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Substance Use Disorders and Self- and Other-Directed Violence Among Adults: Results from the National Survey on Drug Use and Health

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Abstract

Background—Previous studies have identified a violence typology of self- and other-directed violence. This study examines the extent to which substance use disorders (SUDs) as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*, independent of serious psychological distress, major depressive episodes, assault arrest, and criminal justice involvement, are associated with these violence categories.

Method—Data were obtained from the National Survey on Drug Use and Health (NSDUH) pooled across survey years 2008–2015, with a combined sample of 314,881 adult respondents. According to self-report data on suicide attempt (self-directed) and attacking someone with the intent for serious injury (other-directed), violence was categorized in four categories: none, self-directed only, other-directed only, and combined self-/other-directed. Multinomial logistic regression was used to estimate the adjusted odds ratios associated with the risk factors for different forms of violence.

Results—Nicotine dependence and the number of *DSM-IV* SUDs criteria (except the criterion of legal problems) for alcohol, marijuana, and pain reliever use disorders are significantly associated with the self-/other-directed violence categories.

Limitations—Cross-sectional data do not allow assessment of directionality of important factors.

Conclusions—The identification of the combined self- and other-directed violence among adults in the general population extends studies in the adolescent population, and significant correlation between self- and other-directed violence provides additional support for clinical studies that established this association. Findings expand the associated risk factors identified in

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Conflict of Interest

None.

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previous studies for the adult population. Prevention and treatment programs need to address both forms of violence and suicidality.

Introduction

The relationship between suicidal behavior and interpersonal violence has been a focus of psychiatric studies in clinical populations for many years (Apter et al., 1993, 1995; Links et al., 2003; Plutchik et al., 1989). A systematic literature review of clinical and community studies on this topic supports the co-occurrence of aggression against self and aggression against others (O'Donnell et al., 2015). Studies have indicated high frequency of suicide attempts among incarcerated violent offenders (Coid et al., 2006; Cook, 2013; Corrigan and Watson, 2005). Externalizing disorders such as substance use disorders (SUDs) and antisocial personality disorder, typically viewed as risk factors for violence toward others (Elbogen and Johnson, 2009; Giancola, 2015; Klostermann and Fals-Stewart, 2006; Pernanen, 1991; Van Dorn et al., 2012), also have been shown to be independently related to suicidal behavior (Apter et al., 1991, 1995; Hills et al., 2005; Jokinen et al., 2010).

In many instances, mental disorders are implicated in violent behavior (Arseneault et al., 2000; Elbogen and Johnson, 2009; Pulay et al., 2008; Van Dorn et al., 2012). Although a comprehensive study of associations between violent behavior and psychiatric disorders in the general population indicated that only a minority (approximately 8%) of people with psychiatric disorders engaged in violent behavior, the risk for violence was significantly higher among those with SUDs and mood and personality disorders (Pulay et al., 2008).

Plutchik et al. (1989) have proposed a two-stage theory based on the proposition that aggression leads to violence toward self and others. In stage 1, co-occurring risk factors manifest aggression. In stage 2, the pattern of risk factors determines the target (i.e., self or others). Plutchik (1995) has noted that several risk factors (e.g., substance abuse, history of psychiatric hospitalization, poor impulse control) are common for violence against others and for suicide. Basing his premise on the presence of risk factors common to both suicidality and aggression toward others, Hillbrand (1995) proposed and identified a category that defined individuals as partaking in "combined violence" if they are violent to both themselves and others.

Studies on adolescents in the general population have established associations between suicide attempt/ideation and violence against others and have particularly focused on the joint presence of these behaviors (Harford et al., 2012, 2016; Swahn et al., 2013). In a national study of high school students, Harford et al. (2012) constructed a typology of violence based on suicidality and fighting behavior: self-directed, other-directed, combined (both self- and other-directed), and no violence. When compared with students in the other-directed and self-directed violence categories, those in the combined violence category were more likely to be younger, depressed, and to engage in substance abuse. Using a similar typology, Swahn et al. (2013) found significant associations between combined violence and early drinking onset, heavy drinking, and feelings of sadness. Harford et al. (2016) also found heavy episodic drinking to be more prevalent among youth in the combined violence category relative to other-directed and self-directed violence categories. The associations

were even stronger among those meeting two or more alcohol use disorder (AUD) symptom criteria from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV*; American Psychiatric Association, 1994).

Compared to adolescents, there have been fewer studies of combined violence against self and others among adults. In one study using data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), Harford et al. (2013) derived a violence typology based on a latent class analysis (LCA) of five other-directed and four self-directed indicators of violent behavior among adults. The LCA identified four broad categories that best fit the data statistically, including other-directed violence, self-directed violence, combined other- and self-directed violence, and no or minimal violence. The combined form of violence, compared with self- or other-directed forms of violence alone, was more strongly associated with SUDs (88.2% for combined vs. 81.1% for other-directed and 60.3% for self-directed), mood disorders (63.3% for combined vs. 18.3% for other-directed and 40.6% for self-directed), and personality disorders (76.2% for combined vs. 42.1% for other-directed and 46.5% for self-directed). However, because of a limited number of suicide attempt cases in the NESARC study, both suicide ideation and suicide attempt were used to define the self-directed violence category. The inclusion of more prevalent thoughts of one's own death (10% to 13%) with suicide attempt (2%) clouds distinctions between ideation and behavior. The use of broad categories of SUDs (i.e., alcohol use or drug use disorders) can mask the presence of different associations of specific substances with violence. The extent to which the combined form of violence is a meaningful and reliable phenomenon requires replication in other independent adult samples.

In view of these limitations, the current study seeks to use data from the National Survey on Drug Use and Health (NSDUH) to examine suicide attempt and other-directed violence among American adults. The major focus is to identify associations between specific SUDs and violence. SUDs, except nicotine dependence, are expressed by the increasing number of SUD criteria in categories representing different levels of severity. The confounders including serious psychological distress (SPD), *DSM-IV* major depressive episode (MDE), criminal justice involvement, and assault arrest, were also examined as potential risk factors for violence. Based on current literature, it is hypothesized that SUDs will evidence stronger associations with combined self- and other-directed violence than either self-directed or other-directed violence or no violence. Because the suicide rate in the United States is at a 30-year high (Curtin et al., 2016) and violent crime rate increased by 3.1 percent in 2015 after 2 years of decline (Federal Bureau of Investigation, 2016), this study is timely and addresses an important public health issue in suicide and violence prevention. By confirming SUDs as important risk factors for violence, this study is intended to raise public awareness of the consequences of SUDs and can be useful to inform health professionals about how to provide SUD patients with better care that will reduce violence and improve their quality of life.

Methods

Study Design

The study sample is based on the adult sample from the NSDUH, annual surveys of the civilian noninstitutionalized U.S. population ages 12 and older. The NSDUH is sponsored by the Substance Abuse and Mental Health Services Administration and conducted annually under contract with RTI International. The survey collects information on demographics, substance use, and mental health using a combination of computer-assisted face-to-face interviews and audio computer-assisted self-administered interviews. Participants are selected by an independent multistage area probability sample design (i.e., census tracts as the first stage followed by census block groups, segments, dwelling units, and individuals) for each of the 50 states and the District of Columbia. Young people are oversampled. The 1999–2013 sample design requires approximately equal samples sizes among three age groups: ages 12 to 17, ages 18 to 25, and ages 26 and older. The 2014–2017 design, however, places 50% of sample in the 26-and-older age group to more accurately estimate drug use and related mental health measures among the aging drug use population. Nearly 70,000 respondents are interviewed in each survey year, and the weighted interview response rate exceeds 70 percent. Detailed information on NSDUH data collection procedures, sample designs, and methodologies are described in the *2014 NSDUH Methodological Resource Book* (Center for Behavioral Health Statistics and Quality, 2015). The present study was based on public use data, which include about 83% of all of the original respondents due to a subsampling step used in the disclosure protection procedures. In view of the relatively small samples for critical variables (e.g., suicide attempt, illicit substance disorders, minorities), we pooled data from several consecutive national surveys from 2008 to 2015 to augment our study sample, which comprised 314,881 adults ages 18 and older.

Measures

Dependent Variables. Two dichotomous variables were first created and assigned for self- and other-directed violence. They were used to form a four-level violence typology based on a two-way contingency table from the cross-tabulation of other-directed violence and self-directed violence. The resulting four violence categories are none, self-directed only, other-directed only, and combined self-/other-directed. Specifically, for other-directed violence, respondents were asked, “During the past 12 months, how many times have you attacked someone with the intent to seriously hurt them?” This single item alone measured other-directed violence in a dichotomous category (one or more times = 1; none = 0). For self-directed violence, respondents were asked “During the past 12 months, did you try to kill yourself?” This single item alone measured self-directed violence in a dichotomous category (yes = 1; no = 0). The association between self- and other-directed violence was estimated by tetrachoric correlation between the respective dichotomous variables as if they were measured on a continuous scale. Technically, assuming a latent bivariate normal distribution (X_1, X_2) for each pair of two dichotomous variables (v_1,v_2), with a threshold model for the manifest variables, $v_i = 1$ if and only if $X_i > 0$, tetrachoric correlation is the correlation of X_1 and X_2.

Independent Variables. SUDs included disorders pertaining to the use of alcohol, nicotine, marijuana, cocaine, hallucinogens, heroin, inhalants, pain relievers, sedatives, stimulants, and tranquilizers. Other than nicotine dependence, SUDs were *DSM-IV* diagnoses. In view of the lack of support for the distinction between alcohol abuse and dependence (Langenbucher et al., 2004; Martin et al., 1996) and the fact that *DSM-IV* criteria for alcohol abuse and dependence were indicators of a unidimensional latent trait (Gelhorn et al., 2008; Harford et al., 2009; Kirisci et al., 2006; Saha et al., 2006), the number of *DSM-IV* SUD criteria met in the past year were categorized as follows: 0–1 criteria (referent), 2–3 criteria, 4+ criteria for each *DSM-IV* SUD, except heroin, inhalant, and sedative use disorders, for which the last two categories were combined into one category of 2+ criteria because of small sample size. Each *DSM-IV* SUD was assessed by a total of 10 criteria including 7 dependent criteria (i.e., tolerance, withdrawal, larger amounts than intended, unsuccessful efforts to cut down, time spent to obtain substance, important activities given up, continued use despite physical problems) and 3 abuse criteria (failure to fulfill major roles, hazardous use, continued use despite social problems). The abuse criterion of legal problems was not counted because it had low prevalence and had been dropped from the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (American Psychiatric Association, 2013).

The NSDUH assessment of nicotine dependence (yes = 1; no = 0) was based on the Nicotine Dependence Syndrome Scale (NDSS) (Heatherton et al., 1991) and the Fagerström Test of Nicotine Dependence (FTND) (Fagerstrom, 1978) for respondents who reported smoking cigarettes in the past month. A respondent diagnosed with nicotine dependence met either the NDSS or FTND criteria for dependence.

Serious psychological distress was assessed by the Kessler-6 (K6) screening instrument for nonspecific psychological distress (Kessler et al., 2003) included in the NSDUH mental health module. This short, fully structured K6 scale has been shown to be an effective screening instrument for assessing mood and anxiety disorders in the general population (Cairney et al., 2007; Carra et al., 2011). The instrument's six items assessed how often the respondent felt nervous, hopeless, restless, sad, everything was an effort, and felt no good, respectively, in the worst month of the past year and in the past month. The five response categories for each item were 4 = all of the time, 3 = most of the time, 2 = some of the time, 1 = a little of the time, 0 = none of the time. The recommended cutoff for the maximum of the combined scores (0–24) is 13 or more for SPD. In addition to SPD, past-year *DSM-IV* major depressive episode was included as another covariate in the analytic models.

Criminal justice involvement (yes = 1; no = 0) was measured by self-reports of having been arrested or booked (for theft, larceny, burglary, robbery, arson, driving while intoxicated, drunkenness, possession/manufacture/sale of drugs, fraud, possessing stolen goods, or vandalism) in the past year. Assault arrest (yes = 1; no = 0) was based on self-reports of arrest/booking for murder, homicide, non-negligent manslaughter, and other assault or battery.

Sociodemographic variables included gender (male, with female as referent); age categories (18–20, 21–25, 26–34, 50+, with 35–49 as referent); race/ethnicity (non-Hispanic Black,

Native American/Alaskan Native, Hawaiian/Pacific Islander, Asian, more than one race, Hispanic, with non-Hispanic White as referent); education (less than high school, some college, college graduate, with high school as referent); marital status (widowed, divorced or separated, never married, with married as referent); and family income (less than $10,000; $10,000–$29,999; $75,000 and higher; with $30,000–$74,999 as referent).

Analytic Plan

As a preliminary step, frequency distributions of each study variable were examined separately for each survey year before the data were pooled. The frequency distributions based on the pooled data then were presented in Table 1. The cross-tabulation and correlation between self- and other-directed violence were used to identify the combined violence and assess the association. With the four-level violence as the outcome, multinomial logistic regression was used to estimate the mutually-adjusted odds ratios associated with all risk factors for different forms of violence, controlling for background characteristics (Table 2). Because individuals may have multiple risk factors, the mutually-adjusted odds ratios are helpful to understand the net effect of each risk factor, independent of other risk factors. For comparison, the mutually-adjusted odds ratios were produced from the same model excluding MDE and assault arrest from the covariates (Table S1) to address the concerns that MDE might overlap with self-directed violence and that assault arrest might overlap with other-directed violence. Although it is informative to know the association between each risk factor and violence in presence of other risk factors, multicollinearity may potentially attenuate the significance of some risk factors. Therefore, multinomial logistic regression also was used to generate the individually-adjusted odds ratios, which were adjusted only for sociodemographic variables, separately for each risk factor (Table S2). The analyses were conducted using survey procedures based on the Taylor linearization method implemented in the statistical software Stata 14 (StataCorp LP, College Station, TX), which allows the specification of complex survey design in the models for stratification, clustering, and sampling weights that reflect unequal probabilities of selection. These three sampling features were taken into account for parameter estimation and the calculation of 95% confidence interval [CI] as well as the p-values in hypothesis testing. Adjusted Wald tests were used to assess statistical significance for predictors with $p < 0.01$. The significance level was set at 0.01 instead of 0.05 in interpreting our results, because no adjustments were made for multiple comparisons to avoid overlooking an interesting association that is not the result of chance (Rothman, 1990).

Results

The distributions for the violence typology were comparable across survey years in the present study. For the combined years from 2008 to 2015 NSDUH, violent behaviors in American adults were distributed as follows: none, 98.29% (95% CI = 98.23%–98.36%); self-directed only, 0.45% (95% CI = 0.42%–0.48%); other-directed only, 1.20% (95% CI = 1.15%–1.25%); and combined self-/other-directed, 0.06% (95% CI = 0.05%–0.07%). Distributions of demographics and other independent variables for each violence category are shown in Table 1. The adults with combined or other-directed violence, compared with those with self-directed or no violent behaviors, were more likely to be non-Hispanic Black,

ages 18–25, and with less than a high school education, and never married. Adults who engaged in combined violence were more likely to have family income of less than $30,000 than those with no violent behaviors. Moreover, those who engaged in combined violence compared with those with self-/other-directed or no violent behaviors were more likely to have nicotine dependence and four or more *DSM-IV* SUD criteria separately for alcohol, cocaine, pain reliever, and stimulant use disorders, and serious psychological distress. Those who engaged in combined violence and other-directed violence compared with those with self-directed or no violent behaviors were more likely to have four or more DSM-IV marijuana use disorder criteria, criminal justice involvement, and assault arrest.

The results of the multinomial logistic regression are shown in Table 2. Key findings are first highlighted. As expected, men were more likely than women to report other-directed violence. Non-Hispanic Blacks and people of mixed race were more likely to report other-directed violence and combined violence than Non-Hispanic Whites. The patterns of higher odds for both forms of violence and the combined violence can be seen in people ages 18–25 compared with those ages 35–49, high school graduates compared with college graduates, divorced or separated people compared with those who are married; as well as the presence of nicotine dependence, AUD (4+ criteria), SPD, MDE, and assault arrest. More findings are summarized separately below for violence compared with no violence, other-directed compared with self-directed violence, and combined violence compared with self-directed violence and other-directed violence.

Violence Compared with No Violence

For self-directed violence compared with no violence, ages 18–25, divorced/separated, less than $10,000 family income, AUD (2+ criteria), nicotine dependence, SPD, MDE, criminal justice involvement, and assault arrest indicate significantly higher odds, whereas college graduate indicates significantly lower odds.

For other-directed violence compared with no violence, male gender; non-Hispanic Black, Native American, and mixed race; Hispanic; ages 18–34; less than a high school education; widowed; divorced/separated; never married; increased number of SUD criteria for alcohol/marijuana/pain relievers; nicotine dependence; SPD; MDE; criminal justice involvement; and assault arrest indicate significantly higher odds, whereas having more than a high school education indicates significantly lower odds.

For combined violence compared with no violence, non-Hispanic Black race and mixed race, ages 18–25, divorced/separated, increased number of SUD criteria for alcohol (4+ criteria), pain relievers (4+ criteria) and marijuana (2–3 criteria), nicotine dependence, SPD, MDE, and assault arrest indicate significantly higher odds, whereas being a college graduate indicates significantly lower odds.

Other-directed Compared with Self-directed Violence

For other-directed violence compared with self-directed violence, male gender, non-Hispanic Black race, ages 18–34, marijuana use disorders (2–3 criteria), and assault arrest indicate significantly higher odds, whereas being a college graduate, 2+ criteria for inhalant use disorders, SPD, and MDE indicate significantly lower odds.

Combined Compared with Self-directed Violence

For combined compared with self-directed violence, non-Hispanic Black race, ages 18– 25, SPD, and assault arrest indicate significantly higher odds.

Combined Compared with Other-directed Violence

For combined compared with other-directed violence, SPD and MDE indicate significantly higher odds.

Discussion

Findings from this study yielded a small portion (approximately 0.06%) of adults in the general population who reported combined violent behaviors toward both self and others in the past year. This group had significantly higher prevalence of nicotine dependence, 2+ SUD criteria (to a varying degree by specific substance), and SPD than adults who reported no violence or violence toward only self or toward others. Though each SUD alone was significantly related to each violent form compared with no violence (Table S2), the mutually adjusted odds ratios were attenuated, especially for the number of criteria for cocaine use disorders, hallucinogen use disorders, heroin use disorders, inhalant use disorders, sedative use disorders, stimulant use disorders, and tranquilizer use disorders, which became nonsignificant after taking into account other types of SUDs and other risk factors (Table 2). The attenuation may reflect SUD comorbidity from polysubstance use or confounding with SPD and MDE, as evidenced by the high prevalence of SPD (89.6%) and MDE (58.8%) among people who reported combined violence in our study. Other national studies have revealed significant comorbidity between AUDs and mental disorders in association with violence (Elbogen and Johnson, 2009; Van Dorn et al., 2012).

Despite the low past-year prevalence of combined violence in the adult general population, the tetrachoric correlation (ranging from 0 to 1) between self- and other-directed violence is not negligible (0.40 [95% CI =0.36–0.43]) in our study. Combined violence toward self and others has been consistently found in general population studies among adolescents (Harford et al., 2012, 2016; Swahn et al., 2013) and adults (Harford et al., 2013). Our findings provide additional support for clinical studies that established associations between self- and other-directed violent behaviors (Hillbrand, 1995; O'Donnell et al., 2015). By comparison, broad measures of self-directed violence, including suicide ideation and attempt, and other-directed violence, including any form of violence, yield approximately 3% prevalence estimate for the combined violence group (Harford et al., 2012, 2013; Swahn et al., 2013), and narrow definitions based solely on suicide attempt and assault yield lower prevalence estimates among adults (0.06%) in our study, and among adolescents (0.8%) in Harford et al. (2016). Despite the variation in the measurement of violence across these studies, combined violence appears to involve a particularly serious constellation of risk factors (e.g., SUDs, psychiatric disorders) for separate forms of violence. O'Donnell et al. (2015) offer several possible explanations regarding the association between self- and other-directed violence, including a statistical artifact of methodology and common underlying factors.

One possible explanation for the co-occurrence of self- and other-directed violence distinct from the separate forms of violence is that combined violence reflects the addition of risk factors from self-directed and other-directed violence. Findings from our study also suggest quantitative differences in the common risk factors between these violence categories. The prevalence of SPD was significantly higher for combined violence (89.6%) relative to self-directed violence (68.8%) or other-directed violence (37.2%). The significant effects of SPD remained when adjusted for the presence of MDE, suggesting that mental disorders other than MDE can also be predisposing factors for violence. These findings are consistent with a recent study on the adult population in which combined violence, relative to other forms of violence (i.e., toward self and others), was characterized by higher prevalence of mood, personality, and anxiety disorders (Harford et al., 2013). In addition, our study found assault arrest, which was relatively common to combined and other-directed violence, was significantly more prevalent for combined violence (15.6%) than other-directed violence (8.6%) and indicated greater odds for combined violence (OR = 9.2; 95% CI = 5.7–15.1) than other-directed violence (OR = 6.9; 95% CI = 5.7–8.4) versus no violence, although the direct comparison was not statistically significant (OR = 1.3, 95% CI = 0.8–2.2).

Other plausible explanations for the differences between combined and other forms of violence may stem from variations in how to measure and define self-directed and other-directed violence. The narrow definitions adopted in our study may still not be specific enough and thus inadvertently mask differences across the violence categories. There are several subtypes of aggression, including reactive and proactive aggression (Conner et al., 2009) and intermittent explosive disorder, which is associated with major depressive disorder (Kessler et al., 2006). Variations in severity of aggressive behavior may further characterize differences between combined relative to other-directed violence. Suicidality involves heterogeneity of subtypes in terms of level of intent, ideation, planning, lethality, and likelihood of rescue (Conner et al., 2007, 2009; Gvion and Apter, 2011). Lifetime impulsivity and aggression, substance abuse problems, and psychotic disorders have been linked to more violent methods of suicide (Beautrais, 2003; Dumais et al., 2005). Self-mutilating behavior (SMB), another form of self-directed violence, is associated with suicide (Cooper et al., 2005; Suominen et al., 2004), particularly in the presence of borderline personality disorder, posttraumatic stress disorder (PTSD), and bipolar disorders, disorders found to be more prevalent in combined relative to other forms of violence (Harford et al., 2013). Finally, both self- and other-directed violence share certain underlying factors. Sacks et al. (2008) have noted that SMB is linked to depression, hostility, and impulsivity among male veterans with PTSD. These traits have also been linked to other-directed aggression (Birkley et al., 2013; Giancola et al., 2012). Recent studies have related aggression/impulsivity (Gvion et al., 2014), anger (Sadeh and McNiel, 2013), and violence toward others (Van Dulmen et al., 2013) to suicidality. Future studies are required to examine variation in severity of violence and etiological factors underlying self- and other-directed violence. To follow the example of the National Violent Death Reporting System for mortality studies, national and local surveys must probe and collect more in-depth information on the circumstances that bring about the violence for morbidity studies, so that future studies can determine the exact mechanisms underlying the co-occurrence of other- and self-directed violence.

Based on a screening instrument for assessing mood and anxiety disorders, SPD was shown to be a major risk factor for violence and a potentially important confounder for SUDs. Although not examined in this study, personality disorders as well as mood and anxiety disorders could also play a role similar to SPD. Elliot et al. (2016) found that personality disorders (i.e., borderline and antisocial) were significant mediators between childhood maltreatment and the persistence of alcohol and nicotine dependence. Presumably all these factors could directly and indirectly contribute to violence. Therefore, future studies should use structural equation modeling to further specify the direct and indirect roles of particular risk factors in the associations between SUD and violence.

Several limitations of our study must be highlighted. First, although the NSDUH surveys provide extensive data on SUDs, psychiatric history is limited to the assessment of SPD. The SUD measures were affected by the NSDUH partial questionnaire redesign in 2015, which changed how the questions were asked for the use of hallucinogens, inhalants, and prescription pain relievers. Second, the measurement and categorization of violent behavior in the present study are based on retrospective reports and are restricted to a limited number of question items. Underreporting in violence would likely affect the accuracy of prevalence estimates. No objective measure such as criminal records has been included. Self-reports may introduce inherent bias. Third, the assessment of other-directed violence does not indicate the context of incidents (e.g. single versus multiparty instigation or incident severity). Fourth, the study is limited to cross-sectional data, and not all measures are in the same time frame (e.g., nicotine dependence in the past month versus other SUDs in the past year). The data limitation does not allow assessment of directionality of important factors (i.e., SUDs and SPD), nor the concurrency of fighting and suicide attempt. Fifth, many people who engaged in violence may be incarcerated or homeless and are not included in the survey samples analyzed in this study. Therefore, our prevalence estimates of violence categories are conservative. Finally, our analysis was more exploratory than confirmatory and thus did not adjust for multiple comparisons to control type I error, which was not the major focus of our concern (Gelman et al., 2012).

Despite the data limitations, the large and national sample across multiple years and detailed *DSM-IV* assessments of SUDs are important study strengths. More importantly, major findings in this study establish the associations between specific substance use disorders and the violence typology. Of these specific substance use disorders, alcohol use disorders, nicotine dependence, marijuana use disorders, and pain reliever use disorders stand out as important risk factors that should be targeted for preventing violent behaviors. These findings have great implications in morbidity and mortality especially against the backdrop of opioid epidemic and the rise of premature deaths in the United States (University of Wisconsin Population Health Institute, 2017). Government agencies including the National Institute on Alcohol Abuse and Alcoholism have made medications development a high priority area by supporting many pharmacotherapy clinical trials (Litten et al., 2012). It is incumbent on clinical researchers and scientists to better understand SUDs and identify new and cost-effective treatments for patients, thereby reducing the burden of these disorders on society. Future studies also need to further explore the hierarchical structure of polysubstance use and its association with violence. Although the past-year prevalence of combined self- and other-directed violence in the U.S. general population of adults is low

(0.06%), this particular violence category compared with others was associated with higher prevalence of SUDs and SPD, which could pose problems for screening and intervention efforts designed to target only one side of the symptoms. Although prevention and treatment programs are well developed for suicide and violence toward others, the presence of indicators of both forms of violence needs to be addressed. Violence intervention programs need to consider and coordinate referral between health care and criminal justice programs.

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Limitations

Psychiatric history in NSDUH is limited to the assessment of SPD. The measurement and categorization of violent behavior are based on retrospective reports and are restricted to a limited number of question items. Underreporting in violence would likely affect the accuracy of prevalence estimates. No objective measure such as criminal records has been included. Self-reports may introduce inherent bias. The assessment of other-directed violence does not indicate the context of incidents (e.g. single versus multiparty instigation or incident severity). Cross-sectional data do not allow assessment of directionality of important factors nor the concurrency of fighting and suicide attempt. People who engaged in violence may be incarcerated or homeless and are not included in the survey samples, rendering conservative prevalence estimates for violence.

Highlights

- This national study identifies a small percentage of American adults (0.06%) who engaged in the co-occurrence of self- and other-directed violence in the past-year.
- The combined self-/other-directed violence is quantitatively distinct from the separate forms of violence. In particular, the prevalence of severe psychological distress was significantly higher for combined violence (89.6%) relative to self-directed violence (68.8%) or other-directed violence (37.2%).
- Nicotine dependence and the number of DSM-IV SUDs criteria (except the criterion of legal problems) for alcohol, marijuana, and pain reliever use disorders are significantly associated with the self-/other-directed violence categories.
- Serious psychological distress, major depressive episodes, assault arrest, and criminal justice involvement also were risk factors for the self-/other-directed violence categories
- Despite the low prevalence of the combined self-/other-directed violence, the tetrachoric correlation between self- and other-directed violence is not negligible (0.40). This finding provides additional support for clinical studies that established associations between self- and other-directed violent behaviors.

Table 1

Weighted distribution (%) of background characteristics by violence category, NSDUH 2008–2015.

Background characteristics and potential risk factors	Violence categories				
	None	Self-directed	Other-directed	Combined	Total
	(*N* = 304,842) 98.29%	(*N* = 2,289) 0.45%	(*N* = 7,286) 1.20%	(*N* = 464) 0.06%	(*N* = 314,881) 100%
Sociodemographics					
Gender					
Male	48.1[b,c]	41.6[a,c]	61.9[a,b,d]	46.0[c]	48.2
Female	51.9[b,c]	58.4[a,c]	38.1[a,b,d]	54.0[c]	51.8
Race/ethnicity					
Non-Hispanic White	66.9[b,c,d]	61.5[a,c]	51.5[a,b]	53.7[a]	66.7
Non-Hispanic Black	11.5[c,d]	13.9[c,d]	23.0[a,b]	24.0[a,b]	11.6
Non-Hispanic Native American/AK Native	0.5[c]	1.3	1.2[a]	1.7	0.5
Non-Hispanic Native HI/other Pacific Islander	0.3	0.2	0.6	0.4	0.3
Non-Hispanic Asian	4.9[c,d]	4.8[d]	2.4[a]	1.6[a,b]	4.9
Non-Hispanic more than one race	1.3[c]	2.3	2.7[a]	4.4	1.4
Hispanic	14.5[c]	15.9	18.7[a]	14.2	14.6
Age					
18–20	5.4[b,c,d]	18.2[a,c,d]	24.2[a,b]	28.7[a,b]	5.7
21–25	8.8[b,c,d]	16.0[a,c,d]	22.3[a,b]	25.9[a,b]	9.0
26–34	15.7[c]	16.2	20.4[a]	18.2	15.8
35–49	26.6[c,d]	24.7[c]	16.1[a,b]	16.3[a]	26.5
50+	43.5[b,c,d]	25.0[a,c,d]	17.1[a,b]	10.9[a,b]	43.1
Education					
Less than high school	14.1[b,c,d]	22.8[a,c,d]	29.2[a,b]	34.5[a,b]	14.4
High school	29.4[b,c]	33.6[a]	36.8[a]	35.7	29.5
Some college	26.7	28.8	25.6	26.4	26.7

Background characteristics and potential risk factors	Violence categories				
	None	Self-directed	Other-directed	Combined	Total
	(*N* = 304,842) 98.29%	(*N* = 2,289) 0.45%	(*N* = 7,286) 1.20%	(*N* = 464) 0.06%	(*N* = 314,881) 100%
College graduate	29.7[b,c,d]	14.7[a,c,d]	8.4[a,b,d]	3.5[a,b,c]	29.4
Marital status					
Married	53.6[b,c,d]	26.2[a,c,d]	20.9[a,b,d]	12.1[a,b,c]	53.1
Widowed	6.1[b,c,]	3.9[a]	4.2[a]	4.6	6.0
Divorced or separated	13.9[b]	22.4[a,c]	12.3[b]	21.6	13.9
Never married	26.4[b,c,d]	47.5[a,c,d]	62.5[a,b]	61.7[a,b]	27.0
Family income					
Less than $10,000	6.6[b,c,d]	19.1[a]	15.2[a]	21.9[a]	6.8
$10,000–$29,999	22.0[b,c,d]	32.4[a]	32.3[a]	35.0[a]	22.2
$30,000–$74,999	38.5[b,c]	32.5[a]	34.5[a]	33.2	38.4
$75,000+	32.9[b,c,d]	16.1[a]	18.0[a,d]	10.0[a,c]	32.6
Substance use disorders[e]					
Alcohol use disorders (past year)					
0–1 criteria	92.0[b,c,d]	71.3[a,d]	66.4[a,d]	50.8[a,b,c]	91.6
2–3 criteria	5.4[b,c,d]	13.5[a]	17.5[a]	15.4[a]	5.6
4+ criteria	2.5[b,c,d]	15.2[a,d]	16.1[a,d]	33.8[a,b,c]	2.8
Nicotine dependence (past month)					
No	86.8[b,c,d]	68.4[a,d]	67.3[a,d]	50.6[a,b,c]	86.5
Yes	13.2[b,c,d]	31.6[a,d]	32.7[a,d]	49.4[a,b,c]	13.5
Marijuana use disorders (past year)					
0–1 criteria	97.8[b,c,d]	89.4[a,c,d]	82.4[a,b,d]	69.2[a,b,c]	97.5
2–3 criteria	1.7[b,c,d]	6.7[a,c,d]	11.4[a,b,d]	19.3[a,b,c]	1.8
4+ criteria	0.6[b,c,d]	3.8[a,c,d]	6.2[a,b]	11.5[a,b]	0.7
Cocaine use disorders (past year)					
0–1 criteria	99.6[b,c,d]	96.8[a,d]	96.1[a,d]	85.5[a,b,c]	99.5

Background characteristics and potential risk factors	Violence categories				
	None	Self-directed	Other-directed	Combined	Total
	(*N* = 304,842) 98.29%	(*N* = 2,289) 0.45%	(*N* = 7,286) 1.20%	(*N* = 464) 0.06%	(*N* = 314,881) 100%
2–3 criteria	0.2[c,d]	0.6[d]	1.1[a]	4.1[a,b]	0.2
4+ criteria	0.2[b,c,d]	2.6[a,d]	2.8[a,d]	10.4[a,b,c]	0.3
Hallucinogen use disorders (past year)					
0–1 criteria	99.9[b,c,d]	98.4[a,d]	98.2[a,d]	93.7[a,b,c]	99.9
2–3 criteria	0.06[b,c,d]	0.9[a]	1.0[a]	2.5[a]	0.08
4+ criteria	0.02[b,c,d]	0.8[a]	0.8[a]	3.9[a]	0.04
Heroin use disorders (past year)					
0–1 criteria	99.8[b,c,d]	98.6[a]	98.0[a]	97.1[a]	99.8
2+ criteria	0.2[b,c,d]	1.4[a]	2.0[a]	2.9[a]	0.2
Inhalant use disorders (past year)					
0–1 criteria	99.98[c]	99.3	99.8[a]	98.6	99.97
2+ criteria	0.02[c]	0.7	0.2[a]	1.4	0.03
Pain reliever use disorders (past year)					
0–1 criteria	99.2[b,c,d]	93.0[a,d]	93.0[a,d]	80.8[a,b,c]	99.1
2–3 criteria	0.4[b,c,d]	2.5[a]	3.2[a]	4.8[a]	0.4
4+ criteria	0.4[b,c,d]	4.5[a,d]	3.8[a,d]	14.4[a,b,c]	0.5
Sedative use disorders (past year)					
0–1 criteria	99.9[b,c]	98.5[a]	99.0[a]	97.2	99.9
2+ criteria	0.1[b,c]	1.5[a]	1.0[a]	2.8	0.1
Stimulant use disorders (past year)					
0–1 criteria	99.8[b,c,d]	97.3[a,d]	97.7[a,d]	90.3[a,b,c]	99.8
2–3 criteria	0.1[b,c]	1.5[a]	0.8[a]	1.5	0.1
4+ criteria	0.1[b,c,d]	1.2[a,d]	1.5[a,d]	8.2[a,b,c]	0.1
Tranquilizer use disorders (past year)					
0–1 criteria	99.8[b,c,d]	97.1[a]	97.9[a]	93.5[a]	99.8

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Background characteristics and potential risk factors	Violence categories				
	None	Self-directed	Other-directed	Combined	Total
	(*N* = 304,842) 98.29%	(*N* = 2,289) 0.45%	(*N* = 7,286) 1.20%	(*N* = 464) 0.06%	(*N* = 314,881) 100%
2–3 criteria	0.1[b,c]	1.2[a]	1.2[a]	3.2	0.1
4+ criteria	0.1[b,c]	1.7[a]	0.9[a]	3.3	0.1
Serious psychological distress (past year)					
No	90.1[b,c,d]	31.2[a,c,d]	62.8[a,b,d]	10.4[a,b,c]	89.5
Yes	9.9[b,c,d]	68.8[a,c,d]	37.2[a,b,d]	89.6[a,b,c]	10.5
Major depressive episode (past year)					
No	93.6[b,c,d]	51.5[a,c]	81.2[a,b,d]	41.2[a,c]	93.3
Yes	6.4[b,c,d]	48.5[a,c]	18.8[a,b,d]	58.8[a,c]	6.7
Criminal justice involvement (past year)					
No	98.7[b,c,d]	92.6[a,c,d]	88.6[a,b]	82.2[a,b]	98.6
Yes	1.3[b,c,d]	7.4[a,c,d]	11.4[a,b]	17.8[a,b]	1.4
Assault arrest (past year)					
No	99.7[b,c,d]	96.8[a,c,d]	91.4[a,b]	84.4[a,b]	99.6
Yes	0.3[b,c,d]	3.2[a,c,d]	8.6[a,b]	15.6[a,b]	0.4

[a] Significantly different from “none” ($p < 0.01$).

[b] significantly different from “self-directed” ($p < 0.01$).

[c] significantly different from “other directed” ($p < 0.01$).

[d] significantly different from “combined” ($p < 0.01$).

[e] Alcohol use disorder, marijuana use disorder, and other drug use disorders were based on the original *DSM-IV* criteria excluding the criterion of legal problems. However, nicotine dependence was assessed based on the dependence criteria according to the Nicotine Dependence Syndrome Scale (NDSS) and the Fagerström Test of Nicotine Dependence (FTND).

Note: All *p*-values < 0.01 for chi-squared or adjusted Wald F tests of violence categories with respect to background characteristics and potential risk factors.

Table 2

Mutually adjusted odds ratios from multinomial logistic regression of violence categories on sociodemographics, substance use disorders,[a] serious psychological distress, major depressive episode, criminal justice involvement, and assault arrest, NSDUH 2008–2015

Background characteristics and potential risk factors	Contrast of Violence Categories											
	Self-directed vs. none		Other-directed vs. none		Combined vs. none		Other-directed vs. self-directed		Combined vs. self-directed		Combined vs. other-directed	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Sociodemographics												
Gender												
Male	1.0	0.8–1.1	1.6**	1.4–1.7	1.1	0.8–1.5	1.6**	1.3–1.9	1.1	0.8–1.5	0.7*	0.5–0.9
Female	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Race/ethnicity												
Non-Hispanic White	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Non-Hispanic Black	1.3*	1.1–1.6	2.0**	1.8–2.2	2.8**	2.0–3.8	1.5**	1.2–1.9	2.2**	1.5–3.2	1.4*	1.0–2.0
Non-Hispanic Native American/AK Native	1.6	0.9–2.8	1.6**	1.2–2.1	2.3*	1.1–4.6	1.0	0.5–1.8	1.4	0.6–3.5	1.4	0.7–2.9
Non-Hispanic Native HI/other Pacific Islander	0.7	0.2–2.9	2.0	1.0–3.9	1.7	0.3–8.2	2.9	0.6–14.2	2.5	0.3–23.2	0.9	0.2–4.7
Non-Hispanic Asian	1.8*	1.1–2.9	1.0	0.7–1.4	1.1	0.4–2.7	0.6*	0.3–1.0	0.6	0.2–1.6	1.1	0.4–3.0
Non-Hispanic more than one race	1.3	0.9–1.9	1.8**	1.3–2.5	2.8**	1.4–5.5	1.4	0.9–2.1	2.1*	1.0–4.6	1.6	0.8–3.1
Hispanic	1.2	1.0–1.4	1.3**	1.1–1.5	1.2	0.8–1.8	1.1	0.9–1.4	1.0	0.7–1.6	1.0	0.6–1.4
Age												
8–20	2.4**	1.9–3.1	3.7**	3.2–4.3	7.1**	4.3–11.7	1.6**	1.1–2.1	2.9**	1.7–5.2	1.9*	1.1–3.2
21–25	1.4**	1.1–1.7	2.5**	2.2–2.9	4.0**	2.4–6.5	1.8**	1.4–2.4	2.9**	1.6–5.0	1.6	1.0–2.7
26–34	0.9	0.7–1.2	1.7**	1.4–1.9	1.7	0.9–3.1	1.8**	1.3–2.4	1.8	0.9–3.4	1.0	0.6–1.8
35–49	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
50+	0.9	0.7–1.2	0.8*	0.7–1.0	0.6	0.2–1.4	0.9	0.7–1.2	0.6	0.3–1.6	0.7	0.3–1.7
Education												
Less than high school	1.2*	1.0–1.5	1.4**	1.2–1.6	1.5*	1.1–2.2	1.1	0.9–1.4	1.3	0.9–1.8	1.1	0.8–1.6
High school	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref

Background characteristics and potential risk factors	Contrast of Violence Categories											
	Self-directed vs. none		Other-directed vs. none		Combined vs. none		Other-directed vs. self-directed		Combined vs. self-directed		Combined vs. other-directed	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Some college	0.9	0.7–1.1	0.8**	0.7–0.9	0.8	0.6–1.3	0.9	0.7–1.1	0.9	0.6–1.5	1.1	0.7–1.6
College graduate	0.7**	0.6–0.9	0.4**	0.4–0.5	0.3**	0.1–0.6	0.6**	0.4–0.8	0.4*	0.2–0.9	0.7	0.3–1.5
Marital status												
Married	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Widowed	1.1	0.7–1.7	1.9**	1.4–2.8	3.4*	1.2–9.9	1.8	1.0–3.3	3.2*	1.0–9.8	1.8	0.6–5.0
Divorced or separated	1.5**	1.2–2.0	1.4**	1.2–1.8	2.5**	1.5–4.2	0.9	0.7–1.3	1.6	0.9–2.9	1.7	1.0–3.0
Never married	1.2	0.9–1.5	1.5**	1.3–1.8	1.2	0.7–1.8	1.3	1.0–1.7	1.0	0.6–1.6	0.8	0.5–1.2
Family income												
Less than $10,000	1.5**	1.2–1.8	1.1	0.9–1.2	1.2	0.7–1.8	0.7*	0.6–0.9	0.8	0.5–1.3	1.1	0.7–1.7
$10,000–$29,999	1.2*	1.0–1.5	1.1*	1.0–1.3	1.1	0.8–1.6	0.9	0.7–1.2	0.9	0.6–1.3	1.0	0.7–1.4
$30,000–$74,999	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
$75,000+	0.8	0.6–1.0	1.0	0.8–1.1	0.6	0.4–1.0	1.2	0.9–1.6	0.8	0.4–1.4	0.7	0.4–1.1
Substance use disorders[a]												
Alcohol use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2–3 criteria	1.7**	1.3–2.2	2.1**	1.9–2.4	1.8*	1.1–3.0	1.2	0.9–1.6	1.1	0.6–1.9	0.9	0.5–1.4
4+ criteria	2.0**	1.6–2.5	2.6**	2.3–2.9	3.1**	2.1–4.6	1.3*	1.0–1.6	1.6*	1.0–2.4	1.2	0.8–1.8
Nicotine dependence (past month)												
No	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Yes	1.3**	1.1–1.6	1.5**	1.3–1.7	1.7**	1.3–2.4	1.1	0.9–1.4	1.3	0.9–1.9	1.2	0.8–1.6
Marijuana use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2–3 criteria	1.1	0.9–1.4	1.6**	1.4–1.8	2.0**	1.3–3.1	1.4**	1.1–1.8	1.7*	1.1–2.9	1.2	0.8–1.9
4+ criteria	1.0	0.7–1.5	1.6**	1.4–1.9	1.3	0.8–2.1	1.6*	1.0–2.5	1.3	0.7–2.4	0.8	0.5–1.3

Background characteristics and potential risk factors	Contrast of Violence Categories											
	Self-directed vs. none		Other-directed vs. none		Combined vs. none		Other-directed vs. self-directed		Combined vs. self-directed		Combined vs. other-directed	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Cocaine use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2–3 criteria	0.7	0.2–2.0	1.1	0.8–1.7	2.5*	1.1–5.7	1.7	0.5–5.6	3.7*	1.2–11.9	2.2	1.0–5.1
4+ criteria	1.4	0.9–2.1	1.6*	1.0–2.4	2.8**	1.5–5.1	1.1	0.7–1.9	2.0*	1.1–3.9	1.8	1.0–3.3
Hallucinogen use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2–3 criteria	1.7	0.8–3.8	1.4	0.9–2.3	1.4	0.5–4.1	0.8	0.4–1.8	0.8	0.3–2.5	1.0	0.4–2.6
4+ criteria	2.0	0.8–4.8	1.5	0.7–3.0	1.9	0.7–5.1	0.7	0.3–1.8	1.0	0.3–2.7	1.3	0.5–3.1
Heroin use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2+ criteria	0.8	0.4–1.4	1.3	0.8–1.9	0.5	0.2–1.0	1.6	0.8–3.2	0.6	0.2–1.4	0.4*	0.1–0.9
Inhalant use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2+ criteria	3.5*	1.3–9.2	0.9	0.5–1.8	1.8	0.5–6.3	0.3**	0.1–0.7	0.5	0.1–1.9	2.0	0.6–7.1
Pain reliever use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2–3 criteria	1.4	1.0–2.1	1.8**	1.3–2.5	1.6	0.9–2.7	1.3	0.8–2.1	1.1	0.6–2.0	0.9	0.5–1.6
4+ criteria	1.6*	1.1–2.4	1.5**	1.2–1.9	3.1**	1.8–5.2	0.9	0.6–1.5	1.9*	1.0–3.6	2.0*	1.1–3.6
Sedative use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2+ criteria	1.7	0.9–3.4	1.5	0.8–2.5	1.1	0.3–4.0	0.9	0.4–1.7	0.6	0.2–2.3	0.7	0.2–2.5
Stimulant use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2–3 criteria	2.0*	1.1–3.5	0.9	0.6–1.4	0.9	0.4–2.3	0.5*	0.2–0.9	0.5	0.2–1.2	1.0	0.4–2.6
4+ criteria	0.9	0.5–1.9	1.4	0.8–2.4	2.6*	1.3–5.5	1.5	0.7–3.4	2.8*	1.1–7.1	1.9	0.9–3.8

Background characteristics and potential risk factors	Contrast of Violence Categories											
	Self-directed vs. none		Other-directed vs. none		Combined vs. none		Other-directed vs. self-directed		Combined vs. self-directed		Combined vs. other-directed	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Tranquilizer use disorders (past year)												
0–1 criteria	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
2–3 criteria	1.5	0.8–2.7	1.6*	1.1–2.5	1.5	0.5–4.2	1.1	0.5–2.2	1.0	0.4–2.7	0.9	0.3–2.7
4+ criteria	1.3	0.8–2.3	0.8	0.4–1.5	0.6	0.2–1.6	0.6	0.3–1.1	0.4	0.2–1.1	0.7	0.3–2.0
Serious psychological distress (past year)												
No	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Yes	7.8**	6.3–9.6	2.6**	2.3–3.0	20.0**	12.1–33.1	0.3**	0.3–0.4	2.6**	1.5–4.5	7.6**	4.5–12.7
Major depressive episode (past year)												
No	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Yes	3.0**	2.5–3.5	1.4**	1.2–1.6	3.1**	2.1–4.7	0.5**	0.4–0.6	1.1	0.7–1.6	2.3**	1.4–3.6
Criminal justice involvement (past year)												
No	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Yes	1.6**	1.3–2.1	1.7**	1.4–1.9	1.5	1.0–2.2	1.0	0.8–1.4	0.9	0.6–1.5	0.9	0.6–1.3
Assault arrest (past year)												
No	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref	1.0	Ref
Yes	2.9**	1.8–4.5	6.9**	5.7–8.4	9.2**	5.7–15.1	2.4**	1.5–3.8	3.2**	1.7–6.2	1.3	0.8–2.2

OR, odds ratio; CI, confidence interval; Ref, reference category.

[a] Alcohol use disorder, marijuana use disorder, and other drug use disorders in the past year were based on the original *DSM-IV* criteria excluding the criterion of legal problems. However, nicotine dependence in the past month was assessed based on the dependence criteria according to the Nicotine Dependence Syndrome Scale (NDSS) and the Fagerström Test of Nicotine Dependence (FTND).

* $p < 0.05$;

** $p < 0.01$

Note: All the predictors are significant ($p < 0.01$) based on adjusted Wald test, except the number of criteria for cocaine use disorders ($p = 0.0200$), hallucinogen use disorders ($p = 0.5362$), heroin use disorders ($p = 0.1788$), Inhalant use disorders ($p = 0.0399$), sedative use disorders ($p = 0.3654$), stimulant use disorders ($p = 0.0237$), and tranquilizer use disorders ($p = 0.0521$).