HHS Public Access

Author manuscript

J Drug Issues. Author manuscript; available in PMC 2015 November 18.

Published in final edited form as:

J Drug Issues. 2013 October ; 43(4): 468–482. doi:10.1177/0022042613491098.

Methamphetamine Use and Violent Behavior: User Perceptions and Predictors

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Abstract

This study describes the extent to which methamphetamine users perceive that their methamphetamine use has resulted in violent behavior, and describes the level of self-reported prevalence of specific violent criminal behaviors irrespective of methamphetamine use. Predictors of these two violence-related indicators, in terms of potential correlates from substance use history, criminal history, and health risk domains are examined. Data are from extensive interviews of 350 methamphetamine users who received substance use treatment in a large California county. A majority (56%) perceived that their methamphetamine use resulted in violent behavior; 59% reported specific violent criminal behaviors. For more than half of those reporting violent criminal behavior, this behavior pattern began before methamphetamine initiation. Thus, for a subsample of methamphetamine users, violence may be related to factors other than methamphetamine use. Users' perceptions that their methamphetamine use resulted in violence appears strongest for those with the most severe methamphetamine-related problems, particularly paranoia.

Introduction

The prevention of interpersonal violence has been a public health priority of the U.S. Center for Disease Control for some time; although the cost of violence translates into billions of U.S. dollars in premature death, disability, medical care and law enforcement, the human cost in grief and pain cannot be calculated (Krug et al., 2002; Rosenberg, O'Carrol & Powell, 1992). Violent behavior and victimization are common among individuals with substance abuse problems (Fernandez-Montalvo et al., 2012; Torok et al., 2008), and use of substances is involved in many violent incidents (Boles & Miotto, 2003). Accordingly, reduction of violence and injury related to substance abuse is currently a national priority (Healthy People 2020, 2012; Office of National Drug Control Policy [ONDCP], 2012).

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Researchers addressing these priorities have looked for identifiers and predictors of violence in an effort to develop strategies for reducing such behavior. But while research supports a statistical relationship between substance use and violent behavior (National Institute of Justice [NIJ], 2003), continuing research has been recommended to explicate that relationship, e.g. in terms of underlying mechanisms, development, social context and other predictors (Lapworth et al., 2009; NIJ, 2003; Institute of Medicine, 1996).

Substance use and violence

An extensive literature documents an association between substance use and violence (e.g., Cunningham et al., 2009; Fernandez-Montalvo et al., 2012; Mattson et al., 2012), and many of these studies examine violence within the etiological framework described by Goldstein (1985): 1) pharmacological, i.e., violence prompted by the biochemical action of a drug after consumption; 2) economic-compulsive, related to the acquisition of drugs or money to support an individual's drug use; and 3) systemic, related to the aggressive patterns of interaction within the system of drug distribution and use. Pharmacological effects differ by drug and may or may not influence a user's tendency toward violence; alcohol is the substance most frequently implicated in homicide and with pharmacological violence, while studies suggest violence related to illicit drug use more commonly stems from systemic properties of illicit distribution, including territorial disputes and business transactions leading to spontaneous or planned violence intended as intimidation (Nash Parker & Auerhahn, 1998; McLaughlin, Daniel & Joost, 2000; Goldstein, 1985).

Both domestic violence and non-partner violence have been associated with illicit drug use. For example, higher stimulant usage predicted more frequent intimate partner violence (Mattson et al., 2012); the authors suggest that the pharmacological effects of stimulant intoxication and/or withdrawal may lead to alterations in mental state such as irritability and paranoia that may escalate otherwise benign exchanges into violent conflicts. Alcohol, marijuana and cocaine use significantly predicted non-partner violent assault among patients presenting to an inner-city emergency department (Cunningham et al., 2009). Fernandez-Montalvo et al. (2012) found that among substance users who sought treatment in Pamplona, Spain, violence problems were closely associated with drug consumption, and violence was mainly directed at family, friends, and drug-abuse partners, or executed to obtain money for the purchase of drugs.

Methamphetamine use and violence

Overall, methamphetamine supply and demand data indicators show that after a few years of decline in the mid-2000's, methamphetamine use has increased in certain parts of the country, and high prevalence is continuing in many areas of the U.S. (Maxwell & Brecht, 2011). Moreover, significant physical and psychiatric harms are associated with its use, including cardiovascular and respiratory issues, psychosis (Darke et al., 2008), risk-taking and HIV transmission (Colfax & Shoptaw, 2005). Evidence specifically on the association of methamphetamine and violence is accumulating, but the nature of the association and its context are not yet well understood.

Popular media reports may contribute to the belief that substantial violence is associated with methamphetamine use and trafficking (Associated Press, 2012; Grillo, 2012; Hendricks, 2012). For example, a recent article described an incident where methamphetamine traffickers hurled fragmentation grenades and opened fire in broad daylight after the capture of an organized crime leader in Mexico (Grillo, 2012). In addition, high prevalence rates of methamphetamine use have been reported among arrestees, in several sites in the western U.S. (National Institute of Justice, 1999, 2003; Office of National Drug Control Policy, 2006); and over half the offenders participating in the first year of California's Proposition 36 treatment reported methamphetamine as their primary drug problem (Hser et al., 2003). In 2010, 50-73% of state and local law enforcement agencies in the western half of the U.S. identified methamphetamine as the drug that most contributes to violence and crime in their areas (National Drug Intelligence Center [NDIC], 2011). In a literature review of substance use and violence, Boles and Miotto (2003) reported that methamphetamine use is linked to violence through both systemic dynamics (e.g., drug trafficking) and pharmacological effects (e.g., agitation, paranoia, psychosis). However, even after controlling for involvement in the drug trade, i.e., sales, distribution, or manufacturing, a study of prison parolees found methamphetamine use was significantly predictive of self-reported violent criminal behavior and general recidivism (Cartier, Farabee & Prendergast, 2006).

Although popular media reports and criminal justice-related research suggest a significant link between methamphetamine use and violence, results of more naturalistic studies provide inconsistent evidence, with some showing methamphetamine use correlated with violent behavior (Lapworth, et al., 2009; Noffsinger, et al., 2007; Stretesky, 2009), and others showing no significant relationship (Martin et al., 2009; Iritani et al., 2007). Martin et al (2009) found that although alcohol use was predictive of being the victim or perpetrator of violence, methamphetamine use was not. Similarly, a study by Iritani et al. (2007) indicates that after controlling for other substance use, methamphetamine use was not related to violent behavior (defined as one of six violence/weapon-related behaviors in the past 12 months).

Conversely, some studies indicate paranoia and/or psychosis associated with chronic use or high doses of methamphetamine may be precursors to methamphetamine-related violence in some situations (Dawe, et al., 2009; Lapworth, et al., 2009; Fischman & Haney, 1999). Recent reviews examining the link between violence and the pharmacological effects of methamphetamine suggest methamphetamine use is related to impairment in frontal lobe functioning affecting social-cognitive functioning (Homer et al, 2008), and executive functions, affecting self-control (Dawe, et al., 2009), consequently impairing capacity to control or inhibit aggressive impulses. Qualitative data indicate methamphetamine users attribute both pharmacologic and systemic violence to methamphetamine use, including disputes over obtaining methamphetamine, paranoia, ill-tempers, and hallucinations during methamphetamine “binges” (Sexton et al., 2009).

Violent criminal behavior has been linked to methamphetamine use in a study by Stretesky (2009), indicating that even after adjusting for demographic characteristics and use of other substances including alcohol, heroin and crack/cocaine, the odds of committing a homicide

are nearly nine times greater for those who use methamphetamine compared to those who do not. However, the association of methamphetamine use and violence is neither consistent nor unidirectional in apparent causation and appears conditional on many personal and contextual characteristics (Tyner & Fremouw, 2008). Sommers & Baskin (2006) suggest methamphetamine-related violence may stem from the interaction of the individual, the substance, and the situation, as methamphetamine use provides several mechanisms for motivating violence, including inhibition of cues that normally control behavior, increased arousal, interference with interpersonal communication, and intensification of emotions.

Data from a broader natural history study of methamphetamine users affords an opportunity to explore selected indicators of violence and their correlates in a methamphetamine-using population. More specifically, this paper will describe the extent to which methamphetamine users perceive that their methamphetamine use has resulted in violent behavior and will describe the level of self-reported violent criminal behavior, as well as the relationship between these two indicators of violence. In addition, the paper examines user characteristics associated with these two violence-related indicators, in terms of potential correlates from substance use history, criminal history, and health risk domains. These domains may be related to pathways from drug use to violence according to Goldstein's tripartite conceptual framework. The psychopharmacological model suggests that some individuals, as a result of short or long term ingestion/intoxication of specific substances, may become excitable, irrational, and may exhibit violent behavior (Goldstein, 1985); thus, we examine methamphetamine-related problems including paranoia and sleeplessness in relation to violence. Likewise, according to the economic-compulsive model, some study participants may have engaged in violent or economically oriented crime (e.g., distribution/ manufacture of methamphetamine) to support their use. Lastly, systemic violence intrinsic in the involvement of drug use may be closely linked to longer and more severe histories of substance use and criminal behavior. This study uses data collected from a diverse sample of clients treated for methamphetamine use in a large county treatment system, rather than focusing on an already identified violent sample (e.g. prisoners or arrestees).

Methods

Study sample and procedures

The parent study, from which these data are derived, was designed to assess the natural history of methamphetamine use and outcomes of treatment for methamphetamine use. To serve that design, the study selected a stratified (by gender, ethnicity, modality) random sample of records of admissions for residential or outpatient treatment for methamphetamine use in the Los Angeles County publicly funded treatment system for 1996. A 76% interview rate was achieved from the sampled clients who could be located. Subjects were interviewed on two occasions. The first interview (n=350 valid interviews) occurred in 1999-2001, approximately three years after respondents' 1996 treatment episode, and provided data for the current analysis. A second interview was administered in 2002-2003 (n=270), lengthening drug use histories for the majority of the sample, and providing qualitative data for a subset of these subjects.

A Natural History Interview (NHI) protocol was used (McGlothlin et al., 1977; Hser et al., 1993), which includes questions on sociodemographics and other background factors, physical and mental health, criminal behavior and substance use. It also uses a time-line approach to document changes in behaviors over time in terms of substance use, drug and psychiatric treatment, crime and legal status, and employment. These types of self-report data have been shown to have acceptable validity and pattern reliability (Chou, Hser & Anglin, 1996; Anglin, Hser & Chou, 1993; Hser, Anglin & Chou, 1992).

In addition to the NHI, qualitative data providing supporting anecdotal descriptions for the relationship between methamphetamine and violence are from a Contextual Elicitation Technique (CET) interview conducted with a sub-sample of respondents who participated in the 2002-03 follow-up phase (O'Brien, Brecht & Casey, 2008). Respondents were asked to talk for 10 minutes about what their lives were like when methamphetamine had the most control over them. Interviewers guided the discussion to maintain the general topic but let interviewees focus on what was important to them.

Table 1 provides a sample description. The sample is diverse, with slightly more males than females (56% vs 44%) and slightly more total minorities than non-Hispanic whites (54% vs 46%); however note that the largest single race/ethnic category is non-Hispanic white (46%) followed by Hispanic (29%), African-American (16%), and other or multi-racial (6%). About one-third did not finish high school. The average age at the time of interview was 33 years. As produced by the sampling procedure, all subjects had been treated for methamphetamine use two-to-three years prior to the interview; the sampled treatment admission was the first treatment for methamphetamine use for 58% of the sample.

Measures

This analysis included two violence-related indicators. One violence measure reflected whether the respondent reported ever engaging in violent (criminal) activities (regardless of whether the violence was attributed to methamphetamine use, labeled “violent criminal behavior”). Violent criminal behavior was addressed by questions about lifetime participation in six specific types of activities: (1) hit an adult when respondent was under 18 years, (2) beat somebody up or threatened someone with a weapon, (3) attempt or commit homicide, (4) rob a place of business, (5) rob a person, (6) attempt or commit sex by force. For clarification, respondents were provided with examples of each type of assault. A composite indicator of violent criminal behavior was formed from the six types listed above (where 1=any reported violent criminal behavior, 0=none).

A second violence measure indicated whether respondents perceived that methamphetamine had resulted in violent behavior for them. Respondents were asked to indicate in a yes or no format whether they had ever experienced a list of negative consequences commonly associated with methamphetamine use (including violent behavior, paranoia, weight loss, unwanted sleeplessness, hallucinations, dental problems, skin problems, high blood pressure). Specifically, the stem of the question asked, “Did your methamphetamine use result in any of the following:?” Respondents were guided to answer for the time frame prior to the sampled treatment admission. Their response to the violent behavior option was used to indicate whether respondents perceived that their methamphetamine use had resulted in

violent behavior; in this paper, this variable is referred to as “methamphetamine-related violence” to differentiate it from the previously described measure of specific “violent criminal behavior.” From a clinical perspective, the methamphetamine users' expectations or perceptions that their use has resulted in violence is important to examine as it may be related to the users' understanding of consequences of their use and potential receptivity to treatment. Moreover, research suggests expectations of impairment affect substance users' behavioral impairment while intoxicated, thus an interaction of expectancies and intoxication can affect behavior (Logan et al., 2002). In addition, analysis of specific violent criminal behavior is informative with reference to the measure of methamphetamine-related violence, to better understand how predictors of these two violence measures overlap and diverge.

The sample is described in terms of gender, ethnicity, educational attainment and age at interview. Other potential correlates of violent behavior covered domains of psychological and other vulnerabilities, substance use history, methamphetamine-related problems and severity, and criminal history. Psychological and other vulnerabilities included early (before age 15) history of physical abuse (i.e., having been hit or beaten so hard that you had cuts or bruises, had to stay in bed, or had to see the doctor) and of sexual abuse (i.e., forced or pressured to do any sexual acts against your will), and any (lifetime) suicide attempt, psychiatric hospitalization, or self-reported psychological comorbidity (whether the respondent had ever been diagnosed by a psychiatrist as having schizophrenia, mania, or bi-polar disorder). Severe parental drug use (i.e., to the extent that the respondent reported that a parent's drug use impaired important life domains such as finances, home life or legal status) was also included.

Substance use history was represented in terms of any use of nine specific types of substances (cocaine, crack, ecstasy, phencyclidine [PCP], inhalants, hallucinogens, opiates including heroin, tranquilizers, downers), an overall polydrug indicator (composite variable of the number of types of drugs used), regular use of alcohol-to-intoxication, age of first substance use, age at first methamphetamine use, and any injection drug use. All respondents reported having used alcohol and 99% had used marijuana; because of their predominant use, these two substances (in terms of “any use”) were not included in further analyses.

Methamphetamine-related problems and severity included methamphetamine addiction severity (reported for the year prior to the sampled treatment admission), measured using the Substance Problem Index (specialized for methamphetamine) from the Global Appraisal of Individual Needs GAIN (Dennis, 1998). Possible scores on this 16-item scale range from 0-16 with higher scores indicating greater severity. Reliability in the current study was .88. A composite methamphetamine problem score (possible range 0-6) was calculated to indicate the number of physical/mental health problems reported resulting from methamphetamine use (weight loss, sleeplessness, hallucinations, dental problems, skin problems, and high blood pressure, from the same interview question providing the methamphetamine-related violence indicator). Because paranoia has been shown to be particularly common and problematic among methamphetamine users (Lapworth et al., 2009; Dawe et al., 2009), methamphetamine-related paranoia was examined separately from

the composite variable. Criminal history included early arrest (before age 18) and any involvement in the methamphetamine drug trade (selling or making methamphetamine), in addition to the violent criminal behavior indicator and specific types of violence described above.

Analysis

Descriptive statistics are presented for each sample descriptor and potential correlate. In a first stage of analysis, logistic regression was used to assess the association between each potential correlate and each of the two violence indicators. The second stage of analysis fitted a multivariate logistic regression model for each of the two violence indicators, using stepwise regression and best subsets approaches; both methods resulted in the same parsimonious models. Models were confirmed using methods described by Shtatland, Cain & Barton (2001) for stepwise logistic regression using information criteria. Potential correlates were included in the multivariate models if $p<.10$ in the first stage (bivariate) analyses, with three exceptions: 1) all sociodemographic variables were included as control variables; 2) variables indicating whether each specific drug (e.g., cocaine, opiates) was ever used were strongly interrelated, thus were not included in the model; instead the number of illicit drugs ever used was included; and 3) likewise, the overall methamphetamine-related problems indicator (composite variable of six problems) was included, but specific problems of weight loss, sleeplessness, hallucinations, skin problems, dental problems, and high blood pressure were not included in the multivariate models. Variables that were not significant (at $p<.10$) in the estimated multivariate models were dropped and the model re-estimated with the parsimonious set of predictors.

Results

Violent behavior and potential correlates

First, the prevalence of perceived methamphetamine-related violence and reported violent criminal behavior, as well as the relationship between the two violence indicators are described. More than half the sample perceived that their methamphetamine use had resulted in violent behavior (56%). A similar percentage (59%) reported engaging in one or more violent criminal behaviors. Trying to beat someone up or threatening someone with a weapon was the most common type of violent criminal behavior (38%). Attempting or committing homicide (7%) or sex by force (1%) were relatively rare in this sample. Of those reporting violent criminal behavior, 55% indicated that they engaged in violent criminal behaviors before they began to use methamphetamine; 12% first engaged in violent criminal behaviors during the same year of age as initiating methamphetamine use; and 33% initiated methamphetamine use before engaging in any violent criminal behaviors. For those reporting violent criminal behavior, the average age for initiating some type of violent criminal behavior (16.7 years) preceded the average age of methamphetamine initiation (18.1 years); age of methamphetamine initiation was older for those not reporting violent criminal behavior (20.3 years).

The two primary violence measures were related (chi square=17.89, df=1, $p<.01$; rho=.22), but not redundant. This relationship is also reflected in the odds ratios in Table 1: the odds

of violent criminal behavior were 2.56 times higher for those who perceive methamphetamine-related violence than for those who did not perceive methamphetamine-related violence. Almost one-fourth (23%) of the sample reported neither methamphetamine-related violence nor engaging in violent criminal behavior; 39% reported both. There was a larger percentage with violent criminal behavior (69%) among those 56% who perceived methamphetamine-related violence, whereas less than half (46%) reported violent criminal behavior of those 44% who did not perceive methamphetamine-related violence. But for 38% of the sample, the two variables did not coincide: 20% reported violent criminal behavior but did not perceive methamphetamine-related violence, and 18% perceived methamphetamine-related violence yet did not report specific violent criminal behavior.

Table 1 also shows prevalence of psychological and other vulnerabilities, substance use history and criminal history. Approximately one-third of the sample had been sexually abused before age 15, and half had been physically abused before age 15. Approximately one-quarter reported attempting suicide, and a similar proportion reported prior psychiatric hospitalization for reasons other than substance abuse. More than half (56%) reported that their parents had drug or alcohol problems.

Most respondents had used cocaine, crack and hallucinogens, and regular use of alcohol to intoxication. The average age of first substance use was 11. Almost half (47%) had injected drugs. In addition, respondents reported a substantial number of specific problems caused by methamphetamine; most commonly reported problems were weight loss (84%), sleeplessness (78%), paranoia (67%), and hallucinations (61%). More than half (56%) had been involved in the drug trade through sales.

Predictors of Methamphetamine-Related Violence and Violent Criminal Behaviors

Table 1 shows odds ratios for bivariate relationships of potential correlates with each of the two indicators of violence. Results show that perceived methamphetamine-related violence was more likely among younger respondents, those with an early history of physical abuse or with psychological comorbidity indicators of attempted suicide or prior psychiatric hospitalization. In addition, perceived methamphetamine-related violence was more likely to be reported by those who had used more types of drugs as well as specific drugs (crack, inhalants, opiates, tranquilizers, or ecstasy) or regular use of alcohol to intoxication, were younger at substance use initiation, had greater overall methamphetamine addiction severity, had experienced more methamphetamine-related health problems (except dental), and had been involved in methamphetamine sales. Perceived methamphetamine-related violence was also more likely among those with early arrests and more types of violent criminal behaviors as well as each of the six specific violent criminal behaviors.

Violent criminal behaviors were more likely to be reported among males, younger respondents, those with an early history of physical abuse, with each of the psychological comorbidity indicators or by those who had used more types of drugs as well as specific drugs (crack, inhalants, PCP, and opiates) or regular use of alcohol-to-intoxication. In addition, violent criminal behaviors were more often reported by those with greater methamphetamine addiction severity, more methamphetamine-related problems as well as

some specific methamphetamine-related problems (violence, paranoia, hallucinations, skin problems, high blood pressure), those involved in methamphetamine sales or manufacture, or those with early arrests.

Table 2 shows results from multivariate logistic regression models. The first model included perceived methamphetamine-related violence as the dependent variable. This model was significant (chi square=95.52, df=5, p<.001) with a pseudo R^2 of .24. Younger respondents, those reporting more methamphetamine-related problems, with methamphetamine-related paranoia, and greater addiction severity had higher odds of perceiving methamphetamine-related violence.

The model for reported violent criminal behavior was also significant (chi square=75.17, df=8, p<.001) with a pseudo R^2 of .19. As with perceived methamphetamine-related violence, predictors included younger age. But other predictors differed. Odds of reported violent criminal behavior were greater for minority respondents, those with an early history of physical abuse or prior psychiatric hospitalization, more types of drugs used, those arrested before age 18, and those who had sold methamphetamine.

Qualitative descriptions of violence—Responses from the CET interviews were reviewed to identify people who chose to talk about violence and/or loss of control during their period(s) of intense methamphetamine use. One of the themes that emerged from these reports was the feeling of apathy about everything and everyone except methamphetamine. Respondents indicated that this lack of caring leads to lack of self-control, often resulting in violence. One respondent said, "… I lose a sense of feeling and caring about everybody and it's like I really don't give a damn, I could care less if I chopped off your leg, I wouldn't feel no remorse about it …". Another respondent stated, "You know people weren't important, family wasn't important… I was out chasing her [his girlfriend] in my brother's car somewhere and my daughter was in the car with me … I ran a red light and was hit and flipped the car upside down. My daughter went to the emergency room. And, and you know, I couldn't even think about what was going on with my daughter, all I could think about was chasing down my girlfriend …"

Interviewees also reported being the victims or witnesses of violence when using methamphetamine. One said, "… we seen a murder out in the middle of the desert and I stayed up for twenty-one days. And I remember the last day, I was sitting in front of my door of my apartment with a gun in my lap …" Another stated, "I was just tired of having to wear long sleeve shirts in the middle of the summer …he was in a, you know dodge ball, he had been in a game called dodge furniture." Others remarked, "Now my boyfriend's starting to hit me, I couldn't go through that again. I hit him back and I called the cops on him, and he went to jail" and "… I see a lot of people want to kill people for it …" All of this seems to point to the common experience of violent feelings as well as witnessing violence when involved in the culture of using methamphetamine.

Discussion

The analysis of two related but distinct measures of violence and the supplementation of these data with qualitative findings add further to the body of research on the prevalence and complexity of violence in a methamphetamine-using sample. Results appear generally consistent with Goldstein's theoretical framework in terms of association of violence and methamphetamine use and more specifically with pharmacological (e.g. paranoia) and economic/compulsive or systemic (e.g. selling methamphetamine) parts of the model; however, the complex and potentially conditional nature of these associations warrant further study.

In this analysis we found an association between reported violent criminal behavior and perceived methamphetamine-related violence with 39% reporting both and 23% reporting neither. However, similar to previous research (Sommers & Baskin, 2006) our findings suggest that violence is not an inevitable outcome or precursor of methamphetamine use (20% reported violent criminal behavior but did not perceive their violent behavior to be related to methamphetamine use and 18% perceived methamphetamine-related violence but did not report violent criminal behavior). For more than half of those reporting violent criminal behavior, this violent behavior pattern began before methamphetamine initiation. Thus, violence may be related to factors other than methamphetamine use; yet for other users, methamphetamine use may have exacerbated existing violent tendencies or was directly attributed to violence through factors such as craving, paranoia, and violent feelings involved in the culture of methamphetamine use.

These findings are consistent with a qualitative study in which methamphetamine users acknowledged the contribution of methamphetamine to the violence that they perpetrated, but also attributed their violence to pre-existing anger typically generated by lifetimes of violence and abuse (Hamilton & Goeders, 2010). Our findings further support the concept of lifetime violence in this population, as methamphetamine users who engaged in violent criminal behavior were almost twice as likely to have been victims of serious physical abuse as children. Based on social learning theory, this intergenerational transmission of abuse may be indicative that we model behavior we have been exposed to as children.

We also saw that perceived methamphetamine-related violence appears to be part of a syndrome of methamphetamine-related problems (including general methamphetamine addiction severity as well as specific physical/mental health issues) and this relationship was particularly strong for paranoia. These methamphetamine-related problems played less of a role in predicting violent criminal behavior. On the other hand, early background psychological and other vulnerabilities played a stronger role in predicting violent criminal behavior. Use of other drugs (particularly crack and opiates) was related to both violence indicators. Similar to a study of incarcerated amphetamine users in Australia (Riddell et al. 2006), these findings support an integrated approach to address the complications of methamphetamine use and violent behavior, including the integration of mental health, drug treatment addressing use of multiple substances, and criminal justice responses to methamphetamine use.

The strong association of perceived methamphetamine-related violence and paranoia is consistent with other studies suggesting that amphetamine use is associated with increased positive symptoms of psychosis, particularly paranoia, that contribute to a perception of the environment as a hostile, threatening place (Dawe, et al., 2009). Lapworth et al. (2009) also found methamphetamine users who experienced positive symptoms (e.g., suspiciousness, hallucinations) reported higher levels of hostility; higher levels of methamphetamine dependence were associated with increased hostility, and this relationship was mediated by both trait impulsivity and positive symptoms of psychosis, with synergistic effects of impulsivity and psychotic symptoms on aggression/hostility.

Our findings also indicate that increased odds of violent criminal behavior were associated with younger age, having been hospitalized in a psychiatric facility, and selling methamphetamine. This is consistent with other studies indicating the combination of methamphetamine use with psychotic symptoms, younger age, and selling drugs were associated with violent offending (Riddell et al., 2006; Torok et al., 2008). Like our findings, young people appear to be at greater risk, as previous research indicates that among adolescents and young adults, methamphetamine users were significantly more likely than non-methamphetamine users to engage in violence and self-harm behaviors, e.g., physical fighting, carrying weapons, and considering and/or attempting suicide (Noffsinger et al., 2007); and were at heightened risk for violence associated with alcohol and methamphetamine use (Baskin-Sommers & Sommers, 2006).

Additionally, there were other demographic characteristics associated with violence although gender was only correlated with violent criminal behavior (and not significant in multivariate models), indicating that women were less likely to engage in specific acts of violent criminal behavior, but appear to be as likely as men to perceive methamphetamine-related violence. A review of gender differences in methamphetamine use indicates there is an association between methamphetamine and violence for both men and women, and rates of methamphetamine-related violence among women appear to be equal to or possibly exceed rates of men (Dluzen & Liu, 2008).

Finally, our qualitative data indicate that methamphetamine users feel they are violent when using methamphetamine because of a numbing effect the drug has on their normal sense of empathy and the degree to which the drug takes over their lives. A common theme that emerged was that methamphetamine users experienced significant violence while obtaining and using methamphetamine, and they described an all-encompassing focus on methamphetamine, which often led to violence. Moreover, not only are they likely to feel violent but they also report exposure to a high level of violence.

Interpretation of our results is limited to a population of methamphetamine users whose substance abuse precipitated treatment. It is not known whether these results would generalize to those who have not received treatment. Studies based on community samples indicate greater addiction severity (McKetin & Kelly, 2007) and psychiatric comorbidity are associated with greater substance abuse treatment-seeking (Compton et al., 2007), and as indicated from our findings and other studies, these characteristics are associated with greater likelihood of violence among substance users. However, methamphetamine users

who have come into contact with treatment agencies are an important group to study as they comprise a significant proportion of health and social costs associated with drug abuse and addiction. While our results contribute to an exploration of methamphetamine use and violence, there remain several related issues that were not addressable from our data. For example, study participants were not asked whether specific violent crimes were committed under the influence of or as a result of methamphetamine (or other substances). The study did not specifically identify perpetration of domestic violence, although the types of violence reported were inclusive of physical violence regardless of the recipient. It may be, however, that domestic violence is not perceived by some respondents in the same way as violence directed toward someone other than a domestic partner. This analysis addressed only perpetration of violence; the issue of receipt of violence may be related and warrants further investigation. In addition, while analysis included predictors from major domains, there are other participant and contextual characteristics that may predict perceived methamphetamine–related violence and/or reported violent criminal behavior. Further study could also address the role of user perceptions (linking methamphetamine use and violent behavior) in behavioral attributions and motivations relevant to behavior change and treatment outcomes.

In sum, we find that the perceived relationship of methamphetamine use and violence in our sample appears strongest for those with the most severe methamphetamine problems and addiction severity, suggesting methamphetamine-related violence may be part of a complex set of problems, in which paranoia is particularly prominent. Thus, a subgroup of methamphetamine users in treatment may need specialized interventions and resources to address this set of problems. These findings have implications for prevention and treatment planning in that violence for some may be prevented or minimized by intervening earlier in the addiction cycle before severity increases with years of use. Programs and policies aimed at decreasing methamphetamine-related violence must also address health and mental health problems, particularly methamphetamine-related paranoia. Since many methamphetamine users began violent criminal activities prior to methamphetamine use and this violence was strongly related to early arrest history, childhood abuse, and other psychological vulnerabilities, this argues for family intervention and violence prevention efforts well before methamphetamine initiation.

Acknowledgments

We thank Tzu-Hui Lu, PhD, L. Greenwell, PhD, and M. Dylan, MA, for data preparation and analysis; L. Rodriguez, P. Sheaff, L. Guzman, R. Lau, and M. Frias for fieldwork contributing data for this analysis; A. O'Brien, MSc, and M. Dylan, MA, for contributions to the manuscript; and E. Teshome for editorial contributions. This research was supported by grants from the National Institute on Drug Abuse (R01-DA11020 and R01-DA025113).

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J Drug Issues. Author manuscript; available in PMC 2015 November 18.

Table 1

Descriptive Statistics and Bivariate Relationship with methamphetamine-Related Violence and Criminal Violence (n = 350[1])

	Descriptive	Methamphetamine-Related Violence[2]		Violent Criminal Behavior[2]	
Variable	**% or mean (s.d.)**	**Odds Ratio**	**95% CI**	**Odds Ratio**	**95% CI**
Sociodemographics					
Gender (male)	56	1.06	0.69-1.63	1.61*	1.05-2.48
Ethnicity (white)	46	1.07	0.70-1.63	0.72	0.47-1.10
Education (finished high school)	68	0.91	0.58-1.44	1.03	0.65-1.63
Age at interview (years)	33 (6.9)	0.96**	0.93-0.99	0.95**	0.92-0.98
Psychological and other vulnerabilities					
Sexual abuse before age 15	33	1.06	0.67-1.66	1.32	0.83-2.08
Physical abuse before age 15	51	1.63*	1.03-2.58	2.19**	1.36-3.54
Attempted suicide	27	1.85*	1.13-3.03	1.95**	1.18-3.23
Prior psychiatric hospitalization	27	1.73*	1.06-2.83	2.41**	1.43-4.05
Diagnosed with schizophrenia, mania, or bipolar disorder	19	1.55	0.89-2.71	2.11*	1.17-3.80
Parental drug use	56	1.42	0.93-2.18	1.58*	1.03-2.43
Substance use history					
Number of illicit drugs ever used (of 9)	4.8 (2.2)	1.22**	1.11-1.35	1.22**	1.11-1.35
Ever used					
Cocaine	87	1.42	0.75-2.70	1.40	0.74-2.63
Hallucinogens	75	1.21	0.74-1.98	1.52	0.93-2.48
Crack	71	2.28**	1.43-3.65	2.43**	1.52-3.89
Inhalants	56	2.04**	1.32-3.14	2.34**	1.51-3.62
PCP	55	1.50	0.98-2.30	1.93**	1.26-2.98
Opiates including heroin	49	2.08**	1.35-3.20	2.03**	1.32-3.14
Tranquilizers	37	1.64*	1.05-2.80	1.46	0.93-2.88
Downers	33	1.07	0.68-1.68	1.04	0.66-1.63
Ecstasy	20	1.76*	1.01-3.05	1.40	0.81-2.41
Regular use of alcohol-to-intoxication	72	1.66*	1.04-2.67	1.44	0.90-2.30

Variable	Descriptive % or mean (s.d.)	Methamphetamine-Related Violence[2] Odds Ratio	95% CI	Violent Criminal Behavior[2] Odds Ratio	95% CI
Age first use of any substance	11.5(3.6)	0.94*	0.88-1.00	0.92*	0.87-0.98
Age first methamphetamine use	19.0 (5.6)	0.95**	0.91-0.98	0.93**	0.89-0.97
Injection drug use	47	1.39	0.91-2.13	1.89**	1.22-2.91
Methamphetamine-related problems and severity					
Methamphetamine-related paranoia	67	5.87**	3.59-9.61	1.79*	1.14-2.82
Methamphetamine-related violence	56			2.56**	1.65-3.98
No. of other methamphetamine-related physical/mental health problems (of 6)	3.3 (1.5)	1.86**	1.56-2.23	1.16*	1.00-1.33
Weight loss	84	3.65**	1.97-6.75	1.00	0.56-1.79
Sleeplessness	78	4.69**	2.67-8.22	1.27	0.76-2.13
Hallucinations	61	4.08**	2.58-6.45	2.25**	1.45-3.51
Dental problems	55	1.52	0.99-2.34	0.88	0.57-1.36
Skin problems	36	2.98**	1.85-4.79	1.61*	1.02-2.55
High blood pressure	24	2.29**	1.29-4.07	1.85*	1.05-3.27
Severity of methamphetamine addiction (GAIN)	12.5(3.8)	1.27**	1.18-1.37	1.13**	1.06-1.20
Criminal history					
Ever sold methamphetamine	56	1.68*	1.09-2.59	1.71*	1.11-2.64
Ever made methamphetamine	13	1.90	0.97-3.70	1.67	0.86-0.33
Arrested before age 18	43	1.58*	1.02-2.43	3.02**	1.91-4.78
Any violent criminal behavior[3]	59	2.56**	1.65-3.98		
Tried to beat someone up or threatened with a weapon	38	3.58**	2.22-5.77		
Robbed a person	22	2.56**	1.45-4.49		
Hit an adult when under 18 years	21	1.77*	1.09-2.87		
Robbed a place of business	16	2.81**	1.44-5.46		
Attempted/committed homicide	7	5.60**	1.63-19.2		
Attempted/committed sex by force	1	0.77**	0.05-12.4		

Note. CI = confidence interval; PCP = phencyclidine; GAIN = Global Appraisal of Individual Needs.

[1] variables have 0-6 cases with missing data

[2] odds ratios and 95% confidence intervals from logistic regressions with methamphetamine-related violence or criminal violence as dependent variable

[3] variables in this category are components of the "criminal violence" measure; thus, odds ratio estimates for the relationship of these variables to criminal violence are not presented.

** p<.01,

* p<.05

Table 2

Multivariate Predictors of Methamphetamine-Related Violence: Logistic Regression Predictors Significant at p<.10

Variable	Methamphetamine-Related Violence (n=347)		Violent Criminal Behavior (n=344)	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Sociodemographics				
Ethnicity (non-Hispanic white=1, other=0)			0.58*	0.35 - 0.96
Age at interview	0.95**	0.91 - 0.98	0.94**	0.91 - 0.98
Psychological and other vulnerabilities				
Physical abuse before age 15			1.92*	1.13 - 3.26
Ever hospitalized for psych problems			2.49**	1.39 - 4.46
Substance use history				
Number of drugs ever used (of 9)	1.11	0.99 - 1.25	1.16*	1.03 - 1.36
Methamphetamine-related problems and severity				
Number of methamphetamine-related physical/ mental problems (of 6)	1.35**	1.08 - 1.68		
Methamphetamine-related paranoia	2.97**	1.67 - 5.30		
Severity of methamphetamine addiction	1.12**	1.03 – 1.22	1.07	1.00 - 1.14
Criminal history				
Arrest before age 18			2.42**	1.45 - 4.02
Have sold methamphetamine			1.70*	1.01 - 2.85
Model goodness-of-fit				
Likelihood ratio chi square (df), p	95.52(5), p<.001 pseudo r^2=.24		75.17(8), p<.001 pseudo r^2=.20	

** p<.01,

* p<.05