nation et al., 2021). Specifically, a public health approach aligns with the structural determinants of health framework, which emphasizes the role of structural, environmental, and systemic factors in shaping individual health outcomes (Bailey et al., 2017; National Academies of Sciences, Engineering, and Medicine, 2023; Williams & Cooper, 2019). A public health/structural approach recognizes that factors such as access to healthcare, mental health services, education, and social supports are critical in addressing health disparities, particularly within minoritized communities (Bailey et al., 2017). In the context of community violence, addressing these structural factors by improving availability of community resources may help create environments that promote health equity and reduce the psychological and behavioral consequences of violence exposure (Armstead, Wilkins, & Nation, 2021).

One avenue by which to take a public health approach involves investing in historically disadvantaged communities by rectifying unequal access to community resources (e.g., mental health care, education, healthcare facilities, social services, and recreational amenities) (Williams & Cooper, 2019) with the goal of improving individual well-being (Leventhal & Brooks-Gunn, 2000; Small, 2006). For example, Hoffmann et al. (2023) found that adequate access to mental health professionals, defined as the number of mental health professionals relative to the population's needs, was associated with reduced suicide rates in a national sample of youth aged 5–19. Similarly, youth living in a neighborhood with a higher concentration of organizations or services, such as substance abuse treatment centers, family planning clinics, and community youth centers, compared to those living in neighborhoods with fewer resources, was associated with lower levels of aggression (Molnar, Cerda, Roberts, & Buka, 2008), and risky behaviors, such as alcohol use (Snedker, Herting, & Walton, 2013). This evidence suggests that availability of community resources has the potential to create

safer and healthier communities (see also [Coley et al., 2021](#); [Molnar et al., 2008](#); [Shin Park et al., 2021](#); [Tung, Boyd, Lindau, & Peek, 2018](#)). However, the effectiveness of community resources on influencing individual-level psychological mechanisms, especially as it relates to substance use disorders, remains not yet well understood. That is, we do not know whether actual targets of the policies (i.e., exposure to violence) are being addressed to influence individual behavior (i.e., substance use disorders) by targeting a proposed mechanism (i.e., negative emotionality).

The present study adopts a multidisciplinary approach, merging clinical and social psychology with public health, to examine the association between youth-onset community violence exposure and substance use disorders. We had two aims. First, drawing from the self-medication hypothesis ([Khantzian, 1997](#)), we examined the purported pathway linking youth-onset community violence exposure to substance use disorders through negative emotionality. Second, given that the self-medication hypothesis posits that negative emotionality drives substance use as a coping mechanism ([Khantzian, 1997](#)), we wanted to evaluate whether availability of community resources in participants' neighborhood could reduce negative emotionality, thereby mitigating the long-term psychological impacts of youth-onset community violence exposure and its association with substance use disorders. Together, these aims are designed to inform the effectiveness of taking a public health approach to address the consequences of youth-onset community violence exposure by addressing the proposed psychological mechanism.

1. Method

1.1. Participants

Participants were adults ($N = 376$; 68.6% male) ages 18–73 ($M = 40.8$, $Median = 39.5$, $SD = 13.8$) recruited through internet advertisements and flyers posted throughout a diverse Northeastern County. Participants were excluded if they performed below the fourth-grade level on a standardized measure of reading ([Wilkinson, 1993](#)), had an IQ of <80 ([Zachary, Paulson, & Gorsuch, 1985](#)), met criteria for psychotic disorders, or had a history of certain medical problems (e.g., seizures, head injury with lost consciousness of 30 min or more) that may impact their comprehension of materials. Participants earned monetary compensation for their completion of the interview and self-report measures. Each participant provided written informed consent in compliance with the guidelines established by the Yale University Human Subjects Committee. [Table 1](#) and [Fig. 1](#) provide summaries of participant characteristics.

1.2. Measures

1.2.1. Exposure to community violence

The Exposure to Violence scale is a 13-item questionnaire measuring direct and indirect experiences of violence in participants' community throughout an individual's lifetime, including personal victimization or witnessing events ([Selner-O'Hagan, Kindlon, Buka, Raudenbush, & Earls, 1998](#)). Participants were instructed to respond to the items based on experiences they had "in their communities outside their home." Participants were instructed to select "Yes" or "No" for each item on the scale. Example items on the

Table 1
Demographics of the sample ($N = 376$).

Variables	N	%	M	SD	Median	Min	Max	Possible Range
Age	376		40.8	13.8	39.5	18	73	18–73
Female	118	31.4						
Race								
Black	172	45.7						
White	166	44.1						
Asian	19	5.1						
AIAN	6	1.6						
Mixed	35	9.3						
Other	10	2.7						
Ethnicity								
Hispanic	28	7.4						
SES								
BSMSS	376		36.7	11.5	36.9	8.3	66.0	8.3–66.0
Neighborhood Disadvantage	354		7.1	2.8	8	1	10	1–10
Mediation Variables								
Community Violence Exposure	376		4.3	3.6	3.0	0	13	0–13
Negative Emotionality	376		40.9	18.1	37	12	94	0–120
SUD Diagnosis	285	78.6 (present)				0	1	0 or 1
Community Resources								
Social Services	376		2.4	1.0	2.5	0.0	4.7	
Health Care Services	376		2.9	1.6	2.7	0.0	6.7	
Grocery Stores	376		1.7	1.1	1.7	0.0	3.6	
Total Community Resources Score	376		0.0	0.9	0.0	–2.2	2.2	

Note: SES = Socioeconomic Status. BSMSS = Barratt Simplified Measure of Social Status ([Barratt, 2006](#)). AIAN = American Indian Alaska Native. Neighborhood Disadvantage = Higher scores reflect greater neighborhood disadvantage. SUD = Substance Use Disorder. Totals for the race variable exceed 100% (408 selections from 376 participants) due to the option for participants to choose multiple selections.

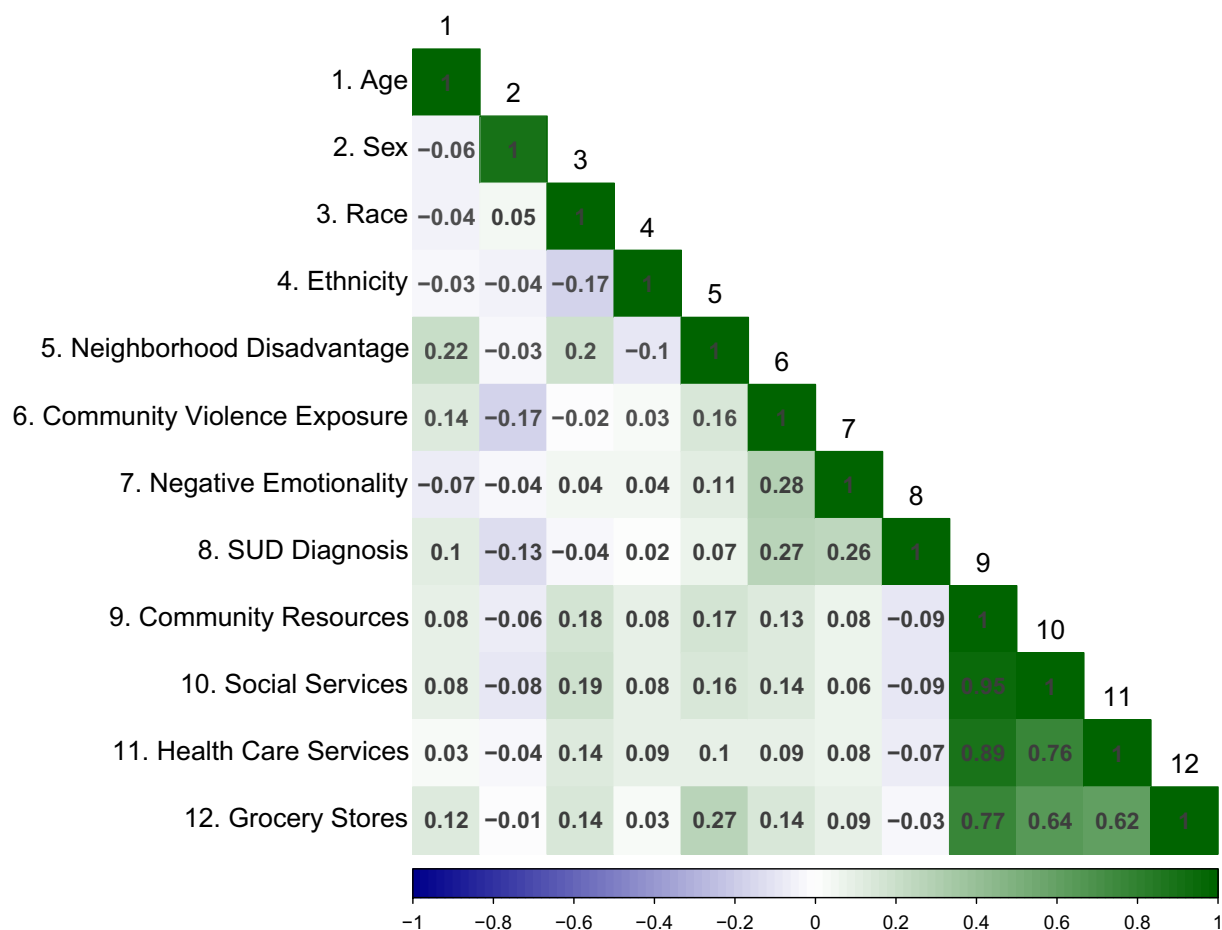


Fig. 1. Heatmap showing Spearman correlations across latent profile analysis and outcome variables ranging from -1 (dark blue) to 1 (dark green). SUD = Substance Use Disorder. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

scale include “Have you been physically assaulted, such as hit, slapped, punched, or beaten up?” and “Have you seen someone else get killed as a result of violence, like being shot, stabbed, or beaten to death?” Additionally, participants provided the age when they first were exposed to each endorsed experience. A total score was calculated by summing all 13 items and an average age of onset was calculated by averaging the age across all endorsed experiences. The reliability for the scale was good (Cronbach’s $\alpha = 0.86$).

1.2.2. Negative emotionality

Negative emotionality was assessed utilizing the Multidimensional Personality Questionnaire-Brief, a 155-item instrument designed to measure personality traits (Patrick, Curtin, & Tellegen, 2002). This self-report measure comprises 12 primary trait subscales: wellbeing, social potency, achievement, social closeness, stress reaction, alienation, aggression, harm avoidance, traditionalism, control, absorption, and unlikely virtues. Participants indicate agreement with statements on a binary scale (1 for “True”, 0 for “False”), where higher scores indicate stronger identification with the given trait. Specifically, negative emotionality reflects a higher order factor that consists of the alienation, aggression, and stress reaction subscales and indicates an increased propensity for experiencing negative emotions, such as fear, anger, and anxiety. The reliability for the scale was acceptable (Cronbach’s $\alpha = 0.79$).

1.2.3. Substance use disorder diagnosis

The Structured Clinical Interview for DSM-5 (First, Williams, Karg, & Spitzer, 2015) was used to assess whether participants met for a substance use disorder diagnosis at any point in their lifetime. Participants who met criteria for a substance use disorder received a score of ‘1’; those who did not received a score of ‘0’. For 20% of the interviews, dual ratings were provided to assess reliability. The interrater reliability was 0.90. In a supplemental analysis, we also examined the lifetime symptom count for substance use disorder. The total symptom count was calculated by summing the number of substance use disorder symptoms endorsed across categories of substances.

1.2.4. Community resources

Using publicly available data from the National Neighborhood Data Archive, we identified data on community resources (NaNDA, 2024). NAnDA provides data that includes counts of businesses or organizations across various community resource categories (NaNDA, 2024). These counts can be aggregated at different spatial levels, such as counties, zip codes, and census tracts. We focused on census tract level data, as it represents the smallest spatial unit available and most closely reflects participants' immediate neighborhoods. For each census tract, NaNDA calculates per capita density for each resource type by dividing the raw counts of businesses or organizations by the tract's population size. We chose to use data reflecting social services, health care services, and access to healthy food due to positive associations with community safety, resource accessibility, and physical and mental well-being (Althoff, Ametti, & Bertmann, 2016; Small & Gose, 2020; Wethington et al., 2008). We assessed the variability of the community resources data and the availability of the measures at the census tract level. The selected community resources that remained were measures of the per capita density of social services (e.g., youth centers, food banks, senior centers, job training programs), health care services (e.g., businesses in the health care sector, including doctors, dentists, mental health providers, nursing facilities, and pharmacies), and grocery stores (e.g., supermarkets, specialty food stores, and warehouse clubs). The community resource data (i.e., social services, health care services, and grocery stores) covered the years 2003–2015 and 2017 at the time they were extracted. To align participants with the appropriate community resource data, participants were asked during interviews to provide their current home address, which we used to determine their corresponding census tract. Each participant's census tract was matched to the community resource data for the same year they completed the study (e.g., participants who completed the study in 2014 were matched with community resource data from 2014). For participants completing the study in years without corresponding data, we matched participants to the most recent prior year available. Participants completing the study in 2016 were assigned 2015 data, and participants completing the study in 2018 or later were assigned 2017 data.

To prepare the data for analysis, we applied a log transformation to the community resource area density scores for social services, health care services, and grocery stores to reduce skewness (social services: skew -0.19 , kurtosis -0.51 ; health care services: skew 0.48 , kurtosis -0.42 ; grocery stores: skew 0.02 , kurtosis -1.09). These log transformed scores were then combined using confirmatory factor analysis to create a latent factor score for each participant. With only three variables contributing to a single factor, our model was just-identified (Brown, 2015; Harrington, 2009) (factor loadings: social services = 1.000, health care services = 1.394, $p < .001$; grocery stores = 0.830, $p < .001$). We chose to combine the three community resources using confirmatory factor analysis to align with the principles of social and structural determinants of health, recognizing the multifaceted and interconnected nature of structural oppression as a latent construct (Adkins-Jackson, Chantararat, Bailey, & Ponce, 2022; Brown & Homan, 2023).

1.3. Covariates

Participants reported their current age, biological sex, and race and ethnicity during the interview. Biological sex was coded as a dichotomous variable (0 = male, 1 = female). Participants could select multiple options for race (White Non-Hispanic, Black or African America, Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, Middle Eastern or North African, or Other), and ethnicity was categorized as a binary variable (0 = non-Hispanic, 1 = Hispanic).

Neighborhood disadvantage was measured using the Area Deprivation Index, which quantifies the level of deprivation in a neighborhood based on census block group data. The Area Deprivation Index provides an aggregated composite score calculated through principal components analysis of 17 different measures related to poverty, education, housing quality, and living conditions, that were gathered over a period of 5 years of Census data by the Neighborhood Atlas website (Kind & Buckingham, 2018). Participants current home address was submitted to the Neighborhood Atlas website (University of Wisconsin School of Medicine and Public Health, 2020) to obtain a neighborhood disadvantage score for each participant that was used in analyses (note: this website provides a composite score and does not provide the individual components from the Census). These neighborhood disadvantage scores reflect state percentile rankings, ranging from 1 to 10, where higher scores represent greater levels of neighborhood disadvantage.

Socioeconomic status was measured using the Barratt Simplified Measure of Social Status (Barratt, 2006). The Barratt Simplified Measure of Social Status categorizes individuals within 4 groups of educational attainment (i.e., highest level of education completed) and 9 groups of occupational prestige to generate an overall assessment of socioeconomic status. The participant also categorizes their mother, father, and/or spouse based on the same factors. Higher scores correspond to greater social socioeconomic status, reflecting higher educational achievement and more prestigious occupations. The total score ranges between 8 and 66, which is created by adding the education and occupation scores.

1.4. Analytic approach

Descriptive, mediation, and moderated-mediation analyses were performed using *Mplus* (version 8.10). Mediation analyses were used to test whether negative emotionality mediated the relationship between youth-onset community violence exposure and having a substance use disorder. Moderated-mediation analyses were used to test whether community resources moderated the b path of the mediation, specifically examining how the community resources score moderated the relationship between negative emotionality and the presence of substance use disorders. All predictors were standardized. The interaction product in *Mplus* was created by multiplying the mediator (i.e., negative emotionality) and the moderator (i.e., density of community resources). Conditional effects of the mediation were estimated at ± 1 SD of the mean of the community resources score. For all analyses, the indirect effect was tested using a bootstrap estimation approach with 10,000 samples (Preacher & Hayes, 2004). Full Information Maximum Likelihood was utilized to handle missing data. Code used to complete analyses were obtained from the eighth edition of *Mplus User's Guide* (Muthén & Muthén,

2017).

2. Results

Of the 376 participants, 258 (68.6%) were male. In terms of race/ethnicity, 172 (45.7%) identified as Black, 166 (44.1%) as White, 19 (5.1%) as Asian, 6 (1.6%) as American Indian or Alaska Native, 35 (9.3%) as mixed, 10 (2.7%) as other, and 28 (7.6%) as Hispanic. The majority of participants (84%) reported at least one exposure to community violence in their lifetime and all participants experiencing their first exposure before the age of 12. Additionally, 285 participants (78.6%) met the criteria for at least one lifetime substance use disorder diagnosis. Participants with an substance use disorder diagnosis had an average of 8.76 symptoms, while those without a diagnosis averaged 0.30 symptoms. Two-thirds (67.0%) lived in neighborhoods with above-average deprivation, as indicated by an Area Deprivation Index score at or above the 6th decile, and 73.6% reported a total income of less than \$25,000 in the past year (see Table 1 and Fig. 1 for summary statistics). These descriptive statistics highlight the relevance of this sample for examining the relationship between youth-onset community violence exposure and its association with having a substance use disorder.

2.1. Does negative emotionality mediate the relationship between youth-onset community violence exposure and having a substance use disorder as an adult?

Results indicated that youth-onset community violence exposure was positively associated with the likelihood of having a substance use disorder (total effect: c path $\beta = 0.92$, $SE = 0.20$, $p < .001$, 95% CI [0.56, 1.32]). Negative emotionality significantly mediated this relationship (indirect effect = 0.22, $SE = 0.07$, $p = .001$, 95% CI [0.11, 0.38]; proportion mediated = 0.24). Specifically, youth-onset community violence exposure was positively associated with negative emotionality (a path: $\beta = 0.26$, $SE = 0.05$, $p < .001$, 95% CI [0.16, 0.35]), and negative emotionality was positively associated with the likelihood of having a substance use disorder (b path: $\beta = 0.37$, $SE = 0.08$, $p < .001$, 95% CI [0.22, 0.51]). Even after accounting for the mediator (negative emotionality), the direct effect of youth-onset community violence exposure on having a substance use disorder remained significant (c' path: $\beta = 0.31$, $SE = 0.08$, $p < .001$, 95% CI [0.15, 0.47]) (Fig. 2A). Consistent with the self-medication hypothesis, these results suggest that higher negative emotionality may be an important factor in how early exposure to community violence is associated with the presence of a substance use disorder.

2.2. Does density of community resources moderate the relationship between youth-onset community violence exposure, negative emotionality, and substance use disorders?

Results indicated that density of community resources moderated the association between negative emotionality and having a substance use disorder ($\beta = -0.23$, $SE = 0.07$, $p = .001$, 95% CI [-0.36, -0.10]). That is, the indirect effect of negative emotionality on youth-onset community violence exposure and having a substance use disorder was conditional on the density of community resources, such that when the density of community resources was -1 SD below or at the mean, the indirect effect of negative emotionality was significant (-1 SD 95% CI [0.38, 1.20]; Mean 95% CI [0.11, 0.38]). However, as the density of community resources increased (+1 SD above the mean), the indirect effect of negative emotionality was no longer significant (95% CI [-0.69, 0.38]) (Fig. 2B). The moderating effect of the density of community resources on the association between negative emotionality and having a substance use disorder remained significant when considering several covariates (sex assigned at birth: $\beta = -0.23$, $SE = 0.07$, $p = .001$, 95% CI [-0.35, -0.09]; neighborhood disadvantage: $\beta = -0.22$, $SE = 0.08$, $p = .003$, 95% CI [-0.36, -0.08]). These findings suggest that a greater availability of community resources in individuals' neighborhoods may help lessen the emotional impact of early exposure to community violence, which could in turn reduce the association with having a substance use disorder.

2.3. Supplemental analyses

First, in addition to assessing youth-onset community violence exposure as a total score, we sought to understand whether the relationship among youth-onset community violence exposure, negative emotionality, and substance use disorder varied depending on type of exposure experienced – witnessing and victimization – and whether these experiences were moderated by availability of community resources (Fig. 3A). To do this, we examined the two subscales separately as independent variables to determine whether the observed relationships were driven by a particular type of exposure. Witnessing community violence resulted in a significant mediation effect, with the indirect effect of witnessing on substance use disorder via negative emotionality being significant (indirect effect = 0.21, $SE = 0.07$, $p = .001$, 95% CI [0.11, 0.37]). Specifically, witnessing community violence was positively associated with negative emotionality (a path: $\beta = 0.25$, $SE = 0.05$, $p < .001$, 95% CI [0.148, 0.34]), and negative emotionality was positively associated with having a substance use disorder (b path: $\beta = 0.38$, $SE = 0.07$, $p < .001$, 95% CI [0.24, 0.52]). Victimization experiences of community violence similarly produced a significant mediation effect, with the indirect effect of victimization on substance use disorder via negative emotionality also being significant (indirect effect = 0.20, $SE = 0.07$, $p = .002$, 95% CI [0.10, 0.36]). Victimization was positively associated with negative emotionality (a path: $\beta = 0.23$, $SE = 0.05$, $p < .001$, 95% CI [0.13, 0.32]), and negative emotionality was positively associated with having a substance use disorder (b path: $\beta = 0.40$, $SE = 0.08$, $p < .001$, 95% CI [0.25, 0.54]). Finally, the effect of negative emotionality on having a substance use disorder was moderated by density of community resources in both the witnessing and victimization models (witnessing: $\beta = -0.23$, $SE = 0.07$, $p = .001$, 95% CI [-0.35, -0.09], conditional effects: -1 SD: 95% CI [0.36, 1.18], Mean: 95% CI [0.11, 0.37], +1 SD: 95% CI [-0.68, 0.01]; victimization: $\beta = -0.24$, SE

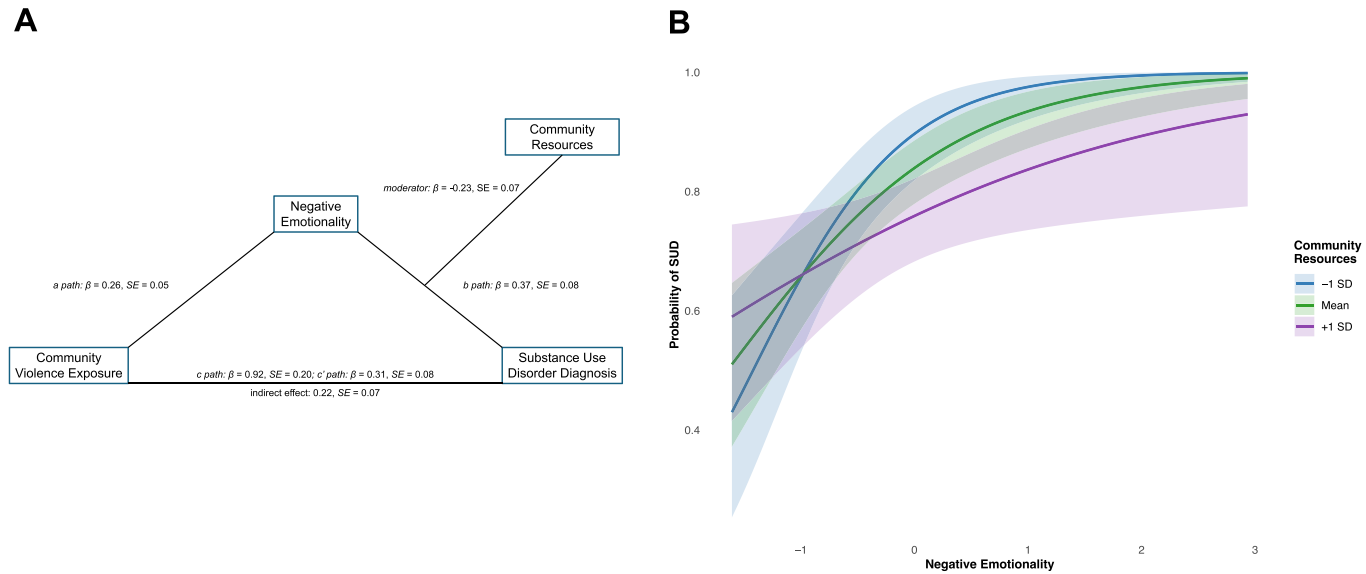


Fig. 2. A: Moderated-mediation model illustrating the relationship between youth-onset community violence exposure and substance use disorder diagnosis, with negative emotionality as the mediator and community resource density as the moderator. All paths tested were significant.

B: Probability of developing a substance use disorder based on levels of negative emotionality, with moderation by density of community resources. The figure illustrates probabilities at +1 SD (one standard deviation above the mean) and -1 SD (one standard deviation below the mean) for community resources. Shading represents 95% CIs, which reflect the confidence intervals for each conditional probability estimate. These visualizations may slightly differ from results generated in MPlus due to differences in how missing data is handled in R. Because this is a logistic regression model, the relationship is non-linear, reflecting the way probabilities are modeled for binary outcomes.

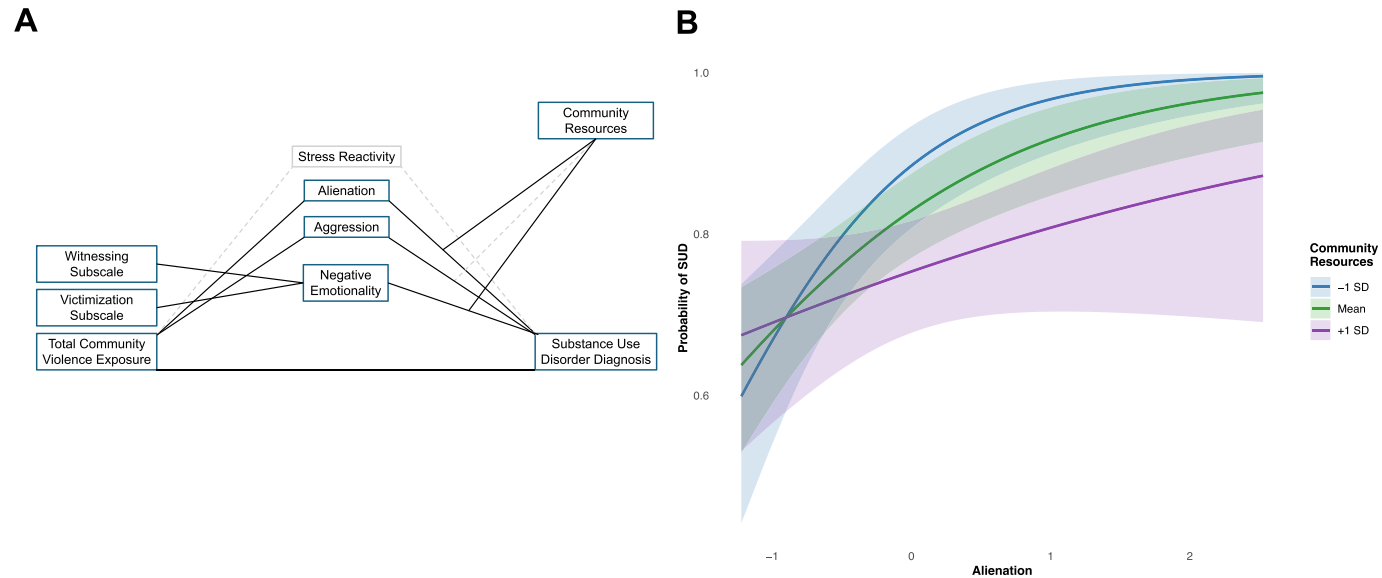


Fig. 3. A: Supplemental analyses testing the moderated-mediation model with specific subscales of negative emotionality (alienation, aggression, and stress reaction) as mediators, and community violence subscales (witnessing and victimization). Non-significant paths are represented by grey dashed lines, and significant paths are represented by solid black lines.

B: Probability of developing a substance use disorder based on levels of alienation (subscale of negative emotionality), with moderation by density of community resources. The figure illustrates probabilities at +1 SD (one standard deviation above the mean), the mean, and – 1 SD (one standard deviation below the mean) for community resources. Shading represents 95% CIs, which reflect the confidence intervals for each conditional probability estimate. These visualizations may slightly differ from results generated in MPlus due to differences in how missing data is handled in R. Because this is a logistic regression model, the relationship is non-linear, reflecting the way probabilities are modeled for binary outcomes.

= 0.07, $p < .001$, 95% CI [-0.37, -0.11], conditional effects: -1 SD: 95% CI [0.39, 1.19], Mean: 95% CI [0.10, 0.36], +1 SD: 95% CI [-0.71, -0.02]). Both witnessing and victimization appear to contribute similarly to relationships among youth-onset community violence exposure, negative emotionality, and substance use disorder. This pattern underscores the generalizability of the self-medication hypothesis across varied community violence experiences and the potential for community resources to mitigate the association.

Second, we wanted to examine whether we saw a similar moderated-mediation effect using symptom severity scores instead of the binary substance use disorder diagnosis as our outcome. Results indicated that negative emotionality significantly mediated the relationship between youth-onset community violence exposure and total symptom count (indirect effect = 0.04, $SE = 0.02$, $p = .02$, 95% CI [0.01, 0.07]). Specifically, youth-onset community violence exposure was positively associated with negative emotionality (a path: $\beta = 0.26$, $SE = 0.05$, $p = .01$, 95% CI [0.16, 0.36]), and negative emotionality was positively associated with the number of substance use disorder symptoms (b path: $\beta = 0.14$, $SE = 0.05$, $p = .01$, 95% CI [0.04, 0.24]). Results indicated that the density of community resources did not moderate the association between negative emotionality and the number of substance use disorder symptoms ($\beta = -0.04$, $SE = 0.05$, $p = .44$, 95% CI [-0.14, 0.06]). These findings provide supporting evidence for the self-medication hypothesis, however, we failed to detect a moderating effect of community resources on substance use disorder symptom count.

Third, we sought to investigate whether the relationship between youth-onset community violence exposure and having a substance use disorder was driven by specific subscales of negative emotionality – that is, alienation, aggression, and stress reaction – rather than by negative emotionality as a whole (Fig. 3A). Results indicated that alienation significantly mediated the relationship between youth-onset community violence exposure and having a substance use disorder (indirect effect = 0.15, $SE = 0.06$, $p = .008$, 95% CI [0.06, 0.28]). Specifically, youth-onset community violence exposure was positively associated with alienation (a path: $\beta = 0.23$, $SE = 0.05$, $p < .001$, 95% CI [0.14, 0.32]), and alienation was positively associated with having a substance use disorder (b path: $\beta = 0.30$, $SE = 0.08$, $p < .001$, 95% CI [0.14, 0.45]). Similarly, aggression significantly mediated the relationship between youth-onset community violence exposure and having a substance use disorder (indirect effect = 0.19, $SE = 0.08$, $p = .02$, 95% CI [0.07, 0.38]). Youth-onset community violence exposure was positively associated with aggression (a path: $\beta = 0.30$, $SE = 0.05$, $p < .001$, 95% CI [0.20, 0.40]), and aggression was significantly associated with having a substance use disorder (b path: $\beta = 0.29$, $SE = 0.09$, $p = .002$, 95% CI [0.11, 0.48]). Stress reaction did not mediate the relationship between youth-onset community violence exposure and having a substance use disorder, as neither the indirect effect (indirect effect = 0.05, $SE = 0.04$, $p = .15$, 95% CI [-0.002, 0.18]) nor the a path ($\beta = 0.09$, $SE = 0.05$, $p = .08$, 95% CI [-0.01, 0.18]) were significant, although the b path remained significant ($\beta = 0.27$, $SE = 0.08$, $p < .001$, 95% CI [0.12, 0.42]). These findings suggest that alienation and aggression may be important emotional factors for the association between youth-onset community violence exposure and substance use disorders.

Fourth, we tested if density of community resources moderated the relationship between the significant mediating subscales – specifically, alienation and aggression – and having a substance use disorder (Fig. 3A). The density of community resources moderated the relationship between alienation and having a substance use disorder ($\beta = -0.24$, $SE = 0.08$, $p = .004$, 95% CI [-0.39, -0.07]). That is, when density of community resources was -1 SD below the mean or at the mean, the indirect effect of alienation was significant and positive (-1 SD: 95% CI [0.26, 1.17]; Mean: 95% CI [0.06, 0.29]), indicating a stronger relationship between alienation and substance use disorder. As density of community resources increased to +1 SD above the mean, the indirect effect of alienation weakened (95% CI [-0.77, -0.01]), suggesting that greater density of community resources reduced the strength of this association (Fig. 3B). However, there was no significant moderating effect of density of community resources on the relationship between aggression and having a substance use disorder ($\beta = -0.06$, $SE = 0.09$, $p = .48$, 95% CI [-0.22, 0.11]).

Finally, we wanted to understand whether the observed moderated-mediation effect was driven by density of a particular type of community resource. To do this, we evaluated if social services, health care services, and grocery stores each separately moderated the indirect effect of negative emotionality on the relationship between youth-onset community violence exposure and having a substance use disorder. Social services, health care services, and grocery stores each independently moderated the relationship between negative emotionality and having a substance use disorder, suggesting that the moderating effect was not limited to any single community resource (social services: $\beta = -0.23$, $SE = 0.07$, $p = .002$, 95% CI [-0.37, -0.08]; health care services: $\beta = -0.20$, $SE = 0.06$, $p = .001$, 95% CI [-0.33, -0.08]; grocery stores: $\beta = -0.21$, $SE = 0.07$, $p = .006$, 95% CI [-0.35, -0.05]). The results suggest that the potential protective effect of density of community resources is not limited to a single category of community resources.

3. Discussion

The self-medication hypothesis has long been used to conceptualize the association between psychological and emotional distress and substance use disorders. Our study advances the application of this hypothesis by showing that youth-onset community violence is associated with increased negative emotionality and having a substance use disorder, as well as a greater number of substance use disorder symptoms. Furthermore, in line with a public health approach to mitigate the adverse effects of community violence, our results suggest that increased availability of community resources may disrupt this pathway by weakening the association between heightened negative emotionality and having a substance use disorder. Ultimately, these results highlight the role that both individual and community factors may play in shaping the mental health of those exposed to community violence.

The present study extends work on the self-medication hypothesis by focusing on youth-onset community violence as a key stressor that relates to the process of self-medication. Residing in areas with high and ongoing community violence exposes individuals to sustained stress, causing long-lasting negative effects (e.g., depression, anxiety) and potentially reinforcing negative emotionality as a key factor in the association between community violence and substance use disorders (Cole et al., 2020; Cooley-Quille, Boyd, Frantz, & Walsh, 2001; Haden & Scarpa, 2008; Scarpa, 2001; Tung et al., 2018). Furthermore, community violence exposure reflects existing

structural inequities that also may contribute to development and maintenance of negative emotionality. Specifically, we would be remiss not to consider the disproportionate impact of community violence on racially and economically minoritized groups (Richards et al., 2014; Stein et al., 2003). Our sample, predominantly composed of minoritized individuals, reflects broader national trends indicating that these communities are more frequently exposed to community violence. Minoritized communities experience a host of institutional and structural stressors in addition to community violence when compared to non-minoritized groups, such as institutional discrimination and police brutality, that can also increase negative emotionality and significantly elevate the risk of developing a substance use disorder (i.e., Minority Stress Theory) (McCabe, Bostwick, Hughes, West, & Boyd, 2010; Meyer, 2003). Considering the multifaceted factors contributing to negative affect in communities with elevated rates of violence—including both the psychological impacts and the structural conditions—as well as exploring how individuals cope within these contexts are important lines of future research.

Our findings also highlight the potential effectiveness of taking a public health approach in addressing the negative impact of youth-onset community violence by targeting underlying psychological mechanisms. While heightened negative emotionality is associated with community violence exposure, individuals' mental health also can be influenced by additional inequitable factors within their neighborhoods, such as reduced community support systems (O'Donnell, Schwab-Stone, & Ruchkin, 2006; Sampson, Raudenbush, & Earls, 1997; Stafford, Chandola, & Marmot, 2007; Tung, Hawkey, Cagney, & Peek, 2019). In fact, in communities burdened by high levels of violence, there is often a lack of social, economic, and physical support systems (see supplemental findings with alienation as a mediator) (Archibald & Putnam Rankin, 2013; Hilmers, Hilmers, & Dave, 2012; Small, 2006). Further, taking a public health approach may be particularly effective because areas with elevated levels of community violence often encounter numerous barriers to mental health support due to a history of structural racism, including financial constraints, institutional mistrust and bias, a dearth of service providers, and issues of accessibility. These challenges can form a daunting landscape for individuals seeking support, necessitating a shift towards more innovative and accessible public health strategies. The present findings suggest that focusing on the broader community needs over solely relying on individual therapy (Williams & Cooper, 2019), may, in part, mitigate the adverse psychological impacts of youth-onset community violence. By increasing the availability of community resources, we can not only aid in addressing the psychological consequences of community violence but also relieve mental health professionals from the undue stress of systemic issues by enabling providers to focus more effectively on individual care (Yearby, Clark, & Figueroa, 2022). For communities disproportionately affected by violence, increasing availability of vital resources for mental and emotional well-being may be a foundational step before individual therapy can be fully effective (Castro-Ramirez et al., 2021).

Before concluding, it is important to note several limitations. First, the present study did not directly assess community resource utilization. While it is notable to see a small yet robust effect by merely the density of these community resources, future research could enhance this work by understanding how individuals engage with community resources in their neighborhoods. It would be important to assess whether individuals are aware of services, if they can access them, or if they find these services suitable or helpful. While we do not assess community service quality, our findings contribute to the growing body of literature by emphasizing that even small improvements in community resource availability, regardless of service quality, are likely to be more beneficial than none at all (Tung, Boyd, et al., 2018). However, much more research is needed to better understand how community resources can mitigate the psychological impact of community violence exposure, how the level of investment and service quality shape these outcomes, and how to effectively prioritize resource allocation across various contexts. Second, while we focused on moderating the association between negative emotionality and substance use disorder, in line with the self-medication hypothesis (Khantzian, 1997), future research should consider how community violence exposure influences the development of negative emotionality and the potential ways community resources may reduce this association. Third, the key variables tested in the study (i.e., youth-onset community violence exposure, negative emotionality, substance use disorder diagnosis) reflect self-report measures. By integrating objective measures, such as physiological indicators like skin conductance or heart rate variability, future research can complement self-reported data and provide a more nuanced biopsychosocial understanding of how community violence exposure affects individuals (Estrada et al., 2020). Fourth, although participants experienced community violence exposure during youth and negative emotionality was measured in adulthood, the timing of the onset of lifetime substance use disorder diagnoses is less clearly defined. This limits certainty around the temporal ordering of variables in our study and our ability to draw firm conclusions about the developmental sequence linking community violence exposure, negative emotionality, and substance use disorder development. While our findings provide support for the self-medication hypothesis, these results should be interpreted as testing theoretical relationships rather than establishing clear causal pathways (Winer et al., 2016). Lastly, though the direction of the moderated-mediation was the same with a binary outcome compared to dimensional outcome (symptom count), the moderation effect of community resources when using the symptom count was non-significant. There is evidence suggesting that sociodemographic differences influence both the number and type of symptoms endorsed for substance use (Gizer et al., 2013; Lewis, Hoffman, Garcia, & Nixon, 2018; Wu et al., 2009). Additionally, evidence suggests that even when individuals endorse the same number of symptoms, the level of associated impairment appears to vary across sociodemographic groups (Gizer et al., 2013). Thus, symptom count may not represent the same severity of substance use for all individuals, a consideration that is particularly relevant given the predominantly racially and ethnically minoritized population in our sample. Further research exploring how sociodemographic factors relate to both binary and dimensional representations of substance use is necessary to fully understand the complex relationships between community violence exposure, negative emotionality, substance use problems, and availability of community resources. However, more work is needed to parse apart both binary and dimensional aspects of substance use to fully understand the relationship between community violence exposure, negative emotionality, substance use problems, and community resources. Despite these limitations, our study represents an important first step in understanding the complex relationships among community violence exposure, negative emotionality, substance use disorders, and community resources.

In conclusion, the present study provides empirical support for the self-medication hypothesis by capturing the association between community violence exposure and substance use disorders. The present study also provides support for the effectiveness of taking a public health approach to mitigate the negative consequences of community violence exposure. Collaboration across disciplines is necessary to develop and implement evidence-based interventions that reduce suffering among those affected by community violence exposure.

CRedit authorship contribution statement

Jordyn R. Ricard: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Jennifer A. Richeson:** Writing – review & editing, Supervision. **Arielle Baskin-Sommers:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare no potential conflicts of interest regarding the research, authorship, and/or publication of this manuscript.

Data availability

Data will be made available on request.

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