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Emerald

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Gender differences in lifetime psychiatric and substance use disorders among people who use substances in Barcelona, Spain

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Gender differences in lifetime psychiatric and substance use disorders among people who use substances in Barcelona, Spain

Abstract

Purpose

To examine gender differences in lifetime substance use and non-substance use (non-SUD) psychiatric disorders among illicit drug users and determine factors associated with non-SUD psychiatric disorders independently for males and for females.

Design

Secondary analysis of five cross-sectional studies conducted in Barcelona, Spain during 2000-2006. Lifetime DSM-IV substance use and non-SUD psychiatric diagnoses were assessed using the Spanish Psychiatric Research Interview for Substance and Mental Disorders among 629 people who use substances (68% male) recruited from treatment (n=304) and out of treatment (n=325) settings. Odds ratios (OR) and 95% confidence intervals (CI) were calculated using binary logistic regression.

Findings

The prevalence of any lifetime psychiatric (non-SUD) disorder was 41.8%, with major depression (17%) and antisocial personality disorder (17%) being the most prevalent disorders. After adjusting for age and study, the odds of having any lifetime non-SUD (OR 2.10; 95%CI 1.48, 2.96); any mood disorder (OR 2.13; 95%CI 1.46, 3.11); any anxiety disorder (OR 1.86; 95%CI 1.19; 2.92); any eating disorder (OR 3.09; 95%CI 1.47, 6.47); or borderline personality disorder (OR 2.30; 95%CI 1.36, 3.84) were greater for females than males. Females

were less likely than males to meet criteria for antisocial personality disorder (OR 0.59; 95%CI 0.36, 0.96) and attention deficit disorder (OR 0.37; 95%CI 0.17, 0.78).

Research limitations/implications

Psychiatric disorders are common among people who use substances, with gender differences reported for specific disorders. Gender-sensitive integrated treatment approaches are required to prevent and to address comorbidity psychiatric disorders among this population.

Originality/value

This secondary analysis of five cross-sectional studies included a large sample size allowing sufficient power to examine differences between men and women. An additional strength of the methodology is the use of the gold standard PRISM which was used to assess disorders.

Key words

psychiatric disorders; substance use disorders; illicit drug users; Psychiatric Research Interview for Substance and Mental Disorders (PRISM); gender differences; secondary analysis.

Introduction

The incidence of comorbid psychiatric disorders is higher among people who use substances than among people who do not (Flynn and Brown, 2008). The prevalence of comorbid substance use and psychiatric disorders ranges from 15-100% depending on the population studied, the timeframe considered and the assessments used (Flynn and Brown, 2008; Torrens *et al.*, 2015; Kingston *et al.*, 2016). Among people who use substances from clinical and non-clinical populations, the most common mental health comorbid disorders are mood, anxiety, and personality disorders (Hasin *et al.*, 2004; Torrens *et al.*, 2015; Torrens *et al.*, 2011; Kingston *et al.*, 2016).

Gender differences have been reported in the prevalence of co-occurring psychiatric disorders among people who use substances. Generally, women report higher prevalence than men of the following disorders: depression, anxiety, (including post-traumatic stress and panic disorders), eating disorders and borderline personality disorder, and men are more likely to report higher prevalence of antisocial personality disorder, psychosis and attention deficit and hyperactivity disorder (ADHD) (e.g. for recent reviews see Torrens *et al.*, 2015; Kingston *et al.*, 2016). Biological and psychosocial differences between men and women influence the “prevalence, presentation, comorbidity, and treatment of substance use disorders” (Back *et al.*, 2006).

People who use substances and have a co-occurring mental health disorder compared to those who do not, have poorer outcomes for both disorders (Boden and Moos, 2009; Flynn and Brown, 2008; Magura *et al.*, 2009). They also report sexual and drug use risk behaviours which could increase the risk of blood borne viruses in this population (Khalsa *et al.*, 2008),

and increased unemployment, homelessness and criminal behaviour (Krausz *et al.*, 2013; Greenberg and Rosenheck, 2014). This profile contributes to the high treatment, legal and societal costs for people with comorbid disorders (DeLorenze *et al.*, 2014; Whiteford *et al.*, 2013).

While strong evidence of gender differences in comorbidity exists, there is a gap in understanding of the relationships between specific mental disorders and specific substance use disorders (Torrens *et al.*, 2015), by gender. Sordo *et al.* (2012) argue that “few studies have evaluated whether there are different predictive factors for men and women” and that such information is required to inform prevention, diagnosis and treatment. The majority of previous research has been undertaken among clinical or general population samples. This study also provides the opportunity to consider out of treatment drug users.

The current study aimed to explore 1) gender differences in lifetime substance use and psychiatric disorders among people using different substances recruited from treatment and non-treatment settings; 2) risk factors for psychiatric disorders among substance users, independently by gender; and 3) associations between psychiatric disorders and substance use disorders, independently by gender.

Methods

Design, participants and settings

Secondary analysis was conducted using data from 629 (201 females, 32.0%) users of illicit substances from five cross-sectional studies conducted in Barcelona, Spain during 2000-2006 (Torrens *et al.*, 2011). In total, 304 (82 females, 27.0%) were recruited from treatment settings and 325 (119 females,

36.6%) were recruited from out of treatment settings. One hundred and fifteen (38 females, 33.0%) consecutive admissions to an inpatient detoxification unit of a teaching hospital (Nocon *et al.*, 2007) and 189 (44 females, 23.3%) consecutive admissions to three municipal outpatient low-threshold methadone-maintenance programs (Astals *et al.*, 2008) constituted the treatment sites. A random sample of 139 (52 females, 37.4%) cocaine (Herrero *et al.*, 2008) and 149 (49 females, 32.9%) heroin users (Rodriguez-Llera *et al.*, 2006) aged 18-30 years were recruited from street sites using targeted sampling and nomination techniques as part of a larger cohort study (de la Fuente *et al.*, 2005; Pulido *et al.*, 2009). Thirty seven (18 females, 48.6%) Ecstasy users aged 18-35 years were recruited via word of mouth in a pharmacological research unit to the study on the Neurotoxic Effects of Ecstasy (Martín-Santos *et al.*, 2010).

Instruments

DSM-IV substance use (abuse or dependence) disorders (SUD) and Axis I (mood, anxiety, eating, psychotic and attention deficit and hyperactivity disorders) and Axis II (antisocial and borderline personality disorders) non-substance use psychiatric disorders (non-SUD) were diagnosed using the Spanish Psychiatric Research Interview for Substance and Mental Disorders (PRISM) (Torrens *et al.*, 2004). The PRISM differentiates between the expected effects of intoxication and withdrawal, and between primary (independent) and substance-induced disorders (Hasin *et al.*, 1998). The PRISM was administered by trained psychologists or psychiatrists in all studies to assess patient demographics, and “current” (previous 12 months) and “past” (criteria were met

before the previous 12 months). Lifetime disorder categories were created for the purpose of this paper.

Test-retest reliability (Hasin *et al.*, 2006), inter-rater reliability (Morgello *et al.*, 2006) and validity (Torrens *et al.*, 2004) to diagnose psychiatric disorders among substance users, have been demonstrated using the PRISM.

In addition to SUD and Non-SUD diagnoses, the following variables were included from each study: participants' sex, age, civil status, highest level of education attained, employment status, living arrangements, drug use history, HIV and hepatitis C virus (HCV) status.

Statistical Analysis

Procedure

Data were analysed using SPSS version 22. Descriptive statistics were calculated using frequencies and percentages for categorical data and means and standard deviations (SD) for continuous data. Odds ratios (OR) and 95% confidence intervals (CI) were calculated using binary logistic regression.

Differences by gender of participant in demographics, lifetime substance use and non-SUD psychiatric disorders are presented in Table 1, with and without adjusting for study setting and age. Tables 2 and 3 describe the associations between lifetime non-SUD psychiatric disorders and substance use disorders, independently for females and males. Tables 4 and 5 describe the factors associated with lifetime non-SUD for females and males, respectively.

Results

Demographics

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The majority of the sample was male (68%). The mean age of participants was 28.6 years (SD 7.1). After adjusting for age and study, females were significantly more likely to be married or cohabiting than males; were less likely to be employed or studying; or to have ever been imprisoned than males (Table 1). Women were over twice as likely to be squatting or homeless as men (compared to living alone). However, once the data were adjusted for age and study, the gender difference was no longer significant.

Substance Use

There were no differences by gender in the age of first use of cocaine, heroin or alcohol; or in the onset of habitual substance use. After adjusting for age and study, females were significantly older than males when they first used cannabis (Table 1). Almost 60% of males and 53% of females had ever injected drugs. Approximately 20% of males and females were HIV seropositive. There was no difference in the prevalence of HCV status between males and females (39% vs 48%). Females were less likely than males to meet criteria for any (abuse or dependence) substance use disorder, for poly substance use disorder and for heroin, cannabis and alcohol abuse or dependence disorders. Males met criteria for a significantly greater number of lifetime substance use disorders than females (3.6 vs. 3.1) (Table 1).

Axis I psychiatric disorders (non-SUD)

The incidence of any Axis 1 psychiatric (non-SUD) disorder was 41.8%, with major depressive disorder (17%) being the most common. The odds of having any non-SUD were over two times greater for females than males even after

adjusting for age and study (Table 1). After adjusting for age and study, females were over twice as likely as males to meet criteria for any mood disorder (including over two times as likely to meet criteria for major depressive disorder); almost two times as likely to meet criteria for any anxiety disorder (including over four times as likely to meet criteria for specific phobia, and over three times as likely to meet criteria for panic disorder with agoraphobia and PTSD); and over three times as likely to meet criteria for an eating disorder. Females were less likely to meet criteria for attention deficit disorder than males after adjusting for age and study. There were no differences by sex for the proportion of participants meeting criteria for any substance induced disorders (Table 1).

After adjusting for age and study, women who met criteria for a lifetime Axis I non-SUD psychiatric disorder were more likely than those who did not to have ever been in prison or to be HCV seropositive (Table 2); and for men lower educational attainment or ever been in prison (marginally significant) were associated with a lifetime Axis I non-SUD psychiatric disorder (Table 3).

Axis II personality disorders

Over a fifth of the sample met criteria for antisocial or borderline personality disorders. After adjusting for age and study, women were more likely than men to meet criteria for borderline personality disorder, and less likely than men to meet criteria for antisocial personality disorder (Table 1).

Associations between specific lifetime SUD and psychiatric disorders (non-SUD) by sex

Tables 4 and 5 describe the associations between specific SUD and psychiatric disorders (non-SUD) for women and men respectively. For women, alcohol or hallucinogen disorders increased the odds of having a mood disorder; cocaine and hallucinogen disorders increased the odds of having an anxiety disorder; a hallucinogen disorder increased the odds of having an eating disorder; sedative and stimulant disorders increased the odds of having a psychotic disorder; opiates, cocaine, cannabis and poly substance disorders increased the odds of having an antisocial or borderline personality disorder; and alcohol, cocaine, stimulants, cannabis, hallucinogens and poly substance disorders increased the odds of having a substance induced disorder. For men, cocaine and poly substance use disorders increased the odds of having a mood disorder; a stimulant disorder increased the odds of having an anxiety disorder; stimulant and hallucinogen disorders increased the odds of having an eating disorder; an alcohol disorder increased the odds of having a psychotic disorder; all substance use disorders (including poly substance use disorder) increased the odds of having an antisocial or borderline personality disorder; and cocaine and hallucinogen disorders increased the odds of having a substance induced disorder.

Discussion

Men were more likely than women to meet criteria for any substance use disorder, for poly substance use disorder and for heroin, cannabis and alcohol abuse or dependence disorders. They were also more likely to report a greater number of lifetime substance use disorders than females.

Co-occurring disorders among people who use substances recruited from in and out of treatment settings is common. Over 4 in 10 participants (almost 4 in 10 men and over 5 in 10 women) included in the studies met criteria for any lifetime axis 1 psychiatric (non-SUD) disorder, and over 2 in 10 men and women met criteria for any lifetime antisocial or borderline personality disorder. The prevalence of any lifetime (non-SUD) axis I substance-induced disorders was substantially lower (15%) than primary or independent psychiatric disorders (64%). While lifetime mood and anxiety disorders were more likely to be independent disorders, psychotic disorders although less prevalent, were more likely to be substance induced disorders. Contrary to other studies (Niciu *et al.*, 2009; Schuckit *et al.*, 2007), the current did not report significantly higher rates of substance-induced disorders among men. It is important for clinicians to distinguish between psychiatric disorders that are independent and those that are substance-induced have different risk factors, prognosis and treatment outcomes, with recent research highlighting an increased risk for relapse following treatment for those with substance induced versus independent major depressive disorder (Connor *et al.*, 2014; Foulds *et al.*, 2015; Langas *et al.*, 2012; Samet *et al.*, 2013; Torrens *et al.*, 2011). As a result, substance induced and independent psychiatric disorders may require different interventions and treatment approaches.

Women were more likely than men to have ever had any mood disorder; any anxiety disorder; any eating disorder or borderline personality disorder; and men were more likely than females to have ever had antisocial personality disorder or attention deficit disorder. Potential explanations for these gender differences have include that women who use substances have often

experienced greater adverse events in childhood and adulthood (including abuse, intimate partner violence, sex trading) than men who use substances (Afifi *et al.*, 2012; Choo *et al.*, 2014; Verona *et al.*, 2015; Gilchrist *et al.*, 2015) which may contribute to the higher prevalence of mood and anxiety disorders. In addition, a greater proportion of women report higher depression and anxiety disorders in childhood and adolescence than men, which is a risk factor for a recurrent episode (Gilchrist and Gunn, 2007). Perhaps as a result of these issues, several studies have reported that for women, psychiatric disorders are more likely to predate the substance use disorder (Kessler, 2004).

The odds of having a personality disorder in the current study were higher for both men and women with polysubstance use disorders. For men personality disorders were associated with alcohol and drug use disorders, whereas for women they were associated with opiate, cocaine and cannabis use disorders. We found that borderline personality was more prevalent among females than males, and antisocial personality disorder was more prevalent among males than females. Lewis and Grenyer (2009) stress the role of trauma in the “etiology and phenomenology” of borderline personality disorder. Zanarini *et al.* (2005) found a higher prevalence of adulthood physical and sexual abuse among people with borderline personality disorder compared to patients with another personality disorders. It has been suggested that the lower prevalence of antisocial personality disorder among women may be underestimated “due to the requirement of childhood conduct disorder symptoms” (Dolan and Völlm, 2009, pp. 2) for a diagnosis. This includes physical aggression in adolescence that may result in more males than females being diagnosed.

Women who met criteria for a lifetime Axis I non-SUD psychiatric disorder were more likely to have ever been imprisoned or to be HCV seropositive. The increased prevalence of psychiatric disorders among men and women who use substances in the criminal justice service have been reported (eg. Prins, 2014; Torrens *et al.*, 2015). While data were not collected on whether participants had received treatment for HCV, Martin-Santos *et al.* (2015) suggest that “both the hepatitis C infection and antiviral treatment (especially when using the pro-inflammatory cytokine interferon α), are highly associated with depression, where female gender constitutes a risk factor”. Also women who have experienced trauma report higher rates of depression (eg. Trevillion *et al.*, 2012) and injecting risk behaviours (eg. Khalsa *et al.*, 2008) attributed to hepatitis C acquisition, which may contribute to this finding.

Similar to other studies, we found that men who met criteria for a lifetime Axis I non-SUD psychiatric disorder were more likely to only have a primary education, to have ever been in prison (marginally significant) or to be unemployed or receiving benefits (Krausz *et al.*, 2013; Greenberg and Rosenheck, 2014).

Strengths and limitations

This secondary analysis is limited as it includes five cross-sectional studies, therefore it was not possible to determine causality only associations. Despite these limitations, the study included a large sample size allowing sufficient power to examine differences between men and women. Finally, an additional

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3 strength of the methodology is the use of the gold standard PRISM which was
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5 used to assess disorders.
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10 **Implications for practice**

11 Being female does not predict the outcome of substance use treatment
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13 (Greenfield *et al.*, 2007). However, comorbid psychiatric disorders and sexual
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15 and physical abuse, both of which are higher among female than male
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17 substance users, are associated with poorer treatment outcomes (Greenfield *et*
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19 *al.*, 2002; Flynn and Brown, 2008; Boden and Moos, 2009; Magura *et al.*, 2009).
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21 Treatment systems are often separated for mental health and substance abuse
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23 (Saitz *et al.*, 2008). Evidence supports the integration of treatment for people
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25 who use substances with co-existing psychiatric disorders (Kelly and Daley,
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27 2013). While women-only treatment is not necessarily more effective than
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29 mixed-gender treatment, some greater effectiveness has been demonstrated by
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31 treatments that address problems more common to women or that are designed
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33 for specific subgroups of this population (Greenfield *et al.*, 2009).
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41 **Conclusions**

42 Our results show that psychiatric disorders are common among people who use
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44 substances. Gender differences were reported for various disorders. Around 5
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46 in 10 men and 6 in 10 women recruited from out of treatment had an Axis I non-
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48 SUD psychiatric disorder, highlighting the need to increase access to both
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50 substance use and mental health treatment for people who use substances,
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52 especially those not in treatment. Integrated treatment should be provided to
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54 address psychiatric comorbidity among people who use substances, and
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gender specific approaches considered to improve outcomes for this population.

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Table 1. Demographics, lifetime substance use and other non-substance use psychiatric disorders by gender of participant

	Total n=629 ^a		Male n=428 ^a		Female n=201 ^a		Unadjusted OR	95% CI	Adjusted OR for study ⁽¹⁻⁵⁾ & age	95% CI
	n	%	n	%	n	%				
Recruited out of treatment	325	51.7	206	48.1	119	59.2	1.56	(1.11, 2.20)	1.24	(0.81, 1.90)
Age [mean (SD)]	28.6	(7.1)	29.2	(7.0)	27.4	(7.0)	0.96	(0.94, 0.99)	0.98	(0.95, 1.01)
Civil status										
Single/Never married/	411	65.3	345	80.6	138	68.7	1.00	-	1.00	-
Divorced/ separated/ widowed										
Married/ cohabiting	146	23.2	83	19.4	63	31.3	1.90	(1.30, 2.78)	2.31	(1.55, 3.45)
Living arrangements										
Lives Alone	70	11.2	52	12.2	18	9.0	1.00	-	1.00	-
Lives with partner/ family/ friends/ flatmate	449	71.6	311	73.0	138	68.7	1.28	(0.72, 2.27)	1.09	(0.60, 1.95)
Squatting/ homeless	108	17.2	63	14.8	45	22.4	2.06	(1.07, 3.99)	1.56	(0.79, 3.10)
Education										
No schooling/ no school certificate/ primary studies	334	53.1	228	53.3	106	52.7	1.00	-	1.00	-
Secondary or University studies	295	46.9	200	46.7	95	47.3	1.02	(0.73, 1.43)	0.95	(0.65, 1.35)
Employment										
Not working or Studying	335	53.5	216	50.7	119	59.5	1.00	-	1.00	-

	Total n=629 ^a		Male n=428 ^a		Female n=201 ^a		Unadjusted OR	95% CI	Adjusted OR for study ⁽¹⁻⁵⁾ & age	95% CI
	n	%	n	%	n	%				
Working or studying	291	46.5	210	49.3	81	40.5	0.70	(0.50, 0.98)	0.69	(0.49, 0.98)
Ever imprisoned	417	70.4	268	62.8	87	43.5	0.46	(0.33, 0.64)	0.47	(0.32, 0.69)
Age first used [mean (SD)]^{b-d}										
Cannabis	15.6	(3.1)	15.4	(3.1)	15.9	(2.9)	1.05	(0.97, 1.11)	1.09	(1.03, 1.16)
Heroin	19.8	(5.2)	19.8	(5.0)	19.9	(5.6)	1.00	(0.97, 1.04)	1.04	(0.99, 1.08)
Alcohol	15.0	(3.1)	14.9	(3.2)	15.4	(2.9)	1.00	(0.95, 1.07)	1.00	(0.93, 1.06)
Cocaine	18.7	(4.9)	18.9	(5.1)	18.2	(4.4)	0.97	(0.93, 1.00)	1.01	(0.96, 1.05)
Hallucinogen	18.1	(3.6)	18.1	(3.4)	18.3	(4.3)	1.01	(0.92, 1.12)	1.04	(0.93, 1.15)
Injected in lifetime	627	99.7	255	59.9	106	52.7	0.75	(0.53, 1.05)	0.97	(0.66, 1.43)
HIV	588	93.5	79	19.5	36	19.8	1.02	(0.66, 1.58)	1.23	(0.78, 1.95)
Hepatitis C	264	45.3	193	48.0	71	39.2	0.70	(0.49, 0.999)	0.85	(0.58, 1.25)
Lifetime substance abuse or dependence disorders (SUD)^g										
Any SUD	589	93.6	409	95.6	180	89.6	0.40	(0.21, 0.76)	0.54	(0.27, 1.10)
Poly SUD ^e	528	83.9	373	87.1	155	77.1	0.50	(0.32, 0.77)	0.55	(0.34, 0.88)
Opiates ^f	450	71.5	317	74.1	133	66.2	0.69	(0.48, 0.99)	1.57	(0.71, 3.48)
Cocaine	476	75.7	330	77.1	146	72.6	0.79	(0.54, 1.16)	0.82	(0.55, 1.24)
Stimulant	209	33.2	145	33.9	64	31.8	0.91	(0.64, 1.30)	0.84	(0.58, 1.23)
Hallucinogen	143	22.7	103	24.1	40	19.9	0.65	(0.42, 1.00)	0.78	(0.52, 1.18)
Cannabis	331	52.6	252	58.9	79	39.3	0.45	(0.32, 0.64)	0.46	(0.32, 0.65)
Sedatives	201	32.2	132	30.8	69	34.3	1.17	(0.82, 1.67)	1.41	(0.93, 2.12)
Alcohol	305	48.5	223	52.1	82	40.8	0.63	(0.45, 0.89)	0.61	(0.42, 0.86)

	Total n=629 ^a		Male n=428 ^a		Female n=201 ^a		Unadjusted OR	95% CI	Adjusted OR for study ⁽¹⁻⁵⁾ & age	95% CI
	n	%	n	%	n	%				
Number SUD ^g [mean (SD)]	3.4	(1.9)	3.6	(1.8)	3.1	(1.9)	0.87	(0.79, 0.95)	0.86	(0.78, 0.96)
Psychiatric non- SUD disorders^g										
Any Axis 1 psychiatric (Non-SUD) disorder	263	41.8	154	36.0	109	54.2	2.11	(1.50, 2.96)	2.09	(1.48, 2.96)
Any substance induced disorder	95	15.1	58	13.6	37	18.4	1.44	(0.92, 2.26)	1.34	(0.85, 2.12)
Any mood disorder	170	27.0	94	22.0	76	37.8	2.16	(1.50, 3.11)	2.13	(1.46, 3.11)
Dysthymia	11	1.7	8	1.9	3	1.5	0.79	(0.21, 3.03)	1.12	(0.20, 6.24)
Major depressive disorder	107	17.0	55	12.9	52	25.9	2.37	(1.55, 3.62)	2.42	(1.57, 3.72)
Hipomania	1	0.2	1	0.2	0	0	-	-	-	-
Substance induced affective disorder	63	10.0	39	9.1	24	11.9	1.35	(0.79, 2.32)	1.27	(0.73, 2.21)
Any anxiety disorder	97	15.4	55	12.9	42	20.9	1.79	(1.15, 2.79)	1.86	(1.19, 2.92)
General anxiety	3	0.5	1	0.2	2	1.0	4.29	(0.39, 47.61)	3.80	(0.34, 42.19)

	Total n=629 ^a		Male n=428 ^a		Female n=201 ^a		Unadjusted OR	95% CI	Adjusted OR for study ⁽¹⁻⁵⁾ & age	95% CI
	n	%	n	%	n	%				
disorder										
Specific phobia	25	4.0	9	2.1	16	8.5	4.30	(1.88, 9.83)	4.73	(2.05, 10.96)
Social phobia	21	3.3	19	4.4	5	2.5	0.55	(0.20, 1.49)	0.61	(0.22, 1.67)
Panic disorder	32	5.1	19	4.4	13	6.5	1.49	(0.72, 3.08)	1.58	(0.76, 3.31)
Obsessive compulsive	7	1.1	7	1.6	0	0	-	-	-	-
PTSD	19	3.0	7	1.6	12	6.0	3.82	(1.48, 9.85)	4.31	(1.65, 11.28)
Substance induced anxiety disorder	7	1.1	5	1.2	2	1.0	-			
Any psychotic disorder	44	7.0	30	7.0	14	7.0	0.99	(0.52, 1.92)	1.05	(0.54, 2.06)
Schizophrenia	11	1.7	10	2.3	1	0.5	0.21	(0.03, 1.64)	0.23	(0.03, 1.85)
Schizoaffective	1	0.2	1	0.2	0	0	-	-	-	-
Lifetime Psychotic disorder	13	2.1	12	2.8	1	0.5	-	-	-	-
Substance induced psychotic disorder	31	4.9	18	4.2	13	6.5	1.57	(0.76, 3.28)	1.53	(0.73, 3.21)
Attention deficit disorder	50	7.9	41	9.6	9	4.5	0.44	(0.21, 0.93)	0.37	(0.17, 0.78)
Any eating disorder	33	5.2	13	3.0	20	10.0	3.53	(1.72, 7.25)	3.01	(1.45, 6.25)
Anorexia	10	1.6	2	0.5	8	4	8.83	(1.86, 41.97)	8.58	(1.77, 41.54)
Bulimia	13	2.1	2	0.5	11	5.5	12.33	(2.71, 56.17)	10.35	(2.25, 47.58)

	Total n=629 ^a		Male n=428 ^a		Female n=201 ^a		Unadjusted OR	95% CI	Adjusted OR for study ⁽¹⁻⁵⁾ & age	95% CI
	n	%	n	%	n	%				
Eating disorder NOS ^h	14	2.2	10	2.3	4	2.0	0.85	(0.26, 2.74)	0.66	(0.20, 2.20)
Antisocial or borderline personality disorder	144	22.9	101	23.6	43	21.4	0.88	(0.59, 1.32)	0.84	(0.55, 1.29)
Antisocial	104	16.5	79	18.5	25	12.4	0.63	(0.39, 1.02)	0.59	(0.36, 0.96)
Borderline	67	10.7	34	7.9	33	16.4	2.28	(1.36, 3.80)	2.29	(1.37, 3.84)

Footnotes

Extremely low cell count for some variables precluded statistical analysis.

¹ Nocon A, Berge D, Astals M, Martín-Santosa R, Torrens M. Dual diagnosis in an inpatient drug-abuse detoxification unit. *Eur Addict Res.* 2007;13(4):192-200.

² Astals M, Domingo-Salvany A, Castillo C, Tato J, Vázquez JM, Martín-Santos R, Torrens M. Impact of substance dependence and dual diagnosis on the quality of life of heroin users seeking treatment. *Subst Use Misuse.* 2008;43(5):612-632.

³ Rodríguez-Llera MC, Domingo-Salvany A, Brugal MT, Silva TC, Sánchez-Niubó A, Torrens M, ITINERE Investigators. Psychiatric comorbidity in young heroin users *Drug Alcohol Depend.* 2006;84(1):48-55

⁴ Herrero MJ, Domingo-Salvany A, Torrens M, Brugal MT. the ITINERE Investigators. Psychiatric comorbidity in young cocaine users: induced versus independent disorders. *Addiction.* 2008;103(2):284-293.

⁵ Martín-Santos R, Torrens M, Poudevida S, Langhor K, Cuyas E, Pacific R, Farré M, Pichini S, de la Torre Fornell R. 5-HTTLPR polymorphism, mood disorders and MDMA use in a 3-year follow-up study. *Addict Biol.* 2010;15:15-22.

^a Discrepancies in totals due to missing responses

^b For young heroin and young cocaine users, the age of first alcohol and cannabis use was calculated from the youngest age of the following two variables: age began chronic use (i.e. ≥ 4 days a week during a month for cannabis, and ≥ 5 drinks per day for ≥ 4 days a week during a month for alcohol) and age began using most of the day for 3 consecutive days for cannabis, and using ≥ 5 drinks for 3 consecutive days for alcohol

^c With the exception of Ecstasy users and inpatient detoxification patients where age of first use of any substance was calculated, age of habitual use refers to the youngest age of the following two variables: age began chronic use (i.e. ≥ 4 days a week during a month for drugs, and ≥ 5 drinks per day for ≥ 4 days a week during a month for alcohol) and age began using most of the day for 3 consecutive days for drugs, and using ≥ 5 drinks for 3 consecutive days for alcohol

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^d Any substance abuse or dependence includes heroin, methadone and other opiates (analgesics), cocaine, stimulants, hallucinogens, cannabis, sedatives, alcohol and other drugs

^e Poly substance abuse/dependence is abuse/dependence of more than one substance

^f Any opiate abuse or dependence includes heroin, methadone and other opiates (analgesics)

^g SUD: Substance use (abuse or dependence) disorder/s

^h NOS: Not otherwise specified

Table 2. Factors associated with Lifetime Axis I Non Substance Use Disorder (non-SUD) among females who use substances

	No lifetime Axis 1 non SUD	Lifetime Axis 1 non SUD	Unadjusted OR and 95% CI	OR and 95% CI Adjusted for age and study
Demographics				
<i>Marital status</i>				
Single/Never married/ Divorced/Separated/Widowed	72.8%	65.1%	1.00	1.00
Married/Cohabiting	27.2%	24.9%	0.70 (0.28, 1.28)	0.71 (0.38, 1.31)
<i>Highest level of education attained</i>				
Secondary school or university studies (versus no or primary schooling)	46.7%	47.7%	1.04 (0.60, 1.81)	1.06 (0.59, 1.88)
<i>Employment</i>				
Working or studying	42.4%	38.9%	0.86 (0.49, 1.52)	0.86 (0.48, 1.55)
<i>Criminal history</i>				
Ever in prison	33.0%	52.3%	2.23 (1.25, 3.97)	2.57 (1.35, 4.86)
<i>Living arrangements</i>				
Lives alone	5.4%	11.9%	1.00	1.00
Flatmate/family	72.8%	65.1%	0.41 (0.14, 1.21)	0.41 (0.14, 1.21)
Squatting/homeless	21.8%	22.9%	0.48 (0.15, 1.58)	0.50 (0.15, 1.68)
<i>Blood borne virus status</i>				
HIV	17.3%	21.8%	1.33 (0.63, 2.81)	1.36 (0.62, 2.96)
Hepatitis C	28.4%	48.0%	2.33 (1.24, 4.34)	3.05 (1.48, 6.29)
Recruited from out of treatment settings	58.7%	59.6%	1.04 (0.59, 1.83)	1.99 (0.58, 6.80)

Table 3. Factors associated with Lifetime Axis I Non Substance Use Disorder (non-SUD) among males who use substances

	No lifetime Axis 1 non SUD	Lifetime Axis 1 non SUD	Unadjusted OR and 95% CI	OR and 95% CI Adjusted for age and study
<i>Marital status</i>				
Single/Never married/ Divorced/Separated/Widowed	78.1%	85.1%	1.00	1.00
Married/Cohabiting	21.9%	14.9%	1.60 (0.94, 2.71)	1.56 (0.90, 2.57)
<i>Highest level of education attained</i>				
Secondary school or university studies (versus no or primary schooling)	50.0%	40.9%	0.69 (0.46, 1.03)	0.63 (0.42, 0.95)
<i>Employment</i>				
Working or studying	52.9%	42.8%	0.66 (0.45, 0.99)	0.67 (0.45, 1.01)
<i>Criminal history</i>				
Ever in prison	60.4%	66.9%	1.32 (0.87, 2.00)	1.51 (0.98, 2.34)
<i>Living arrangements</i>				
Lives alone	12.4%	11.8%	1.00	1.00
Flatmate/family	74.5%	70.4%	0.99 (0.53, 1.84)	0.85 (0.50, 1.80)
Squatting/ homeless	13.1%	17.7%	1.42 (0.66, 3.03)	1.32 (0.59, 2.92)
<i>Blood borne virus status</i>				
HIV	21.2%	16.3%	0.72 (0.43, 1.23)	0.75 (0.44, 1.29)
Hepatitis C	46.1%	51.4%	1.23 (0.82, 1.86)	1.40 (0.91, 2.17)
Recruited from out of treatment settings	46.4%	51.3%	1.22 (0.82, 1.81)	0.79 (0.32, 1.94)

Table 4. Associations between specific Lifetime Substance Use Disorders and Non Substance Use Disorder among females who use substances

Lifetime substance use disorders OR (95%CI)	Lifetime (non-substance use) psychiatric disorders OR (95%CI)					
	Mood	Anxiety	Eating	Psychotic	Antisocial and/or borderline personality	Any substance induced
Alcohol	1.84 (1.03, 3.29)	1.82 (0.92, 3.60)	1.21 (0.48, 3.07)	1.10 (0.37, 3.28)	1.71 (0.87, 3.37)	2.92 (1.40, 6.11)
Opiates	1.58 (0.85, 2.93)	1.58 (0.74, 3.37)	0.59 (0.23, 1.50)	7.26 (0.93, 56.71)	2.68 (1.17, 6.16)	1.75 (0.77, 3.95)
Cocaine	1.36 (0.71, 2.60)	2.67 (1.06, 6.76)	2.28 (0.64, 8.13)	5.28 (0.67, 41.35)	10.34 (2.41, 44.43)	2.81 (1.03, 7.63)
Sedatives	1.44 (0.79, 2.61)	1.40 (0.70, 2.82)	0.45 (0.14, 1.39)	3.81 (1.22, 11.86)	1.93 (0.97, 3.85)	1.93 (0.89, 3.78)
Stimulants	1.31 (0.71, 2.40)	1.62 (0.80, 3.28)	2.35 (0.93, 5.98)	3.12 (1.03, 9.41)	1.54 (0.77, 3.11)	2.12 (1.02, 4.39)
Cannabis	1.32 (0.74, 2.36)	1.06 (0.53, 2.13)	1.62 (0.64, 4.10)	3.01 (0.97, 9.34)	4.47 (2.18, 9.20)	3.66 (1.73, 7.74)
Hallucinogens	2.13 (1.06, 4.29)	2.19 (1.01, 4.75)	3.10 (1.17, 8.21)	0.65 (0.14, 3.05)	1.80 (0.82, 3.93)	2.75 (1.25, 6.06)
Poly substance	1.52 (0.75, 3.09)	2.57 (0.95, 6.98)	0.88 (0.30, 2.56)	-	7.91 (1.83, 34.11)	6.42 (1.48, 7.80)

Footnote: Extremely low cell count for some variables precluded statistical analysis.

Table 5. Associations between specific Lifetime Substance Use Disorders and Non Substance Use Disorder among males who use substances

Lifetime substance use disorders OR (95%CI)	Lifetime (non-substance use) psychiatric disorders OR (95%CI)					
	Mood	Anxiety	Eating	Psychotic	Antisocial and/or borderline personality	Any substance induced
Alcohol	1.32 (0.83, 2.10)	1.22 (0.69, 2.15)	2.11 (0.64, 6.97)	2.70 (1.17, 6.20)	2.89 (1.77, 4.69)	1.60 (0.91, 2.83)
Opiates	0.73 (0.44, 1.21)	1.03 (0.54, 1.97)	0.78 (0.24, 2.59)	1.82 (0.68, 4.86)	2.18 (1.21, 3.91)	0.82 (0.45, 1.51)
Cocaine	2.13 (1.13, 4.02)	0.95 (0.49, 1.86)	0.99 (0.27, 3.67)	1.53 (0.57, 4.09)	3.35 (1.67, 6.73)	4.60 (1.62, 13.04)
Sedatives	1.07 (0.65, 1.74)	1.74 (0.97, 3.11)	1.00 (0.30, 3.30)	0.96 (0.43, 2.15)	3.88 (2.43, 6.20)	1.57 (0.89, 2.79)
Stimulants	1.21 (0.75, 1.95)	1.91 (1.08, 3.39)	3.25 (1.04, 10.11)	0.83 (0.37, 1.85)	3.33 (2.10, 5.28)	1.71 (0.98, 3.01)
Cannabis	1.38 (0.86, 2.23)	1.83 (0.99, 3.39)	0.81 (0.27, 2.45)	0.59 (0.28, 1.24)	1.91 (1.18, 3.08)	1.39 (0.78, 2.47)
Hallucinogens	1.57 (0.94, 2.61)	1.49 (0.80, 2.78)	3.88 (1.27, 11.81)	0.78 (0.31, 1.95)	2.58 (1.59, 4.20)	2.38 (1.33, 4.26)
Poly substance	4.06 (1.43, 11.53)	2.02 (0.70, 5.83)	1.80 (0.23, 14.08)	4.55 (0.61, 34.11)	19.78 (2.70, 144.88)	-

Footnote: Extremely low cell count for some variables precluded statistical analysis.