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Resilience characteristics mitigate tendency for harmful alcohol and illicit drug use in adults with a history of childhood abuse: A cross-sectional study of 2024 inner-city men and women

Aliza P. Wingo^{a,b}, Kerry J. Ressler^{b,c}, and Bekh Bradley^{a,b,*}

^aAtlanta VA Medical Center, 1670 Clairmont Road, Decatur, GA 30033, USA

^bDepartment of Psychiatry and Behavioral Sciences, Emory University School of Medicine, USA

^cHoward Hughes Medical Institute, Chevy Chase, MD, USA

Abstract

Resilience refers to abilities to cope adaptively with adversity or trauma. A common psychological sequella of childhood abuse or other traumatic experiences is substance use problems. There are, however, very limited data on relationships among resilience traits, childhood abuse, and alcohol or drug use problems. Hence, we aimed to examine associations between resilience characteristics and lifetime alcohol and illicit drug use in 2024 inner-city adults with high rates of childhood abuse and other trauma exposure. In this cross-sectional study, resilience was assessed with the Connor-Davidson Resilience Scale, childhood abuse with the Childhood Trauma Questionnaire, lifetime alcohol and illicit drug use with the Alcohol Use Disorder Identification Test and Drug Abuse Screening Test. Associations between resilience and substance use were examined with linear regression models, adjusting for trauma load, age, and sex. We found that resilience characteristics mitigated tendency for lifetime alcohol use problems both as a main effect ($\beta = -0.11$; $p = 0.0014$) and an interaction with severity of childhood abuse ($\beta = -0.06$; $p = 0.0115$) after trauma severity, age, and sex were controlled for. Similarly, resilience reduced lifetime illicit drug use both as a main effect ($\beta = -0.03$; $p = 0.0008$) and as an interaction with severity of childhood abuse ($\beta = -0.01$; $p = 0.0256$) after trauma load, age, and sex were adjusted for. Our findings add to a nascent body of literature suggesting that resilience characteristics mitigate risks not only for PTSD, major depression, and suicidality, but also for substance use problems in adults exposed to childhood abuse or other traumatic experiences.

*Corresponding author. Atlanta VA Medical Center, 1670 Clairmont Road, Decatur, GA 30033, USA. Tel.: +1 404 321 6111x7935. bekh.bradley@va.gov, R.Bekh.Bradley@gmail.com, rbradl2@emory.edu (B. Bradley).

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Contributors

Kerry Ressler and Bekh Bradley designed and implemented the investigation. Aliza Wingo conducted statistical analyses and wrote the first draft of the manuscript. All coauthors were actively involved in editing all components of the manuscript.

Conflict of interest

None of the authors have any conflict of interest.

Keywords

Resilience; Alcohol use; Substance use; Childhood abuse; Trauma; Risk

1. Introduction

Exposure to traumatic experiences, including childhood abuse, substantially increases one's risks for psychiatric disorders such as post-traumatic stress disorder (PTSD), major depressive disorder, substance abuse or dependence, or a combination of these disorders (Alim et al., 2008; Bennett and Kemper, 1994; Downs and Harrison, 1998; Dunca et al., 1996; Eisen et al., 2004; Petrakis et al., 2011; Weiss et al., 1999). Longitudinal studies suggest that these psychiatric disorders can persist for many years after trauma exposure (up to 40 years in one study), and are less likely to respond to treatment (Boe et al., 2011; Hull et al., 2002; Kadri et al., 2006; Nanni et al., 2011). As a trauma, childhood abuse has quite unique and important implications in that it can exert negative influences on sensitive developmental periods for emotional, behavioral, cognitive, and social domains, interrupt healthy development, and lead to increased risk for psychopathology. Substance abuse or dependence is one of the most common psychological sequella of childhood abuse (Bennett and Kemper, 1994; Downs and Harrison, 1998; Green et al., 2010a; Kendler et al., 2000; McLaughlin et al., 2010). Despite the increased risk associated with exposure to childhood abuse and other traumas, some individuals develop effective coping responses and are successful in one or more important life domains such as relationship or work, illustrating the concept of resilience (Alim et al., 2008; Collishaw et al., 2007; Fergusson and Lynskey, 1996).

Resilience refers to the ability to cope adaptively with adversity or trauma (Luthar et al., 2000). It has been conceptualized as a complex and multidimensional construct with personal characteristics and environmental factors (Feder et al., 2009; Luthar et al., 2000). Studies have identified several salient traits of resilience including ego strength, hardiness, positive emotions, optimism, spirituality/faith, adaptive coping styles, or cognitive flexibility (Feder et al., 2009; Southwick et al., 2005). Certain environmental factors such as strong role models, close and nurturing family bonds, and access to quality or supportive relationships have all been shown to foster resilience (Feder et al., 2009; Southwick et al., 2005). Given its complexity, resilience has been operationally defined in various ways. One of the most widely used and validated measures of resilience is the self-report Connor-Davidson Resilience Scale (CDRISC), which assesses a combination of core resilience characteristics – hardiness, tenacity, strong self-efficacy, emotional and cognitive control under pressure, adaptability, ability to bounce back, tolerance of negative affect, spiritual coping, and goal orientation (Campbell-Sills and Stein, 2007; Connor and Davidson, 2003). Therefore, in this study, we assessed resilience traits using the 10-item version of the CDRISC (Campbell-Sills and Stein, 2007).

Resilience characteristics are likely to mitigate risks of developing substance use disorders, perhaps through effective emotional regulation, tolerance of negative affect, or active seeking of supportive or nurturing relationships. So far, studies on the interaction between resilience attributes and exposure to childhood abuse on substance use problems are still

very limited. To our knowledge, there has been only one study in 497 OEF/OIF veterans who experienced combat trauma, and it found that high CDRISC scores were associated with less alcohol use problem (Green et al., 2010b). Therefore, to address gaps in research on resilience and substance use disorders, we aimed to examine associations between resilience traits and lifetime alcohol and illicit drug use problems in a population of inner-city adults with high rates of childhood abuse and other trauma exposure. We hypothesized that greater resilience would be associated with fewer substance use problems.

2. Methods

2.1. Sample

This cross-sectional study was part of a larger study investigating genetic and environmental factors for PTSD in a population of inner-city, low income, and high stress and trauma exposure (Binder et al., 2008; Bradley et al., 2008). Inclusion criteria were: 1) age 18 or older; 2) understanding English; and 3) able to give informed consent. Exclusion criteria consisted of: 1) being acutely suicidal; or 2) psychotic; or 3) having an acute medical problem. Members of the research team approached adult patients waiting for their appointments in several locations including primary care or obstetrical-gynecology clinic, or general pharmacy waiting area of the Grady Memorial Hospital in Atlanta, GA to solicit study participation. Participants gave informed consent and completed a battery of measures. Sociodemographic information including age, sex, race, education, income, and marital status was also collected. The study was approved by the Institutional Review Boards of Emory University School of Medicine and Grady Memorial Hospital.

2.2. Assessment instruments

Resilience was assessed with the abbreviated 10-item Connor-Davidson Resilience Scale (CDRISC), which has excellent psychometric properties, with internal consistency Cronbach's α of 0.85 and test-retest correlation coefficient of 0.87 (Campbell-Sills and Stein, 2007). The 10-item CDRISC is highly correlated with the full CDRISC, with a correlation coefficient of 0.92 (Campbell-Sills and Stein, 2007). The 10-item CDRISC score ranges from 0 to 40, with higher scores indicating greater resilience.

Alcohol use was evaluated with the 10-item, self-report Alcohol Use Disorders Identification Test (AUDIT) designed by the World Health Organization to screen for harmful and hazardous alcohol use (Babor et al., 1994). The AUDIT has been validated in primary care patients in six countries, is consistent with the ICD-10 definitions of alcohol dependence and harmful alcohol use, and provides an accurate measure of hazardous alcohol drinking (Babor et al., 1994). This measure has a reliability correlation coefficient of 0.83 and test-retest reliability of 0.87–0.95 (Babor et al., 1994). In our study we assessed both current alcohol use, using the standard version of the AUDIT, and lifetime alcohol use using a modified version of the AUDIT. To assess lifetime alcohol use, we modified the phrase “during the last year” to “during the year when you drank the most” for each question in the AUDIT. For instance, we modified the original question of “During the last year, on average, how many drinks containing alcohol do you have on a typical drinking day?” to “During the year when you drank the most, how many drinks containing alcohol did you have on a typical

drinking day?” When participants reported that their current level of drinking was the highest it had been during their lifetime, the current and lifetime AUDIT scores were the same. For the purposes of this paper, we presented data from the lifetime AUDIT assessment. Each item of the AUDIT is rated on a scale of 0–4, yielding a possible score range of 0–40, with higher scores reflecting more problematic alcohol drinking (Babor et al., 1994).

Illicit drug use was assessed with the self-report psychometrically validated Drug Abuse Screening Test (DAST) (Cocco and Carey, 1998; Skinner, 1982; Yudko et al., 2007). The DAST has an internal consistency of 0.92 and test-retest reliability of 0.78 (Yudko et al., 2007). We also assessed both current and lifetime drug use patterns using the standard and modified versions of the DAST. To assess lifetime drug use, we modified the phrase “in the last year” to “in your life” in the DAST questionnaire. For example, the question “In the last year, have you used drugs other than those required for medical reasons?” was modified into “In your life, have you used drugs other than those required for medical reasons?” When individuals reported that their current level of illicit substance use was the highest it had been during their lifetime, the current and lifetime DAST scores were the same. For the purposes of this paper we presented data from the lifetime DAST assessment. Each item on the DAST consists of a choice of yes (1) or no (0), yielding a score range of 0–10, with higher scores indicating more hazardous illicit drug use.

Childhood abuse was assessed retrospectively with the self-report and psychometrically validated 28-item childhood trauma questionnaire (CTQ) (Bernstein and Fink, 1998; Bernstein et al., 2003). The CTQ captures emotional, sexual, and physical abuse. It has an internal consistency Cronbach’s α of 0.91, test-retest reliability of 0.79–0.86 over an average of 4 months, and convergent validity with both clinician-rated interview of childhood abuse and therapists’ ratings of abuse (Pearson correlation: 0.38–0.65) (Bernstein et al., 1994; Scher et al., 2001). Scores from the CTQ were extracted for each of the categories of emotional, physical, and sexual abuse and classified into either none/mild or moderate/severe range for each type of abuse following Bernstein and Fink’s score cutoffs (Bernstein and Fink, 1998). Similar to our previous approach (Bradley et al., 2013, 2008), we summed the number of types of abuse in the moderate/severe range to create a childhood abuse index, which ranged from 0 to 3 for each participant. This index was included as a covariate in our linear regression models to control for severity of childhood abuse.

Other trauma exposure was reported retrospectively by participants via the Traumatic Events Inventory (TEI) (Gillespie et al., 2009; Schwartz et al., 2005). The TEI elicits lifetime history of exposure to different categories of trauma. Traumatic event is defined as having experienced, witnessed, or confronted with one or more of the following: physical assault, sexual assault, natural disaster, serious accident/injury, sudden life-threatening illness, military combat, having a close friend or family member being murdered, witnessing a family member being assaulted, childhood abuse, or witnessing violence between parents or caregivers in childhood. The childhood abuse item in the TEI was excluded to avoid overlap with the CTQ.

2.3. Data analysis

Analysis was performed using SAS software (version 9.3, SAS Institute, Cary, NC, USA). Associations between resilience and harmful substance use were examined with linear regression models in which substance use (either lifetime alcohol use or lifetime illicit drug use) was the outcome, resilience (CDRISC score) the independent variable, and childhood abuse, other trauma exposure, sex, and age as covariates. Additionally, we ran these two linear regression models with the covariate of childhood abuse decomposed into subcategories of sexual, physical, and emotional abuse. Lastly, we examined association between resilience and extreme groups of alcohol and drug use using logistic regression models adjusting for trauma load, sex, and age. For alcohol, we split the sample into two clinically distinct groups using AUDIT score – controls with scores below 8 and cases of alcohol use problems with scores ≥ 20 (Babor et al., 1994). Likewise, for drug use, we split the sample by DAST scores into controls with DAST scores ≤ 1 and cases of substance use problems with DAST scores ≥ 4 (Cocco and Carey, 1998; Yudko et al., 2007).

3. Results

3.1. Sample description

A total of 2024 subjects were included in this study. The majority of the participants were women (70.4%) and African American (93.4%) with a mean age of 39 (Table 1). Among these participants, 22.7% did not graduate from high-school, 43.8% did, 21.6% had some college or technical school education, 10.9% were graduates of a technical school or college, and only 1.0% went to graduate school (Table 1). The sample had low employment rate (28.0%) and low marriage rate (10.8%; Table 1). Notably, there was a relatively high trauma exposure rate in this population, as reflected by a mean number of childhood abuse in the moderate or severe range of 0.7 ± 1.0 and mean number of other trauma exposure of 2.5 ± 1.9 (Table 1).

3.2. Association between resilience and harmful lifetime alcohol use

The linear regression model with lifetime AUDIT score as the outcome, resilience as the independent variable, and covariates including severity of childhood abuse, other trauma exposure, interaction term between resilience and childhood abuse, sex, and age explained 27% of the variance of lifetime alcohol use pattern (adjusted $R^2 = 0.27$; $p < 0.0001$; Table 2). The regression model suggested that resilience reduced lifetime hazardous alcohol use as a main effect ($\beta = -0.11 \pm 0.03$; $p = 0.0014$), whereas childhood abuse ($\beta = 2.53 \pm 0.75$; $p = 0.0008$) and other trauma exposure increased hazardous alcohol use ($\beta = 0.93 \pm 0.08$; $p < 0.0001$) (Table 2). Notably, in addition to reducing the risk of alcohol use as a main effect, resilience also significantly interacted with the severity of childhood abuse to decrease harmful alcohol use pattern ($\beta = -0.06 \pm 0.02$; $p = 0.0115$; Table 2).

Furthermore, the linear regression model also suggested that sex significantly contributed to alcohol use pattern ($\beta = -5.72 \pm 0.46$; $p < 0.0001$) (Table 2). Specifically, given similar resilience score, trauma load, and age, a woman would score 5.7 points lower on the AUDIT compared to a man. Lastly, in this model, age also significantly contributed to alcohol use

pattern ($\beta = 0.13 \pm 0.01$; $p < 0.0001$), with being older associated with lower hazardous alcohol use scores.

For visual conceptualization of the interaction between resilience and childhood abuse in reducing lifetime hazardous alcohol use, we divided resilience into three groups based on the percentile of the CDRISC score. Specifically, CDRISC scores ≥ 75 th percentile were grouped into high resilience, CDRISC scores between 25th and 75th percentile medium resilience, and CDRISC score < 25 th percentile low resilience. Fig. 1 shows that given similar numbers of childhood abuse, participants in the high resilience group had the lowest hazardous alcohol use scores compared to those of the medium and low resilience groups. Likewise, adults in the medium resilience group had lower hazardous alcohol use scores than those in the low resilience group given similar severity level of childhood abuse (Fig. 1). Notably, the separation of AUDIT scores appeared more pronounced with increasing level of severity of childhood abuse (Fig. 1).

We also examined association between resilience and clinically distinct groups of alcohol use using logistic regression modeling controlling for confounding factors. The two groups were controls with AUDIT scores of less than 8 and cases with AUDIT scores ≥ 20 , reflecting likely alcohol use disorder (Babor et al., 1994). We found that higher resilience scores were associated with lower odds of having alcohol use disorder (OR = 0.95, 95% CI [0.93–0.97]; $p < 0.0001$; Table 3) and that higher load of childhood trauma or other trauma was associated with greater odds for having alcohol use disorder (Table 3). There was no interaction between childhood abuse and resilience in this logistic regression model. Lastly, being women and younger age were associated with lower risk for alcohol use problems (Table 3).

We examined relationships between resilience and alcohol use with the covariate of childhood abuse decomposed into specific type of sexual, physical, and emotional abuse. Consistently with the above models, we found that greater resilience scores were associated lower problematic alcohol use ratings ($\beta = -0.17 \pm 0.03$; $p < 0.0001$; Table 4). Notably, while childhood emotional and physical abuse were associated with more problematic alcohol use, childhood sexual abuse was only marginally associated with it (Table 4).

3.3. Association between resilience and lifetime illicit drug use

The linear regression model predicting lifetime illicit drug use pattern with resilience as the independent variable, adjusting for severity of childhood abuse, other trauma exposure, sex, and age, explained 32% of the variance of lifetime illicit drug use (adjusted $R^2 = 0.32$; $p < 0.0001$; Table 5). As hypothesized, higher resilience scores predicted lower hazardous illicit drug use scores ($\beta = -0.03 \pm 0.01$; $p = 0.0008$; Table 5), while a history of more severe childhood abuse predicted higher scores of illicit drug use ($\beta = 0.68 \pm 0.22$; $p = 0.0017$; Table 5). Likewise, higher load on other trauma exposure was also associated with higher illicit drug use scores ($\beta = 0.35 \pm 0.02$; $p < 0.0001$; Table 5). Additionally, given similar scores on resilience, childhood abuse, other trauma exposure, and age, women would score 1.38 points lower than men on illicit drug use ($\beta = -1.38 \pm 0.13$; $p < 0.0001$; Table 5). Older age was associated with higher score on the DAST ($\beta = -1.38 \pm 0.13$; $p < 0.0001$; Table 5). Lastly, in addition to reducing hazardous drug use as a main effect, resilience also interacted

with severity of childhood abuse in decreasing illicit drug use pattern ($\beta = -0.01 \pm 0.01$; $p = 0.0256$; Table 5).

To better visually conceptualize the interaction between resilience and severity of childhood abuse on reducing lifetime illicit drug use, we divided subjects into three resilience groups as explained above, high resilience, medium resilience, and low resilience. Fig. 2 shows that given similar severity of childhood abuse, scores on the hazardous illicit drug use were lowest in the high resilience group and highest in the low resilience group, suggesting that resilience mitigates the tendency for harmful illicit drug use in adults with a history of childhood abuse.

We also examined association between resilience and clinically distinct groups of cases of drug use problems, as reflected by a DAST score of ≥ 4 ($n = 587$), and controls with no drug use with a DAST score ≤ 1 ($n = 780$) using logistic regression model, controlling for severity of childhood abuse and other trauma exposure, sex, and age. We found that greater resilience scores were associated with a lower risk for drug use disorder (OR = 0.96 [0.94–0.98]; $p < 0.0001$; Table 3). As expected, more childhood abuse or more other trauma was associated with a higher odd of having drug use problems (Table 3). There was no interaction between resilience and childhood abuse in this logistic regression model. Being a woman was associated with a lower risk for substance use disorder after controlling for trauma load, age, and resilience score (Table 3).

Lastly, we examined the relationship between resilience and drug use with the covariate of childhood abuse decomposed into the specific type of childhood emotional, physical, and sexual abuse. In line with the above findings, higher resilience scores were associated with lower drug use ($\beta = -0.05 \pm 0.01$; $p < 0.0001$; Table 4). Interestingly, in this model, childhood emotional abuse was associated with higher scores on harmful drug use while childhood physical and childhood sexual abuse were not (Table 4).

4. Discussion

In this cross-sectional study of 2024 urban-dwelling, low income, primarily African American adults recruited from urban public outpatient clinics, we aimed to examine associations between resilience, measured with the CDRISC, and lifetime hazardous alcohol and illicit drug use, measured with the AUDIT and DAST respectively, controlling for severity of trauma load, sex, and age, using linear regression models. We found that a greater resilience score was associated with lower lifetime hazardous alcohol and illicit drug use both as a main effect and as an interaction term with childhood abuse. These effects remained after severity of childhood abuse and other trauma exposure, sex, and age were controlled for. Similar findings were found when we looked at extreme cases of alcohol use disorder vs. controls or cases of drug use disorder vs. controls.

Our findings are consistent with results from one prior study on this subject of 497 OEF/OIF veterans, in which higher CDRISC scores were associated with lower AUDIT scores (Green et al., 2010b). Notably, we also found that resilience traits interacted with the severity of childhood abuse in mitigating its effects on increasing risks for harmful alcohol and illicit drug use. In sum, our results suggest that resilience traits reduced lifetime substance use

problems in adults with a history of childhood abuse and/or other trauma exposure both as an independent variable and in an interaction with severity of childhood abuse.

Additionally, our regression models suggested that women had lower scores on lifetime harmful alcohol and illicit drug use than men given similar levels of resilience, childhood abuse, other trauma exposure, and age. This finding is consistent with observations from at least two prior studies (Hasin et al., 2007; Kessler et al., 2005). In the first, the 2005 National Comorbidity Survey Replication, men were found to have significantly higher lifetime risk for any substance use disorders (alcohol or illicit drugs) than women (Kessler et al., 2005). The second study, the 2007 National Epidemiologic Survey on alcohol abuse or dependence, found that the prevalence of lifetime alcohol use disorder was higher in men than women (42% vs. 19.5%) (Hasin et al., 2007). Also consistent with prior studies is our finding that childhood abuse or other trauma exposure was associated with higher levels of lifetime harmful and hazardous alcohol and illicit drug use (Bennett and Kemper, 1994; Downs and Harrison, 1998; Green et al., 2010a; Kendler et al., 2000; McLaughlin et al., 2010).

We theorize that resilience characteristics mitigate risks for substance use disorders in individuals exposed to childhood abuse or other traumatic experiences via a combination of factors including emotional and cognitive control under pressure, tolerance of negative affect, utilization of cognitive reappraisal, goal orientation, spiritual coping, nurturing role models, or strong social support. A prospective study suggested that the ability to adapt flexibly to environmental demand is one of the characteristics of resilience that can reduce the risk of early onset alcohol use (Wong et al., 2006). In this study, pre-school children of alcoholic parents were compared to those of non-alcoholic parents without assessment of trauma exposure. Resilience was defined as the ability to flexibly adapt one's characteristic level of control in response to the environment, as assessed by the clinician-rated California Child Q-sort. It found that pre-school children with higher initial levels of resilience, assessed at 3–4 years of age, were less likely to start using alcohol early as adolescents (by age 14–17) (Wong et al., 2006). It also found that this characteristic of resilience was stable from preschool through adolescence (Wong et al., 2006). Another study by the same group found that resilience, defined as the ability to modulate impulses, affect, and behavior in response to environmental context protected against substance use problems during the age range of 12–15 (Weiland et al., 2012). It also suggested that this resilience characteristic appeared to be linked to better working memory, a component of executive functioning (Weiland et al., 2012). More studies are needed to elucidate the psychological mechanisms underlying protective effects of resilience characteristics on substance use disorders.

Our results should be interpreted in light of the study limitations. First, childhood abuse, alcohol, and drug use patterns were assessed retrospectively and thus are subjected to recall bias. Second since this is a cross-sectional study, no causal relationship between resilience and substance use can be drawn. Future prospective studies are needed to elucidate this relationship. Third, while our approach of summing the number of types of childhood abuse to estimate the severity of abuse might not represent exactly the severity of the abuse, it does appear to capture the degree of abuse. This approach is similar to that used in the Adverse Childhood Experiences study (Dong et al., 2004). Fourth, we modified the phrase “in the

last year” to “in your life” in the AUDIT and DAST questionnaires to assess lifetime, instead of current, patterns of alcohol and drug use. Though we do not anticipate significant changes in measures’ validity, this possibility cannot be ruled out. Lastly, the results from this study may not be generalizable to the general population since we recruited participants specifically from an inner-city indigent population. Nevertheless, this is the first study, to our knowledge, to focus on interactions between resilience traits and childhood abuse in predicting lifetime tendency for harmful alcohol and illicit drug use in a civilian population. Moreover, the large sample size of more than 2000 participants of our study increases the confidence level of the study results.

Our findings add to a nascent body of literature suggesting that resilience traits can mitigate general psychopathology such as depression (Green et al., 2010b; Pietrzak et al., 2010b; Wingo et al., 2010), PTSD (Green et al., 2010b; Pietrzak et al., 2010b; Wrenn et al., 2011), suicide ideation (Green et al., 2010b; Pietrzak et al., 2010a), and harmful substance use problems (Green et al., 2010b) in both civilian and combat veterans who were exposed to traumatic experiences such as childhood abuse, combat trauma, or other traumas. For instance, in a study of 272 OEF/OIF combat veterans, CDRISC scores were negatively correlated with symptoms of PTSD ($r = -0.53$), depression ($r = -0.57$), and psychosocial difficulties ($r = -0.40$) (Pietrzak et al., 2010b). Additionally, among these 272 veterans, those with suicide ideation had significantly lower CDRISC score than those without (Pietrzak et al., 2010a). Likewise, in another study of 497 OEF/OIF combat veterans, higher CDRISC scores were associated with lower risk of developing PTSD, less suicide ideation, fewer depressive symptoms, and fewer physical complaints after gender, age, and trauma load were controlled for (Green et al., 2010b). Consistently, in a civilian, inner-city population, resilience, as indicated by high CDRISC scores, was shown to mitigate depressive symptom severity (Wingo et al., 2010) and risk of having PTSD (Wrenn et al., 2011) in adults exposed to childhood abuse or other traumatic experiences.

Building on these results, future studies should explore biological or genetic factors that underpin or enhance resilience traits to contribute to efforts in prevention or treatment of the common psychopathology in individuals exposed to traumatic experiences.

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Fig. 1.
Interaction between resilience and childhood abuse on lifetime alcohol use.

Fig. 2.
Interaction between resilience and childhood abuse on lifetime drug use.

Table 1Characteristics of the studied population ($n = 2024$).

Characteristics	Percentage	Mean $\pm$ SD ^a	Range
Age	–	39 $\pm$ 14	18–65
Sex (% female)	70.4	–	–
Education		–	–
Less than highschool	22.7		
Highschool graduates	43.8		
Some college/technical school	21.6		
Technical school/college graduates	10.9		
Graduate school	1.0		
Marital status		–	–
Single (never married)	60.7		
Married	10.8		
Divorced	15.6		
Others (separated, widowed, domestic partner)	12.9		
Employment		–	–
Employed	28.0		
Unemployed	72.0		
Race		–	–
African American	93.4		
Others (White, Latino, Asian, mixed, other)	6.6		
Resilience (CDRISC score)	–	31.8 $\pm$ 7.5	2–40
Alcohol use (AUDIT score)	–	8.8 $\pm$ 10.3	0–40
Drug use (DAST score)	–	2.7 $\pm$ 2.9	0–10
Childhood abuse ^b	–	0.7 $\pm$ 1.0	0–3
Other traumas	–	2.5 $\pm$ 1.9	0–10

“–”: Not applicable.

^aSD: standard deviation.^bNumber of types of childhood abuse (emotional, physical, or sexual) in the moderate to severe range based on Childhood Trauma Questionnaire (CTQ) score.

Table 2

Linear regression model for association between *lifetime alcohol use* (outcome; measured with the AUDIT) and *resilience*, adjusting for sex, trauma load, and age (adjusted $R^2 = 0.27$; model $p < 0.0001$).

Variables predicting lifetime alcohol Use	df	β	SE of β	p
Higher resilience (CDRISC score)	1	-0.11	0.03	0.0014
More childhood abuse ^a	1	2.53	0.75	0.0008
Greater number of other traumas	1	0.93	0.08	<0.0001
Interaction variable (resilience $\times$ childhood abuse)	1	-0.06	0.02	0.0115
Sex (women vs. men) ^b	1	-5.72	0.46	<0.0001
Older age	1	0.13	0.01	<0.0001

df: Degree of freedom; β : parameter estimate; SE: standard error.

^a Number of types of childhood abuse (emotional, physical, or sexual) in the moderate to severe range based on Childhood Trauma Questionnaire (CTQ) score; range: [0–3].

^b Women was scored as 1 and men as 0.

Table 3

Two logistic regression models for a) lifetime alcohol use disorder, and b) lifetime drug use disorder, adjusting for trauma load, sex, and age.

Variables	df	Alcohol use disorder		Drug use disorder	
		OR [95% CI]	p	OR [95% CI]	p
Higher resilience	1	0.95 [0.93–0.97]	<0.0001	0.96 [0.94–0.98]	<0.0001
More childhood abuse	1	1.20 [1.03–1.40]	0.019	1.20 [1.04–1.40]	0.015
Greater number of other traumas	1	1.25 [1.19–1.32]	<0.0001	1.41 [1.33–1.49]	<0.0001
Sex (women vs. men)	1	0.21 [0.16–0.29]	<0.0001	0.24 [0.18–0.32]	<0.0001
Older age	1	1.05 [1.04–1.06]	<0.0001	1.03 [1.02–1.04]	<0.0001

AUDIT scores for alcohol controls were <8 ($n = 1232$) and cases 20 ($n = 351$). DAST scores were 1 for drug use controls ($n = 780$) and 4 for cases ($n = 587$). Resilience was reflected by high CDRISC score. Childhood abuse referred to the total number of types of childhood abuse – sexual, physical, or emotional – in the moderate to severe range, with a possible range of [0–3]. There was no interaction between childhood abuse and resilience in either of these regression models.

Table 4

Two linear regression models for lifetime alcohol use and lifetime drug use, considering subcategories of childhood abuse and adjusting for trauma load, sex, and age.

Variables	df	Alcohol use			Drug use		
		β	SE of β	p	β	SE of β	p
Higher resilience	1	-0.17	0.03	<0.0001	-0.05	0.01	<0.0001
Having childhood emotional abuse	1	1.42	0.63	0.025	0.41	0.18	0.023
Having childhood physical abuse	1	1.69	0.62	0.006	0.04	0.17	0.822
Having childhood sexual abuse	1	-1.04	0.51	0.044	0.21	0.15	0.142
Greater number of other trauma	1	0.92	0.08	<0.0001	0.35	0.02	<0.0001
Sex (women vs. men)	1	-5.33	0.47	<0.0001	-1.38	0.13	<0.0001
Older age	1	0.13	0.01	<0.0001	0.03	0.00	<0.0001

A total of 2020 subjects were included in the alcohol use model and 1834 in the drug use model. These variables explained 27.7% (adjusted $R^2 = 0.277$) of the variance of lifetime alcohol use, and 31.5% (adjusted $R^2 = 0.31$) of the variance of lifetime drug use.

Table 5

Linear regression model for association between *lifetime illicit drug use* (outcome; measured with the DAST) and *resilience*, adjusting for trauma load, sex, and age (adjusted $R^2 = 0.32$; model $p < 0.0001$).

Variable predicting lifetime illicit drug use	df	β	SE of β	p
Higher resilience (CDRISC score)	1	-0.03	0.01	0.0008
More childhood abuse ^a	1	0.68	0.22	0.0017
More other traumas	1	0.35	0.02	<0.0001
Interaction variable (resilience $\times$ childhood abuse)	1	-0.01	0.01	0.0256
Sex (women vs. men) ^b	1	-1.38	0.13	<0.0001
Older age	1	0.03	0.00	<0.0001

df: Degree of freedom; β : parameter estimate; SE: standard error.

^a Number of types of childhood abuse (emotional, physical, or sexual) in the moderate to severe range based on Childhood Trauma Questionnaire (CTQ) score; range: [0–3].

^b Women was scored as 1 and men as 0.