Antisocial Personality and Depression Among Incarcerated Drug Treatment Participants

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Abstract

Purpose. The co-occurrence of antisocial personality (ASP) and depression among drug dependent individuals was examined in a sample of federal inmates participating in residential or outpatient drug and alcohol treatment to increase our understanding of the co-occurrence of theses disorders. **Methods.** We examined drug dependence patterns both by the number of drugs of dependence as well as by type of drug, and separately studied men and women. The Diagnostic Interview Schedule (DIS) was used to obtain DSM-III-R diagnostic information on a sample of 609 men and women participating in a multi-site drug treatment evaluation project. Logistic regression results are reported which compared lifetime rates of ASP and major depression by number of drugs of dependency for men and women. ASP and major depression diagnostic rates were also examined by type of drug dependency pattern among men. **Results.** We found that both the number of drugs as well as the type of drug(s) are related to prevalence patterns for both diagnoses. The high rates of ASP and major depression among specific subgroups of drug dependent inmates highlight the need for thorough psychiatric assessment and the tailoring of treatment programs to the issues associated with these diagnoses. **Implications.** Our results suggest that although there are similarities in comorbidity between men and women, the differences point to the need to study men and women separately.

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Background and Purpose

Much of the research in the area of psychiatric comorbidity has been an attempt to understand the extent of multiple diagnoses, offer more accurate diagnoses and provide better treatment environments. Although studies of psychiatric comorbidity have been conducted over the past several decades, these studies have been limited in scope, particularly regarding individuals with drug addiction. The role of comorbidity in understanding treatment seeking behavior and treatment regimen has recently received greater recognition in the substance abuse field (Onken et al., 1997; Reis, 1994). Most of the research on comorbidity among substance users has been limited to users of a particular drug type or to an undifferentiated group of substance abusers. The importance of examining patterns of comorbidity among different types of drug abusers has not yet been recognized, despite the fact that substance abusers represent a heterogeneous group.

Our understanding of comorbidity patterns among individuals who are substance dependent is particularly crucial within incarcerated populations. Substance abuse/dependence is the most commonly occurring psychiatric disorder in the general population as well as in incarcerated populations. Furthermore, the prevalence of substance abuse/dependence is higher in incarcerated populations than in the general population. The lifetime prevalence rate of substance abuse/dependence in the general population ranges between 15 and 18.1 % (Robins et al., 1984). In contrast, substance abuse disorders have been found to range between 49.2% (Collins et al., 1988) and 73.7% (Peters et al., 1998) among men in prison. Additionally, Abram (1990), in a study of jail detainees found lifetime prevalence rates of 49.1% for alcohol disorders and 31.1% for drug disorders. Penitentiary inmates were found to have even higher rates, with 66.9% having a lifetime diagnosis of alcohol abuse/dependence and 48.9% a drug abuse/dependence diagnosis (Cote and Hodgins, 1990). Limited information is available on prevalence rates among incarcerated women. Teplin et al. (1996) found that 70.2% of their sample of female jail detainees met the criteria for a lifetime diagnosis of substance abuse or dependence.

Two diagnoses are of particular concern in studying comorbidity patterns within an incarcerated substance using population: antisocial personality (ASP) and depression. The prevalence rates for these two diagnostic categories are higher in incarcerated populations than in the general population. In addition, previous research on comorbidity patterns among various populations has consistently found those with a substance use disorder to have higher rates of ASP and depression.

The prevalence of ASP within the general population is low, ranging between 2.1 and 3.3% (Robins et al., 1984). In contrast, among a sample of 1,149 male prison inmates, 28.7% had an ASP diagnosis (Collins et al., 1988). A comparison between a female general population sample and a sample of female jail detainees showed that for African American, Non-Hispanic White and Hispanic groups the prevalence of ASP ranged from 12.1% to 20.8%.

The prevalence of a lifetime diagnosis of major depression in the general population ranges between 3.7% and 6.7% (Robins et al., 1984). In a comparison of prevalence rates among men, the percentage with a lifetime diagnosis of major depression was twice as high in a jail sample than in a general population sample: 5.75% versus 3.15%, respectively (Teplin, 1990). Among non-incarcerated women, the prevalence of a lifetime diagnosis of major depression ranged between 6.8% and 12.8% across three racial and ethnic groups. The comparable figures for a sample of jail detainees ranged between 15.3% and 24.8% (Teplin et al., 1996).

The association of ASP and depression with substance use disorders has consistently been found in samples of the general population, hospitalized psychiatric patients, substance abusers seeking inpatient and outpatient treatment, as well as criminal offenders. Reiger et al. (1990) found that the highest mental disorder rate was among those with drug (other than alcohol) disorders, among whom 53% had another mental disorder. In a combined community and institutional sample 83.6 % of individuals with any substance abuse or dependence disorder had a lifetime diagnosis of ASP and 27.2% had a lifetime diagnosis of major depression (Reiger et al., 1990). When assessing a sample of hospitalized psychiatric patients, Wolf et al. (1988) found that over half had more than one diagnosis with combinations of alcoholism, antisocial personality, and drug dependence occurring at high frequencies.

Comorbidity research among individuals seeking treatment for drug or alcohol use has also exhibited high rates of major depression and ASP. The percentage of individuals seeking substance use treatment with a diagnosis of depression was 20% for major atypical depression (Mirin et al., 1988) and 24.3% for major depression (Ross et al., 1988). Nace et al. (1991) found 57% of substance abusers to also have a personality disorder and Ross et al. (1988) found that 46.9% had ASP.

Researchers have examined individuals who are addicted and seek treatment for specific drugs (although some individuals in these samples used multiple drugs). The majority of this research has involved individuals addicted to opioids. A review of the literature published before 1980 concluded that addicted heroin users were more likely to have psychopathic personality characteristics and to have greater levels of depression and anxiety than non-addicted heroin users (Craig, 1979). Since 1980, researchers have consistently found ASP and depression as two of the more commonly occurring diagnoses among opioid users. The prevalence of ASP among opiate users ranges between 23% and 73%. (Brooner et al., 1993; Brooner et al., 1997; Calsyn et al., 1996; Craig, 1988; Khantzian and Treece, 1985). The prevalence of depression is lower than that of ASP, ranging between 15.8% and 56% (Brooner et al., 1997; Khantzian and Treece, 1985; Rounsaville et al., 1982; Woody and Blaine, 1979). In addition, Brooner et al. (1997) found that among opioid abusers the primary comorbid diagnosis is ASP for men but depression for women.

Studies of individuals addicted to cocaine show similar comorbidity patterns with ASP and depression, but with varying prevalence rates. In one sample of persons addicted to cocaine and crack and who were seeking treatment, 21% met the criteria for ASP (Kleinman et al., 1990) whereas another sample found 7.7 percent meeting the criteria for ASP (Rounsaville et al., 1991). Kleinman et al. (1990) found that 47% of individuals addicted to cocaine/crack and in treatment were diagnosed with an Axis I depressive disorder. A comparison of persons addicted to cocaine with those addicted to opioids showed those addicted to cocaine as having lower rates of major depression and ASP (Rounsaville et al., 1991).

Research within the criminal justice system further delineates the extent of ASP and depression diagnoses among individuals with a substance use disorder. Among male jail

detainees, approximately two-thirds of those with a substance use disorder had a lifetime diagnosis of ASP and 6.5% of those with an alcohol disorder had a lifetime diagnosis of major depression as compared with 7.6% of those with a drug disorder (Abram, 1990). Cote and Hodgins (1990) found that the most frequently occurring combination of disorders was ASP, alcohol abuse/dependence and drug. Collins et al. (1988) found higher rates of alcohol and drug dependence among inmates with ASP. Only 23.7% of those with ASP did not have an alcohol or drug dependence diagnosis.

Comorbidity among substance dependent individuals, with the exception of one study (Flynn et al., 1996), has not been examined in light of the number of drugs of dependence nor the drug dependency pattern. (Flynn et al., 1996) classified a sample of male and female substance-dependent treatment clients into various types of drug dependency patterns. Rates of ASP were found to be highest among those persons dependent on heroin, cocaine and alcohol (60%) whereas persons dependent on heroin only had the lowest rate of ASP (27%). Those dependent on heroin only also had the lowest rate of depression (7%) and generalized anxiety (2%).

In summary, previous research consistently shows substance dependent individuals as having high rates of comorbidity for ASP and depression. As noted above, the majority of the research examines drug use in reference to one drug, such as, cocaine or heroin, ignoring multiple drug dependency. A recent National Institute on Drug Abuse workgroup recommended future research to examine the usefulness of polysubstance use diagnosis (Hasin et al., 1995). As suggested by Flynn et al. (1996) the comorbidity pattern of ASP and major depression may differ dramatically when looking at differing types of drug dependent individuals.

The primary purpose of this study is to identify the relationship of drug dependence patterns with the diagnoses of ASP and depression among incarcerated drug treatment participants. We seek to add to the understanding of this relationship by categorizing drug dependence patterns both by the number of drugs of dependence as well as the type of drug and by separately examining men and women.

We examine the relationship between drug dependence, and depression and ASP using a sample of federally incarcerated male and female offenders who had participated in drug and

alcohol treatment. Since there are no definitive guidelines on how best to classify the different types of drug dependent individuals, we categorized them in two different manners. Our first categorization looked at the number of drugs of dependency. The second categorization examined the type of drug dependency pattern. This latter strategy categorized individuals into eight different types of drug dependence patterns. These types are based upon three major drugs: alcohol, opiates, and cocaine. These drug categories correspond to those which the American Psychiatric Association (APA) has recently issued its first set of treatment guidelines because of both the public health importance of these drugs and the availability of a base of treatment research (American Psychiatric Association, 1995). In addition, previous research has found differences in comorbidity rates when contrasting individuals who abuse cocaine versus those who abuse opioids Rousanville et al. (1991) and much of previously cited research has also found differences between alcohol and other drug disorders.

We present the results separately by gender since we expect that comorbidity patterns for women may differ from those for men. As previously noted, the diagnoses of ASP and drug/alcohol dependence have been found to be more common among men than women in the general population. Conversely, depression has been shown to be more common among women than men (American Psychiatric Association, 1987; Croughan et al., 1982). We do not know, however, the extent to which the prevalence of these diagnoses in combination differs across gender, particularly in a drug dependent incarcerated population.

Method

Instruments

Two intake interviews were administered to all research subjects as part of a multi-site evaluation of federal prison-based residential drug treatment programs. These treatment programs consisted of either 1000-hour 12-month programs or 500-hour 9-month programs. These treatment programs were made available to all inmates with a history of substance use who did not have a mental health problem which precluded participation in the program. Some inmates only had outpatient treatment available at their facility. Treatment participation was voluntary in nature. The interviews were part of a battery of instruments used to obtain information on the

background characteristics as well as the psychological and cognitive characteristics of the research subjects. The first interview contained questions about a wide variety of background characteristics. In addition, at the outset of the project this interview contained questions from the alcohol and drug dependence modules of the Diagnostic Interview Schedule (DIS). The second interview consisted solely of the automated modules of the DIS for ASP and depression. Lay interviewers were provided training on the DIS interview by clinical psychologists. The DIS interview was developed under sponsorship of the National Institute of Mental Health to allow lay interviewers or clinicians to conduct diagnostic interviews and thus facilitate its large multi-site Epidemiological Catchment Area (ECA) study. Various studies have evaluated its reliability and validity (Helzer et al., 1985; Robins et al., 1981). The DIS interview has been used in various studies of the prevalence of psychiatric diagnoses in different populations (Abram, 1990; Collins et al., 1988; Cote and Hodgins, 1990; Ross et al., 1988; Teplin, 1990; Teplin et al., 1996). The DIS modules included algorithms which, using DSM-III-R criteria, provided lifetime prevalence rates for drug dependence, alcohol dependence, depression, and ASP diagnoses. Drug dependence diagnostic information was available for nine illicit drug categories: cocaine, crack, heroin, other opiates, barbiturates, stimulants, hallucinogens, marijuana, and inhalants.

Subjects

The sample included in the analyses consisted of a subset of the individuals followed by the multi-site drug treatment evaluation effort. This subset consisted of the treatment participants from 20 residential treatment and 4 outpatient prison programs who completed a version of the intake interview containing the DIS lifetime drug and alcohol dependence questions and also completed a second interview which contained DIS lifetime diagnoses for major depression and ASP. These individuals had participated in either a residential or outpatient substance abuse treatment program between October 1991 and October 1993. Initially, 968 men and 233 women were flagged as treatment research subjects by virtue of being admitted to treatment. However, 255 men and 66 women did not complete one or more interviews due to logistical issues in interview administration. In addition, seventy-three subjects (only 2 women) refused to provide informed consent and thus were not interviewed. Logistic regression analyses were conducted to

assess whether the respondents completing the interviews were significantly different from those who did not. The goodness-of-fit measures for the model predicting missing data indicated that the model did not fit the data. Thus, the results suggested no significant difference between those for whom data were available and those who were missed in the data collection process. Analysis of refusals was limited to men since only 2 women refused to be interviewed. The results indicated that blacks and Hispanics were more likely to refuse the interviews. The sample used in our analyses comprised 633 male inmates and 156 female inmates. Eighteen individuals were excluded from the analyses due to incomplete data.

Analyses and Results

Seventy-four percent of the male inmates and 91% of the female inmates met the criteria for dependence on one or more drugs as defined by DSM-III-R. We limited our analyses to individuals with a dependence diagnosis since there were only 19 individuals who had only an abuse diagnosis. We believe women in our sample had higher rates of dependency since most of the data on women were from one institution which had very stringent criteria for admission to the treatment program. This program, unlike some of the male treatment programs, did not accept women who did not meet the criteria for drug/alcohol dependence.

Among both male and female inmates, the prevalence of ASP and major depression was much lower for the drug treatment program participants who did not meet the DSM-III-R drug or alcohol dependence criteria. Thirty-eight percent of the male inmates dependent on one or more drugs had a diagnosis of ASP as compared with 13% of the males who were not dependent on any drug. Forty-three percent of the drug dependent women had a diagnosis of ASP as compared with 13% of the women who were not drug dependent.

Drug dependent inmates were also more likely to report depression. Seventeen percent of the drug dependent males had a lifetime diagnosis of depression compared with only 6% who did not report drug dependency. One-third of the female inmates who reported dependency had a diagnosis of depression compared with 15% of the non-dependent females.

Since we were examining the co-occurrence of drug dependency and other psychiatric diagnoses, only those inmates who were diagnosed as drug dependent are part of further analyses

— 467 male and 142 female inmates.

Number of Drugs of Dependency

Table 1 shows the pattern of dependency for males and females when we categorize by the total number of drugs of dependency. Although the maximum number of drugs of dependency was twelve, we grouped all individuals with five or more drugs of dependency into one group. Without grouping together those dependent on many drugs (five or more), we would have categories with very small sample sizes. Only 13% of the women and 9% of the men were dependent on six or more drugs. In addition, the large number of resulting zero cells when cross classifying number of drugs of dependency with the ASP and depression would make logistic regression analyses problematic.

Table 1 about here

There was a significant difference between men and women in the number of drugs of dependency ($p < .001$). Approximately 80% of the women reported being dependent on two or more drugs as compared with 63% of the men. In most of the multiple drug dependent categories, a greater percentage of women reported dependence. For example, twenty-one percent of the women and 13% of the men were dependent on five or more drugs.

Table 1 also shows the relationship of ASP and depression to the number of drugs of dependency, including alcohol. Among both men and women, it is clear that as the number of drugs of dependency increased so did the likelihood of an ASP diagnosis. Twenty-seven percent of the men dependent on one drug only had a diagnosis of ASP compared with 61% of those dependent on five or more drugs. Eighteen percent of the women dependent on one drug only had a diagnosis of ASP compared with 73% of the women dependent on five or more drugs.

The pattern of comorbidity for depression differs somewhat from that found for ASP. Among both men and women the relationship was not linear. For both genders we found that the percentage of individuals with a lifetime diagnosis of depression was smaller for those dependent on three drugs than for those dependent on two drugs. In addition, both men and women with five or more drugs of dependence were more likely to have a lifetime diagnosis of depression than those with only one drug of dependence (50% versus 29%, respectively, for women, and 34%

versus 10%, respectively, for men). We note that the results for women must be interpreted with caution due to the small sample size.

Substance Dependence Patterns

Our second method of categorizing our drug dependent sample yielded eight different types of drug dependence patterns. These types were created using the various combinations of the three major drugs: alcohol, opiates and cocaine. Drugs other than alcohol, opiates and cocaine were grouped into the "other" category. Individuals were categorized by the drug combination(s) for which they met the criteria of dependence. Dependency for "other" drugs was ignored when an individual met the criteria for at least one of the three major drug categories. Thus, for example, the opiate only group could include individuals who might also have been dependent on drugs other than alcohol and cocaine, such as, marijuana or barbiturates.

Data are presented for male inmates only because for many of the drug category types the female sample was too small to allow meaningful discussion. In addition, the small female sample size resulted in zero cells which precluded inclusion of all cases in a logistic regression analysis.

Table 2 presents the drug dependency patterns for male inmates. Ninety-four percent of the drug dependent male inmates were dependent on at least one of the three major drugs of interest, that is, cocaine, alcohol or opiates. The highest rates of dependency were found for alcohol only, 25%, and cocaine and alcohol, 24%. The lowest rate of dependency among the drug categories was found to be for opiates and alcohol, 3%.

Table 2 about here

Lifetime rates of ASP and depression varied by type of drug dependence pattern (see Table 2). Overall, more than one-quarter of the men in each of the drug categories had a diagnosis of ASP. The highest rates of ASP occurred for those dependent on opiates and alcohol (69%) while the lowest rate was found for the alcohol only group (29%).

Male inmates who were dependent on opiates and alcohol had the highest rate of depression, 38%, followed by those dependent on cocaine and opiates, 36%. Those inmates dependent on opiates only had the lowest rate of depression, 8%. We note that in comparing ASP with depression among men, the opiate and alcohol groups had the highest likelihood for

both these diagnoses.

Logistic Regression Analyses

Logistic regression analyses were conducted to clarify the pattern of comorbidity by the number of drugs of dependency. The logistic regression analyses included demographic characteristics -- race, ethnicity, education level and age -- as control variables. Age and level of education were continuous variables. Effects vector coding was used for nominal and ordinal level variables: number of drugs of dependency, race, and ethnicity. In effects vector coding each coefficient represents the contrast of that category with all categories in the sample. Thus, effects vector coding provides us with the advantage of being able to identify which drug dependency patterns have higher *or* lower comorbidity rates when contrasted with *all* drug dependency patterns. In addition, the use of effects vector coding avoids the problem of choosing a referent group with the lowest rate of ASP or depression since this referent group is not the same for men and women.

The logistic regression results for ASP and number of drugs of dependence are presented for men and women in Table 3. Two women of 'other' race were deleted from both logistic regression analyses because of zero cells. Among male inmates, the coefficients for dependency on one drug only and for dependency on five or more drugs were significant, albeit in opposite directions. Men who were dependent on one drug only were 52% less likely to have an ASP then all drug dependent men on average. On the other hand, males dependent on five or more drugs were 107% more likely to be diagnosed with ASP. None of the background factors were found to be related to ASP.

Table 3 about here

Findings for female inmates were quite similar, with significant coefficients for one drug and for five or more drugs of dependency. Additionally, among women we also found the coefficient for two drugs of dependence significant. Women dependent on one drug as well as those dependent on two drugs were significantly less likely to have a diagnosis of ASP, 75% and 53%, respectively. Similar to the men, women dependent on five or more drugs were more than 353% more likely to be diagnosed with ASP. As with the men, no background variables were

found to be significantly related to ASP. The model chi-square statistic for both men and women was significant (p=.0001) thus indicating that the model fits the data. In addition, the other goodness-of-fit measures indicate the model is appropriate.

Table 4 shows the findings for the logistic regression for depression and the number of drugs of dependency. As with ASP, there is a significant relationship between number of drugs of dependency and depression. For men, being dependent on one drug reduced the likelihood of a diagnosis of depression by 46%. However, men dependent on five or more drugs were 116% more likely to be diagnosed with depression. The chi-square statistics for the model was significant (p=.014) indicating the model fits the data. In contrast, the model for women did not have a significant chi-square statistic (p=.171). Thus, for women, even after controlling for demographic characteristics, we were unable to identify any significant comorbidity pattern between number of drugs of dependency and depression.

Table 4 about here

The logistic regression analyses examining the relationship between type of drug(s) of dependence and their relationship to both ASP and depression among men once again used demographic characteristics as control variables.

Table 5 shows the logistic regression results for ASP and drug dependency patterns. Male inmates who reported being dependent on opiates and alcohol were over 200% more likely to be diagnosed as ASP. The opposite was found for those inmates dependent on alcohol only. That is, the alcohol only group was 42% less likely to meet the criteria for ASP. No other drug dependency patterns were significantly related to the diagnosis of ASP. Among the demographic characteristics, only ethnicity was found to be significant. Hispanics were 30% less likely to be diagnosed with ASP than male subjects on average.

Table 5 about here

Logistic regression results for depression and type of drug dependency are also reported in Table 5. Among men, the odds of depression were greater among the opiate/alcohol and cocaine/opiate drug dependency groups. Male inmates who reported dependency on opiates and alcohol were 193% more likely to meet the criteria for lifetime depression than were male inmates

on average. As previously noted, this group was also more likely to be diagnosed with ASP. Similarly, male inmates dependent on opiates and cocaine were 149% more likely to have a diagnosis of depression. None of the demographic variables were significantly related to the diagnosis of depression.

The chi-square statistic was significant in both models of ASP and depression for men (p=.014 and .006, respectively). However, the Hosmer-Lemeshow goodness-of-fit statistics showed that the depression model for men (p=.04) did not fit the data well.

Discussion

Consistent with previous research we found a high prevalence of lifetime diagnoses of ASP and major depression among individuals who are substance dependent. We also note that unlike findings in the general population we did not find the prevalence of ASP to be lower among substance dependent men than among women. However, consistent with other general findings, we did find the prevalence of depression to be lower among incarcerated women than among incarcerated men who are substance dependent. Comparisons to studies of incarcerated populations is limited due to the lack of comparable studies. Nonetheless, we highlight the fact that the rate of ASP is lower but the rate of depression is higher than found among male jail detainees who have a drug disorder (Cote and Hodgins, 1990).

ASP and drug dependence comorbidity patterns were quite similar for men and women when we categorized drug dependent individuals by the number of drugs of dependency. Among both male and female inmates, those who reported only one drug of dependency were less likely to have an ASP diagnosis and those with five or more drugs were more likely to meet the criteria for ASP. Women differed from men in that they also had a lower likelihood of ASP when they were dependent on two drugs.

The logistic regression findings for depression showed differences between men and women. Among men there was an increased likelihood of a lifetime diagnosis of depression when they had five or more drugs of dependency. In addition, among men, those with only one drug of dependency had decreased odds of depression. In contrast, the chi-square statistic for

women indicated the predictive model was not significant.

Additional analyses of comorbidity among male inmates revealed that the rates of depression and ASP differed by the type of drug(s) dependence patterns. Male inmates dependent on opiates and alcohol were more likely to be diagnosed with ASP as well as depression. Additionally, male inmates dependent on cocaine and opiates were more likely to meet the criteria for a diagnosis of depression and male inmates dependent on alcohol only were less likely to have ASP.

Our findings of comorbidity by type of drug dependency pattern differ somewhat from those of Flynn et al. (1996). They found all three drug dependency groups involving cocaine and one or two other drugs (i.e., alcohol and/or heroin) as having a higher likelihood of ASP. Our findings, however, indicated that only those men in the opiate/alcohol dependency group had an increased likelihood of ASP. In addition, unlike Flynn et al. (1996), we found men dependent on alcohol only to have decreased odds of ASP.

When examining depression, Flynn et al. (1996) found the alcohol only group and all three groups dependent on cocaine and one or more of the other major drugs more likely to have a diagnosis of depression. We did not find alcohol only to be significantly related to depression. Rather, we found two of the opiate groups to have higher rates of depression: those dependent on opiates and alcohol and those dependent on cocaine and opiates.

The differences in results may be a function of differences in the analytic procedures. Whereas Flynn et al. (1996) combined men and women together in the same logistic regression equation, we conducted separate analyses for each gender. In addition, our sample consisted of incarcerated drug dependent individuals whereas their sample consisted of non-incarcerated drug treatment clients. Lastly, their analyses used the heroin only dependency group as a reference group since this group had the lowest comorbidity rate across the other diagnostic categories of interest: ASP, depression and anxiety. We used effects vectors which compare each group to the mean value.

Our examination of comorbidity among federally incarcerated inmates showed that the number and type of drug(s) of dependency are directly related to the likelihood of being

diagnosed with other psychiatric diagnoses, specifically, ASP and depression. The finding of significant patterns of comorbidity among men using both methods of classifying drug dependent individuals points to the complexity of understanding comorbidity. Our findings also point to the need for understanding the differences between male and female drug dependent individuals. Although there are similarities, we found notable gender differences, at least when categorizing individuals by the number of drugs of dependency. Analyses which use gender as a control factor cannot adequately identify gender differences without the inclusion of many interaction terms. The lack of fit of the model of depression by number of drugs for women and the inadequate Hosmer-Lemeshow statistic for the depression model by type of drug dependency among men suggests the need to incorporate other factors in future comorbidity studies addressing the diagnosis of depression.

Although our research underscores the varying rates of comorbidity among different types of substance dependent individuals, we need to explore how the patterns of comorbidity affect entry into treatment and treatment retention.

Consistent with previous research, our results clearly demonstrate that drug treatment clients often come to treatment with multiple diagnoses. However, we do not know the extent to which these rates of comorbidity may reflect characteristics only of those substance abusers who seek treatment. A comparison of comorbidity patterns between the treatment seeking population and those who did not seek treatment will help us address the question of whether comorbidity patterns are specific to the treatment population or are generalizable to the population of incarcerated drug dependent individuals.

Future research is needed to determine the effects of comorbidity on treatment retention. Previous research on treatment retention has focused on demographic variables and client motivation (DeLeon et al., 1994; Hser, 1997; Simpson and Joe, 1993). However, individuals with dependence on multiple substances may require different methods to keep individuals engaged in the treatment process and may require “different treatment services during different phases of treatment” (Reis, 1994). Information on type of substance abuser, type of treatment, and treatment content will help us better identify when and how comorbid disorders such as

depression and ASP are prognostic indicators for treatment.

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Table 1

Antisocial Personality and Depression by Number of Drugs of Dependency: Male and Female Federal Inmates

	MEN				WOMEN			
# Drugs of Dependency	N	%	% with ASP	% with Depression	N	%	% with ASP	% with Depression
1	174	37.3%*	27.0%	9.7%	28	19.7%	17.8%	28.6%
2	125	26.8%	34.4%	18.4%	36	25.4%	27.8%	36.1%
3	67	14.3%	43.3%	11.9%	30	21.1%	43.3%	16.7%
4	39	11.3%	51.3%	23.1%	18	12.7%	61.1%	27.8%
5 or more	62	13.3%	61.3%	33.8%	30	21.2%	73.3%	50.0%
Total	467	100.0%	37.9%	16.7%	142	100.0%	43.0%	32.4%

* P^2 (4, N=609) =19.944, p < .001

Table 2

Antisocial Personality and Depression by Type of Drug Dependency Pattern: Male Federal Inmate

Substance Dependence Pattern	N	%	% with ASP	% with Depression
Alcohol Dependence Only	118	25.3%	28.8%	13.6%
Opiate Dependence Only	25	5.3%	36.0%	8.0%
Opiate & Alcohol Dependence	13	2.8%	69.2%	38.5%
Cocaine Dependence Only	90	19.3%	33.3%	11.1%
Cocaine & Alcohol Dependence	110	23.5%	42.7%	14.5%
Cocaine & Opiate Dependence	33	7.1%	36.4%	36.4%
Cocaine & Opiate & Alcohol Dependence	49	10.4%	53.1%	28.6%
Dependence on Other Drugs	29	6.2%	34.5%	10.3%
Total	467	100.0%	37.9%	16.7%

Table 3

Logistic Regression: Antisocial Personality by Number of Drugs of Dependency and Demographic Characteristics: Male and Female Federal Inmates

	Men		Women	
	b	Odds ratio	b	Odds ratio
Demographic Characteristics				
Intercept	.807		1.373	
White	.119	1.127	-.203	.816
Black	.128	1.137	.203	1.226
Other Race	-.247	.781	N/A	N/A
Hispanic	-.247	.781	.207	1.230
Non-Hispanic	.247	1.281	-.207	.813
Age	-.011	.989	-.015	.985
Level of Education	-.078	.925	-.080	.923
# of Drugs of Dependency				
1	-.724**	.485	-1.372**	.254
2	-.343	.710	-.759*	.468
3	-.011	.989	-.161	.851
4	.349	1.417	.780	2.181
5 or more	.730**	2.075	1.512**	4.536
X^2/df	34.2 /9 (p=000)		29.0 / 8 (p=.000)	
Concordant Pairs	65.2%		75.9%	
Somer's D	.309		.520	
Hosmer- Lemeshow Goodness of Fit	2.74 with 8 DF (p=.950)		6.86 with 8 DF (p=.552)	

* p<.05 **p<.01

Table 4

Logistic Regression: Depression by Number of Drugs of Dependency and Demographic Characteristics: Male and Female Federal Inmates

	Men		Women	
	b	Odds ratio	b	Odds ratio
Demographic Characterisitcs				
Intercept	-2.727		-1.899	
White	.201	1.223	.152	1.164
Black	-.253	.777	-.152	.859
Other Race	.052	1.053	N/A	N/A
Hispanic	-.073	.930	.325	1.384
Non-Hispanic	.073	1.075	-.325	.723
Age	-.004	.996	.021	1.021
Level of Education	.096	1.100	.057	1.059
# Drugs of Dependency				
1	-.619*	.539	-.171	.843
2	.063	1.066	.271	1.312
3	-.463	.629	-.796	.451
4	.247	1.280	-.123	.884
5 or more	.771**	2.162	.818*	2.267
X^2/df	24.6 /9 (p=.003)		11.5 / 8 (p=.171)	
Concordant Pairs	66.5%		66.7%	
Somer's D	.336		.337	
Hosmer- Lemeshow Goodness of Fit	9.50 with 8 DF (p=.302)		7.47 with 8 DF (p=.486)	

* p<.05 **p<.01

Table 5

Logistic Regression: Antisocial Personality and Depression Among Men

	Antisocial Personality		Depresssion	
	b	Odds ratio	b	Odds ratio
Demographic Characteristics				
Intercept	.717		-2.566	
White	.171	1.187	.182	1.200
Black	-.031	.969	-.348	.706
Other Race	-.140	.869	.165	1.180
Hispanic	-.352*	.703	-.106	.899
Non-Hispanic	.352*	1.422	.106	1 .112
Age	-.018	.982	-.012	.988
Level of Education	-.063	.939	.111	1.117
Drug Dependency Pattern				
Alcohol Dependence Only	-.555*	.575	-.341	.711
Opiate Dependence Only	-.170	.844	-.707	.493
Opiate & Alcohol Dependence	1.150*	3.158	1.075*	2.930
Cocaine Dependence Only	-.370	.691	-.505	.603
Cocaine & Alcohol Dependence	.068	1.071	-.297	.743
Cocaine & Opiate Dependence	-.246	.782	.913**	2.491
Cocaine &Opiate & Alcohol Dependence	.452	1.571	.512	1.668
Other Drug Dependence	-.330	.719	-.649	.522
X^2/df	25.2 / 12 (p=.014)		27.5 / 12 (p=.006)	
Concordant Pairs	62.7%		68.6%	
Somer's D	.258		.380	
Hosmer- Lemeshow Goodness of Fit	3.37 with 8 DF (p=.908)		16.14 with 8 DF (p=.040)	

* p<.05 **p<.01

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