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Presence and Persistence of Psychotic Symptoms in Cocaine-versus Methamphetamine-Dependent Participants

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Abstract

The primary objective of this study was to compare and contrast psychotic symptoms reported by cocaine and methamphetamine-dependent individuals. Participants included 27 cocaine-dependent and 25 methamphetamine-dependent males, as well as 15 cocaine-dependent and 18 methamphetamine-dependent females. After screening, participants were excluded if they met criteria for any Axis I diagnosis other than nicotine dependence, or methamphetamine or cocaine dependence (ie, participants had to use either methamphetamine or cocaine but were excluded if they met dependence criteria for both). The participants were administered the newly developed Psychotic Symptom Assessment Scale (PSAS), which assesses psychotic symptoms. A high proportion of both cocaine- and methamphetamine-dependent men and women reported delusions of paranoia and auditory hallucinations. However, during the abstinent and intoxicated conditions, methamphetamine-dependent men and women were more likely than cocaine-dependent men and women to report psychotic symptoms. Future studies will compare psychotic symptoms reported by non-dependent recreational stimulant users to stimulant-dependent individuals.

INTRODUCTION

Drug-induced psychosis has been described as indistinguishable from schizophrenia.¹ The prevalence of psychosis following the use of stimulants, such as cocaine and methamphetamine, is substantial. For example, Satel and colleagues reported that 68% of study participants experienced highly distressing, albeit transient, paranoia following cocaine use.² Moreover, recent reports claim that the prevalence of psychotic symptoms among methamphetamine users was 11 times higher than the general population.³ Similar

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findings have been reported in other studies of cocaine-⁴ and methamphetamine-dependent individuals.⁵

While cocaine and methamphetamine use are both risk factors for psychosis, to our knowledge, there have been no investigations comparing the degree of similarity between the psychotic syndromes associated with the use of these drugs. Because both drugs are stimulants, it is reasonable to speculate that the psychotic symptoms induced by cocaine and methamphetamine may be similar. However, given that the drugs have different half-lives (90 min for cocaine vs. 11 hours for methamphetamine), mechanisms of action (monoamine transport inhibition versus release), and long-term effects on brain dopamine systems (with methamphetamine abuse more often associated with neurotoxicity), it may be that the drugs produce differential profiles of psychotic symptoms.⁶⁻⁸

In order to investigate this possibility, we examined the prevalence of psychotic symptoms in cocaine- and methamphetamine-dependent individuals. In addition, we investigated factors that potentially moderate the onset of these symptoms, including route of administration and drug use history. We also compared psychotic symptoms occurring during abstinence to those occurring during stimulant intoxication.

METHODS

Participants

Participants included 42 non-treatment-seeking, cocaine-dependent individuals (27 males, 15 females) and 43 non-treatment-seeking, methamphetamine-dependent individuals (25 males, 18 females). Subjects were recruited from the community via radio and newspaper advertisements. All participants met DSM-IV criteria for cocaine- or methamphetamine-dependence, though no participant met criteria for *both* current methamphetamine and cocaine abuse or dependence. In addition, all subjects reported either methamphetamine or cocaine as their primary drug of use. The Institutional Review Board of the University of California Los Angeles approved the study and informed consent document. After the risks of the study had been fully explained, all subjects provided informed consent, and were then paid \$25 for participation upon completion of the study.

Procedure and Measures

Participants completed an initial battery of questionnaires, including demographic, locator, and recruitment surveys. At the time of assessment, a comprehensive toxicology screen was performed to assess recent substance use. Subjects were administered a variety of assessments, including the SCID (Structured Clinical Interview for DSM-IV-TR diagnoses)⁹ or MINI (condensed version of the SCID),¹⁰ Addiction Severity Index-Lite,¹¹ Beck Depression Inventory II,¹² Substance Use Inventory, and Timeline Follow-back. The main instrument used was the Psychotic Symptom Assessment Scale (PSAS; see Appendix), which was developed at UCLA by Drs. Newton and Kalechstein and consists of 32 questions yielding a detailed assessment of psychotic symptoms based on the DSM-IV criteria for psychosis. The PSAS addresses psychotic symptoms such as delusions, hallucinations, and disorganized thoughts (such as ideas of reference, thought broadcasting,

and thought insertion), as well as secondary symptoms such as agitation and attention. These secondary symptoms do not necessarily indicate psychotic behavior, but would contribute to psychiatric morbidity produced by psychotic symptoms. The PSAS also assesses the degree to which study participants attributed psychotic symptoms to drug use at the time the symptom occurred as well as whether they attributed the symptoms to drug use in retrospect (at the time of assessment).

Reliability analyses were conducted to evaluate the internal consistency of each of the subscales. Adequate internal consistency was demonstrated for the subscale querying whether subjects had ever experienced particular psychotic symptoms ($\alpha = .87$), the subscale assessing psychotic symptoms while not intoxicated ($\alpha = .83$), and the subscale assessing while intoxicated ($\alpha = .86$).

The quantity of cocaine or methamphetamine used was assessed by presenting the participants with test tubes containing various amounts of white powder or crystalline substances (0.1–2.0 g), from which they selected an option that best approximated their daily use amount. The subject's demographics for each group are detailed in Table 1.

Data Analysis

Student t-tests were used to identify group differences across demographic and drug use profile. One-way analyses of variance (ANOVAs) were used to determine if there were any differences with regard to demographic data. Chi-square analyses were used to determine whether cocaine- and methamphetamine-dependent participants differed with respect to the likelihood that they would experience a particular symptom during different mental states (intoxicated versus sober). Chi-square analyses also were used to determine whether the prevalence of psychotic symptoms differed across ethnic groups or route of administration. Correlations were used to determine the level of association between drug use profile and cumulative onset of psychotic symptoms.

RESULTS

Table 1 provides demographic and drug use information for all participants. Cocaine- and methamphetamine-dependent males were similar with regard to age, ethnicity, route of administration, education, and the amount of money spent each week on the primary drug of abuse. Among males, the groups differed with respect to years of use ($p = 0.006$, cocaine users had been using for significantly longer) and average amount of stimulant used per week ($p = 0.015$, cocaine users reported using significantly more grams per week). There were no demographic or pattern of use differences among female cocaine and methamphetamine users.

In general, the frequency of psychotic symptoms reported by cocaine and methamphetamine male users was high (see Table 2). For example, a substantial percentage of both male cocaine and male methamphetamine users reported ever experiencing paranoid delusions, including "people are talking about you" (59% vs. 64%, respectively) and "people are watching you" (48% vs. 44%). Furthermore, a notable number of cocaine and methamphetamine male users experienced perceptual disturbances, such as "imagining

someone calling your name" (48% vs. 40%). In addition, stimulant users were prone to "lose their train of thought easily" (44% vs. 48%) and "have difficulty completing tasks" (41% vs. 60%). Nonetheless, differences between cocaine- and methamphetamine-dependent males were observed. While sober, in the non-drug using (abstinent) state, methamphetamine-dependent men were more likely than cocaine-dependent men to report "seen or felt things that others could not" (32% vs. 4%, $p < 0.01$). In addition, methamphetamine-dependent men were more likely than cocaine-dependent men to report, "someone or something has external control over their actions" (16% vs. 0%, $p < 0.05$). Group differences were not observed for any other psychotic symptoms while sober.

While "high," in the drug using state, methamphetamine-dependent men were more likely than cocaine-dependent men to report, "feeling as if an organization is conspiring against you" (16% vs. 0%, $p < 0.05$), "you have a special role in society" (24% vs. 4%, $p < 0.05$), "seen or felt things that others could not" (52% vs. 11%, $p < 0.001$), and "smelled things others could not" (20% vs. 0%, $p < 0.02$), and approached significance when asked to report "felt someone was touching you" (14% vs. 0%, $p = 0.064$; see Table 3). Group differences were not observed for any other psychotic symptoms while high.

Because there were significant differences in stimulant use detected between the cocaine and methamphetamine groups (ie, years of use and average amount used per week in grams), stimulant use history and the total number of psychotic symptoms (maximum of 32) reported by methamphetamine and cocaine dependent participants were correlated (see Table 4). There were no significant correlations found between any of the groups. Cocaine-dependent males and females averaged 7.6 ± 5.0 and 9.1 ± 5.5 total psychotic symptoms, respectively, and methamphetamine-dependent males and females average 9.7 ± 7.2 and 12.5 ± 5.6 total psychotic symptoms, respectively. In addition, there were no significant differences between total symptoms reported by methamphetamine- and cocaine-dependent males, or between total symptoms reported by methamphetamine- and cocaine-dependent females.

In comparison with males, the frequency of psychotic symptoms reported by cocaine and methamphetamine female users was high (see Table 2). For example, a substantial percentage of both cocaine and methamphetamine females reported paranoid delusions during either the high or abstinent conditions, including "people are talking about you" (67% vs. 67%), "people are watching you" (47% vs. 56%, respectively), and "people go out of their way to hurt you" (47% vs. 50%, respectively). Also, both groups endorsed paranoid delusions of "something is wrong with the way your body looks" (40% vs. 72%, respectively) and "feeling as if your significant other was having an affair" (40% vs. 50%, respectively). In addition, both groups experience auditory hallucinations such as "imagine someone calling your name" (60% vs. 47%, respectively). In addition, stimulant users were prone to "feeling easily agitated" (47% vs. 61%, respectively), "have a difficult time moving your body" (47% vs. 47%), "lose train of thought easily" (60% vs. 67%, respectively) and "have difficulty completing tasks" (60% vs. 67%, respectively).

Important differences between cocaine- and methamphetamine-dependent females were observed. While sober, in the non-drug using (abstinent) state, methamphetamine-dependent

women were more likely than cocaine-dependent women to report, “having special powers” (28% vs. 0%, respectively, $p < 0.05$), “something is wrong with the way your body looks” (72% vs. 33%, respectively, $p < 0.05$), and “dressing inappropriately” (22% vs. 0%, respectively, $p = 0.05$). Cocaine-dependent women were more likely than methamphetamine-dependent women to report “imagine someone touching you” (20% vs. 0%, respectively, $p < 0.05$). Group differences were not observed for any other psychotic symptoms while sober. While “high,” in the drug-using state, methamphetamine-dependent women were more likely than cocaine-dependent women to report “feeling strange sensations (61% vs. 27%, respectively, $p < 0.05$).

Several other factors may contribute to the presence or persistence of psychotic symptoms in stimulant users. The data indicate that BDI scores, years of stimulant use, days of stimulant use in the past 30, and amount stimulant used per week (grams) were not correlated with the report of psychotic symptoms in either cocaine- or methamphetamine-dependent males and females (see Table 4).

Given the differences in ethnic distribution between the cocaine and methamphetamine using individuals in the current study, Table 5 details the most prevalent symptoms and the percentage of African-American, Caucasian, Hispanic and other participants that reported those symptoms. African-American, methamphetamine-dependent males and females were more likely to report “people are talking about you” ($p < 0.05$) as well as “have difficulty completing tasks” ($p < 0.05$) when compared to Caucasian, Hispanics, and others. However, for the remaining most prevalent symptoms, the analysis indicates that there were no significant differences between the report of psychotic symptoms and the percentage of each ethnic group reporting those symptoms. Because a considerable percentage of participants reported smoking (67% of male and 80% of female cocaine users and 52% of male and 67% of female methamphetamine users) as their primary route of administration, compared to intravenous (0% of male and 0% of female cocaine users and 28% of male and 0% of female methamphetamine users), nasal (30% of male and 20% of female cocaine users and 8% of male and 22% of female methamphetamine users), or other (4% of male and 0% of female cocaine users and 12% of male and 11% of female methamphetamine users), an analysis was conducted to determine whether there were route of administration differences among the affirmative report of psychotic symptoms. There were no differences between route of administration and the report of the most common psychotic symptoms (see Table 5).

DISCUSSION

In the current report, we show that the frequency of several psychotic symptoms reported by cocaine and methamphetamine males and females was high. Common psychotic symptoms included paranoid delusions, erotomanic delusions, grandiose delusions, and perceptual disturbances.

Of interest, methamphetamine-dependent males, as compared to cocaine-dependent males, were more likely to exhibit select psychotic symptoms. For example, a higher percentage of methamphetamine users reported visual and tactile hallucinations and felt that someone or something had external control over them during the abstinent state. In addition, a higher

percentage of methamphetamine male users reported delusions of paranoia and grandiosity as well as visual, auditory, and olfactory hallucinations while intoxicated. Also, a higher percentage of methamphetamine-dependent females, when compared to cocaine-dependent females, reported feeling strange sensations while intoxicated. The frequency of participants reporting suspiciousness (paranoia) in this study was lower than the report of McKetin and colleagues.³ The lower rate of paranoia among our participants probably was due to the fact that participants with a history of schizophrenia or non-drug induced psychosis were excluded from the current study, while McKetin and colleagues included such participants in their study.

Despite the fact that the cocaine-dependent males reported a longer duration of stimulant use in years, the analyses revealed that cocaine users were less prone to experience selected psychotic symptoms than methamphetamine users. The identification of the neurobiological mechanisms that underlie vulnerability to psychosis is beyond the scope of this study; however, we speculate that these findings may be reflective of the neurotoxic effects produced by methamphetamine, as compared to cocaine. Although cocaine and methamphetamine are similar in that they both bind to presynaptic transporters and inhibit monoamine uptake, the significantly longer half-life of methamphetamine, as compared to cocaine, may also contribute to the greater incidence of psychotic symptoms in methamphetamine users.⁶

Some studies have found that African-Americans are at greater risk for stimulant-induced psychosis,^{13,14} while others report opposite trends^{4,15} or negative associations.^{2,16} In a previously published meta-analytic report looking at migration and incidence of schizophrenia, it was found that African-Americans were more at risk than Caucasians for experiencing symptoms of psychosis.¹⁷ While ethnic differences were noted in the current study between the two sample populations, our analysis indicated that ethnicity did not moderate the prevalence of most psychotic symptoms.

Previous studies have shown that some individuals are likely to experience psychotic symptoms after using relatively modest amounts of a stimulant,¹⁸ whereas others do not do so until exposure to relatively larger doses of stimulants.¹⁹ Our clinical research group has conducted several inpatient laboratory studies in which methamphetamine was administered to methamphetamine-dependent patients and cocaine was administered to cocaine-dependent patients. Over a course of several years and testing of more than 100 patients, we have administered low doses of methamphetamine (30 mg) and cocaine (40 mg) approximately 500 times and have not noted drug-induced psychotic symptoms such as paranoia, hallucinations, or delusions. Further research is needed to determine risk factors and protective factors for development of drug-induced psychosis.

Several limitations should be noted. First, although the PSAS items are internally consistent, the validity of the measure has not been determined. Second, the current data reflect retrospective reports of psychotic symptoms by the participant rather than observation of psychotic symptoms by others. Also, when investigating whether ethnic and route of administration differences exist, it must be noted that the samples sizes were relatively small and more data is necessary in order to make a definitive conclusion. Future studies are

needed to investigate the development and characteristics of psychotic symptoms following the experimental administration of methamphetamine or cocaine.

APPENDIX

Psychotic Symptom Assessment Scale

Date: _____
 Subject Initials: _____
 Subject #: _____

To be administered by the Research Assistant

Read the following directions prior to beginning: Please answer the following questions by answering with the number that most accurately corresponds to your experience. The scale's range is from 0–10, with 0 indicating never, 5 indicating often (one-half of the time), and 10 indicating always.

As used here, “while you were high” indicates that you had used cocaine or methamphetamine *within the last 24h*, and “while sober” indicates that you had not used cocaine or methamphetamine *for one week* or more. If you use both cocaine and methamphetamine, discuss this with the administrator.

1. Has it ever seemed like people were talking about you or paying extra attention to you?

1a. Yes/no

1b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

1c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

1d. Did you feel **then** that you were experiencing this due to drug use? Yes No

1e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

2. Have you ever felt like you were receiving special messages from the radio, TV, newspaper, or the way that things were arranged around you?

2a. Yes/no

2b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

2c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

2d. Did you feel **then** that you were experiencing this due to drug use? Yes No

2e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

3. Have you ever felt like people are watching you, spying on you, or checking up on you?

3a. Yes/no

3b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

3c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

3d. Did you feel **then** that you were experiencing this due to drug use? Yes No

3e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

4. Have you ever felt like people go out of their way to give you a hard time, are out to get you, or want to hurt you?

4a. Yes/no

4b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

4c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

4d. Did you feel **then** that you were experiencing this due to drug use? Yes No

4e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

5. In these situations, do you feel like there is an organization or group behind these actions?

5a. Yes/no

5b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

5c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

5d. Did you feel **then** that you were experiencing this due to drug use? Yes No

5e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

6. Have you ever felt like you have special powers?

6a. Yes/no

6b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

6c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

6d. Did you feel **then** that you were experiencing this due to drug use? Yes No

6e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

7. Have you ever felt like there is a specific or special mission to your life?

7a. Yes/no

7b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

7c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

8. Have you ever felt like you hold a powerful role in society or that you should hold a powerful role in society?

8a. Yes/no

8b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

8c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

8d. Did you feel **then** that you were experiencing this due to drug use? Yes No

8e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or

was there no clear distinction? Please

explain:_____

9. Have you ever felt like something was wrong with the way a part of your body looked?

9a. Yes/no

9b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

9c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

9d. Did you feel **then** that you were experiencing this due to drug use? Yes No

9e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or

was there no clear distinction? Please

explain:_____

10. Have you ever had any unusual religious experiences, such as communication with God?

10a. Yes/no

10b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

10c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

10d. Did you feel **then** that you were experiencing this due to drug use? Yes

No

10e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

11. Have you ever felt like your significant other was having an affair when it was not true?

11a. Yes/no

11b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

11c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

11d. Did you feel **then** that you were experiencing this due to drug use? Yes

No

11e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

12. Have you ever felt that someone loves you from a distance, even though they deny it?

12a. Yes/no

12b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

12c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

12d. Did you feel **then** that you were experiencing this due to drug use? Yes No

12e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

13. Have you ever felt like someone could read your mind or felt like telepathy, magic, witchcraft, or hypnotism has affected you in some way?

13a. Yes/no

13b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

13c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

13d. Did you feel **then** that you were experiencing this due to drug use? Yes No

13e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

14. Have you ever felt like electricity, x-rays, or radiowaves are or have affected you?

14a. Yes/no

14b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

14c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

14d. Did you feel **then** that you were experiencing this due to drug use ? Yes No

14e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

15. Have you ever felt like someone or something outside of yourself was controlling your thoughts or actions?

15a. Yes/no

15b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

15c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

15d. Did you feel **then** that you were experiencing this due to drug use? Yes No

15e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please

explain: _____

16. Have you ever felt like someone or something else was putting thoughts into or removing thoughts from your head?

16a. Yes/no

16b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

16c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

16d. Did you feel **then** that you were experiencing this due to drug use? Yes No

16e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

17. Have you ever felt like people could hear your thoughts?

17a. Yes/no

17b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

17c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

17d. Did you feel **then** that you were experiencing this due to drug use? Yes No

17e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or

was there no clear distinction? Please explain: _____

—

18. Have you ever felt like someone was calling your name, but no one was really calling you?

18a. Yes/no

18b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

18c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

18d. Did you feel **then** that you were experiencing this due to drug use? Yes No

18e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

—

19. Have you ever heard tapping noises, whispers, or music that others couldn't hear?

19a. Yes/no

19b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

19c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

19d. Did you feel **then** that you were experiencing this due to drug use? Yes No

19e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

20. Have you ever seen or felt things that others couldn't?

20a. Yes/no

20b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

20c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

20d. Did you feel **then** that you were experiencing this due to drug use? Yes No

20e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

21. Have you ever felt like someone is touching you but no one was there?

21a. Yes/no

21b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

21c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

21d. Did you feel **then** that you were experiencing this due to drug use? Yes No

21e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

22. Have you ever felt strange sensations, such as insects crawling on your body or skin?

22a. Yes/no

22b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

22c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

22d. Did you feel **then** that you were experiencing this due to drug use? Yes No

22e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

23. Have you ever felt that things taste or smell differently than they should?

23a. Yes/no

23b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

23c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

23d. Did you feel **then** that you were experiencing this due to drug use? Yes No

23e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

24. Have you ever smelled things that others could not?

24a. Yes/no

24b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

24c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

24d. Did you feel **then** that you were experiencing this due to drug use? Yes No

24e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

25. Have you ever had a difficult time moving your body?

25a. Yes/no

25b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

25c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

25d. Did you feel **then** that you were experiencing this due to drug use? Yes No

25e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

26. Have you ever had too much energy and could not control your body?

26a. Yes/no

26b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

26c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

26d. Did you feel **then** that you were experiencing this due to drug use? Yes
No

26e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

_____ *If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

27. Have you ever felt like you get easily agitated or annoyed and cannot control yourself?

27a. Yes/no

27b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

27c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

27d. Did you feel **then** that you were experiencing this due to drug use? Yes
No

27e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

28. Have you ever displayed inappropriate sexual behavior? Here, inappropriate means behavior you would not usually participate in.

28a. Yes/no

28b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

28c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

28d. Did you feel **then** that you were experiencing this due to drug use? Yes
 No

28e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain: _____

29. Have you ever been aware of dressing inappropriately or unusually? Here, inappropriate or unusual means dressing as you would not usually.

29a. Yes/no

29b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

29c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

29d. Did you feel **then** that you were experiencing this due to drug use? Yes
 No

29e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number

of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

30. Have you ever been told or been aware that your facial expressions are unrelated to what you are talking about or feeling (like smiling while talking about something sad)?

30a. Yes/no

30b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

30c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

30d. Did you feel **then** that you were experiencing this due to drug use? Yes No

30e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

31. Have you ever felt like you lose your train of thought easily, will go off onto different tangents while speaking, or that people don't understand you?

31a. Yes/no

31b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

31c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

31d. Did you feel **then** that you were experiencing this due to drug use? Yes
No

31e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

32. Do you ever feel like you have a difficult time completing tasks or activities?

32a. Yes/no

32b. Did this occur while you were sober (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

32c. Did this occur while you were high (yes / no)

If yes, rate the frequency: 0 1 2 3 4 5 6 7 8 9 10

32d. Did you feel **then** that you were experiencing this due to drug use? Yes
No

32e. Do you feel **now** that these experiences were due to drug use? Yes No

*Did this happen after a certain amount of drugs or after a certain number of days? Please explain:

*If this has occurred while you were using drugs, was it more evident during your high, while you were coming down, or was there no clear distinction? Please explain:_____

Administrator, Please complete at the end of the interview:

Please comment on the subject's affect:

Please comment on the subject's speech:

Please comment on the subject's appearance:

Please comment on the subject's body language:

Additional comments:

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TABLE 1

Demographics

All values represent percentage or Mean ± SD	Males				Females			
	Coc (n = 27)	MA (n = 25)	F _(1,50)	p	Coc (n = 15)	MA (n = 18)	F _(1,31)	p
Age (years)	41.9 ± 6.7	38.6 ± 9.0	2.36	.131	36.3 ± 9.2	37.9 ± 8.9	.27	.610
Ethnicity (%)			1.96	.168			.72	.403
White	11.1	52			20.0	55.6		
African American	63	24			53.3	11.1		
Hispanic	22.2	12			13.3	22.2		
Other	3.7	12			13.3	11.2		
Years of use	14.5 ± 8.7	8.1 ± 7.1	8.35	.006*	15.9 ± 10.0	12.3 ± 10.0	1.04	.315
Route of administration (%)			2.42	.126			1.40	.246
Nasal	29.6	8			20.0	22.2		
Smoking	66.7	52			80.00	66.7		
IV	0	28			0	0		
Other	3.7	12			0	11.1		
Education (years)	13.4 ± 2.4	14.2 ± 2.4	1.36	.249	11.9 ± 2.4	13.2 ± 2.2	2.74	.108
Average amount used per day (g)	0.7 ± 0.5	0.4 ± 0.4	6.40	.015*	1.1 ± 1.0	0.9 ± 1.2	.37	.547
Average amount spent per day (\$)	48.9 ± 79.8	21.0 ± 17.7	2.81	.100	55.5 ± 76.8	28.6 ± 22.7	1.80	.190

TABLE 2

Most frequent symptoms of male and female cocaine and methamphetamine users (in either the abstinent or intoxicated states)

	Coc (%)	MA (%)
Male	(n = 27)	n = 25)
Has it ever seemed like people were talking about you or paying extra attention to you?	59	64
Have you ever felt like people are watching you, spying on you, or checking up on you?	48	44
Have you ever felt like someone was calling your name, but no one was really calling you?	48	40
Have you ever felt like you lose your train of thought easily, will go off onto different tangents while speaking, or that people don't understand you?	44	48
Do you ever feel like you have a difficult time completing tasks or activities?	41	60
Female	(n = 15)	(n = 18)
Has it ever seemed like people were talking about you or paying extra attention to you?	67	67
Have you ever felt like people are watching you, spying on you, or checking up on you?	47	56
Have you ever felt like people go out of their way to give you a hard time, are out to get you, or want to hurt you?	47	50
Have you ever felt like something was wrong with the way a part of your body looked?	40	72
Have you ever felt like your significant other was having an affair when it was not true?	40	50
Have you ever felt like someone was calling your name, but no one was really calling you?	60	47
Have you ever had a difficult time moving your body?	47	47
Have you ever felt like you get easily agitated or annoyed and cannot control yourself?	47	61
Have you ever felt like you lose your train of thought easily, will go off onto different tangents while speaking, or that people don't understand you?	60	67
Do you ever feel like you have a difficult time completing tasks or activities?	60	67

TABLE 3

Onset of selected psychotic symptoms while abstinent from or high on stimulants

	Coc (%)	MA (%)	χ^2	<i>p</i>
Onset of selected psychotic symptoms while abstinent from stimulants	(n = 27)	(n = 25)		
Males				
Have you ever felt like someone or something outside of yourself was controlling your thoughts or actions?	0	16	4.7	.031
Have you ever seen or felt things that others could not?	4	32	7.3	.007
Females	(n = 15)	(n = 18)		
Have you ever felt like you have special powers?	0	28	4.9	.027
Have you ever felt like something was wrong with the way a part of your body looked?	33	72	5.0	.025
Have you ever felt like someone is touching you but no one was there?	20	0	4.0	.047
Have you ever been aware of dressing inappropriately or unusually? Here, inappropriate or unusual means dressing as you would not usually.	0	22	3.8	.051
Onset of selected psychotic symptoms while high on stimulants	(n = 27)	(n = 25)		
Males				
Have you ever felt like an organization has gone out of their way to give you a hard time, are out to get you, or want to hurt you?	0	16	4.7	.031
Have you ever felt like you hold a powerful role in society or that you should hold a powerful role in society?	4	24	4.6	.032
Have you ever seen or felt things that others could not?	11	52	10.2	.001
Have you ever smelled things that others could not?	0	20	6.0	.015
Have you ever felt like someone is touching you but no one was there?	0	14	3.4	.064
Females	(n = 15)	(n = 18)		
Have you ever felt strange sensations, such as insects crawling on your body or skin?	27	61	3.9	.048

TABLE 4

Total Psychotic Symptoms reported and Variables of Interest (including drug use patterns and BDI scores)

Total psychotic symptoms reported versus	Males		Females	
	Coc (<i>p</i>)	MA(<i>p</i>)	Coc(<i>p</i>)	MA(<i>p</i>)
BDI-II scores	.218	.078	.120	.618
Years of stimulant use	.325	.764	.904	.309
Days used in last 30	.763	.605	.697	.200
Amount used per week (g)	.301	.570	.173	.767

TABLE 5
Route of administration and ethnicity differences for the most common symptoms

Gender	Stim	Symptom <i>Have you ever felt/imagined that:</i>	Route of administration					x ²	p
			Nasal (%)**	Smoking (%)	IV (%)	Other (%)			
Male	Coc	People are talking about you	25	72	NA	100	3.3	.54	
		People are watching you	25	56	NA	100	1.6	.22	
		Someone was calling your name	38	50	NA	100	.69	.51	
Male	MA	Lose train of thought easily	38	44	NA	100	.66	.53	
		Had difficulty completing tasks	38	39	NA	100	.71	.50	
		People are talking about you	0	69	86	33	2.4	.10	
		People are watching you	0	31	71	67	1.9	.17	
		Someone was calling your name	50	46	43	0	.77	.53	
		Lose train of thought easily	0	54	71	0	2.4	.10	
Female	Coc	Had difficulty completing tasks	0	62	71	67	1.1	.36	
		People are talking about you	33	75	NA	NA	1.9	.20	
		People are watching you	33	50	NA	NA	.24	.64	
		People go out of their way to hurt you	33	50	NA	NA	.24	.64	
		Body dysmorphism	67	33	NA	NA	1.0	.33	
		Significant other was having an affair	0	50	NA	NA	2.6	.13	
	MA	Someone calling your name	67	58	NA	NA	.06	.81	
		Difficult time moving your body	33	50	NA	NA	.24	.64	
		Easily agitated	67	42	NA	NA	.54	.47	
		Lose train of thought easily	100	50	NA	NA	2.6	.13	
		Had difficulty completing tasks	67	58	NA	NA	.06	.81	
		People are talking about you	50	75	NA	50	2.4	.10	
Female	MA	People are watching you	75	42	NA	100	1.9	.17	
		People go out of their way to hurt you	25	58	NA	50	.70	.57	
		Body dysmorphism	50	83	NA	50	1.7	.21	
		Significant other was having an affair	25	67	NA	0	.83	.49	
		Someone calling your name	50	46	NA	50	.77	.53	
		Difficult time moving your body	25	55	NA	50	2.6	.08	

Gender	Stim	Symptom <i>Have you ever felt/imagined that:</i>	Route of administration					x ²	P
			Nasal (%)**	Smoking (%)	IV (%)	Other (%)			
		Easily agitated	75	50	NA	100	1.7	.21	
		Lose train of thought easily	50	75	NA	50	2.4	.10	
		Had difficulty completing tasks	75	75	NA	0	1.1	.36	
Ethnicity									
			White (%)	AA (%)	Hispanic (%)	Other (%)			
Mal	Coc	People are talking about you	33	65	50	100	.60	.63	
		People are watching you	33	53	33	100	.62	.61	
		Someone was calling your name	33	59	33	0	.78	.51	
		Lose train of thought easily	0	59	33	0	1.7	.19	
		Had difficulty completing tasks	0	47	33	100	1.3	.30	
Male	MA	People are talking about you	77	83	0	33	3.6	.03*	
		People are watching you	46	67	33	0	1.2	.32	
		Someone was calling your name	50	50	0	33	.86	.48	
		Lose train of thought easily	46	83	33	0	2.2	.11	
		Had difficulty completing tasks	54	100	67	0	3.8	.03*	
Female	Coc	People are talking about you	33	75	100	50	.92	.47	
		People are watching you	0	75	0	50	3.2	.07	
		People go out of their way to hurt you	33	50	50	50	.07	.98	
		Body dysmorphism	33	25	50	100	1.3	.33	
		Significant other was having an affair	0	50	50	50	.73	.55	
		Someone calling your name	67	63	50	50	.06	.98	
		Difficult time moving your body	33	38	50	100	.83	.50	
Ethnicity									
			White (%)	AA (%)	Hispanic (%)	Other (%)	x ²	P	
		Easily agitated	33	38	100	50	.83	.50	
		Lose train of thought easily	33	63	50	10	.67	.59	
		Had difficulty completing tasks	33	63	50	100	.67	.59	

Gender	Stim	Symptom <i>Have you ever felt/imagined that:</i>	Route of administration					x ²	P
			Nasal (%)**	Smoking (%)	IV (%)	Other (%)			
Female	MA	People are talking about you	70	50	75	50	3.6	.03*	
		People are watching you	50	50	50	100	1.2	.32	
		People go out of their way to hurt you	50	100	25	50	.73	.55	
		Body dysmorphism	70	100	75	50	.69	.57	
		Significant other was having an affair	50	100	25	50	2.1	.13	
		Someone calling your name	67	50	25	0	.86	.48	
		Difficult time moving your body	60	0	75	100	.20	.90	
		Easily agitated	60	50	50	100	1.5	.26	
		Lose train of thought easily	60	100	75	50	2.3	.11	
		Had difficulty completing tasks	70	100	50	50	3.8	.03*	

* p < 0.05.

** Percentages reflect individuals within each condition that experienced that particular psychotic symptom.