



## Short Communication

## Depression among regular heroin users: The influence of gender

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## ABSTRACT

The aim of this study was to determine the prevalence of recent (last 12 months) depression in regular young heroin users and to ascertain factors associated with depression in this population, broken down by gender. A sample of 561 participants completed a cross-sectional survey. Eligibility criteria were: age 30 years or younger, and having used heroin for at least 12 days in the last 12 months and at least one day in the last 3 months. Participants were recruited outside of health-care facilities in the cities of Barcelona, Madrid and Seville by targeted sampling and chain referral methods. Depression was assessed using the World Mental Health Composite International Diagnostic Interview. The prevalence of recent depression was 22.3% (35.2% among women and 17.3% among men,  $p < 0.001$ ). In the multivariate analysis, the factors positively associated with recent depression in the whole sample were female gender, age 25 or less, inability to work due to health problems and high risk consumption of alcohol. Among women, the related variables were age 25 or less, cocaine dependence in the last 12 months, and alcohol consumption in that period. Among men, employment status was the only related variable. Analysis of an overall sample without the gender breakdown may hide important differences in the factors associated with depression in men and women. Both prevention and treatment of depression should rely on specific gender analysis.

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## 1. Introduction

The prevalence of depression among opiate addicts, depending on the population, setting and recall period, ranges between 16 and 44% (Havard, Teesson, Darke, & Ross, 2006; Magura, Kang, Rosenblum, Handelsman, & Foote, 1998; Rodriguez-Llera et al., 2006; Teesson et al., 2005), and is higher than that in the general population (Havard et al., 2006). Depression during drug dependence has important implications for morbidity and mortality, beyond those of the disease itself. Persons who suffer depression are less compliant with antiretroviral treatment (Cook et al., 2007), have more risk of overdose (Tobin & Latkin, 2003), higher incidence of suicide (Darke et al., 2009; Havard et al., 2006) and higher rates of relapse following rehabilitation treatment (Hasin et al.,

2002). The factors associated with depression that have been identified in this population include greater consumption of psychoactive drugs (Compton, Cottler, Ben Abdallah, Cunningham-Williams, & Spitznagel, 2000; Conner, Pinquart, & Duberstein, 2008; Havard et al., 2006) and less social support (Risser, Cates, Rehman, & Risser, 2010); moreover, the same as in the general population, the prevalence of depression among persons addicted to opiates is twice as high as in women as in men (Magura et al., 1998; Rodriguez-Llera et al., 2006; Torrens, Gilchrist, & Domingo-Salvany, 2011). However, although some studies have evaluated the factors related with depression in opiate users (Broadhead, Gehlbach, de Gruy, & Kaplan, 1988; Davey-Rothwell & Latkin, 2007; Magura et al., 1998) using gender as one more covariate, to our knowledge few studies have evaluated whether there are different predictive factors for men and women (Davey-Rothwell & Latkin, 2007; Magura et al., 1998; Risser et al., 2010). Depression in opiate addicts is a curable condition (Wines, Saitz, Horton, Lloyd-Travaglini, & Samet, 2004) and the identification of specific gender-related factors would make it possible to design more appropriate strategies for prevention, diagnosis and treatment.

The aim of this study is to determine the prevalence of recent depression in a sample of regular heroin users recruited outside of the

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health services, and to identify the factors related with depression in men and women.

## 2. Material and methods

### 2.1. Subjects

This study focused on a subsample of the ITINERE cohort of heroin users. The total number of participants in the ITINERE cohort was 992 at first visit. The cohort eligibility criteria were: age 30 years or younger, having used heroin for at least 12 days in the last 12 months and at least one day in the last 3 months (de la Fuente et al., 2005). Participants were recruited outside health-care facilities in the cities of Barcelona, Madrid and Seville by targeted sampling and chain referral methods.

In order to allow a cross-sectional analysis, depression assessment was introduced in the questionnaire several months after the first follow-up visit had begun. Thus, since assessment was introduced once follow-up visits had already started and some subjects were lost during the first follow-up, only 561 participants with depression assessment in the first or second follow-up visit between September, 2002 and July, 2005 were included.

### 2.2. Data collection and measures

Depression was assessed using the World Mental Health Composite International Diagnostic Interview (CIDI) (Kessler & Ustun, 2004). Recent depression was defined as major depression within the last 12 months according to DSM-IV criteria.

Heroin dependence and cocaine dependence were determined based on the Severity of Dependence Scale (SDS). The SDS contains five items, all of which are explicitly concerned with impaired control over drug taking and with worries and anxieties about drug use. It satisfies a number of criteria indicating its suitability as a measure of dependence (Gossop et al., 1995). It was applied to assess dependence severity (scores from 0 to 15; where 0 = no dependence) for heroin (SDS-H) and for cocaine (SDS-C). Dependence was defined as a score of 3 or more in the case of heroin, and 4 or more in the case of cocaine (Gonzalez-Saiz et al., 2009).

The Duke-UNC Functional Social Support Questionnaire (FSSQ) (Broadhead et al., 1988) was administered to measure users' perception of personal social support. It is a questionnaire composed of 8 items that assess two factors: Confidant and Affective Support. This version has been validated in the Spanish general population (Bellón, Delgado, Luna, & Lardelli, 1996).

Major socio-demographic characteristics were assessed, as age, educational level, type of housing and occupational status that was categorised in the questionnaire as employed, unemployed and unable to work due to health problems. Other assessed variables were: drug use history, frequency and route of cocaine and heroin administration, use of alcohol [alcohol consumption was rated as none or moderate (that is, <40 g/day for men and <20 g/day for women), at risk ( $\geq 40$ –80 g/day for men and  $\geq 20$ –40 g/day for women), or at high risk ( $\geq 80$  g/day for men and  $\geq 40$  g/day for women)], use of benzodiazepines and other drugs, and HIV serostatus. All behavioural variables referred to the last 12 months.

### 2.3. Laboratory analysis

Determination of antibodies in the dried blood sample was made by commercial enzyme immunoanalysis for anti-HIV. Only doubly reactive samples were considered positive.

### 2.4. Data analysis

A bivariate analysis was performed to identify possible factors related with depression in the last 12 months. The statistical significance of

differences between qualitative variables was assessed with Chi-square and Fisher's exact tests, and analysis of variance (ANOVA) was used for the qualitative variables. Significance was set at two-tailed  $p < 0.05$ . Three logistic regression models were fitted to assess the factors related to depression in the whole sample, and among men and women. The models included all variables with  $p < 0.10$  in the bivariate analysis. All variables retained in these three regressions were used to make the final models shown. Possible interactions among the related factors were also evaluated.

## 3. Results

Of the 561 subjects, 27.8% were women. The mean age was 26 years (SD 3.25). About 64.9% were unemployed and 23.4% were HIV positive. Some 55.7% had injected drugs in the last 12 months. About 79.7% had been using heroin for more than 5 years, and 88.1% had been using cocaine for this time. Some 57.2% were dependent on heroin and 54.9% were dependent on cocaine. High risk alcohol consumption was found in 20.5%, and 34.2% took benzodiazepines daily or almost daily. Women were younger and more frequently unemployed, had a shorter history of consuming heroin [7.8 vs. 9.3 years for men ( $p < 0.01$ )] and cocaine [8.7 vs. 10.16 years ( $p < 0.01$ )], and fewer years of injecting drug use [6 vs. 7.3 years ( $p = 0.02$ )]. The overall prevalence of current depression was 22.3% (35.3% in women and 17.3% in men,  $p < 0.001$ ) (Table 1).

In the bivariate analysis for the whole sample, it was found that depression was more frequent among those aged  $\leq 25$  years (OR = 1.61; 95% CI 1.07–2.38), in the homeless (OR = 1.89; 95% CI 1.18–3.06), in those who were unable to work due to health problems (OR = 2.92; 95% CI 1.41–6.04), in persons who had received psychological treatment in the last 12 months (OR = 4.5; 95% CI 1.31–15.69), and in those with risk levels of alcohol use in that period (OR = 1.67; 95% CI 1.01–2.75). In men the only variable associated with depression was being unable to work due to health problems (OR = 9.1; 95% CI 2.89–29.19). The variables related with recent depression in women were cocaine dependence (OR = 2.02; 95% CI 1.01–4.05), being homeless (OR = 2.36; 95% CI 1.08–4.08), and consumption of benzodiazepines 3 or more days a week (OR = 2.07; 95% CI 1.04–4.1).

In the multivariate analysis, the variables positively associated with recent depression in the whole sample were female gender, age 25 or less, and being unable to work due to health problems, and high risk consumption of alcohol. Among men, the only related variable was employment status, whereas among women the related factors were age 25 or less, cocaine dependence in the last 12 months, and high risk alcohol consumption in that period (Table 2).

## 4. Discussion

In our study, the factors associated with depression among women who use heroin regularly differed from those found in their male counterparts. Analysis of the whole sample, in which gender was shown as a related factor, hid important differences in the factors that predicted depression in men and women; that is, gender modifies the effect of other factors on depression. In women, younger age, alcohol consumption, and cocaine dependence were positively associated with suffering depression, whereas in men, the only variable associated was being unable to work due to health problems. Our study also confirms that depression among regular heroin users, the same as in the general population, is much higher in women than in men.

Among the main reasons for the scarcity of studies that aim to identify the factors associated with depression among drug using women and men are the difficulties in attaining a sufficient sample size (Conner et al., 2008), particularly for women, and perhaps the misconception that, in preventing or treating depression, those factors valid for a male–female sample (males are usually the bigger group in these studies) are also

valid for women or men separately. The studies we identified that had the objective of determining the associated risk factors focused either on injecting (Conner et al., 2008; Risser et al., 2010) or HIV-positive

populations (Broadhead et al., 1988; Knowlton et al., 2001), or obtained their sample from persons in drug treatment (Compton et al., 2000).

Two modifiable factors related with drug abuse patterns are significantly related in our study with major depression in women. With regard to cocaine use, it has been reported that women have a more intense craving (Elman, Karlsgodt, & Gastfriend, 2001; Elman, Karlsgodt, Gastfriend, Chabris, & Breiter, 2002) and that depressive symptomatology in women enhances this effect (Rodriguez-Llera et al., 2006). All of this may influence why it is more difficult for women to stop drug use and thus be more exposed to depression. Alcohol may act in a similar way. The stronger relation found in women between depression and alcohol consumption is similar to what has previously been described in the general population (Boden & Fergusson, 2011). There are genetic factors and gender differences that condition the greater vulnerability to depression in women with high alcohol consumption than in men (Kendler, Heath, Neale, Kessler, & Eaves, 1993). Furthermore, the association between being a young woman and depression has been described previously (Burns, Martyres, Clode, & Boldero, 2004), although other studies found no age differences; in the latter studies, however, the populations were taken from clinical samples, either exclusively in drug injectors or in samples of persons much older than those in our sample (Magura et al., 1998; Peles, Schreiber, Naumovsky, & Adelson, 2007; Risser et al., 2010). Thus, both cocaine dependence and excess alcohol consumption are important factors in female heroin users who suffer from depression. Modification of these factors may contribute to more adequate treatment of depression, and their presence can alert the clinician to a possible depressive condition in young women who seek treatment for heroin dependence.

The fact that no factors other than employment status were found to be associated with depression in men is noteworthy. The explanation may be that mental illness is precisely one of the reasons for the inability to work. Neither the factors identified for women, nor most of those investigated in the bivariate analysis were found to be associated with depression. It is possible that our variables failed to detect the relevant information related with the occurrence of depression among males, which suggests that further studies should be carried out in this regard. In fact, the only associated factor shows that men who are unable to work due to health problems are more frequently depressed than those who are employed or unemployed. It may be that inactivity (Lerner et al., 2004) could lead to depression, or that depression in a substantial proportion of men was related to their inability to work.

Our data confirm that depression in heroin users recruited outside of the health services is higher than in the general population (Havard et al., 2006) and that it is particularly high in women. This is one of the few studies (Risser et al., 2010) on depression in a community sample which differentiates between men and women and, to our knowledge, the only study to do this without focusing on HIV patients or exclusively on injectors. The prevalence of depression observed is lower than in community samples of injectors (Risser et al., 2010), but similar to those obtained in populations of heroin users recruited through clinical samples or treatment centres (Havard et al., 2006; Teesson et al., 2005), which suggests that there is an important unmet need among populations contacted in the street.

Our study has several limitations. First, its cross-sectional nature means that the causal sequence cannot be determined. Second, the ITINERE sample is not random, although rigorous efforts were made to make the sample as representative as possible (de la Fuente et al., 2005). Third, the social desirability bias may have led to

**Table 1**  
Characteristics of participants by gender.

	Total		Women		Men	
	n = 561		n = 156		n = 405	
Age (years) <sup>***</sup>						
>25	350	62.4%	78	50%	272	67.2%
≤25	211	37.6%	78	50%	133	32.8%
Educational level						
≤Primary level	207	36.9%	50	32.1%	157	38.8%
≥Secondary level	354	63.1%	106	67.9%	248	61.2%
Occupational status <sup>a,**</sup>						
Employed	177	31.6%	40	25.6%	137	33.8%
Unemployed	364	64.9%	115	73.7%	249	61.5%
Unable to work due to health problems	20	3.6%	1	0.6%	19	4.7%
Type of housing <sup>a,**</sup>						
Homeless <sup>b</sup>	99	17.6%	38	24.4%	61	15.1%
Other	462	82.4%	118	75.6%	344	84.9%
Drug injection <sup>a</sup>						
No	305	54.3%	87	55.8%	218	53.8%
Yes	256	55.7%	69	44.2%	187	46.2%
Length of drug injection <sup>**</sup>						
<5 years	325	57.9%	107	68.6%	218	53.8%
5 years or more	236	42.1%	49	31.4%	187	46.2%
Frequency of heroin use <sup>a</sup>						
Three times a week or more	212	37.8%	54	34.6%	158	39%
1–2 times a week or less	349	62.2%	102	65.4%	247	61%
Length of heroin use						
<5 years	114	20.3%	46	29.5%	68	16.8%
5 years or more	447	79.7%	110	70.5%	337	82.2%
Heroin dependence (SDS)						
No	240	42.8%	74	47.4%	166	41%
Yes	321	57.2%	82	52.6%	239	59%
Frequency of cocaine use <sup>a</sup>						
Three times a week or more	319	56.8%	96	62.3%	223	55.5%
1–2 times a week or less	247	43.2%	58	37.7%	179	44.5%
Length of cocaine use <sup>**</sup>						
<5 years	67	11.9%	26	16.7%	41	10.1%
5 years or more	494	88.1%	130	83.3%	364	89.9%
Smoked cocaine use <sup>a,*</sup>						
No	195	34.8%	46	29.5%	149	36.8%
Yes	366	65.2%	110	70.5%	256	63.2%
Injected cocaine use <sup>a</sup>						
No	358	63.9%	101	64.7%	257	63.5%
Yes	202	36.1%	54	35.3%	148	36.5%
Cocaine dependence (SDS)						
No	251	45.1%	64	41.6%	187	46.4%
Yes	306	54.9%	90	58.4%	216	53.6%
Alcohol <sup>a</sup>						
None or moderate consumption	378	67.4%	106	67.9%	272	67.2%
Risk consumption	68	12.1%	18	11.5%	50	12.3%
High risk consumption	115	20.5%	32	20.5%	83	20.5%
Benzodiazepines <sup>a</sup>						
1–2 times a week or less	369	65.8%	102	65.4%	267	65.9%
Three times a week or more	192	34.2%	54	34.6%	138	34.1%
Stimulants other than cocaine						
No	393	70.2%	112	71.8%	282	69.6%
Yes	167	29.8%	44	28.2%	123	30.4%
HIV <sup>***</sup>						
No	418	76.6%	107	69.9%	311	79.1%
Yes	128	23.4%	46	30.1%	82	20.9%
Treatment <sup>a</sup>						
None	340	60.6%	99	63.5%	241	59.5%
Drug treatment	179	31.9%	50	32.1%	129	31.9%
Psychological/psychiatric treatment	13	2.3%	4	2.6%	9	2.2%
Both	29	5.2%	3	1.9%	26	6.4%
Depression <sup>a***</sup>						
No	436	77.7%	101	64.7%	335	82.7%
Yes	125	22.3%	55	35.3%	70	17.3%
	Mean (SD)		Mean (SD)		Mean (SD)	
Confidant support (DUKE) <sup>*</sup>	73.8 (27.9)		77.3 (27.1)		72.5 (28.2)	
Affective support (DUKE)	63.4 (27.7)		65.7 (27.1)		62.53 (28)	

Notes to Table 1:

<sup>a</sup> In the last 12 months.

<sup>b</sup> Living most of the time in the last 12 months on the street, in abandoned houses or in similar places.

\* p<0.10.

\*\* p<0.05.

\*\*\* p<0.001.

**Table 2**  
Correlates of recent depression<sup>†</sup> among regular heroin users. Multivariate logistic regression analysis.

Independent Variables		Global (N = 561)		Women (N = 156)		Men (N = 405)	
		AOR	95% CI	AOR	95% CI	AOR	95% CI
Sex	Male	1		–		–	
	Female	2.76***	(1.78–4.29)				
Age (years)	≥25	1		1		1	
	<25	1.6**	(1.03–2.48)	2.79**	(1.29–6.04)	1.33	(0.76–2.33)
Occupational status <sup>†</sup>	Employed	1		1		1	
	Unemployed	1.33	(0.81–2.16)	1.64	(0.71–3.84)	1.24	(0.68–2.27)
	Unable to work due to health problems	10.38***	(3.76–28.69)	¥	–	9.05***	(3.18–25.76)
Estimated cocaine dependence (SDS) <sup>†</sup>	No	1		1		1	
	Yes	1.4	(0.91–2.16)	2.7**	(1.12–5.86)	1.05	(0.61–1.8)
Alcohol <sup>†</sup>	None or moderate consumption	1		1		1	
	Risk consumption	1.39	(0.83–2.32)	2.24*	(0.95–5.3)	1.08	(0.55–2.1)
	High risk consumption	1.74**	(1.04–2.93)	3.21**	(1.29–7.97)	1.35	(0.7–2.61)

AOR: Adjusted Odds Ratio; CI: Confidence interval; SDS: Severity dependence Scale.

<sup>†</sup> Refers to last 12 months.

¥ Only one woman was in this category.

\* p < 0.10.

\*\* p < 0.05.

\*\*\* p < 0.01.

under-reporting of some behaviours; nevertheless, the interviews were held outside the drug health or social service settings, and the interviewers were carefully trained to be non-judgemental.

## 5. Conclusion

Our results show that in heroin users about 1 of every 5 men and 1 of every 3 women suffered from depression. This is a condition that should be addressed by drug dependence treatment resources as it can be related with worse outcome or relapses. Among women, age, dependence on cocaine, and alcohol consumption are related to depression, whilst among men no relevant factors could be found. Given the important differences in the factors associated with depression among men and women, studies by gender should be encouraged.

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### Contributors

Authors Bravo MJ, Barrio G, Brugal MT, Domingo-Salvany A and De la Fuente L designed the study and wrote the protocol. Author Sordo L, Bravo MJ, Barrio G and Chahua M conducted literature searches and provided summaries of previous research studies. Author Sordo L and Molist G conducted the statistical analysis. Author Sordo L wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

### Conflict of Interest

There are no conflicts of interest.

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