

Chapter 5

Methamphetamine Use, Personality Traits, and High-Risk Behaviors

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Abstract *This study explored the relationships among methamphetamine use and violent behavior, methamphetamine use and risky sexual conduct, as well as the role of personality traits as moderating variables. The sample was comprised of 339 respondents, aged 16–30 years old and included comparison groups of alcohol only users, methamphetamine users, and non-substance users. The results indicated that during the 6 months prior to data collection, individuals who used alcohol or methamphetamines were more likely to be involved in violence and high-risk sex than non-substance users. Perhaps most important, methamphetamine users were more likely to be involved in assault and unprotected sex than alcohol-only users. In addition, the results suggest that personality trait differences, specifically volatile temper, accounted for the overwhelming majority of explained variance in the prevalence of assault. In fact, when controlling for personality traits, substance use ceased to be a significant predictor of the prevalence of assault. While volatile temper was the key predictor of the prevalence of violence, it was not associated significantly with the co-occurrence of substance use and violence. However, the co-occurrence of substance use and assault was significantly greater for respondents who used methamphetamines as compared to alcohol-only users. With regard to risky sexual behavior, the findings indicate that substance use, alcohol-only, and methamphetamines heightened the risk for unprotected sexual intercourse even when controlling for demographics and personality traits.*

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B. Sanders et al. (eds.), *Crime, HIV and Health: Intersections of Criminal Justice
and Public Health Concerns*, DOI 10.1007/978-90-481-8921-2_5,
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In 2007, 13 million Americans reported having ever used methamphetamines (Office of National Drug Control Policy 2007). Although this number represents a tapering off of a decade of steep growth, it remains of grave public health concern. For that matter, despite the stabilization of use, between 2002 and 2004, rates of dependence rose from 10.6 to 22.3% (American Academy of Family Physicians 2007). Research documents substantial increases in emergency room visits and admissions to drug treatment by methamphetamine users (Crevecoeur et al. 2007). Surveys indicate that between 5 and 25% of men who have sex with men use methamphetamines and report significant health and social consequences (Schrem and Halkitis 2008; Semple et al. 2004). Furthermore, between 1994 and 2006, the number of pregnant women seeking treatment for methamphetamine dependence tripled (National Library of Medicine 2009).

Although methamphetamines were initially used almost exclusively by Whites, their use has spread to Hispanic and Asian communities (Hunt et al. 2005; Sommers and Baskin 2004). Methamphetamine use in the United States has expanded from its origin in the West to the Midwest and now to many parts of the East (Maxwell and Rutkowski 2008), and is currently an urban, suburban, and rural phenomenon (Borders et al. 2008; Sexton et al. 2009; Simons et al. 2005), with increasing globalization (Hall et al. 1996; Humeniuk and Ali 2004; Isralowitz and Rawson 2006; Pinhey and Wells 2007; Pluddemann et al. 2008; Sekine et al. 2006). The staying power of methamphetamine use seems to rest on the ease of its production and procurement, its low cost, and its functional uses, as a diet aid, an energy and mood booster, and as a way to stay awake for employment and recreational activities. Nonetheless, methamphetamine use has not been without its individual and societal costs. Some estimates have been given for 2005 that suggest \$48 billion in economic costs, \$4.2 billion in crime and criminal justice loss and expenditures and \$545 million in drug treatment (Nicosia et al. 2005). Methamphetamine use has also been associated with mortality, disability, employment loss, child maltreatment, divorce, and psychiatric distress (Baskin-Sommers and Sommers 2006; Darke et al. 2008; Nicosia et al. 2005; Sommers et al. 2006; Zweben et al. 2004).

Research on the societal and health risks of methamphetamine use identifies violence and risky sexual behavior as two major correlates. Recent reviews of the literature document the strength of these associations across a wide variety of studies and cross-cultural contexts (Hoeken and Stewart 2003; Maxwell 2005; McKetin et al. 2006; Meredith et al. 2005; Tyner and Fremouw 2008). A correlation between methamphetamine use and criminal violence is found in national data base surveys, treatment and criminal justice samples, and community studies. For instance, Stretsky (2008), using the National Household Survey on Drug Abuse and the Survey of Inmates in State and Federal Correctional Facilities, finds that methamphetamine users are nine times more likely to commit homicide than their non-using counterparts. Cartier et al.'s study (2006) of male parolees also uncovers a significant association between methamphetamine use and violent behavior.

These results are replicated among other samples, as well. Pinhey and Wells (2007), in an analysis of data from the Youth Risk Survey in Guam, demonstrate that methamphetamine use increases involvement in violence for both males and

females. Similarly, Wright and Klee (2001) and Brecht et al. (2004) report that in their treatment samples of methamphetamine users, 47 and 57%, respectively, were involved in criminal violence, with no differences based on gender. The absence of gender differences in methamphetamine use and violence is corroborated in a treatment sample studied by von Mayrhauser et al. (2001). And, in Zweben et al.'s (2004) research, 45% of the treatment sample was involved in violent behavior. These findings appear in community studies, too well (Hall et al. 1996; Sekine et al. 2006; Sexton et al. 2009). Thus, research consistently points to a strong correlation between use and violent behavior.

Much the same can be said about the correlation between methamphetamine use and high-risk sexual behaviors. From research related to men who have sex with men (Bolding et al. 2006; Bonell et al. 2010; Drumright et al. 2006; Schrem and Halkitis 2008; Semple et al. 2004) to those involving youth (Pinhey and Wells 2007; Cheng-Fang and Mian-Moon 2006), and heterosexual adults (Darke et al. 2008; Lorvick et al. 2006; Molitor et al. 1998; Zule and Desmond 1999) studies, time and again, demonstrate that methamphetamine use increases participation in risky sex. One study of heterosexual men from low-income California neighborhoods finds a significant relationship between recent methamphetamine use and having multiple partners (Centers for Disease Control and Prevention [CDC] 2006), although no significant relationship was found for condom use after controlling for demographic characteristics and use of *other* substances. Yet, a study by Iritani et al. (2007) shows no unique relationship to sexual risk among men but did find an association for women. Therefore, much like the literature on the social consequences of methamphetamine use, i.e. violence, there may be an association with risky sexual conduct, as well.

Nonetheless, some studies do not find such a widespread presence of risky behavior among methamphetamine users (Lende et al. 2007; Sommers and Baskin 2004). Instead, it could be that the grievous social and individual consequences documented in many studies exist only for certain *subgroups* of users. In other words, there may be particular factors that moderate the relationship between methamphetamine use and risky behaviors. For instance, researchers have identified certain stable personality traits as being correlated with methamphetamine use and its social consequences (Borders et al. 2008; Brecht et al. 2004; Herman-Stahl et al. 2007; Iritani et al. 2007; Stretsky 2008).

Personality traits represent internal factors that affect individual life histories and social interactions and influence cognitions, opinions, attitudes, behavior, and direct experiences (Zillmann and Weaver 1997). They develop in early childhood and remain constant throughout the lifecourse (Romero et al. 2003). Traits such as impulsivity, volatile temper, and sensation seeking have been associated with the development of risky behaviors (Gottfredson and Hirschi 1990; Donovan and Jessor 1985) and act to release the individual from social restraints. This results in an inability to control behavior, thereby producing myriad psychosocial problems (Cauffman and Steinberg 2000; Silk et al. 2003).

Impulsivity refers to behavior performed with little or inadequate forethought (Whiteside and Lynam 2003), and has long been considered a key correlate of violence

risk and substance abuse, as well as an explanation for many other uncontrolled behaviors (Lynam and Miller 2004; Ramoutar and Farrington 2006; Wiebe 2006). Dickman (1990) proposes that impulsivity is related to aggression in two distinct forms. The first is functional impulsivity, which is an appropriate response to situations that require quick decisions. The second is dysfunctional impulsivity and is related to speedy and non-reflexive decisions. This form often brings about negative consequences for the individual which may result in violence.

Volatile temper, the inability of an individual to regulate their own expression of annoyance, irritation, antagonism, resentment, or rage, is also identified as a personality trait related to substance abuse and violence (Huang et al. 2001; Nichols et al. 2008; Swaim et al. 1989; Weiner et al. 2001). Poor anger control and substance use both may function to produce violence by reducing the inhibition of aggressive impulses (Parrott and Giancola 2004). Furthermore, their combination may synergistically reduce the inhibition of aggressive impulses more than either alone.

Anderson and Bushman (2002) propose that volatile temper may influence violence in three ways. First, temper may reduce prohibitions against aggression, either by justifying the aggressive response or by disrupting normal cognitive processes that would otherwise suppress aggression. Second, over time, episodes of anger become information cues and primes for aggressive "scripts." Thus, certain thoughts, images, and memories become closely associated with an anger experience such that each new episode of anger arousal activates the same processes and motivational sets that call forth an aggressive response. As a result, aggressive individuals behave violently, in part, because they have effortlessly accessed a highly routinized script that dictates how that individual should think, feel, and respond to that particular type of situation. Third, anger energizes behavior by increasing arousal levels. Excitation-transfer models (Zillmann and Weaver 1997) demonstrate how individuals experiencing increased anger arousal from one source will transfer that arousal to a temporally related second source and then mistakenly ascribe the cause of the arousal to the second source.

A third personality trait that has been linked to the substance use-violence nexus is that of sensation seeking (Butler and Montgomery 2004; Dauman et al. 2001; Puente et al. 2008; Yanovitzky 2006). According to Zuckerman (1979, p. 10), sensation seeking is a biologically based personality trait that represents "the need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences." Research suggests that high sensation seekers are more aggressive (Zuckerman et al. 1993), more curious about morbid events (Zuckerman and Litle 1986), and more attracted to dangerous behaviors than low sensation seekers (Romero et al. 2003). Thus, sensation seeking, much like impulsivity and volatile temper, may act as a pathway to methamphetamine use and/or moderate the relationship between use and a variety of outcomes.

The present study explores the relationships among methamphetamine use and violent behavior, methamphetamine use and risky sexual conduct, as well as the role of personality traits as moderating variables. Additionally, the research examines the temporal relationship of methamphetamine use and two high-risk behaviors: assault and unprotected sex.

5.1 Research Methods

5.1.1 Sample Recruitment

A non-random community sample of 339 respondents, aged 16–30 years old, was recruited from various Los Angeles County locations. Recruitment flyers were posted at four universities and three high schools (with principals' permission). The flyers described the research as a study on health and social behaviors and included a telephone number to call for more information. In addition, potential respondents were recruited from neighborhood venues, such as coffee shops and bookstores. Individuals who expressed interest were screened systematically for eligibility. Specifically, a brief interview that focused on demographic characteristics and substance use patterns was used to monitor the selection of the sample. In this way, the sample reflected the demographic diversity of Los Angeles and, most importantly, included comparison groups of substance users: alcohol only, methamphetamines, and non-substance users. In light of the age structure of methamphetamine use, risk behaviors, and violence, the present study targeted individuals 16–30 years old. All questionnaires were completed in a private university office and were anonymous.

5.1.2 Measures

Demographics. (1) *Sex* was a dichotomy of male and female. (2) *Age* was coded originally as a continuous variable and then recoded into three categories: *teens* (16–19 years old), *young adults* (20–24 years old) and *adults* (25–30 years old). (3) *Race* included White, Black, Latino, and Asian.

Substance use. The study sample included three subgroups: alcohol users only, methamphetamine users, and non-substance users. Each respondent was screened prior to acceptance into the study. The subgroup of methamphetamine users was asked if they had ever used (i.e., yes/no) other substances including alcohol, marijuana, ecstasy, cocaine, or heroin during the previous 6 months. For each substance used, the methamphetamine users reported the frequency of use.

Violence. Respondents reported the frequency (continuous variable) of committing assault (stranger and intimate partner) during the previous 6 months.

Sexual risk-taking. Study participants reported the number of times that they had sexual intercourse without a condom outside of a long-term monogamous (i.e., a minimum of 12 months) relationship during the prior 6 months.

Co-occurrence of substance use and assault. To ensure that substance use and violence occurred together, participants were asked to report on the use of specific substances while engaging in assaultive behavior. For each time the participants engaged in assault, they were asked to specify if they used alcohol, methamphetamines, and/or other substances prior to and/or during involvement in assault.

Co-occurrence of substance use and high risk sex. To ensure that substance use and sexual risk behaviors occurred together, participants were asked to report on the use of specific substances while engaging in risky sexual behaviors. For each time the participants engaged in unprotected sex, they were asked to specify if they used alcohol, methamphetamines, and/or other substances prior to and/or during involvement in the behavior.

Personality traits. The study used the impulsivity and temper subscales developed by Grasmick et al. (1993). The following items were measured on a four-point Likert scale (Strongly Disagree to Strongly Agree):

Impulsivity (Cronbach's alpha = .903)

"I often act on the spur of the moment."

"I don't devote much thought and effort to preparing for the future."

"I often do whatever brings me pleasure here and now, even at the cost of some distant goal."

"I'm more concerned about what happens to me in the short run than in the long run."

Volatile Temper (Cronbach's alpha = .815)

"I lose my temper pretty easily."

"Often, when I am angry at people I feel more like hurting them than talking to them about why I am angry."

"When I have a serious disagreement with someone, it is usually hard for me to talk about it without getting upset."

Sensation seeking. Sensation seeking was measured using the brief sensation seeking scale developed by Stephenson et al. (2003). The following three items were measured on a three-point Likert scale (Strongly Disagree to Strongly Agree; Cronbach's Alpha = .835):

"I like to explore strange places."

"I like to do frightening things."

"I like new and exciting experiences, even if I have to break the rules."

5.2 Study Results

5.2.1 Sample

The sample was comprised of 159 male (46.9%) and 180 female (53.1%) respondents (Table 5.1). The majority of participants were Latino (47.8%) and in their teens (16–19 years old, 52.2%). A total of 174 (51.3%) respondents used only alcohol during the 6 month time period, 63 (18.6%) respondents used methamphetamines and 102 (30.1%) sample members did not use any substances during the 6-month period. Importantly, all of the study subjects who used methamphetamines also used alcohol and marijuana.

Of the 339 people in the study, 23.0% ($n=78$) committed assault at least once in the previous 6 months. All of the 78 participants who committed assault used alco-

Table 5.1 Sample characteristics and involvement in high risk behaviors

	Total (N=339)	No drug use (N=102)	Alcohol only (N=174)	Meth (N=63)
		(30.1%)	(51.3%)	(18.6%)
<i>Sex</i>				
% Male	46.9	41.2	37.9	81.0***
<i>Race/ethnicity</i>				
% White	30.1	39.2	23.6	33.3*
% Black	8.8	5.9	8.6	14.2
% Latino	47.8	35.3	55.2	47.6**
% Asian	13.3	19.6	12.6	4.8*
<i>Age</i>				
% 16–19	52.2	57.8	43.1	68.3**
% 20–24	23.0	23.5	23.0	22.2
% 25–30	24.8	18.6	33.9	9.5***
<i>Personality traits (mean scores)</i>				
Impulsive	2.17	1.85	2.10	2.88***
Sensation seeking	2.21	1.85	2.06	3.14***
Volatile temper	1.52	1.09	1.36	2.65***
<i>Assault (prevalence):</i>				
% Yes	23.0	0	17.2	76.2***
% Co-occurrence of drug use and assault:	18.6	NA	6.9	80.1***
<i>Risky sex (prevalence):</i>				
% Yes	53.4	9.8	63.2	96.8***
% Co-occurrence of drug use and risky sex:	14.2	NA	12.1	42.9***

* $p < .05$; ** $p < .01$; *** $p = .000$

hol or methamphetamines during the 6 month period. Of the 78 respondents who engaged in assault, 63 (80.8%) reported that they committed at least one act of assault while using alcohol or methamphetamines (18.6% of the total sample).

A total of 244 of the 339 (72.3%) people in the sample had sexual intercourse during the prior 6 months. Of the 245 sexually active respondents, 181 (73.9%) reported that they did not use condoms at least once during the past 6 months. The data indicate that substance use co-occurred with high-risk sexual behavior in 28.1% ($n=48$) of the respondents who engaged in unprotected sex as compared to 9.8% of non-substance users who engaged in high-risk sex.

5.2.2 Predictors of Violence

Logistic regression analyses were performed in order to test the effects of substance use and personality traits on the prevalence of violence, as well as on the co-occurrence of substance use and violence. Prevalence of violence and the co-occurrence

Table 5.2 Hierarchical logistic regression of the prevalence of assault

	B	S.E.	Odds	B	S.E.	Odds	B	S.E.	Odds
Males	2.76	.420	15.84***	1.97	.444	7.17***	2.20	.620	9.04***
Teens	.697	.429	2.01	.191	.471	1.21	-.172	.573	.842
Young adults	-.491	.559	.612	-1.16	.680	.314	-1.56	.966	.210
Black	1.69	.695	5.43*	1.36	.790	3.89	2.19	1.07	8.98*
Latino	.735	.411	2.09	1.14	.488	3.13*	2.21	.690	9.12**
Asian	-19.93	7115	.000	-19.29	7362	.000	-17.81	7719	.000
Meth use				2.58	.508	13.18***	1.09	.672	2.98
Impulsive							.377	.334	1.46
Sensation seek							.789	.496	2.20
Volatile temper							1.84	.500	6.27***
R ²			.345			.429			.519

*p<.05; **p<.01; ***p=.000

Table 5.3 Hierarchical logistic regression of the co-occurrence of substance use and assault

	B	S.E.	Odds	B	S.E.	Odds	B	S.E.	Odds
Males	1.51	.850	4.54	-.713	1.03	.490	-2.42	1.53	.089
Teens	2.65	.843	14.18**	1.81	1.08	6.12	2.38	1.15	10.78*
Young adults	22.29	13466	.000	20.05	13579	.000	18.91	13274	.000
Black	20.46	12544	.000	18.50	12839	.000	20.01	12281	.000
Latino**	.398	.682	1.49	.288	.987	1.33	1.24	1.26	3.44
Asian	constant (0)			constant (0)			constant (0)		
Meth use				3.70	.896	40.44***	4.20	1.17	66.93***
Impulsive							-.461	.763	.631
Sensation seek							2.27	1.43	9.68
Volatile temper							-1.02	.763	.360
R ²			.337			.507			.535

*p<.05; **p<.01; ***p=.000

of substance use and violence were coded as dichotomous variables (yes or no). Since no violent events for the non-substance users were reported, the analyses excluded this group. Each model included controls for age, sex, and race. Table 5.2 indicates the results for the hierarchical regression models on the prevalence of violence. The data demonstrate a strong relationship between personality traits, specifically volatile temper (e.g., anger), and having committed assault over the 6-month period. When personality trait factors were eliminated from the model, methamphetamine users were approximately 13 times more likely to commit assault than alcohol only users. However, the significance of this association disappeared when controlling for personality traits. In addition, males and Blacks and Latinos were more likely to commit assault than females and White participants.

The analysis in Table 5.3 focused on the co-occurrence of substance use and assault. The results were different when analyzing the subgroup of participants who engaged in violence ($n=78$) with respect to the co-occurrence of substance use and

Table 5.4 Hierarchical logistic regression of the prevalence of unprotected sex

	B	S.E.	Odds	B	S.E.	Odds	B	S.E.	Odds
Males	.772	.239	2.16**	.138	.315	1.15	.178	.339	1.20
Teens	-.711	.288	.491*	-.882	.364	.440*	-.970	.399	.379*
Young adults	.290	.337	1.34	.464	.427	1.59	.518	.464	1.68
Black	.180	.436	1.20	-1.17	.603	.309*	-.996	.680	.369
Latino	.198	.270	1.22	-.399	.388	.671	-.308	.435	.735
Asian	-.744	.384	.475*	-.880	.509	.415	-.941	.557	.390
Alcohol only				2.95	.408	19.03***	2.89	.431	17.90***
Meth use				6.08	.845	435.65***	5.55	.966	58.11***
Impulsive							.058	.242	1.06
Sensation seek							.241	.361	1.27
Volatile temper							.497	.353	1.64
R ²			.071			.405			.416

*p<.05; **p<.01; ***p=.000

violence as compared to the results for the prevalence of assault. Two variables were significant predictors of the co-occurrence of substance use and assault: age and methamphetamine use. For instance, teens were approximately 11 times more likely to commit assault while under the influence of drugs than adults. Respondents who used methamphetamines were approximately 67 times more likely than alcohol only users to commit assault while intoxicated. Personality traits were not significant predictors of the co-occurrence of drug use and assault. In fact, unlike the results for the prevalence model, the odds of committing assault increased for methamphetamine users when controlling for personality traits.

5.2.3 Predictors of Risky Sexual Behavior

Logistic regression analyses were performed in order to test the effects of substance use and personality traits on the prevalence of risky sex as well as on the co-occurrence of substance use and risky sex. Table 5.4 reports the results for the hierarchical regression models on the prevalence of risky sexual behavior. The data indicate that respondents who used alcohol only (odds=17.90) or methamphetamines (odds=258.11) were significantly more likely to engage in risky sex over the 6 month period than non-substance users even when controlling for personality traits and demographic differences. Furthermore, methamphetamine users were 14 times more likely to engage in risky sex than alcohol only users (data not shown). Personality traits were not related significantly to high risk sexual behavior. Teens were less likely to engage in risky sex than adults. Contrary to previous findings (Benda and Corwyn 1999; CDC 2006), no significant differences between males and females emerged with regard to the prevalence of unprotected sex. Finally, the logistic regression results indicated no race/ethnic differences in the use of condoms.

Table 5.5 Hierarchical logistic regression of the co-occurrence of substance use and unprotected sex

	B	S.E.	Odds	B	S.E.	Odds	B	S.E.	Odds
Males	-.981	.446	.375*	-2.32	.650	.099***	-2.09	.694	.124**
Teens	2.59	.678	13.27***	2.38	.706	10.78**	2.09	.718	8.06**
Young adults	.454	.736	1.58	-.083	.783	.920	-.074	.861	.929
Black	1.93	.687	6.91**	1.52	.734	4.57*	.773	.820	2.17
Latino	.430	.475	1.54	.613	.544	1.85	.149	.580	1.16
Asian	-19.11	9182	.000	-20.20	8312	.000	-19.79	9054	.000
Meth use				1.86	.612	6.42**	1.48	.690	4.37*
Impulsive							.009	.275	1.01
Sensation seek							-.461	.547	.631
Volatile temper							1.28	.424	3.61**
R ²			.245			.314			.356

* $p < .05$; ** $p < .01$; *** $p = .000$

The odds of the co-occurrence of substance use and being involved in unprotected sexual intercourse are shown in Table 5.5. The data indicate a significant relationship between methamphetamine use and condom use, even when controlling for demographics and personality traits. The odds of not using a condom were significantly higher for individuals who used methamphetamines compared to respondents who only used alcohol (odds=4.37). The results also indicate that individuals with higher scores on the volatile temper scale were more likely to engage in unprotected sex than individuals with lower scores (odds=3.61). Unlike the findings for the prevalence of unprotected sex, a significant gender difference emerged for the co-occurrence of substance use and risky sex: males were less likely than females to have unprotected sex while using drugs. Also, teens were more likely to have high risk sex while using drugs than adults.

5.3 Discussion

The objective of the present study was to gain an understanding of the temporal relationship of substance use and high-risk behaviors (assault and unprotected sex) within a 6-month time frame. During the 6 months prior to data collection, individuals who used alcohol or methamphetamines were more likely to be involved in violence and high-risk sex than non-substance users. Perhaps most important, methamphetamine users were more likely to be involved in assault and unprotected sex than alcohol-only users.

The present study also explored the possibility that the drug-risky behavior connection is spurious. Studies emanating from developmental psychology suggest that traits related to emotion dysregulation may play a key role in poor judgment and risk taking behaviors (Cauuffman and Steinberg 2000; Steinberg 2004). For instance, some studies have demonstrated that sensation seeking is related to emotional regulation and its converse, impulsivity (Boyer 2006; Cauuffman and Steinberg 2000;

Loeber 1988). The logic of this perspective is that individuals who lack regulation skills hastily engage in more goal-defeating, sensation-seeking behaviors, especially in frustrating or anger provoking situations.

Along the lines suggested by the research cited above, the current study attempted to disentangle the many intersecting factors that may link substance use with high risk behaviors by including three personality traits that underlie emotion regulation: impulsivity, sensation seeking and volatile temper. The results suggest, clearly, that personality trait differences, specifically volatile temper, accounted for the overwhelming majority of explained variance in the prevalence of assault. In fact, when controlling for personality traits, substance use ceased to be a significant predictor of the prevalence of assault. Thus, the findings suggest that the relationship between substance use and the prevalence of assault may be spurious.

Importantly, however, the relationship among personality traits, substance use, and involvement in violence varied based on the outcome measure of association. Volatile temper was the key predictor of the prevalence of violence, but was not associated significantly with the co-occurrence of substance use and violence. However, the co-occurrence of substance use and assault was significantly greater for respondents who used methamphetamines as compared to alcohol-only users.

Similarly, Fals-Stewart et al. (2003) collected detailed diaries over a 15 month time frame from male partners with a history of intimate partner violence (IPV), entering either an alcoholism or domestic violence treatment program, and from their female partners. The diaries contained information not only about the occurrence of male-to-female aggression, but also about the time of day these episodes happened, whether the male partner drank alcohol during the same day the violence occurred, and what time of day the drinking occurred. This allowed for a detailed examination of the daily temporal relationship between male-to-female physical aggression and alcohol consumption. Importantly, in both samples, over 80% of all IPV episodes occurred within 4 h following drinking by the male partner. Similar results were found for the temporal association between cocaine and episodes of IPV in a sample of patients who primarily abused drugs other than alcohol (Fals-Stewart et al. 2003). These findings suggest the need for future research that examines the concurrent and simultaneous relationship of substance use and violence.

With regard to risky sexual behavior, the findings indicate that substance use, alcohol-only, and methamphetamines heightened the risk for unprotected sexual intercourse even when controlling for demographics and personality traits. The findings are similar to those of other studies that indicate that both the frequency of substance use and use at last intercourse were strongly associated with the likelihood of condom use (Santelli et al. 2001; Tapert et al. 2001).

Contrary to general deviance models, which imply that risk behaviors are unidimensional, current results support a multidimensional model for risk-taking behaviors (Boyer 2006; Romero et al. 2003). Although volatile temper was related to both risk behaviors, its predictive value varied by measure of association and by type of risk behavior. However, the reverse association was found for risky sexual behavior. Volatile temper was not associated with the prevalence of unprotected sex but was a significant predictor of the co-occurrence of drug use and high risk sex.

The complexity of the interaction of substance use, personality traits, and high risk behaviors suggests the need for longitudinal research that can trace their mutual development and interaction across time (Romero et al. 2003). So as to reconstruct the key influences on the development of high risk behaviors, such research should include the following: severity, frequency, timing, and recency of high risk behavior; precipitating life events, location, context, and consequences; presence of individual-level mental health problems and active symptoms; substance use and intoxication at the time the behavior occurs; and subjects' interpretations of these episodes.

In addition, future investigations in this area should assess the consistency of the findings by exploring the dynamic interplay of the occurrence and timing of drug use on different violent behaviors, not just assault. Finally, the current study compared individuals who only used alcohol to methamphetamine users. However, all of the respondents in the methamphetamine group were polydrug users, both concurrently and simultaneously. Thus, future research should explore the role that polydrug use plays with regard to risky behaviors.

Aside from the acute effects associated with intoxication and impairment, little research has examined simultaneous polydrug drug use in relation to behavioral outcomes. Some evidence indicates that the use of multiple substances increases the risk of violence. For instance, polydrug abusers in treatment obtained significantly higher scores on self-report measures of hostility and aggression than did single-substance abusers, regardless of the particular types of drugs and drug combinations used (McCormick and Smith 1995). In addition, Bennett (2000) reported an exponential relationship between the number of drug types that arrestees used during a 1-year period and the number of acquisitive offenses that occurred during that same period. It may be that polydrug users have personality traits (particularly antagonism and impulsiveness) that predispose them toward violence (McCormick et al. 1998), that polydrug use prompts more instrumental violence and acquisitive crime to maintain a multiple-drug habit (Bennett and Holloway 2005; Smith and Polsenberg 1992), or that polydrug use coincides with heavier involvement in a deviant, problematic, and "excessive" lifestyles than does single-substance abuse.

Alternatively, the use of multiple drugs may interact to increase intoxication, which places one at greater risk for violence than does single drug use (Hammersley and Morrison 1987). One reason for this is that particular drug combinations might create unique metabolites with greater toxicity than those formed when the drugs are used individually. For instance, Pennings et al. (2002) suggest that alcohol and cocaine each elevate extraneuronal dopamine and serotonin levels, which may lead to deficits in impulse control and then to violent behavior.

Much drug research is often limited by its reliance on a simple checklist of drugs used by respondents without elaborating on whether it was single, combined, or polydrug use that characterized consumption (Grob 2000; Pedersen and Skrondal 1999; Reid et al. 2007). However, when polydrug use is considered, its definition is so variable as to make comparisons across studies difficult. Some research defines polydrug use as having ingested more than one drug during over the course of the respondent's life (Montgomery et al. 2005; Scholey et al. 2004; Sneed et al. 2004; Wu et al. 2006) over the 6 months prior to the study, the prior 90 or 30 days, the

week before, or 1 or 2 days prior to data collection (Carlson et al. 2005; Copeland et al. 2006; Hunt et al. 2005; Isralowitz and Rawson 2006; Sterk et al. 2000). These studies often ignore the frequency of use and the differences between combined and sequential use.

Complicating studies on polydrug use is the fact that substances are co-used in different ways for different reasons. Some users, for example, may inject cocaine and heroin simultaneously in the form of a speedball to experience the effects of both drugs at the same time. Some may use the speedball to achieve a greater level of euphoria, especially when they have insufficient quantities of either drug. Other users might mix cocaine with heroin with the goal of gradually reducing heroin consequently eliminating their physical reliance upon opioids. Heroin users often report co-use of cocaine in a sequential manner either to enhance euphoria or to reduce the withdrawal symptoms commonly experienced during their typical day or when they decide to detoxify from opioid drugs (Leri et al. 2003). Therefore, future research must incorporate these relevant dimensions if a more complete understanding of the relationships among substance use and risky behaviors is to be attained.

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