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Changes in Psychiatric Symptoms among Persons with Methamphetamine Dependence Predicts Changes in Severity of Drug Problems But not Frequency of Use

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Abstract

Background—Few studies have examined how changes in psychiatric symptoms over time are associated with changes in drug use and severity of drug problems. No studies have examined these relationships among methamphetamine (MA) dependent person receiving motivational interviewing within the context of standard outpatient treatment.

Methods—Two hundred seventeen individuals with MA dependence were randomly assigned to a standard single session of motivational interviewing (MI) or an intensive 9-session model of MI. Both groups received standard outpatient group treatment. The Addiction Severity Index (ASI) and time-line-follow-back (TLFB) for MA use were administered at treatment entry and 2-, 4- and 6-month follow-up.

Results—Changes in ASI psychiatric severity between baseline and 2 months predicted changes in ASI drug severity during the same time-period, but not changes on measures of MA use. Item analysis of the ASI drug scale showed psychiatric severity predicted how troubled or bothered participants were by their drug us, how important they felt it was for them to get treatment, and the number of days they experienced drug problems. However, it did not predict the number days they used drugs the past 30 days. These associations did not differ between study conditions and they persisted when we compared psychiatric severity and outcomes across 4- and 6-month time periods.

Conclusion—Results are among the first to track how changes in psychiatric severity over time are associated with changes in MA use and severity of drug problems. Treatment efforts targeting reduction of psychiatric symptoms among MA dependent persons might be helpful in reducing the level of distress and problems associated with MA use but not how often it is used. There is a need for additional research describing the circumstances under which the experiences and perceptions of drug related problems diverge from frequency of consumption.

Keywords

Methamphetamine; Psychiatric Severity; Motivational Interviewing; Drug Treatment

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Introduction

The co-occurrence of psychiatric problems among persons with drug dependence is widespread. Clark et al[1] reported that up to sixty percent of adults seeking treatment for alcohol or drug problems also had a mood or anxiety disorder. Studies comparing client characteristics in mental health and substance abuse programs show high prevalence of co-occurring disorders in both settings. For example, Havassy and colleagues[2] found similarities between mental health and substance abuse clients in terms of clinical diagnoses, drug use, and severity of problems in a variety of other areas.

Studies of psychiatric problems specifically targeting persons with methamphetamine (MA) disorders have been limited. However, several studies have documented high rates of co-occurring psychiatric problems. Using data from 214 MA users in treatment in Australia, Kay-Lambkin[3] showed that 70% met criteria for depressive disorders at treatment entry. In a post-treatment follow-up study of 526 persons who received treatment for MA problems Glasner-Edwards et al[4] reported 48% had a diagnosable psychiatric disorder at some point in their life. General population data also show that MA users are at risk for mental health problems such as depression and anxiety,[5,6] and for psychiatric hospital admissions.[7] A history of a psychiatric disorder elevates risk for later MA use among adolescents regardless of drug use history.[8]

When subclinical levels of psychiatric symptoms such as anxiety and depression are included, rates of MA dependence are much higher, particularly among women. For example, Polcin et al[9] used a screening instrument (the Psychiatric Diagnostic Screening Questionnaire[10] to assess psychiatric problems among 128 MA dependent persons (103 men and 25 women) in sober living recovery homes. Psychiatric symptoms were found to be extremely common. Proportions meeting screening criteria among the eleven psychiatric disorders assessed ranged from 24% to 72% for women and 2% to 49% for men. Women consistently reported more psychiatric symptoms, especially for somatization and bulimia disorders.

The co-occurrence of mental health and substance use problems impedes effective drug and alcohol treatment. Research has shown that the severity of psychiatric symptoms at treatment entry is associated with worse response to treatment.[11,12] For example, in a review of outcomes among substance abuse clients McNulty[13] concluded that depression at treatment entry is associated with lower treatment engagement and poorer substance use outcomes. One of the limitations in the current literature is most studies assess psychiatric severity at baseline as a predictor of outcome. Relatively less is known about the *course* of mental health problems over time and how they relate to substance use outcome.

One of the few studies of psychiatric severity among MA dependent persons receiving treatment was reported by Glasner-Edwards[14]. Using data from 526 adults in a large clinical trial of MA users they found the presence of psychiatric disorders post treatment was associated with more MA use post treatment. However, psychiatric disorders were only assessed at 3-year follow-up and the analyses did not show how changes in psychiatic symptoms were associated with changes in MA use over time.

In a separate analysis using the same dataset Glasner-Edwards et al[15] examined how measures of depression at different time points predicted MA use. Depressive symptoms declined significantly during treatment, particularly for those who abstained from MA. Although baseline assessment of depression prior to treatment predicted treatment adherence and reduced MA use at the end of treatment, there was no association between pre-treatment depression and post treatment outcomes at 3-year follow-up. In addition, measures of depression at the end of treatment did not predict outcome after treatment. Taken together, these findings suggest that MA treatment may initially help reduce depression and MA use, but those improvements do not persist three years after treament ends. No data reported how changes in psychiatric severity over time were associated with changes in drug use or problem severity.

The primary purpose of the current study was to examine how change in psychiatric severity during treatment (a 2-month period of time) was associated with change in MA use and severity of drug problems. Because our dataset also included 4- and 6- month follow up interviews, we also aimed to assess whether variable relationships remained consistent at follow up.

Methods

Sample

Study participants consisted of 217 individuals taking part in a study of Intensive Motivational Interviewing for MA dependence at an intensive outpatient treatment program located in Lafayette, CA, a suburb in the San Francisco Bay Area.

Participants were recruited onsite at the treatment program or through advertisements or postings. Inclusion criteria included being 18 years or older, meeting 12-month DSM IV criteria[1718] for MA dependence, and having the ability to read and understand English. Additionally, participants needed to provide contact information for follow-up interviews. Individuals who presented serious medical or psychiatric problems that were beyond the scope of services offered by the program were referred to other services.

Procedures

Individuals with MA dependence who were interested in participating in the study signed an informed consent at the baseline interview and were assigned to a one of two study conditions. The intervention condition consisted of an intensive, 9-session model of motivational interviewing (MI).[1920] The comparison condition included a standard single session of MI[21] along with eight sessions of nutrition education to achieve time and attention equivalence. Adherence to the two MI intervention manuals was monitored using the Yale Adherence and Competency Scale Nuro, et al.[22]

Individuals in both study conditions took part in the program's standard outpatient group treatment, which consisted of three cognitive behavioral group interventions per week. The intervention primarily emphasized craving management and is described in detail elsewhere.[23] Group sessions took place 3 times a week for up to 12 weeks, eight weeks of active treatment and four weeks of aftercare that was optional.

Previous analyses of these data showed significant longitudinal improvement on percent days abstinent (PDA) from MA for both study conditions.[16] The trajectories for participants in both conditions showed significant improvement between baseline and 2 months. Importantly, the improvemetns were maintained at 4 and 6 months. Although there were no differences between the control and comparison conditions in terms of improvement on substance use measures, we did find differences by psychiatric severity. Improvement on psychiatric severity, as measured by the Addiction Severity Index, was found in the intervention condition (nine sessions of motivational interviewing) but not the comparison condition (a single session of MI). In addition, the number of days participants reported exsperiencing psychiatric problems was significantly lower in the intervention condition.[16] For additional details about the outcomes of this clinical trial please see the paper published by Polcin et al. [16]

Because we saw significant improvement on measures of MA use between treatment entry and 2 months, our primary interest in the current paper was to assess whether changes in psychiatric severity during that same time period predicted improvements. However, we also conducted follow-up interviews at 4 and 6 months and were able to assess whether variable relationships were consistent over these longer periods of time. The research study provided treatment at no cost to the participants and payment of $30 for the baseline interview, and $50 for the 2-month interview. All study procedures were approved by the Public Health Institute institutional review board (IRB).

Measures

The instruments described below are divided into subheadings depicting their purpose in the study: baseline assessments, outcome measures, and predictor measures. Baseline measures were only administered at baseline. Other measures were administered at baseline, 2 months, 4 months and 6 months.

Baseline Assessments

Demographics included gender, age, marital status, highest educational attainment, and race/ethnicity.

DSM-IV Checklist for Drug and Alcohol Dependence was used at baseline to determine inclusion criteria of past 12-month MA dependence. Items are based on DSM IV diagnostic criteria.[17,18]

Outcome Measures

Percent Days Abstinent (PDA) was derived from the Timeline Follow-Back (TLFB) method of obtaining participant self-reported use of MA. The instrument yields a dichotomous yes or no response about MA use for each day assessed. Our study assesses the 60 day time periods between data collection time points. The primary time periods of interest collected the percent days abstinent from MA in the eight weeks prior to the baseline interview and the 8 weeks after the baseline interview. We also collected data at 4 and 6 months to assess whether associations seen in treatment persisted. The TLFB has been used extensively in a variety of drug and alcohol studies,[24] including NIDA funded Clinical Trials Network

studies of MI[25,26] and has shown strong test-retest reliability as well as construct validity using collateral reports and urine samples.

Addiction Severity Index – Lite (ASI) is a standardized, structured interview that assesses past 30 days problem severity for seven areas of functioning (medical, family, employment, legal, drugs, alcohol and legal). Problem severity algorithms were created on a scale of 0.0–1.0 with a higher score indicative of more problem severity.[27,28] The present study utilizes the measures of drug problem severity as outcome measures. The ASI drug severity scale asks the number of days (in the past 30) eight different classes of drugs were used, the number of days more than one substance was used, and the number of days the respondent experienced problems related to drug use. The drug severity scale also includes a 5-point scale measuring how troubled or bothered the respondent is by drug problems and the importance of receiving treatment. We used the ASI composite score for drug severity as an outcome measure as well as individual items, including the number of days of drug use, number of days respondents experienced drug problems, ratings of how troubled or bothered respondents were by drug problems, and how important they felt it was to receive treatment. Although we were primarily interested in assessing changes in drug problem severity during treatment (i.e., baseline to 2 months) we also tracked drug problems at 4- and 6-month follow-up.

Predictor Measures

The *ASI Psychiatric Severity scale* was used to assess overall psychiatric severity, which results in a composite score ranging from 0–1.0. This measure asked seven questions of a significant period in the past 30 days in which psychiatric problems were experienced (yes/no). These included depression, anxiety, hallucinations, concentration problems, violent behavior, thoughts of suicide, and attempted suicide. Additional questions in the composite measure asked about use of prescription medication for psychological/emotional problems, the number of days the respondent experienced psychological/emotional problems, how bothered respondents were by these problems (5-point scale) and the importance of receiving treatment for psychiatric problems (5-point scale). Because we were interested in the severity and manner in which psychological problems were experienced (i.e., overall severity as well as the number of psychiatric symptoms) we use both the overall composite score of psychiatric severity as well the number of psychiatric symptoms experienced during the past 30 days as predictor variables.

Analysis

Within-respondent baseline to two-month changes in psychiatric, substance use, and drug problem severity measures were tested first. To inform longitudinal modelling, correlations were examined between each of the psychiatric predictors and substance use outcomes, separately for baseline and the 2-month follow-up. Longitudinal modelling of substance use outcomes was carried out in the context of a within and between-individual effects model,[29,30] defined as: $y_{i,t} = \alpha_i + \beta_c \cdot x_{i,1} + \beta_L \cdot (x_{i,t} - x_{i,1}) + \Sigma\theta \cdot z_i + \varepsilon_{i,t}$ for t=1, 2. For this longitudinal model, the parameter β_L represents the within-person effect of changes in psychiatric severity (x) on changes in substance use outcomes (y) between baseline and the 2-month follow-up (as seen from differencing both the left and right hand side of the above

model (i.e., $(y_{i,2} - y_{i,1}) = \beta_L \cdot (x_{i,2} - x_{i,1}) + (\varepsilon_{i,2} - \varepsilon_{i,1})$ and is the reported parameter of primary interest. Such random effects models have been used widely and are implemented here using the xtmixed Stata function [31]. These models allow for unbalanced data due to loss at follow-up and account for correlations in errors resulting from repeated measures on the same individuals over time. Additional control variables (z) in the above model include gender, age, ethnicity, marital status, education, and treatment condition (MI1 vs. MI9). The same procedures were used to assess how variables were related over 4- and 6-month time periods.

Results

A majority of the sample was white (67%), 12% were Hispanic, and 9% were African American. Because we used stratified sampling the sample was about half women (49%). The mean age was 38. Of the 217 individuals who enter the study, baseline and 2-month interviews were completed by N=202 participants, representing a 2-month follow-up rate of 93%. Interviews conducted at 4- and 6-month follow-up represented follow-up rates over 90% and 87% of the participants completed all four research interviews.

On average, participants in both study conditions attended about 14 standard outpatient group sessions. Across the four time periods when participants were interviewed 30% to 36% indicated they had taken prescribed psychiatric medications during the past month. Attendance at any outside outpatient counseling sessions to address psychiatric issues ranged from 20% to 23% across the four data collection time points. For a more complete description of the sample, recruitment, and study procedures see Polcin et al. [16]

Estimated means and standard deviations for each of the key psychiatric severity and substance use outcome measures are shown in Table 1. Means are depicted for all of the data collection time points, but we were primarily interested in changes during the active treatment period between baseline and 2-months. Baseline scores on the ASI drug and psychiatric severity scales were roughly equivalent with other studies of individuals entering treatment in our geographic area (e.g., Polcin and Beattie[32]). Within-individual changes between baseline and 2 months indicated an overall reduction in psychiatric severity on the ASI psychiatric severity scale, but the level of improvement did not reach statistical significance. However, significant reductions were observed for all drug outcome measures, including reduced frequency of use and problems associated with use (i.e., higher MA PDA, lower drug ASI scores, fewer days used drugs, less troubled by and fewer number of days experiencing drug problems, lower importance of drug treatment). Improvements between baseline and 2 months for all study variables were maintained at 4 and 6 months and in some case slightly increased.

To inform longitudinal analyses that followed, baseline correlations between psychiatric and substance use outcomes were examined first. Correlations in Table 2 indicated that both psychiatric severity indicators were significantly correlated with ASI drug, number of days experiencing drug problems, how troubled the respondent was by drug problems, and the importance of drug treatment to the respondent.

Parameter estimates for the longitudinal model described above described changes between baseline and 2 months and are shown in Table 3. Due to the formulation of the longitudinal model estimated, these parameter estimates can be directly interpreted as the expected within-respondent change in outcomes associated with a 1-unit within-respondent reduction in the predictor. Results indicated that reductions in ASI psychiatric scores between baseline and the 2-month follow-up were associated with significant reductions in ASI drug scores, # days experiencing drug problems, degree to which participants were troubled or bothered by their drug use, and importance of receiving treatment for drug problems. However, reductions in ASI psychiatric scores were not associated with reductions in PDA from MA use or the number of days used drugs. A similar pattern of results were observed when considering the number psychiatric symptoms as the predictor.

Similar associations were found when we assessed associations from baseline to 4-months and baseline to 6 months (not shown). ASI psychiatric scores were associated with ASI drug scores at 4 months (Beta=.167, se=.044, p<.001) and 6 months (Beta=.239, se=.041, p<.001). When we examined how different items on the ASI drug scale were associated with psychiatric severity we found results consistent with the 2 month findings: changes in psychiatric severity predicted number of days experiencing drug problems, degree to which participants were troubled or bothered by their drug use, and importance of receiving treatment for drug problems. However, changes in psychiatric severity did not predict the number of days of drug use over the past 30 days. These findings were similar when we used number of psychiatric symptoms over the past 30 days as the predictor.

At 4 months there was no association between changes in psychiatric measures and changes in PDA from MA. However, at 6 months there was a significant relationship between the ASI psychiatric severity and PDA from MA (Beta= -.360, se=.158, p<.05). When we used number of psychiatric symptoms experienced over the past 30 as the predictor we found a trend (Beta=-038, se=0.22, p<.10).

Discussion

Studies targeting the impact of psychiatric problems on outcome have typically been limited to assessment of psychiatric severity at baseline.[11,12] Our design was different in that we studied how changes in psychiatric severity over a 2-month period were associated with changes in frequency of MA and other drug use and severity of problems experienced as a result of use. We also examined whether relationships among these variables continued at 4- and 6-month follow-up. The central finding was that changes in psychiatric severity between baseline and 2 months predicted changes in severity of drug problems but not frequency of MA and other drug use. This pattern continued at 4 months and for the most part at 6 months as well. Assessment of individual items on the ASI drug severity scale showed the association with drug severity was driven by participant responses to questions about how “troubled or bothered” they felt about their drug problems, number of days they experienced problems related to drug use and how important it was to receive treatment. In contrast, items assessing days of drug use over the past 30 days showed no relationship with psychiatric severity.

The exception to the predominant trend of psychiatric severity being associated with drug problem severity but not frequency of consumption was at 6 months, where psychiatric measures had associations with PDA from MA. However, the magnitude of these relationships was smaller than associations measuring how psychiatric measures were related to experiences and perceptions about drug use (e.g., how bother or troubled participants were by their drug use and how important it was to get treatment). Additional research is needed to determine if psychiatric severity increases its power to predict change in MA use at longer follow-up time points.

Our finding that psychiatric severity had disparate associations with frequency of drug use and level of distress associated with use is atypical. For example, Glasner-Edwards et al[14] reported that MA dependent persons with psychiatric disorders had higher frequency of drug use and more functional impairment. In an earlier analysis using the same dataset Glasner-Edwards et al[15] found baseline measures of depression predicted worse MA outcomes at discharge and higher level of depression before discharge was associated with more MA use during the same period of time.

One of the reasons our findings may have differed is that our analyses examined the impact of change in psychiatric severity on drug outcome over time, not simply how the presence or absence of psychiatric disorders was associated with drug outcome at a discrete time point.

Understanding the reasons for the associations found, particularly the discrepancy between drug use and level of distress while using, will require more research. However, it is not surprising that persons with higher psychiatric severity experience MA and other drug use as more distressing or troublesome than person with low psychiatric severity. MA use is known to cause significant exacerbation of psychiatric symptoms including depression, anxiety, and psychosis.[56] Participants in our sample who reported high psychiatric severity may have rated how troubled of bothered they were by their use largely in terms of exacerbation of psychiatric symptoms associated with drug use.

One potential explanation for our results is that MA and other drug users may be attempting to self-medicate psychiatric symptoms with counterproductive results. For persons with higher levels of psychiatric symptoms attempts to decrease their symptoms by using MA and other drugs might actually increase their symptoms. This might also help explain why frequency of use does not increase as psychiatric severity increases. The hoped for effects do not occur and the increase in distressing psychiatric symptoms might lead to reductions in frequency of use and an increased desire to seek treatment.

Limitations

There are a number of limitations that bear noting:

1. Study finding reflect associations over time between psychiatric severity and outcome and cannot be used to attribute causality.
2. Data were limited by geographic locality (the San Francisco Bay Area in Northern California) and diversity (e.g., 67% of the sample was white).

3. We are unclear why psychiatric measures predicted PDA from MA at 6 months but not previous time points. This is a finding in need of further research. It would be interesting to study whether there is a delayed effect that commences at 6 months and then increases.

4. Our study was limited to a few assessment instruments. It could be informative to use other measures assessing drug use, drug problems and psychiatric severity. Although the time line follow back for drug use has shown excellent psychometric properties for assessing time periods longer than two months, there can be some degree of error in participant recall.

Conclusion

Our findings suggest that treatment efforts targeted toward decreasing psychiatric symptoms might result in concurrent reductions in level of distress associated with use MA and other drug use but not frequency of use. Because our results tended to show limited support for the contention that decreasing psychiatric symptoms will decrease drug consumption, separate efforts specifically targeting consumption of MA and other drugs are needed. The current literature is filled with examples of how higher frequency and quantity of substance use is associated with more severe problems and personal distress. However, our findings suggest these related yet separate outcomes in some instances may have disparate correlates. More consideration in research studies should be given to the distinction between frequency of use and how use is experienced. Additional research is needed on ways that the social context of MA use might influence frequency of use, level of distress associated with use, and the disparate associations these two variables have with psychiatric severity.

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Table 1

Predictor and outcome descriptives.

	Baseline (n=202)		2-month (n=202)		4-month (n=195)		6-month (n=201)	
	mean	**sd**	**mean**	**sd**	**mean**	**sd**	**mean**	**sd**
Predictors								
ASI psychiatric	0.30	0.16	0.28	0.17	0.26	0.17	0.25	0.18
# psych symptoms	1.77	1.19	1.78	1.28	1.56	1.20	1.47	1.29
Outcomes								
PDA from MA use [c]	0.49	0.35	0.70	0.31	0.76	0.33	0.76	0.32
ASI drug [c]	0.23	0.09	0.18	0.10	0.16	0.10	0.16	0.10
# of days used drugs [c]	17.66	11.15	14.24	12.09	12.94	13.10	13.10	12.05
# of days experienced drug problems [c]	17.89	11.60	13.14	12.14	11.02	11.57	11.57	12.07
How troubled by drug problems [c]	3.05	1.14	2.33	1.50	2.20	1.48	2.14	1.56
Importance of drug treatment [c]	3.57	1.04	2.74	1.58	2.40	1.64	2.21	1.70

[c] $p < 0.05$, paired t-test significance between baseline and the 2-month follow-up interview The items assessing troubled by drug problems and importance of drug treatment were assessed on a 5-point Likert scale

Table 2

Correlations between psychiatric predictors and outcomes

		Baseline predictors	
		ASI Psychiatric	**# of psych symptoms**
Baseline outcomes	PDA from MA use	.05	−.02
	ASI drug	**.26** [c]	**.28** [c]
	# of days used drugs	.07	.10
	# of days experienced drug problems	**.29** [c]	**.29** [c]
	How troubled by drug problems	**.25** [c]	**.28** [c]
	Importance of drug treatment	**.19** [b]	**.20** [b]

[a] p<0.05;

[b] p<.01;

[c] p<.001

Table 3

Psychiatric predictors of outcome using fixed effect regression models~

	PDA from MA use		ASI Drug		# of days used drugs		# of days experienced drug problems		How troubled by drug problems		Importance of drug treatment	
	β	***se***	***β***	***se***	***β***	***se***	***β***	***se***	***β***	***se***	***β***	***se***
ASI psychiatric	−.10	.15	**.16** *c*	**.04**	8.16	5.04	**21.65**	**5.12**	**2.80** *c*	**0.58**	**2.64** *c*	**0.60**
# psych symptoms	−.01	.02	**.02** *c*	**.00**	1.24	.65	**2.62**	**.66**	**0.38** *c*	**0.07**	**0.30** *c*	**0.08**

~Models control for gender, ethnicity, marital status, education, age, and treatment condition

a p<0.05;

b p<.01;

c p<.001