Gender differences in substance abuse treatment and barriers to care among persons with substance use disorders with and without comorbid major depression

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Abstract

Objectives—To compare substance use disorders (SUD) treatment patterns and barriers to such treatment among men and women with SUD with and without comorbid major depressive episodes (MDE) in a community sample.

Methods—Using data from adult participants in the National Survey on Drug Use and Health 2005-2010, we investigated differences by gender in the association of MDE comorbidity with SUD on patterns of, perceived unmet need for, and the perceived barriers to SUD treatments.

Results—Compared to participants with SUD without MDE, both men and women with comorbid SUD and MDE were more likely to use SUD services or to report an unmet need for such treatment. Gender modified the association of comorbidity and treatment patterns: males with MDE comorbidity had a greater likelihood of emergency room visits and use of inpatient services than females. Barriers to substance treatment were remarkably similar for males and females in both the SUD without MDE, and with MDE groups, with attitudinal factors being the most common barriers.

Conclusions—Comorbidity with MDE appears to be an important predictor of service utilization and perceived need for SUD treatment in both men and women. The association of comorbidity with the use of some types of services, however, appears to vary according to gender. The findings have implications for the design of gender-specific SUD treatment programs.

Keywords

sex/gender difference; substance abuse; comorbidity; substance treatment; treatment barrier

Men and women differ with regard to patterns of substance use disorders (SUD) (Green, 2006), physiological responses to substances (Wasilow-Mueller and Erickson, 2001),

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psychiatric comorbidities (Zilberman et al., 2003), and barriers to SUD treatment (Brady, 2005). Differences in treatment-utilization (i.e., contact with health professionals) are especially of concern as they point to potential problems in access to SUD treatment services. In prior research, women have been found to be consistently less likely to utilize treatment for SUD (Dawson, 1996; Green, 2006). Also, some reports indicate that women are more likely than men to encounter multiple barriers to treatment, including economic barriers, stigma, and difficulty attending treatment visits due to family obligations (Brady and Randall, 1999; Brady, 2005).

In addition to gender, psychiatric comorbidity, which is commonly associated with SUD (Grant et al., 2004; Regier et al., 1990), has been shown to impact service utilization and perceived unmet need for care (Harris and Edlund, 2005; Wu et al., 1999). Prior research indicates that individuals with comorbid psychiatric and SUD are more likely than those with either disorder alone to receive professional help (Harris and Edlund, 2005; Wu et al., 1999) and to report an unmet need for mental health care (Sareen et al., 2007; Urbanoski et al., 2008). While the main effects of gender and comorbidity on service utilization and perception of unmet need for SUD treatments have been well characterized, little is known about any potential moderating effect of gender on the association of comorbidity with SUD service utilization.

Examining the moderating effect of gender is especially of interest as past research indicated that women have higher rates of psychiatric comorbidity compared to men (Compton et al., 2000; Zilberman et al., 2003). Furthermore, psychiatric comorbidity may have different implications for SUD treatment outcomes as a function of gender (Brady, 2005; Green, 2006).

In order to examine whether gender has an impact on the relationship between major depressive episode (MDE) comorbidity, on the one hand, and SUD service utilization and perceived unmet need, on the other hand, in this report we used data from the U.S. National Survey on Drug Use and Health (NSDUH) to examine the moderating effects of gender on the association of comorbidity and service utilization. Furthermore, as gender differences in barriers to treatments would have important implications for the design of services and outreach programs, we also examined variations according to gender in the association of MDE comorbidity with SUD treatment barriers.

We aimed to answer the following three specific questions: First, are men and women with comorbid SUD and major depressive episodes (MDE) more likely to use services or use different types of services compared to those with a SUD without MDE? Second, do the levels of perceived unmet need and barriers to substance abuse treatment differ for persons with a comorbid SUD and MDE vs. those who have SUD without MDE? Third, does gender moderate the comorbidity-service utilization relationship or comorbidity-barrier relationship? Based on some past research (Brady, 2005; Green, 2006; Green et al., 2002), we hypothesized that these relationships would differ for men relative to women. The analyses focused on major depressive episodes (MDE) which are highly prevalent, frequently co-occur with substance use (Kessler et al., 1997; Regier et al., 1990), and are associated with adverse outcomes including suicide, functional impairment and development of chronic health conditions (Katon, 2003; Vos et al., 2004). Furthermore, MDE is the only psychiatric health condition fully assessed in the NSDUH, and is commonly comorbid with other psychiatric disorders (Kessler et al., 1997; Moffitt et al., 2007).

METHODS

Sample

Data were drawn from the public use data files of NSDUH for the years 2005 to 2010 (total n=336,003). The design and procedures of NSDUH are described in detail elsewhere (SAMHSA, 2006, 2007, 2008, 2009b, 2010, 2011). Briefly, NSDUH interviews household residents 12 years old and older in all 50 states and the District of Columbia (response rate range=73-76%). In our analyses, we restricted the sample to participants 18 years old and older (n= 227,123). The analyses of barriers were limited to 1,259 participants with SUD who reported an unmet need for SUD treatment.

Survey items were administered by computer-assisted personal interviewing (CAPI) for basic demographic information and audio computer-assisted self-interviewing (ACASI) for most other questions. Use of ACASI was designed to provide respondents with more private and confidential means of responding to questions and to increase the level of valid reporting of illegal drug use and other sensitive behaviors.

Assessments

Substance use disorders (SUD) were assessed dichotomously using structured interview designed to operationalize Diagnostic and Statistical Manual of Mental Disorders–IV criteria for substance abuse (role interference, hazardous use, problems with the law, and relationship problems) or dependence (tolerance, withdrawal, taking larger amounts or taking them for longer periods, inability to cut down, time spent using the substance, giving up activities, and continued use despite problems) in the past year (American Psychiatric Association, 1994). Substance use disorders included alcohol and non-alcohol drug abuse and/or dependence. Non-alcohol drugs included marijuana, crack/cocaine, heroin, hallucinogens, inhalants, pain relievers, tranquilizers, stimulants and sedatives.

Major depressive episode (MDE) was also ascertained using a structured interview based on the DSM-IV criteria met in the past 12-months (APA, 1994). The diagnostic assessment was modeled after the Composite International Diagnostic Interview (CIDI) as implemented in the National Co-morbidity Survey-Replication (NCS-R) study (Kessler et al., 2003). Minor revisions were made to the NCS-R questions, primarily to reduce its length and modify the questions for the format used in NSDUH (SAMHSA, 2009a). The questions regarding MDE specifically referred to "the worst or most recent period of time when the respondent experienced symptoms". Specification of other psychopathology was not included in the NSDUH.

Substance use disorder services were assessed by asking participants whether they received any SUD treatment in the past 12 months, and among those who reported any service utilization whether the type of service was inpatient in a hospital, inpatient in a rehabilitation center, outpatient in a rehabilitation center, outpatient in a medical center, in an emergency room, in a private doctor's office, in a prison or jail, or at a self-help group for alcohol or drug use. As noted, service utilization was operationalized as any contact with these services.

Perceived unmet need for substance use disorder treatment was defined as needing drug or alcohol treatment in the past year, but not receiving such care. A positive response to this question was rated as a perceived unmet need for SUD treatment.

Barriers to substance use disorder treatment were assessed by asking participants who reported an unmet need for SUD treatment about the reasons for not receiving the needed care in the past 12 months. The participants were asked to choose the reasons from a list

categorized into four groups: financial reasons, perceived stigma, attitudinal reasons, and structural reasons.

Socio-demographic variables included in our analyses were gender, age (18-25, 26-34, 35-50, 50 or more), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), marital status (married, divorced/separated, never married), employment status (employed full-time or part-time, unemployed, not in labor force), educational attainment (less than high school, high school, college and above), annual household income (less than $19,999, $20,000-$34,999, $35,000-$69,999, $70,000 or more), insurance status (no insurance, private health insurance, Medicare, Medicaid/State, Champus/Military, other), and population density in the participant's area of residence (metropolitan, suburban, rural).

Data Analysis

Adult participants with SUD were divided into the two groups of participants with past-year SUD with MDE comorbidity and those without such comorbidity. Next, these two groups were stratified by gender and compared with regard to other socio-demographic characteristics, SUD service utilization patterns, perceived unmet need for SUD treatment, and perceived reasons for not using needed SUD treatment (barriers). We used a series of bi-variable and multivariable binary logistic regression models using the SUD without MDE participants as the reference group. The multivariable models adjusted for age, race/ethnicity, education, marital status, employment status, household income, type of health insurance, and population density. In order to examine whether gender modified the association between MDE comorbidity and SUD service utilization we entered interaction terms of gender*MDE comorbidity into models predicting service utilization. Data for males and females were combined for these analyses. Similar interaction analyses were conducted to assess the moderating effect of gender on the association of MDE and barriers. Taylor series linearization methods as implemented in Stata 12.0 (StataCorp, 2011) were used to take account of the survey weights, stratification and clustering. All percentages reported are weighted by survey weights. A p-value <.05 was used.

RESULTS

Prevalence and socio-demographic correlates (Table 1)

The NSDUH 2005-2010 adult participants (n=227,123) were categorized into two groups: SUD without MDE (n=27,359, 7.5%) and SUD with MDE (n=5,557, 1.5%). Among the SUD without MDE group, a total of 17,776 (70.1%) were male and 9,583 (29.9%) female. Among those with SUD with MDE, 2,269 (48.4%) were male and 3,288 (51.6%) female.

Compared to males in the SUD without MDE group, males with SUD with MDE were more likely to be older, single or divorced/separated, to have a family income less than $19,999, not to be in the labor force, and to be covered by Champus/Military insurance (Table 1). The socio-demographic profiles for females with and without MDE comorbidity were different from males. For example, there was no difference in educational attainment between the SUD without MDE and SUD with MDE males, while females with SUD with MDE were more likely to have achieved an education level of high school or greater. Also, females with SUD with MDE had few differences in insurance type compared to the SUD without MDE group, in contrast to the differences in insurance types for males.

Comorbidity with MDE was associated with somewhat different alcohol or drug use disorder profiles in females compared to males. Females with SUD with MDE were less likely to have alcohol abuse or dependence compared to females in the SUD without MDE group. Males with SUD with MDE were less likely to have alcohol abuse compared to males in the SUD without MDE group. In addition, females with SUD with MDE were

twice as likely to have drug dependence, while no such difference was found among males. For both genders, participants with SUD with MDE were more likely to report using prescription drugs: pain relievers, tranquilizers, stimulants, and sedatives.

Substance use disorder service utilization and perceived unmet needs (Table 2)

Participants with SUD and comorbid MDE were more likely to receive substance treatment regardless of gender, with the exception of substance treatment in jail/prison. These associations remained statistically significant even after adjusting for other socio-demographic characteristics.

For both genders, participants with SUD with MDE were more likely than those without MDE to report a perceived unmet need for substance treatment. Whereas merely 4.1% of male and 3.8% of female participants in the SUD without MDE group reported perceiving an unmet need for SUD treatment, 13.6% of male and 9.5% of female participants with SUD and comorbid MDE reported a perceived unmet need. Differences for perceived unmet needs between the SUD groups persisted in both genders in multivariable analyses (Male SUD with MDE, aOR= 2.75, p<0.001; female SUD with MDE, aOR=2.15, p=<0.001).

Analyses of the interaction of gender and MDE comorbidity yielded significant results in the use of hospital overnight services (adjusted Wald test F=4.90, df=1, 60, p=0.031) and use of emergency rooms (F=9.18, df=1, 60, p=0.004), suggesting that MDE comorbidity was associated with greater use of these two types of services among males compared to females. Gender was not a significant modifier in the other analyses for service utilization patterns or perceived unmet need for SUD treatment (Table 2).

Treatment barriers for substance use service (Table 3)

Reasons for not using substance treatment were remarkably similar across the SUD groups for both genders. After adjusting for socio-demographic characteristics, lack of insurance coverage was a more commonly reported treatment barrier among males with SUD with MDE compared to those without MDE, but this was not the case for females. None of the interaction terms of gender with comorbidity were statistically significant (Table 3). The most common single treatment barrier across the four groups (i.e., males and females with SUD with MDE and SUD without MDE), was not being ready to stop using. The second leading treatment barrier was inability to afford cost of treatment. In males, financial barriers stood out as a more common group of barriers among those with SUD and comorbid MDE compared to the SUD without MDE group (aOR= 1.97, p<0.05). There were few differences between groups with regard to perceptions of stigma, attitudes toward treatment, and structural reasons.

DISCUSSION

There were three main findings in this study. First, both males and females with comorbid past-year SUD and MDE in this community sample had higher rates of SUD service utilization compared to individuals in the SUD without MDE group. This finding is consistent with prior research indicating that psychiatric comorbidity with SUD is associated with increased use of substance treatment services (Harris and Edlund, 2005). In the National Comorbidity Study, individuals with comorbid psychiatric disorders and SUD had more than twice of the frequency of receiving SUD treatment compared to those with SUD alone (Mojtabai et al., 2002). Our findings further indicate that the association holds for both genders. There are a number of possible explanations for this observation, including the possibility that there is a greater severity of SUD when it is associated with a comorbid psychiatric disorder (Hanna and Grant, 1997). It is also possible that the use of mental health

services because of MDE may lead to increased access to and use of SUD treatment services through direct referral to SUD treatment services by psychiatric care providers. Another possibility is that individuals who use SUD treatments are simply more aware of their mood symptoms and more likely to report them.

Second, gender appear to play a role as a moderator for receiving specific types of SUD treatments among individuals with comorbid disorders. In this study, male participants with comorbid MDE were especially more likely than females to be hospitalized or to use emergency room services for SUD treatment. This may in part relate to medical conditions associated with SUD evaluated in these settings (e.g., injuries evaluated in the emergency room). This finding is consistent with a report from psychiatric emergency room visits, which found that individuals with a substance-induced disorder were more likely to be males (Szuster et al., 1990). Gender differences in the type and quantity of substances used, in the severity of the SUD, or in attitudes toward treatment utilization may also partly explain these differences.

Third, we found remarkable similarity, with few exceptions, in the profiles of barriers to substance abuse care across the SUD with MDE and the SUD without MDE groups among the two genders. One exception was that males with SUD with MDE were more likely to report financial barriers compared to males in the SUD without MDE group. Since these analyses adjusted for socio-demographic variables, it is unlikely that differences in barriers could be explained by differences in characteristics such as income. Except for financial barriers, SUD with MDE did not appear to be linked with any other specific type of barrier to substance treatment as a function of gender.

Attitudinal barriers appeared to be the most common group of barriers for all groups considered in the present analyses. Approximately 42-55% of participants reported not using professional help due to a pessimistic attitude toward treatment, followed by financial barriers reported by 34-52% of participants. This finding is consistent with previous national studies showing that attitudinal factors were more pronounced than financial ones when accessing SUD treatment (Xu et al., 2007). Our study further indicates that attitudinal barriers are crucial for both SUD with and without MDE. Financial barriers are also worthy of attention as they were more commonly reported by participants with SUD with MDE, although not at a statistically significant level.

Assessment of the potential gender differences in the association of MDE comorbidity with treatment barriers has important clinical implications for identifying interventions aimed at improving treatment access since a small number of individuals with SUD ever enter treatment for their conditions (Cohen et al., 2007; Price et al., 2001). Identifying appropriate targets for improving acceptability of and access to these treatments is a first step to increase service utilization. Our results indicate that with few exceptions barriers to SUD treatment are not gender-specific, nor are they specific to individuals with MDE comorbidity. Future analyses need to assess whether other SUD comorbidities have a different profile of barriers to care. It is probable that intervention efforts to alter negative attitudes towards treatment, and improvements to financial accessibility through parity legislation will be potentially beneficial to the large proportion of individuals with SUD regardless of other health conditions.

The net benefit in access to services would likely be especially pronounced among females with comorbid disorders because females are almost twice as likely as males to have comorbid SUD with MDE and individuals with these comorbid conditions were more likely than those without comorbid conditions to perceive an unmet need. Thus, while our analyses focused on the associations within gender groups, wide differences in service utilization

across gender and MDE comorbidity groups reflect strong main effect differences with important policy implications.

A noteworthy finding of our study was that participants with SUD with MDE of both genders were more likely to report misusing prescription drugs. One possible explanation for this pattern is self-medication of depression (Ghandour et al., 2012). Major depression is commonly comorbid with other psychiatric or physical conditions such as anxiety disorders or chronic pain (Moffitt et al., 2007; Ohayon and Schatzberg, 2010), and these disorders, as well as MDE itself may increase access to and use of prescription drugs, which may be later misused. Another possibility is that misused prescription drugs may be more prone to produce substance-induced mood disorders, leading to the higher prevalence of MDE.

The results of this study should be viewed in the context of its limitations. First, the assessment of SUD, MDE, and service utilization was based on self-report, which is prone to recall bias. Previous studies have shown that self-reports of past service utilization generally underestimates the actual use of services (Petrou et al., 2002). Restricting our analyses to the past-year may have helped to reduce the potential for recall bias. However, individuals with lifetime but not prior year SUD or MDE, who may suffer from less persistent disorders, would not be included. Second, the cross-sectional design does not allow us to assess whether SUD preceded or followed MDE, which may influence treatment using behaviors. Third, the list of reasons for not using treatment was limited. For instance, negative past treatment experiences or aversion to a specific type of treatments, which are potentially important factors in service utilization (Appel et al., 2004) were not included in the surveys. Fourth, the perceived unmet need for services was assessed by only a single item with untested reliability. Fifth, due to sample size limitations, we combined all SUD into one category without distinguishing between diagnoses of abuse and dependence or different substances. Sixth, the NSDUH only assesses a history of MDE, and it is possible that other comorbidities (e.g., anxiety disorders) would have different patterns of service utilization and associations with treatment barriers (Mojtabai et al., 2002). Lastly, it is important to note that MDE is not equivalent to major depressive disorder. Individuals with bipolar disorder also frequently experience MDE. Furthermore, the implications for comorbidity with major depressive episode may be different for comorbidity with bipolar disorder. However, the lower prevalence of bipolar disorder relative to unipolar depression may reduce this potential bias (Brooner et al., 1997; Compton et al., 2000; Schuckit et al., 1997).

CONCLUSIONS

In the context of these limitations, this study offers important findings with implications for the design of treatment services. To the best of our knowledge, this is the first national study to examine interaction between gender and MDE comorbidity in SUD service utilizations and barriers to such treatments. Gender appears to modify the association of MDE comorbidity with the use of some types of SUD treatments, although this moderating effect is modest. Perceptions of need for treatment and barriers to care appear to be remarkably consistent for both genders. The unfolding of the mental health parity law and the Affordable Care Act which aim to expand health care insurance coverage may have a pronounced impact on access to health care for individuals with SUD and comorbid psychiatric conditions. It would be important to continue monitoring service utilization and barriers to treatments as these policies are fully implemented in the coming years.

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Table 1

Socio-demographic characteristics of 32,916 adult participants in the National Survey of Drug Use and Health 2005-2010 with past-year substance use disorder (SUD) with and without past-year comorbid major depressive episodes (MDE).

Socio-demographic Characteristics	Total (N=32,916)	Male SUD with MDE (N=2,269)		Male SUD without MDE (N=17,776)		Male OR (95% CI)	Female SUD with MDE (N=3,288)		Female SUD without MDE (N=9,583)		Female OR (95% CI)
	N	N	%	N	%		N	%	N	%	
Age											
18-25	22,873	1,391	26.7	12,173	32.2	1.00	2,281	36.7	7,028	39.1	1.00
26-34	4,488	382	25.2	2,522	24.1	1.26(1.07,1.48) †	434	21.6	1,150	21.8	1.06(0.91,1.23)
34-50	4,303	391	31.1	2,299	26.3	1.43(1.22,1.67) ‡	477	29.5	1,136	25.8	1.22(1.03,1.44) *
50 or more	1,252	105	17.1	782	17.4	1.19(0.85,1.65)	96	12.2	269	13.3	0.98(0.70,1.37)
Race/Ethnicity											
White	22,164	1,543	71.4	11,793	67.5	**1.00**	2,265	74.3	6,563	73.0	1.00
Black	3,356	210	11.8	1,836	11.7	0.95(0.75,1.21)	332	11.4	978	10.9	1.02(0.81,1.30)
Hispanic	4,641	320	12.8	2,720	16.2	0.75(0.58,0.97) *	405	9.9	1,196	11.3	0.86(0.70,1.05)
Others	2,755	196	4.0	1,427	4.6	0.83(0.60,1.16)	286	4.5	846	4.8	0.91(0.71,1.18)
Marital status											
Married	5,440	328	22.5	3,098	33.8	1.00	496	24.7	1,518	30.2	1.00
Divorced/Separated	2,874	316	26.5	1,243	14.1	2.83(2.21,3.62) ‡	459	25.2	856	16.1	1.92(1.53,2.41) ‡
Single	24,602	1,625	51.0	13,435	52.1	1.47(1.19,1.81) ‡	2,333	50.1	7,209	53.7	1.15(0.97,1.35)
Educational status											
< High school	6,390	525	20.7	3,841	18.9	1.00	552	15.5	1,472	14.1	1.00
High school	10,799	783	35.4	6,049	31.8	1.02(0.79,1.32)	1,082	32.2	2,885	26.8	1.51(1.19,1.91)**
College	15,727	961	43.9	7,886	49.3	0.82(0.65,1.02)	1,654	52.3	5,226	59.1	1.32(1.12,1.55)**
Household income											
$19,999	10,404	750	31.3	5098	21.3	1.00	1,242	31.3	3,314	27.0	1.00
$20,000-$34,999	11,203	795	34.6	6130	33.4	0.70(0.58,0.85) ‡	1,093	34.8	3,185	32.1	0.94(0.80,1.10)
$35,000-$69,999	4,651	314	13.6	2657	16.6	0.56(0.43,0.72) ‡	409	13.9	1,271	14.6	0.82(0.67,1.00) *
$70,000	6,658	410	20.5	3891	28.8	0.48(0.38,0.61) ‡	544	20.1	1,813	26.3	0.66(0.53,0.81) ‡

Socio-demographic Characteristics	Total (N=32,916)	Male					Female				
		SUD with MDE (N=2,269)		SUD without MDE (N=17,776)		OR (95% CI)	SUD with MDE (N=3,288)		SUD without MDE (N=9,583)		OR (95% CI)
	N	N	%	N	%		N	%	N	%	
Employment											
Part/Full employed	23,638	1,480	6.0	7,255	77.4	1.00	2,201	65.6	6,838	72.3	1.00
Unemployed	3,520	324	11.6	9,155	8.7	1.63(1.29,2.06) ‡	341	9.9	833	7.2	1.10(0.88,1.36)
Not labor force	5,758	465	25.5	1,366	13.9	2.25(1.85,2.74) ‡	746	24.6	1,912	20.6	**0.81(0.69,0.94)** †
Insurance status											
No insurance	9,093	771	30.5	5,426	27.2	1.00	818	23.8	2,089	20.0	1.00
Private Health	17,667	1,049	44.2	10,023	60.1	**0.65(0.55,0.78)** ‡	1,643	51.2	5,492	61.4	**0.70(0.62,0.80)** ‡
Medicare	331	67	4.6	207	2.5	**1.64(1.15,2.36)** ‡	67	3.6	96	2.3	1.36(0.91,2.02)
Medicaid /State	3,694	183	9.5	1,071	4.4	**1.92(1.36,2.72)** ‡	553	15.6	1,312	11.2	1.18(0.96,1.44)
Champus/Military	864	110	8.2	450	3.5	**2.07(1.45,2.96)** ‡	92	2.7	212	2.2	1.05(0.67,1.66)
Others	1,171	86	2.9	591	2.4	1.11(0.77,1.60)	114	3.1	380	3.1	0.84(0.58,1.22)
Population density											
Metropolitan	13,560	952	51.9	7,255	52.3	1.00	1,336	51.4	4,017	55.3	1.00
Suburban	16,888	1,127	41.2	9,155	42.1	0.98(0.85,1.13)	1,723	43.7	4,883	40.1	**1.17(1.04,1.32)** *
Rural	2,468	190	6.9	1,366	5.6	1.25(0.89,1.75)	229	4.9	683	4.6	1.14(0.88,1.49)
Alcohol use disorder											
No alcohol disorder	5,822	426	17.8	2931	14.0	1.00	758	24.7	1,707	15.3	1.00
Alcohol abuse	15,152	698	29.4	8923	50.3	**0.46(0.37,0.57)** ‡	1,058	29.4	4,473	46.4	**0.39(0.33,0.47)** ‡
Alcohol dependence	11,942	1,145	52.8	5922	35.8	1.16(0.95,1.42)	1,472	46.0	3,403	38.4	**0.74(0.62,0.89)** †
Drug use disorder											
No drug disorder	21,757	1,265	60.0	11,959	73.9	1.00	1,873	60.7	6,660	74.3	1.00
Drug abuse	3,227	223	8.6	1,983	8.9	**0.46(0.37,0.57)** ‡	245	6.0	776	6.9	1.07(0.81,1.40)
Drug dependence	7,932	781	31.3	3,834	17.2	1.16(0.95,1.42)	1,170	33.3	2,147	18.8	**2.16(1.87,2.50)** ‡
Type of Drugs											
Marijuana	7331	628	20.1	4213	16.6	**1.27(1.10,1.46)** †	739	18.1	1751	13.2	**1.45(1.22,1.72)** *

Socio-demographic Characteristics	Total (N=32,916)	Male					Female				
		SUD with MDE (N= 2,269)		SUD without MDE (N= 17,776)		OR (95% CI)	SUD with MDE (N= 3,288)		SUD without MDE (N= 9,583)		OR (95% CI)
	N	N	%	N	%		N	%	N	%	
Cocaine	1961	219	11.7	912	5.6	**2.23(1.79,2.76)** ‡	299	10.1	531	5.5	**1.95(1.51,2.52)** ‡
Heroin	454	54	2.1	210	1.3	1.66(0.95, 2.90)	57	1.5	133	1.4	1.12(0.70,1.78)
Hallucinogens	635	72	1.7	325	1.2	1.43(0.99,2.06)	86	1.5	152	1.1	1.34(0.96,1.88)
Inhalants	152	24	0.5	83	0.4	1.35(0.68,2.69)	17	0.3	28	0.2	1.10(0.44,2.73)
Pain relievers	2613	294	13.1	1070	5.2	**2.72(2.14,3.47)** ‡	505	14.1	744	7.4	**2.05(1.67,2.51)** ‡
Tranquilizers	656	89	4.5	245	1.2	**3.98(2.56,6.18)** ‡	160	5.1	162	1.5	**3.59(2.39,5.41)** ‡
Stimulants	598	89	3.5	190	0.8	**4.37(2.67,7.14)** ‡	144	4.1	175	1.5	**2.76(1.79,4.26)** ‡
Sedatives	155	28	1.4	42	0.3	**5.61(2.05,15.37)** †	48	1.7	37	0.5	**3.49(1.83,6.67)** ‡
Number of substances											
One	26,721	1,606	74.1	14,521	86.1	1.00	2,462	79.6	8,132	87.5	1.00
Two	4,574	438	17.4	2,529	10.9	**1.86(1.52,2.27)** ‡	520	12.6	1,087	9.6	**1.44(1.26,1.65)** ‡
Three or more	1,621	225	8.5	726	3.1	**3.22(2.44,4.23)** ‡	306	7.8	364	3.0	**2.88(2.12,3.92)** ‡

Note: OR stands for odds ratio, CI for confidence interval.

*
  $p<0.05$,

†
  $p<0.01$,

‡
  $p<0.001$

Terms in bold font are significantly different at $p<0.05$.

Table 2

Patterns of substance use disorder (SUD) service utilization in 32,916 National Survey of Drug Use and Health 2005-2010 adult participants with past-year SUD with and without past-year major depressive episode (MDE).

Substance disorder service use	Male						Female						Effect Modification Wald –Test $F(1, 60)$
	SUD with MDE (N=2,269)		SUD without MDE (N=17,776)		OR (95% CI)	aOR (95% CI)	SUD with MDE (N=3,288)		SUD without MDE (N=9,583)		OR (95% CI)	aOR (95% CI)	
	N	%	N	%			N	%	N	%			
Any substance use treatment	418	21.6	1721	9.3	2.68‡ (2.27, 3.16)	1.99‡ (1.68, 2.35)	442	14.5	689	7.3	2.16‡ (1.78, 2.64)	1.64‡ (1.29, 2.08)	2.59 (0.113)
Hospital/Overnight	124	8.8	282	1.8	5.19‡ (3.69, 7.28)	3.27‡ (2.32, 4.62)	138	5.2	164	1.8	2.95‡ (2.05-4.24)	2.92‡ (1.88, 4.54)	4.90* (0.031)
Rehabilitation center/Overnight	144	9.1	439	2.7	3.68‡ (2.85, 4.76)	2.35‡ (1.77, 3.11)	150	5.4	197	2.1	2.63‡ (1.98, 3.51)	2.10‡ (1.37, 3.23)	3.41 (0.07)
Rehabilitation center/Outpatient	194	9.5	761	4.0	2.56‡ (2.00, 3.27)	1.77‡ (1.32, 2.37)	214	6.6	337	3.0	2.28‡ (1.64, 3.17)	1.70‡ (1.16, 2.47)	0.34 (0.561)
Outpatient mental health center	134	7.1	374	2.2	3.41‡ (2.52, 4.62)	2.47‡ (1.88, 3.25)	215	6.2	208	2.5	2.60‡ (1.84, 3.67)	1.96‡ (1.37, 2.81)	1.28 (0.263)
Emergency Room	81	5.4	171	1.0	5.78‡ (3.83, 8.74)	3.89‡ (2.58, 5.86)	95	3.1	109	1.3	2.38** (1.44, 3.91)	1.90* (1.05, 3.44)	9.18** (0.004)
Private doctor's office	88	4.6	263	1.5	3.17‡ (2.16, 4.66)	2.74‡ (1.70, 4.43)	120	4.9	116	1.5	3.33‡ (2.12, 5.24)	2.91‡ (1.72, 4.91)	0.03 (0.864)
Prison/Jail	37	2.3	204	0.9	2.66† (1.39, 5.10)	1.95 (0.88, 4.29)	35	0.9	69	0.6	1.39 (0.63, 3.05)	0.84 (0.40, 1.78)	1.80 (0.185)
Self-help group	243	12.2	891	5.5	2.38‡ (1.89, 3.27)	1.71‡ (1.32, 2.21)	286	9.7	363	4.0	2.56‡ (1.89, 3.45)	2.00‡ (1.40, 2.85)	0.14 (0.707)
Perceived unmet need	199	13.6	521	4.1	3.72‡ (2.71, 5.10)	2.75‡ (1.98, 3.82)	233	9.5	306	3.8	2.64‡ (1.97, 3.55)	2.15‡ (1.59, 2.90)	2.69 (0.106)

Note: OR stands for odds ratio, aOR for adjusted odds ratio, CI for confidence interval. Adjusted odds ratios are from multivariate logistic models which controlled for age, race, marital status, education, income, insurance, employment and population density.

*
$p < 0.05$,

†
$p < 0.01$,

‡
$p < 0.001$.

Terms in bold font are significantly different at $p<0.05$.

Table 3

Perceived barriers to substance use disorder (SUD) treatment in 32,916 National Survey of Drug Use and Health 2005-2010 adult participants with past-year SUD with and without comorbid past-year major depressive episode (MDE).

Reasons for not receiving treatment	Male						Female						Effect Modification Wald –Test F(1, 60)
	SUD with MDE (N= 199)		SUD without MDE (N= 521)		OR (95% CI)	aOR (95% CI)	SUD with MDE (N= 233)		SUD without MDE (N= 306)		OR (95% CI)	aOR (95% CI),	
	N	%	N	%			N	%	N	%			
Financial Reasons	88	51.8	197	36.1	1.91 * (1.05, 3.47)	1.97 * (1.14, 3.39)	92	41.2	103	33.8	1.37 (0.75, 2.51)	1.41 (0.78, 2.55)	0.57 (0.451)
Could not afford cost	81	47.9	179	31.9	1.96 * (1.06, 3.62)	1.77 (0.97, 3.24)	82	34.9	94	31.0	1.19 (0.66, 2.14)	1.41 (0.79, 2.48)	1.34 (0.251)
No insurance coverage	11	6.3	23	4.4	1.48 (0.49, 4.44)	3.22 * (1.13, 9.16)	12	6.7	14	5.9	1.16 (0.44, 3.03)	0.57 (0.14, 2.33)	0.10 (0.750)
Stigmatization Reasons	53	23.7	98	21.3	1.15 (0.62, 2.13)	1.15 (0.63, 2.11)	72	23.9	76	22.4	1.09 (0.62, 1.93)	1.05 (0.49, 2.22)	0.02 (0.901)
Fear of neighbors' opinion	37	17.1	48	9.3	2.02 (0.89, 4.59)	1.43 (0.61, 3.31)	48	15.3	48	10.3	1.57 (0.77, 3.21)	1.76 (0.67, 4.57)	0.24 (0.626)
Fear of negative effect on job	27	15.4	48	13.4	1.18 (0.56, 2.46)	1.66 (0.83, 3.35)	31	9.2	38	12.8	0.69 (0.31, 1.54)	0.46 (0.18, 1.21)	0.94 (0.335)
Did not want others to find out	18	7.3	31	5.6	1.33 (0.51, 3.52)	1.32 (0.50, 3.46)	26	9.4	26	9.8	0.95 (0.39, 2.35)	0.78 (0.32, 1.92)	0.25 (0.622)
Attitude toward treatment	98	47.2	218	47.5	0.99 (0.54, 1.82)	0.97 (0.52, 1.81)	107	42.4	165	55.0	0.60 (0.34, 1.05)	0.58 (0.33, 1.03)	1.60 (0.211)
Did not think treatment needed	21	9.0	33	6.6	1.41 (0.52, 3.86)	1.94 (0.56, 6.72)	24	9.1	23	5.5	1.73 (0.58, 5.15)	1.61 (0.60, 4.37)	0.07 (0.789)
Did not think treatment would help	12	5.7	17	4.1	1.40 (0.41, 4.72)	1.37 (0.44, 4.50)	13	5.5	8	1.1	5.30** (1.97,14.29)	3.39 * (1.24, 9.23)	2.85 (0.097)
Thought could handle the problem without treatment	34	13.0	42	8.3	1.65 (0.78, 3.46)	1.65 (0.77, 3.52)	40	11.7	39	10.4	1.14 (0.57, 2.25)	1.03 (0.48, 2.21)	0.61 (0.438)
Not ready to stop using	78	40.7	174	38.5	1.10 (0.55, 2.20)	1.17 (0.63, 2.18)	78	31.4	129	44.7	0.57 (0.33, 0.96)	0.57 (0.31, 1.05)	2.49 (0.120)

Reasons for not receiving treatment	Male						Female						Effect Modification Wald–Test F(1, 60)
	SUD with MDE (N=199)		SUD without MDE (N=521)		OR (95% CI)	aOR (95% CI)	SUD with MDE (N=233)		SUD without MDE (N=306)		OR (95% CI)	aOR (95% CI),	
	N	%	N	%			N	%	N	%			
Structural Reasons	57	29.4	140	24.4	1.29 (0.61, 2.70)	0.79 (0.38, 1.62)	76	23.8	97	30.1	0.72 (0.41, 1.27)	0.92 (0.52, 1.64)	1.72 (0.194)
No program open or treatment type	14	10.6	47	7.8	1.41 (0.37, 5.41)	0.56 (0.22, 1.42)	20	5.6	29	6.4	0.86 (0.32, 2.32)	1.10 (0.37, 3.25)	0.36 (0.551)
Did not know where to go	29	11.8	55	9.6	1.26 (0.48, 3.29)	0.91 (0.31, 2.64)	37	12.4	55	17.3	0.68 (0.29, 1.59)	0.87 (0.36, 2.14)	1.22 (0.274)
Did not have time	16	6.7	18	4.1	1.68 (0.56, 5.10)	1.64 (0.57, 4.76)	15	6.0	21	6.5	0.93 (0.34, 2.55)	0.82 (0.22, 3.02)	0.67 (0.415)
No transportation or inconvenient	10	4.9	45	6.3	0.77 (0.28, 2.12)	0.88 (0.30, 2.61)	23	7.1	25	10.7	0.63 (0.23, 1.73)	0.86 (0.36, 2.08)	0.08 (0.781)

Note: OR stands for odds ratio, aOR for adjusted odds ratio, CI for confidence interval. Adjusted odds ratios are from multivariate logistic models which controlled for age, race, marital status, education, income, insurance, employment and population density.

*
p<0.05,

†
p<0.01,

‡
p<0.001.

Terms in bold font are significantly different at *p*<0.05.