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Violent Offenses Associated with Co-Occurring Substance Use and Mental Health Problems: Evidence from CJDATS†

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Abstract

The present study examines the relationship between substance use, mental health problems, and violence in a sample of offenders released from prison and referred to substance abuse treatment programs. Data from 34 sites ($n = 1,349$) in a federally funded cooperative, the *Criminal Justice Drug Abuse Treatment Studies* (CJDATS), were analyzed. Among parolees referred to substance abuse treatment, self-reports for the six-month period before the arrest resulting in their incarceration

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revealed frequent problems with both substance use and mental health. For most offenders with substance use problems, the quantity of alcohol consumed and the frequency of drug use were associated with a greater probability of self-reported violence. Mental health problems were not indicative of increases in violent behavior, with the exception of antisocial personality problems, which were associated with violence. The paper emphasizes the importance of providing substance abuse treatment in relation to violent behavior among offenders with mental health problems being discharged to the community.

BACKGROUND

Mental Health and Substance Use among Offenders

The U.S. Department of Justice (James & Glaze, 2006) has reported that 18% of state prison inmates, 10% of federal prison inmates, and 14% of jail inmates cited either a mental condition or an overnight stay in a mental hospital during their lifetimes. A systematic review of mental disorder prevalence worldwide suggested that about one in seven prisoners in western countries had a psychotic illness or major depression (Fazel & Danesh, 2002). These and other studies have found the prevalence of mental disorders to be higher in the prison system than in the general population (Fazel & Danesh, 2002; James & Glaze, 2006; O'Brien, Mortimer, Singleton, & Meltzer, 2003). Furthermore, the number of correctional clients with mental disorders appears to be increasing; specifically, the Colorado Department of Corrections has reported that the proportion of inmates with mental illness has risen from 4% in 1991 to 14% in 2001 (Kleinsasser & Michaud, 2001) to 20% more recently (J. Stommel, personal communication, March 18, 2006). By 2004, fully 16% of new court-committed offenders had *severe* mental disorders (Colorado Department of Corrections, 2005a, 2005b).

Substance use is a common problem among offenders. Teplin (1994) found current substance use disorder in 29% and lifetime substance use disorder in 61% of male urban jail detainees. Peters and colleagues (1998) found substance use disorders occurring in the 30-day period before incarceration in more than half of state prison inmates. More recently, Belenko and Peugh (2005) found that half of male and two-thirds of female state prison inmates were in need of long-term substance abuse treatment. Similarly, a survey conducted by the Bureau of Justice Statistics (Mumola & Karberg, 2006) of state and federal prisons revealed that nearly half of the prisoners met criteria for drug abuse or dependence. A recent systematic review of substance use disorders among prison inmates showed that both alcohol abuse or dependence and drug abuse or dependence were much more common than in the general population; this observation was true for both male and female inmates (Fazel, Bains, & Doll, 2006).

Findings of elevated prevalence of mental health and substance use disorders fuel concerns about offenders with these disorders, since the disorders often are co-occurring (Cote & Hodgins, 1990; James & Glaze, 2006; Sacks & Pearson, 2003). For example, Sacks and colleagues (Sacks et al., 2007a, 2007b) found that 80% of state prison inmates entering substance abuse treatment had some form of mental health disorder; for 39%, the mental disorder was severe. Similarly, Swartz and Lurigio (Lurigio & Swartz, 2000; Swartz, 2006) have shown that psychiatric disorders are common (50–75%) among offenders in substance abuse treatment.

Substance Use and Violence

The relationship between offending and substance use has several hypothesized mechanisms. First, pharmacological properties of certain substances can affect the risk of violence; some substances increase anxiety, others dampen inhibition mechanisms, and some decrease pain sensitivity, all of which are elements of substance use that can increase the probability of violence (Hoaken & Stewart, 2003). A second hypothesized mechanism is the high correlation

of substance use and antisocial personality disorder (ASPD). Several investigations have found little to no association between co-occurring disorders and violence, except when the co-occurring mental disorder is ASPD (Hendrin, 1980; Kaplan, 1995; Tengstrom, Hodgins, Grann, Langstrom, & Kullgren, 2004). A third hypothesized mechanism is that violent crime provides the means for some offenders to continue a substance use career. That is, maintenance of heavy substance use requires significant funding, and violent crime is a means of obtaining money (Faupel, 1991; Kaplan, 1995; Maruna, 2000; Valle & Humphrey, 2002). Finally, substance abuse can interact with psychiatric symptoms (i.e. paranoia and hallucinations) to increase anxiety, tension and cognitive perceptions, all of which are psychological symptoms that may increase the probability of violence (Hiday, 1997).

Many studies have established a relationship between substance use, particularly alcohol, and violence (e.g. National CASA, 1998). Investigators have found significant relationships between violence and specific substances (Chermack & Blow, 2002); specifically, cocaine and alcohol use were found to have the strongest associations with violence compared with other drug use variables. Two systematic reviews (Hoaken & Stewart, 2003; Parker & Auerhahn, 1998) suggest that, even among samples of illicit substance abusers, alcohol is the substance with the strongest association with violence. Furthermore, among samples of persons with mental health problems, two studies (Haggård-Grann, Hallqvist, Langstrom, & Moller, 2006; Mulvey et al., 2006) found that, of all the substances investigated, only alcohol consistently increased the risk of future violence.

Monahan and colleagues have also demonstrated the relationship between substance use and increased risk of violence among individuals with mental disorders (Monahan et al., 2001). A recent analysis of the MacArthur risk data showed that, for patients classified as “no drug use,” “little drug use,” or “met criteria for substance abuse disorder,” the prevalence of violence climbed from 15 to 26 to 29%, respectively; the corresponding figures for alcohol were 14, 23, and 32% (Melnick, Sacks, & Banks, 2006).

Mental Health and Violence

The relationship between mental health and violence has not been studied as frequently, although research efforts have increased over the past decade. The *MacArthur Risk Study* is a primary source of evidence on the relationship between mental illness and violence. Early studies found that, within an average of 4 months of release from a psychiatric hospital, 27% of patients (men and women) reported at least one violent act (Monahan, 1993). Yet, for persons with a mental disorder, the predictive value of the type of mental disorder appears to be modest. Steadman and colleagues (1998) found no appreciable difference in the risk of violence when they compared community samples to persons recently released from psychiatric hospital facilities when symptoms of substance abuse were absent from both groups. A subsequent study revealed that, when determining the risk of violence, the exact diagnosis should be considered; specifically, a diagnosis of schizophrenia reduced the likelihood of later violence, but personality disorders increased violence (Monahan et al., 2005). It is important to note that the MacArthur Study sample consisted of released psychiatric inpatients, so schizophrenia was contrasted with other diagnoses, including substance use disorders.

Co-occurring Disorders and Violence

As noted earlier, the MacArthur study data revealed that individuals with co-occurring disorders had a higher risk of violent behavior than did those with major psychiatric disorders alone (Melnick et al., 2006). Also, Steadman and colleagues (1998) found a higher probability of violence among persons recently released from psychiatric hospital facilities than among others sampled from the same community, when substance abuse symptoms were present in both groups. A relationship between violence and co-occurring substance use and mental

illness has been found among jail inmates (McNiel, Binder, & Robinson, 2005) and schizophrenic patients (Swanson et al., 2006); however, other studies have not found an association between co-occurring disorders and violence (Abram & Teplin, 1990). On the whole, the literature presents mixed results with respect to relationships between mental illness and violence and between co-occurring disorders and violence.

ASPD and Violence

Incarcerated populations have a high prevalence (50–80% of prisoners) of antisocial personality disorder (ASPD) and symptoms of psychopathy (Hare, 2003). Several studies have examined the co-occurrence of substance use with ASPD and/or psychopathy and their relationship to violence (Coid, 2002; Crocker et al., 2005; Friedman, Kramer, Kreisher, & Granick, 1996; Kaplan & Damphouse, 1995; Miller, 1990; Richards, Casey, & Lucente, 2003; Tengstrom et al., 2004; Walsh, 1999). These studies have found that psychopathy increased the risk of violence. Given the overlap of antisocial personality characteristics, other mental health problems, and substance use, it is important to consider all of these factors and their potential influences when attempting to isolate their individual contributions to the relationship between co-occurring disorders and violence.

The present study examines the relationship between substance abuse, mental health problems, and violence in a sample of offenders discharged from prison and referred to substance abuse treatment programs. Data from 34 sites ($n = 1,349$) were analyzed to explore the effects of the frequency of substance use/abuse and of the type and severity of mental health problem(s) on violent offenses. In light of the findings of previous studies (Chermack & Blow, 2002; Haggård-Grann et al., 2006; Hoaken & Stewart, 2003; Mulvey et al., 2006; Parker & Auerhahn, 1998; Rice & Harris, 1995), the differential effects of specific substances used/abused on violence were examined, with an emphasis on alcohol consumption.

METHODS

Study Design and Sample

The analyses were conducted on data collected as part of the National Institute on Drug Abuse (NIDA) initiative, *Criminal Justice Drug Abuse Treatment Studies* (CJDATS), a cooperative research effort in which nine regional research centers, a coordinating center, and NIDA work with federal, state, and local criminal justice partners, in part, to develop and test new approaches for prison and reentry services to meet the needs of offenders with substance use disorders. Data from the CJDATS *Intake Interview* (CJDATS, 2005), administered in two reentry studies, encompassing 34 sites, provided data for this study. Analyses used data collected from all participants who had been recruited as of October 2, 2007, who had consented to participate in the studies, and who had complete datasets ($n = 1,349$).

Sample—Data from one study, *Transitional Case Management* (TCM), involved 812 participants who were recruited from prison substance abuse treatment programs and scheduled for referral to community substance abuse treatment. Participants were men and women at least 18 years of age and within 3 months of release. Only 6% of eligible offenders solicited refused participation in the TCM study. Data from the second investigation, *Step'n Out* (SNO), involved 565 male and female parolees who had histories of substance abuse treatment and for whom substance abuse treatment had been mandated or recommended as a condition of parole. Some were recruited in prison and some in the community; all were at least 18 years of age. Only one percent refused participation in the SNO study. Neither study excluded individuals for evidence of mental disorder; however, it is likely that *severely* disordered individuals, where recognized, would not have been admitted to substance abuse treatment programs. Of the 1377 offenders recruited, 28 participants (2%) were not included in the analyses for this paper.

because they either had not completed both of the instruments or were missing key variables. The final sample for analysis consists of 807 TCM participants and 542 SNO participants for a total of 1,349.

Measures—The CJDATS *Intake Interview* (CJDATS, 2005), a structured interview used to collect socio-demographic background information including education and employment, criminal history, health and psychological status, and drug use history, was administered to all participants. Most intake interviews were completed in one to two hours. CJDATS Research Centers conducting the studies obtained *Institutional Review Board* and *HHS Office for Human Research Protections* approvals, and a *Data and Safety Monitoring Board* reviewed the protection of human research subjects.

In addition, participants completed the *Client Evaluation of Self and Treatment Intake Version* (TCU CEST-Intake; Joe, Broome, Rowan-Szal, & Simpson, 2002). Two scales from this instrument were used to indicate antisocial personality characteristics, the *Childhood Problems Scale* and a modified *Hostility Scale*. While these two scales are not diagnostic instruments, they do isolate features that are consistent with antisocial personality disorder. The *Childhood Problems Scale* consists of eight items indicative of childhood conduct disorder. Conduct problems during childhood indicate the early onset and pervasiveness of antisocial characteristics, which define what it is to have an antisocial personality disorder. Examples from this scale include: “You skipped school while growing up” and “You took things that did not belong to you when you were young.” Internal consistency for this scale was good (Cronbach’s $\alpha = .75$). A *Hostility Scale* with items indicative of antisocial personality disorder was included; of the eight items, three seemed too close to the criterion of recent violence (e.g. “Your temper gets you into fights or other trouble”) and were dropped from the analyses. Examples from the modified *Hostility Scale* are “You like others to feel afraid of you” and “You feel a lot of anger inside you.” Internal consistency for this scale was good (Cronbach’s $\alpha = .74$).

Substance Use—Participants were asked about the frequency of their alcohol use in the 30-day and six-month periods before the arrest that led to their last incarceration. Respondents fell into one of nine levels of frequency, ranging from “never, not used” to “about four or more times per day.” Several questions were asked about the quantity of alcohol consumed during the 30-day period before the arrest that resulted in their incarceration. Participants were asked about the size and number of drinks of beer, malt liquor, wine, fortified wine, and liquor consumed on a typical day of drinking. Quantities were converted into standard drinks, with 12, 6, 5, 5, and 1.5 ounces corresponding to one standard drink for beer, malt liquor, wine, fortified wine, and liquor, respectively. The total number of standard drinks on a typical day of drinking served as an overall summary of the quantity of alcohol consumed. In the analyses described below, a natural logarithm transformation was applied to this alcohol quantity variable to reduce positive skew.

Participants were also asked about the frequency of their use of 18 different drugs of abuse in the 30-day and six-month periods before the arrest that led to their incarceration, including marijuana, crack and powder cocaine, heroin, methamphetamines, inhalants, hallucinogens, barbiturates, sedatives, minor tranquilizers, GHB, ketamine, street methadone, and other opiates. Again, nine levels of frequency ranged from “never, not used” to “about four or more times per day.” Overall frequency was defined by the most frequently used drug. In addition, several frequency variables were constructed to summarize the use of specific types of drugs. *Stimulants* included crack, powder cocaine, methamphetamine, and amphetamine. *Opioids* included heroin, non-prescription methadone, and other opiates (e.g. oxycontin). “*Speedball*” described the simultaneous use of either heroin and cocaine or heroin and methamphetamine. *Psychedelics* included marijuana and hallucinogens. *Sedatives* included tranquilizers,

barbiturates, and other sedatives. Similar to the overall frequency of drug use variable, for each drug type, frequency was defined by the drug most often used within that type. These additional frequency variables were constructed to determine whether the frequency of use of some types of drug would have a stronger association with violence than other types of drug.

Mental Health Problems—Mental health diagnoses were not available. Participants were asked whether they had experienced any of the following six problems (independent of the effects of alcohol or other drug use) during their lifetime: serious depression; serious anxiety or tension; trouble understanding, concentrating, or remembering; hallucinations; thoughts of suicide; and attempts at suicide. They were also asked whether they had received inpatient, outpatient, or emergency room treatment for “mental or emotional difficulties” in the 30-day period before the arrest that resulted in their last incarceration, and the number of times in their lives that they had been hospitalized for a psychiatric or emotional problem. If any of the six problems were present, or if any mental health treatments had been received, a lifetime mental health problem was considered to be present.

Assessments of mental health problems contemporaneous with reported substance use (i.e. the six-month or 30-day period before the arrest resulting in their last incarceration) would have been preferred as predictors of violence if available, but treatment services for mental health problems during those periods occurred too infrequently to be used as the *only* indicators of mental health problems. Because questions about recent mental health problems overlapped or referred to a period of time in which offenders had been incarcerated, questions about lifetime mental health were considered to have more relevance to problems experienced in the community.

Violent Offenses—Participants were asked how many offenses of various types they had committed in the six-month period before the arrest that led to their last incarceration. The following seven offense types were considered to be “violent”: (1) robbery/attempted robbery/mugging; (2) assault/aggravated assault/battery; (3) kidnapping/hostage taking; (4) terrorist threats/acts; (5) homicide/attempted homicide/manslaughter; (6) arson; (7) sex offenses. If the participant reported one or more of these types of offense during the six months preceding their arrest and incarceration, then a violent offense was considered to be present.

Data Analysis

To account for clustering of the 1,349 individual participants in the 34 recruitment sites, a generalized linear mixed model analysis with a random intercept (McCulloch & Searle, 2001) was used to predict the occurrence of a violent offense (yes/no). The *lme4* package (Bates, 2007; Pinheiro & Bates, 2000) of the freely available, open-source *R* program (*R* Development Core Team, 2007) was used to fit generalized linear mixed models. All predictors were individual participant characteristics, including gender, age, race, Hispanic ethnicity, alcohol quantity, drug frequency, childhood problems, hostility, and lifetime mental health problems. Following a standard statistical approach, an initial model was fit with main effects for all of these variables, as well as two-way interactions between each mental health problem and alcohol quantity, each mental health problem and drug frequency, alcohol quantity and drug frequency, childhood conduct problems and alcohol quantity, childhood conduct problems and drug frequency, hostility and alcohol quantity, and hostility and drug frequency (17 two-way interactions in total). The model was reduced through a process of manual elimination of non-significant two-way interaction terms. Starting with the two-way interaction term that was farthest from significance (i.e. highest *p*-value), terms were removed one at a time until only significant ($p < .05$) two-way interactions remained. The resulting reduced model was the basis for determining which variables had unique associations with violence. For three two-way interactions that remained in the final model, simple main effects (Winer,

Brown, & Michels, 1991) were calculated to determine how the effect of one variable differed across levels of another variable. Prior to the primary modeling, substance use variables were explored to determine which variables were the best predictors of violence.

RESULTS

Profiles

Table 1 shows the characteristics of participants with ($n = 358$) and without ($n = 991$) a violent offense in the six-month period before the arrest that led to their last incarceration. Twenty-seven percent of all offenders (i.e. $358/1349 = .265$) reported at least one violent offense during this period. Apart from age, the demographic characteristics of offenders with and without violent offenses during this period were similar. Those with recent violent offenses had more lifetime arrests. As expected, mental health problems were common, with problems of depression, anxiety, and concentration much more common than hallucinations, suicidal ideation, and suicide attempts. Offenders who had engaged in recent violent activities were more likely to have each individual mental health problem, had more problems in total, and had higher scores on the *Childhood Problems* and *Hostility Scales*. Recent substance use was frequent, and the most frequently used substances were stimulants, alcohol, and psychedelics. Except for opioid drugs and speedball, the use of both alcohol and drugs was more frequent among those with a recent violent offense.

Preliminary Analyses

Prior to the primary modeling, substance use variables were explored to determine which variables were the best predictors of violence. Separate generalized linear mixed models were fit for alcohol quantity and for alcohol frequency. In these models, quantity was a stronger predictor than frequency. When a model was fit with both alcohol quantity and frequency entered together, quantity remained the stronger predictor; consequently, subsequent modeling used the alcohol quantity variable.

Separate models were fit for overall drug use frequency and for each of the other individual drug use frequencies (stimulant, opioid, speedball, psychedelic, sedative, and other) in the past six months. In these models, alcohol quantity was included as a control variable in recognition of the established association of alcohol use with violence and because alcohol was more likely to be used in combination with certain substances (e.g. marijuana), and less likely to be used in combination with others (e.g. stimulants). None of the more specific drug use frequency variables were better predictors of violence than overall drug use frequency; therefore, subsequent modeling used the overall drug use frequency variable.

The Association of Mental Health Problems and Substance Use Frequencies with Violent Offenses

In generalized linear mixed model analyses, 14 of 17 two-way interaction terms were not significant and were removed. The final model with these terms removed is summarized in Table 2. Older age was associated with a decrease in the probability of violence. Both childhood conduct problems and hostility, as measured by the two scales from the *CEST-Intake*, were associated with an increase in the probability of violence. Table 2 shows that, for the most part, no direct relationship between the mental health items and the probability of violence was evident, but the analyses revealed some statistically significant complexities in which the relationship between a specific variable and violence depended on the value or level of one or two other variables.

Drug Use Frequency—Drug use frequency interacted with lifetime problems of both anxiety and trouble in understanding/remembering/concentrating. In other words, the

association between drug use frequency and violence was conditional on the lifetime presence or absence of both anxiety and trouble understanding/remembering/concentrating problems. When lifetime anxiety and trouble understanding/remembering/concentrating were both absent, overall drug frequency was associated with an increase in the probability of violence ($z = 2.56$, odds ratio (OR) = 1.10); when lifetime anxiety and trouble understanding/remembering/concentrating were both present, overall drug frequency was associated with an increase in the probability of violence ($z = 2.26$, OR = 1.12). Also, when lifetime anxiety problems were absent and trouble understanding/remembering/concentrating was present, overall drug frequency was associated with an increase in the probability of violence ($z = 4.25$, OR = 1.28); however, when anxiety problems were present and trouble understanding/remembering/concentrating problems were absent ($n = 206$, about 15% of the sample), overall drug frequency was not associated with violence ($z = -0.77$).

Alcohol Quantity—Alcohol quantity interacted with suicidal ideation. When suicidal ideation was absent, alcohol quantity was associated with an increase in the probability of violence ($z = 5.58$, OR = 1.33); however, when suicidal ideation was present ($n = 135$, about 10% of the sample), alcohol quantity was not associated with violence ($z = -0.38$).

Mental Health Problems—When drug use frequency was at its lowest, a lifetime anxiety problem was associated with an increase in the probability of violence ($z = 2.81$, OR = 2.74); when drug use frequency was at its median ($z = 1.11$) and at its highest ($z = -0.39$), a lifetime anxiety problem was not associated with violence.

When drug use frequency was at its highest, lifetime trouble understanding/remembering/concentrating was associated with an increase in the probability of violence ($z = 1.94$, OR = 1.54), but this was only marginally significant. When drug use frequency was at its lowest, lifetime trouble understanding/remembering/concentrating was associated with a decrease in the probability of violence ($z = -2.18$, OR = 0.46). Also, when drug use frequency was at its median, lifetime trouble understanding/remembering/concentrating was not associated with violence ($z = 0.76$).

When alcohol quantity was at its lowest ($z = 0.88$) and at its median ($z = -0.85$), suicidal ideation was not associated with violence; however, when alcohol quantity was at its highest, suicidal ideation was associated with a decrease in the probability of violence ($z = -2.39$, OR = 0.27).

In sum, drug use frequency and alcohol quantity were associated with an increase in violence *for all but a select subset* of offenders, whereas, of the six mental health problem items, just one was associated with an increase in violence, and then *only for a small number* of offenders.

Sensitivity Analysis

Two additional analytic strategies were employed to check that important associations between mental health problems and violence were not being missed. In one alternative strategy, each of the six mental health problems was considered separately to avoid any multicollinearity due to the co-occurrence of different problems. In these analyses, the unique association of each mental health problem with the probability of violence was essentially the same as when all six problems were considered together (as reported earlier).

In another alternative strategy, the total number of mental health problems endorsed (0–6) replaced the six individual items. Following the same model simplification strategy as described above, an interaction between the mental health problem sum and alcohol quantity remained ($z = -2.19$, $p < .05$). When none of the six problems was present, alcohol quantity was associated with an increase in the probability of violence ($z = 4.98$, OR = 1.40). The association between alcohol quantity and the probability of violence was weaker as the total

number of mental health problems increased. At the lowest level of alcohol quantity, the number of mental health problems was marginally associated with an increase in the probability of violence ($z = 1.95$, $OR = 1.16$). As alcohol quantity increased, the association became weaker and then negative, but was never significant. As in the primary analysis, aging was associated with a decrease in violence ($z = -2.25$, $p < .05$), whereas childhood conduct problems ($z = 2.16$, $p < .05$), hostility ($z = 4.47$, $p < .01$), and overall drug use frequency ($z = 3.69$, $p < .01$) were each associated with increases in the probability of violence.

DISCUSSION

Summary of Findings

For most of this sample of paroled offenders who had been referred to substance abuse treatment programs in the community, recent alcohol quantity and drug use frequency were associated with an increase in the probability of violence and mental health problems were not; however, among a select group with lifetime anxiety and without a lifetime problem understanding/remembering/concentrating, drug use frequency was not associated with violence. Also, among another select group with suicidal ideation, alcohol quantity was not associated with violence.

A lifetime anxiety problem was associated with an increase in violence, but only among those at the lowest level of recent drug use frequency. A lifetime problem understanding/remembering/concentrating was associated with an increase in violence, but only among those at the highest level of recent drug use frequency, and with only marginal significance. Suicidal ideation was associated with a decrease in violence, but only among those at the highest level of alcohol quantity. Two scales indicative of antisocial personality characteristics predicted an increase in the probability of violence independent of the frequency of recent drug use or of the quantity of alcohol consumed.

Discussion of Findings

Characteristics of the Sample—The analyses reported here showed high rates of co-occurring mental health problems among paroled offenders who had been referred to substance abuse treatment services in the community (61% on items indicative of any lifetime mental health problem). These rates are consistent with those found in studies of substance abuse programs in the community (Compton, Cottler, Phelps, Abdallah, & Spitznagel, 2000; Sacks, Sacks, De Leon, Bernhardt, & Staines, 1997) and in prison (Swartz, 2006), despite the fact that the data were drawn from research interview items rather than from a diagnostic clinical interview or a standardized instrument.

The prevalence rate for violent offenses (27%) is considerably higher than violence rates found in community-based mental health populations. For example, the recent National Institute of Mental Health (NIMH) *Clinical Antipsychotic Trials of Intervention Effectiveness* (CATIE) study found a six-month prevalence rate of 4% for serious violent behavior in the period prior to entry into the clinical trial (Swanson et al., 2006). That the rate is high in the sample reported here is not surprising, given that all who participated in the current study were offenders and, by definition, many had been incarcerated for a committing a violent offense.

Comparison with Findings from the MacArthur Risk Study—The results of the current analyses are similar to those of the *MacArthur Risk Study* (Monahan et al., 2001), in that both studies demonstrated that the risk of violence increased as alcohol and drug use increased, and both studies found more limited and specific associations between mental health problems and violence. The current results are from a sample of offenders referred to substance abuse treatment programs in the community, differing in some important aspects from those

in the MacArthur study, which sampled individuals discharged from community residential psychiatric hospitals. Initial reports of the MacArthur data indicated that any drug or alcohol use among individuals discharged from mental hospitals increased the risk for violence, while mental disorders had only minimal effects (Steadman et al., 1998), whereas a re-analysis of data from the MacArthur study found a relationship between severity of both drug and alcohol use and violence (Melnick et al., 2006). In the analyses reported here, both the quantity of alcohol consumed and the overall frequency of drug use were associated with violence for most offenders. Taken together, the two studies demonstrated relationships between both alcohol and drug use and violence among hospitalized psychiatric patients and offenders recently released from prison.

Differences in the measurement of violence need to be taken into account in the comparison of the current study to the MacArthur study. The *MacArthur Risk Study* used an extensive structured assessment of specific aggressive behaviors, along with probes for severity and context. The *MacArthur Community Violence Instrument* has become a standard in the field and has been used in many recent studies including the NIMH CATIE project cited above. The CJDATS study measured violence offenses by asking respondents whether they had committed any of several types of violent crime, such as mugging, aggravated assault, terrorist threats, homicide, arson, or sex offenses. The data on violent acts in the current study were obtained from self-reports, as are commonly employed in both substance use and criminal justice research, and results, while different from the MacArthur study (which focused exclusively on violent behavior), were consistent with the literature in these areas.

Substance Abuse, Mental Health, and Violence—Two important findings emerged from the current analyses. First, the finding that the quantity of alcohol consumed and overall drug frequency were related to violence is consistent with the literature (Chermack & Blow, 2002; Haggård-Grann et al., 2006; Hoaken & Stewart, 2003; Melnick et al., 2006; Mulvey et al., 2006; Parker & Auerhahn, 1998; Rice & Harris, 1995; Steadman et al., 1998) and underscores the need for post-release treatment focused on alcohol and drug use. Second, similar to the MacArthur Risk Study, associations between mental health problems and violence were limited and fairly specific; only indicators of antisocial personality were associated with violence regardless of substance use. Other problems of anxiety and trouble understanding/remembering/concentrating were related to violence only at specific and less common levels of substance use. These limited effects of mental health problems clearly warrant further exploration because they do not appear in previous studies and do not seem to fit into a theoretical or clinical framework, which would explain why these particular mental health problems interact with substance use in idiosyncratic ways.

Co-Occurring Disorders and Violence—It is useful to consider the findings with regard to co-occurring disorders. If substance use and mental health problems combine to increase the likelihood of violence beyond what one would expect given the separate effects of each, then mental health problems should be more strongly associated with violence when substance use problems are present, and substance use problems should be more strongly associated with violence when mental health problems are present; yet, in all of the interactions examined, this pattern emerged only once. A lifetime problem understanding/remembering/concentrating increased the probability of violence when drug use frequency was high and decreased the probability of violence when drug use frequency was low. Although this interaction did follow the expected pattern, the simple effect of the mental health problem at the highest level of drug use frequency was only marginally significant. Other interaction effects emerged with an opposite pattern; that is, mental health problems increased violence most when drug use was less frequent and when less alcohol was consumed. Also, substance use did not interact with childhood conduct problems or with hostility. On the whole, this suggests that substance use and characteristics of antisocial personality disorder are each relevant to violence, but that these

associations with violence remain, for the most part, unaffected by the presence of other mental health problems.

Limitations

Because sex offenses were considered to be violent offenses and because registered sex offenders were excluded from the TCM study, offenders whose only violent offense was a sex offense were likely underrepresented in this sample. Similarly, parolees who would have otherwise been eligible for the SNO study were excluded if psychotic features were present. This suggests that certain mental health problems, particularly the most severe types of mental illness, were likely underrepresented in this sample. Future studies of co-occurring disorders and violence should address the whole spectrum of substance use and mental health problems as well as all types of violent offense. Less restrictive inclusion criteria may be more feasible when these relationships are studied outside the context of treatment.

It was not possible to ascertain whether substance use and mental health problems preceded violent offenses. It is possible that the mental health and substance use problems observed were the result of committing violent offenses rather than the cause. Ideally, the associations observed here should be confirmed in prospective, longitudinal studies. For example, it would be useful to follow individuals with co-occurring disorders prospectively so that the presence of co-occurring disorders would be established before violent offenses were observed.

Items available to characterize mental health were limited in at least three ways that should be taken into account when comparing this study to others reported in the literature. First, participants were only asked whether a particular problem was present or absent. It would be useful if future research on co-occurring disorders and violence were to obtain greater detail on the age of onset, frequency, duration, and severity of mental health problems. Second, in the TCM and SNO studies, structured clinical interviews could not be conducted with participants to obtain specific diagnoses. In future studies, it would be helpful to obtain information on diagnoses in addition to specific dimensional measures of mental health problems or symptoms, which would permit the examination of the relative contribution of symptoms or problems and specific disorders to the risk for violent offenses. Finally, the items available to these analyses were far from comprehensive with respect to common mental health problems or symptoms.

Nevertheless, the items employed emphasize those aspects of psychiatric disorder most common to co-occurring disorders findings in other studies. Although not comprising a complete listing of the panoply of potential disorders, those most prevalent in instances of co-occurring disorders were included, and results are, therefore, valid. The study is an important clarifying initial step that the authors hope will encourage additional work in this area employing more comprehensive diagnostic evaluation and assessment of psychiatric symptoms.

Summary and Conclusions

For most offenders with substance use problems, the recent quantity of alcohol consumed and the frequency of drug use were both associated with a greater probability of violence, while reported mental health problems were only associated with violence in a more specific and limited fashion. Future research should endeavor to employ standardized diagnostic and symptom measures, to provide greater detail on the nature of the mental health problems (e.g. age of onset, frequency, duration, and severity of the problem) and to determine the sequential relationship between substance use, mental health disorders (if any), and violence. The results of the present study emphasize the importance of providing substance abuse treatment in

relation to violent behavior for offenders with mental health problems on their release to the community.

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Table 1
Intake profiles

	No violence P6M [†] (n = 991)	Violence P6M [†] (n = 358)	Total (n = 1,349)	p-value [§]
	Mean (SD) (%)	Mean (SD) (%)	Mean (SD) (%)	
Background				
Male	77	84	79	.538
Age at interview date	35.3 (9.11)	32.6 (8.49)	34.58 (9.03)	<.001
African-American race/ethnicity	41	33	39	.785
White race/ethnicity	42	49	44	.619
Other race/ethnicity	17	19	18	.834
Hispanic	14	16	15	.397
HS grad. or GED	69	74	70	.567
Single/never married	62	61	62	.976
Unemployed	49	52	50	.333
Criminal history				
Lifetime arrests	2.35 (0.98)	2.62 (1.04)	2.42 (1.00)	.032
Proportion lifetime arrests drug use related	0.71 (0.47)	0.75 (0.45)	0.72 (0.47)	.148
Any violent offense lifetime	47	100	61	—
Mental health				
Depression lifetime	32	40	34	.009
Anxiety lifetime	36	48	39	.001
Understanding/remembering/concentrating lifetime	34	46	37	.009
Hallucinations lifetime	5	8	6	.023
Suicide ideation lifetime	9	13	10	.042
Suicide attempt lifetime	9	14	10	.007
Mental health treatment lifetime	17	26	20	<.001
Any psychiatric hospitalizations lifetime	16	23	18	.002
Any mental health problems lifetime	58	70	61	.001
Total number of MH problems (0–6)	1.24 (1.48)	1.68 (1.67)	1.36 (1.54)	<.001
CESI Childhood Problems Scale	3.03 (0.77)	3.36 (0.74)	3.12 (0.77)	<.001
CESI Hostility Scale	2.34 (0.76)	2.67 (0.81)	2.43 (0.79)	<.001
Substance use				
Ever injected drugs	22	26	23	.738
Alcohol frequency P6M	3.02 (2.81)	3.95 (2.62)	3.26 (2.79)	<.001
Alcohol quantity P30D [‡]	11.31 (19.24)	16.83 (18.44)	12.78 (19.18)	<.001
Drug frequency P6M	4.92 (3.01)	5.60 (2.49)	5.10 (2.90)	<.001
Drug frequency P30D	4.87 (3.98)	5.48 (2.64)	5.03 (3.68)	.003
Daily drug use P30D	61	74	65	<.001
Daily alcohol use P30D	25	33	27	.002
Previous SU treatments	2.76 (4.64)	2.32 (3.46)	2.65 (4.36)	.231
Stimulant drug frequency P6M	3.22 (3.16)	3.99 (3.05)	3.43 (3.15)	<.001
Opioid drug frequency P6M	1.52 (2.77)	1.44 (2.61)	1.50 (2.73)	.355

	No violence P6M [†] (n = 991)	Violence P6M [†] (n = 358)	Total (n = 1,349)	p-value [§]
	Mean (SD) (%)	Mean (SD) (%)	Mean (SD) (%)	
Speedball drug frequency P6M	0.44 (1.60)	0.39 (1.43)	0.43 (1.56)	.901
Psychedelic drug frequency P6M	2.54 (3.03)	3.48 (2.99)	2.79 (3.05)	<.001
Sedative drug frequency P6M	0.35 (1.28)	0.64 (1.76)	0.43 (1.43)	.001
Other drug frequency P6M	0.05 (0.47)	0.21 (1.05)	0.09 (0.68)	.003

[†] Past six months (P6M) and past 30 days (P30D) refer to the period before the arrest that led to incarceration.

[§] p-values are based on generalized linear mixed models with a random intercept and participants nested in sites.

[‡] For descriptive purposes, these are actual numbers of standard drinks on a typical day of drinking.

Table 2

Predicting a violent offense before incarceration

	Logit	SE	z	p	Odds ratio
(Intercept)	-3.599	0.597	-6.03	<.001	—
Male gender	0.134	0.257	0.52	.602	1.14
Age (years)	-0.021	0.008	-2.45	.014	0.98
Race Other vs. African-American	0.008	0.278	0.03	.976	1.01
Race White vs. African-American	0.039	0.171	0.23	.819	1.04
Hispanic	0.167	0.282	0.59	.553	1.18
Childhood conduct problems (CEST-Intake)	0.217	0.107	2.02	.043	1.24
Hostility (CEST-Intake)	0.447	0.097	4.61	<.001	1.56
Overall drug use frequency ^{†§}	0.094	0.037	2.56	.011	1.10
Alcohol quantity ^{†§}	0.287	0.051	5.58	<.001	1.33
Psychiatric hospitalization	0.279	0.196	1.42	.155	1.32
Depression	-0.233	0.180	-1.29	.196	0.79
Anxiety [†]	0.190	0.171	1.11	.266	1.21
Trouble understanding/remembering/concentrating [†]	0.127	0.167	0.76	.446	1.14
Hallucinations	0.243	0.301	0.81	.420	1.27
Suicidal ideation [†]	-0.291	0.341	-0.85	.393	0.75
Suicide attempts	0.341	0.337	1.01	.311	1.41
Overall drug use frequency × anxiety	-0.136	0.057	-2.39	.017	—
Overall drug use frequency × trouble understanding/remembering/concentrating	0.151	0.058	2.59	.010	—
Alcohol quantity × suicidal ideation	-0.336	0.135	-2.49	.013	—

[†]This is a simple main effect (Winer, Brown, & Michels, 1991), that is, the effect at a specific level of another variable (or two other variables) with which this variable interacts. These *do not* characterize the effect across *all* levels of the factor(s) with which this variable interacts.

[§]Overall drug frequency and alcohol quantity are centered at median values (6 and 1.946, respectively). Therefore, the effects of anxiety and trouble understanding/remembering/concentrating are simple effects at levels of substance use typical for this sample.