

# Substance use among patients in specialized mental health services in Norway: prevalence and patient characteristics based on a national census

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## Research article

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# Abstract

**Background:** Most studies on substance use among psychiatric patients focus on patients within specific diagnostic categories. Less is known about substance use among the general psychiatric patient population. The aim of this study was to investigate the clinical and demographic variation in the prevalence of substance use among psychiatric in-patients and outpatients in Norway.

**Methods:** A national census in psychiatric institutions and outpatient clinics was conducted. Data were returned for 2,358 in-patients (response rate, 65%) and 23,167 outpatients (response rate, 60%). Substance use was measured based on substance use disorder diagnosis or reported substance use in the last four weeks (alcohol 2–4 days a week or illicit drug use). Regression analyses controlling for demographic and socio-demographic characteristics were carried out.

**Results:** Substance use was identified in 32.4% of in-patients and 13.9% of outpatients. The most frequently reported substances used were alcohol, sedatives and cannabis. Among in-patients, the prevalence of substance use was highest in patients with schizophrenia, personality disorders and anxiety disorders. Among outpatients, the prevalence was highest in patients with schizophrenia and other psychoses. In-patients with anxiety disorders and outpatients with schizophrenia and other psychoses had a significantly higher risk of substance use than other patients. In both samples, the prevalence of substance use was higher among males, 24–29-year-olds and the most socially deprived.

**Conclusions:** This study provides further knowledge about patients at risk for co-morbid substance abuse and poor treatment outcomes. Clinicians may consider targeting patients with severe mental illness, young males and those who are socially deprived in efforts to prevent emerging substance abuse and improve outcomes.

## Background

The high prevalence of co-morbid substance use disorders (SUD) and mental health disorders documented in epidemiological research [1, 2] has also been found in studies of the psychiatric patient population. For instance, register-based studies reported that among patients with psychiatric disorders, rates for any lifetime SUD were 25% for anxiety and depression and 46% for personality disorders [3]. Recent research has suggested that among individuals with schizophrenia, even non-problematic drug use may increase the risk for developing SUD [4].

Most previous studies on substance use among psychiatric patients were carried out among patients within specific diagnostic categories, such as schizophrenia, bipolar disorders and major depression [5–10]. A strong association between severe mental disorders and SUD has been shown both among in-patients and outpatients [7], as well as among patients in acute departments [11, 12]. The most frequently reported substances used among patients with severe mental disorders were alcohol, cannabis, sedatives and stimulants [3, 11, 12]. In some studies, alcohol was found to be the most

prevalent drug used across all psychiatric disorders [3], whereas other studies estimated the use of illicit substances to be more common than alcohol use among those with severe mental illness [7, 10].

While many studies have investigated co-morbid SUD among patients with severe mental illness, substance use in patients with less severe mental disorders, such as anxiety and affective disorders [13], has received less attention. One of the few studies conducted in a sample of patients drawn from the general psychiatric patient population indicated a higher prevalence of SUD among in-patients than outpatients, and particularly among patients with personality disorders [14]. However, this study did not report data on the type of substances used. Another study of a non-selected sample of patients receiving treatment in community mental health centres in Norway, where anxiety and affective disorders are common psychiatric disorders, identified SUD in 20% of the patients. This study also showed that having SUD was associated with a lower prevalence of anxiety and depression [15].

Despite previous research among psychiatric patients used different samples and different methods to identify substance use, and thus reported varying SUD prevalence rates, the findings regarding the characteristics of patients with substance use problems are consistent. Previous studies have shown that co-occurring mental disorders and SUD are associated with being male [3, 7, 9, 14], younger and single [14, 16]. Moreover, research has demonstrated that psychiatric patients with SUD have less educational attainment [3, 14, 17] and generally more adverse socio-economic characteristics [15].

The literature suggests that substance use in individuals with mental disorders is associated with higher levels of antisocial and behavioural challenges [14], more complicated recovery processes [15] and poorer outcomes [18, 19]. To date however, research on the characteristics of patients with substance use in mental health services has mainly focused on delimited patient populations. The current study extends existing knowledge by investigating substance use among in-patient and outpatient psychiatric patients in a nationwide census.

## Aims of the study

The aims of this study were to examine:

- the prevalence of substance use among in-patients and outpatients in the specialized mental health services;
- the substance use characteristics of these patients, in terms of psychiatric disorders and type of drug used most frequently; and
- the demographic (age and gender) and socio-demographic (education, income and marital status) characteristics of outpatients and in-patients with substance use compared with other patients.

We hypothesized that the prevalence of substance use would be higher among patients suffering from severe mental disorders compared with other mental disorders, and moreover, that substance use would

be more prevalent among males than females, and among social deprived patients, in line with previous studies [3, 14].

## Methods

### Setting

In Norway, as in most other European countries [20], there are distinct mental health and SUD treatment departments. Specialized mental health services are owned on behalf of the state by four regional health authorities (RHAs), which are responsible for the provision of health services for the population in their area. Specialized mental health services are organized together with general hospital services in 19 health trusts. The services are mostly public, and the private health service providers have an operating agreement with the RHA [21]. General practitioners or other specialist health services make referrals of patients to mental health services. As in most Western countries, the services for people with mental disorders have gone through major changes in recent decades. There has been a reduction in the number of patients staying in psychiatric institutions, with most people with mental problems being provided with outpatient mental health services.

### Design

A comprehensive national census of patients in mental health treatment, commissioned and financed by the Norwegian Directorate of Health, was carried out by the SINTEF Research Foundation. The census was conducted in all psychiatric wards and departments (including acute wards) providing in-patient treatment on a specific date, and in all clinics and departments (including community mental health centres), providing outpatient treatment during a specific 14-day period. Each patient's clinician was responsible for completing the form. Because the study had a national cross-sectional design with high coverage, it was possible to estimate the point prevalence for the entire patient population. The Regional Committee for Medical and Health Research Ethics (reg. no. 2012/848) approved the current study.

### Data collection

All in-patients on a given day (20 November 2012) and all outpatients who had one or more consultations during a 14-day period (15–28 April 2013) were the targeted study participants. All mental health services in public and private sectors were invited to participate in the census. Several months prior to the mapping, the service managers and clinicians received information describing the project and the data collection procedures. The clinicians completed one form per patient. The registration forms included a wide range of topics, including main and secondary diagnoses (International Classification of Diseases, ICD–10), demographics and socio-demographic characteristics. The clinicians were encouraged to invite the patient to participate in completing the form, and over half of the in-patients (55%) and outpatients

(57%) did so. The completed forms were returned by registered mail to a firm that performed scanning and coarse quality control of the data. The project team performed further quality control of the data files.

## Sample

In total, 94 of the 104 psychiatric in-patient departments and 107 of the 110 psychiatric outpatient clinics in the health trusts participated in the census. Most of the units that did not participate were small, and they cited a lack of time as their reason for not participating. Non-participating clinics comprised 1% of all outpatient consultations, and non-participating institutions comprised 4% of all in-patient days during 2012. Data were returned for 2,358 in-patients and 23,167 outpatients. Based on data from the National Patient Register on the number of patients attending the mental health services during the inclusion periods, the response rates were estimated to be 65% of 3,618 in-patients and 60% of 38,904 outpatients.

## Variables

### *Psychiatric diagnoses*

The following diagnostic categories were used: Schizophrenia (F20), Other psychoses (F22–25, F28-F29), Bipolar disorder (F31), Depression (F32-F34), Anxiety (F40, F41), PTSD (F43.1), Eating disorders (F50), Personality disorders (F60, F61), Other psychiatric diagnoses or unspecified (all other F-diagnoses).

### *Substance use*

Substance use was measured based on the recorded ICD–10 diagnoses of SUD (F10-F19), or reported substance use in the last four weeks preceding treatment, and included the following response options: (1) Less than once a week; (2) almost weekly; (3) 2–4 times a week; (4) almost daily. For individuals with psychiatric disorders, regular alcohol use and occasional use of illicit drugs may pose a risk of worsening psychiatric symptoms [22, 23] and development of problematic substance use [4]. Based on a recorded SUD diagnosis and reported substance use, we constructed a dichotomized variable, with a value of 1 for the presence of a SUD diagnosis or reported regular alcohol use (2–4 times a week or more/occasional illicit drug use), and 0 for no SUD diagnosis and non-regular alcohol use and no illicit drug use. Type of drug used was categorized as: alcohol, opioids, cannabis, sedatives, stimulants, or multiple substance use.

### *Demographic and socio-demographic characteristics*

In addition to gender and age, we included education (where low education corresponds to only primary school, medium education to secondary school and high education to university or other higher education), income (with the categories income from labour, health-related benefits, other economic support) and marital status (grouped in the three categories married/cohabitant/partner, separated/divorced/widow(er) and single/unmarried).

## Data analyses

The binary nature of the substance use variable as the dependent variable implies a logit model. The STATA software package was used for all analyses (Stata/SE 14.2 for Windows; StataCorp LP, College Station, TX). We estimated 3 models; the first model included only diagnoses (Model 1), gender and age were added in the second model (Model 2), and the third model also included the socio-demographic variables level of education, main source of income and marital status (Model 3).

## Results

### Prevalence of substance use

The prevalence of substance use is presented in Table 1. Substance use was identified in 390 in-patients (16.4%) based on ICD–10 diagnosis (F10-F19), and in an additional 373 in-patients (15.8%) based on recorded substance use. The total prevalence of substance use among in-patients was 32.4%. Among outpatients, substance use was identified in 1,300 outpatients (5.6%) based on ICD–10 diagnosis (F10-F19), and in an additional 1,910 outpatients (8.2%) based on recorded substance use. The total prevalence of substance use among outpatients was 13.9%.

Substance use was identified in 42.0% of all male in-patients, whereas the corresponding prevalence in female in-patients was 24.0%. Male patients diagnosed with schizophrenia had almost twice the risk of substance use compared with female patients suffering from the same mental illness. The same result appeared in in-patients diagnosed with bipolar disorders, with substance use being three times more prevalent for male than for female patients.

Substance use was prevalent in 20.0% of all male outpatients, versus only 10.1% of female outpatients. Consistent with in-patient results, male outpatients diagnosed with schizophrenia had more than twice the risk of substance use than female patients suffering from the same mental illness. The same male–female difference in prevalence of substance use also appeared among patients with bipolar disorders and depression. Among patients with personality disorders, the prevalence was roughly similar for females (13.4%) and males (16.4%). Within the various categories of diagnoses, the prevalence of substance use was lowest among those with eating disorders (8.3%), and few of these patients were men (3.2%).

### Substance use characteristics

Substance use characteristics are presented in Table 2. Among in-patients, cannabis and sedatives were the most frequently used substances, accounting for 12.3% and 10.9% of the total prevalence of substance use, respectively. The use of any illegal substances, such as cannabis (23.8%) and stimulants (20.8%), was more prevalent among patients diagnosed with schizophrenia than patients with other psychiatric diagnoses.

The substance most frequently used among patients diagnosed with anxiety disorders, personality disorders, and PTSD was sedatives, with rates of 21.0%, 17.9% and 17.3%, respectively. Among patients with bipolar disorders, use of alcohol (11.3%) was more prevalent than use of any illegal substance.

Among outpatients, use of alcohol was more prevalent (6.3%) than use of any illegal substances. In patients diagnosed with depression, who represented the largest diagnostic outpatient group, alcohol use was more prevalent (6.1%) than any illicit drug use. Cannabis and sedatives were the most frequently reported illegal substances used, accounting for 4.0% and 3.7% of the total prevalence of substance use, respectively. Patients with schizophrenia had higher use of illegal substances, particularly stimulants (11.2%) and cannabis (9.2%), than patients with other psychiatric diagnoses.

## Demographic and socio-demographic characteristics

Table 3 shows that the prevalence of substance use was highest among in-patients aged under 40 years, particularly among those aged 24–29 years (43%). Among patients in outpatient treatment settings, there were relatively small differences in prevalence of substance use between age groups, with rates of 13% and 18% for those aged under 40 years and those aged 60–69 years, respectively. Patients with lower levels of education (primary school or less) had a higher prevalence of substance use than those with higher levels of education (university), both among in-patients (36% and 22%, respectively) and outpatients (17% and 10%, respectively). Among both in-patients and outpatients, those with health-related benefits had a higher prevalence of substance use than those with income from labour or other sources. Finally, being married, cohabiting or having a partner implied a lower prevalence of substance use than having any other marital status.

## Regression results

Table 4, Figures 1 and Figure 2 provide the results of multivariate logistic regressions of the association between patient characteristics and odds ratios for substance use. Among in-patients (Figure 1), the differences in substance use prevalence in diagnoses (Model 1) were reduced when we added demographic (Model 2) and socio-demographic (Model 3) characteristics. Patients with anxiety disorders had significantly higher substance use prevalence than patients with schizophrenia when we controlled for demographic and socio-demographic characteristics.

Among outpatients (Figure 2), demographic and socio-demographic characteristics explained fewer of the differences in substance use prevalence between the diagnostic categories. Patients diagnosed with schizophrenia and patients with other psychoses did not differ significantly in substance use prevalence in Model 3.

Male patients had a higher prevalence of substance use in all model specifications. The youngest age groups (i.e., 18–23 years and 24–29 years) had higher substance use prevalence among in-patients, while the opposite was found among outpatients in Model 3.

The socio-economic differences found in the descriptive analyses were also valid in the regression analyses; lower education, receiving benefits rather than deriving income from labour, and not having a partner implied higher substance use prevalence in both samples, even when controlling for demographic characteristics and diagnoses.

## Discussion

This nationwide census conducted in psychiatric institutions and outpatient clinics showed that substance use occurred more frequently among in-patients than outpatients, and among patients with more severe mental illness in both treatment settings. Among in-patients, the most frequently used substances were cannabis and sedatives, whereas alcohol was more prevalent than use of any illegal substances among outpatients. In both samples, substance use was more prevalent in young males and the most socially deprived.

The higher prevalence of both SUD diagnosis and substance use found among in-patients aligns with previous studies [7, 14], and suggests that in in-patient treatment, there is a different patient case mix with relatively higher rates of severe mental illness, such as schizophrenia and major depression, which are typically associated with higher rates of co-occurring SUD [3, 7, 10].

A number of studies have documented that substance use and SUD are under-reported and underdiagnosed in psychiatric treatment settings [24–26]. Moreover, a recent Norwegian Board of Health study highlighted the existing deficiencies in specialized mental health services regarding the investigation and examination of patients with possible concurrent SUD [27]. The accuracy of reported substance use, such as in the present study, may depend on several factors, including whether substance use issues were part of the routine clinical assessment, and the patients' responses when asked about substance use. Such conditions may vary between treatment settings [28]. It is possible that the intensive treatment and close monitoring of patients in in-patient treatment allowed clinicians to make a more thorough evaluation of the patients' substance use behaviour, resulting in higher identification rates than in outpatient treatment settings. The under-identification of substance use may also be related to insufficient knowledge of substance abuse issues among clinicians [25] and/or the lower status of working with substance users [29].

Methodological and sample differences complicate the comparison of results between studies. Of the few studies conducted in general psychiatric outpatient and in-patient treatment settings, Rush and Koegl's study [14], conducted in in-patient and outpatient mental health treatment facilities in Ontario, is most comparable with the present work. They reported a prevalence of SUD (based on diagnosis) among in-patients of 15.6%, which is similar to the point prevalence of recorded SUD diagnosis in the current in-patient sample (16.4%). However, the current SUD rate of 5.6% based on recorded diagnosis found in the outpatient sample is relatively low in comparison with the 11% SUD prevalence among outpatients reported by Rush and Koegl [14].

When comparing the prevalence of substance use in psychiatric patients across countries, one should take into account possible between-country differences in the organization and delivery of health services. For example, community addiction services have a more prominent role in Norway and other European countries than in the USA [20]. Moreover, in Norway, community-integrated mobile teams offer dual treatment for individuals with mental illness and substance abuse.

Consistent with results from other studies of psychiatric patients, the present results showed that alcohol, cannabis and sedatives were the most commonly used substances [3, 11, 12]. Also in line with previous reports [7, 10], use of illegal substances, particularly cannabis, occurred more frequently among in-patients than outpatients, and, as hypothesized, among patients with the most severe mental disorders (e.g., schizophrenia and other psychoses). Although the association between use of illicit drugs and severe mental illness is frequently recognized in the literature, the basis for the link is still being discussed [30–32]. For example, research concerning the association between schizophrenia and SUD has suggested a common genetic risk [33], or that patients with a genetic risk for schizophrenia are more vulnerable to substance use [34].

As hypothesized, and consistent with previous clinical studies, the current results showed that substance use occurred twice as often among men than among women [e.g., 7, 9]. The prevalence of substance use was particularly high among in-patient young males, aged 18–29 years. This finding may reflect the high prevalence of substance-induced mental disorders among in-patients, which is associated with symptom onset at a younger age [7, 35]. Our results also confirmed the socio-demographic differences in prevalence of substance use reported elsewhere [3].

After adjusting for demographic and socio-demographic variables in multivariate analysis, the differences in prevalence rates of substance use between the psychiatric diagnostic categories among in-patients were reduced, indicating that substance use was associated with greater levels of social and economic disadvantages, as reported elsewhere [3]. The present results showed that independent of demographic and socio-demographic factors, in-patients with anxiety disorders, who constituted a relatively small subsample of those in in-patient treatment ( $n = 62$ ), had the highest prevalence of substance use, particularly alcohol and sedatives; this suggests that this subsample constituted a group of patients who used substances to cope with severe anxiety symptoms [36, 37].

A Canadian study found that socio-demographic characteristics did not explain differences in substance use prevalence among in-patients, while the opposite was found for outpatients [14]. Our results imply that socio-demographic characteristics explain differences in prevalence of substance use among both in-patients and outpatients. Furthermore, Rush and Koegl [14] found that among outpatients, socio-demographic variables such as young age, being male, single, and having a low level of education were associated with prevalence of substance use. Our results indicate that outpatients in the youngest age group (18–23 years old) were at lower risk of substance use than patients older than 24 years. However, we also found that less of the difference in prevalence of substance use between psychiatric disorders was explained by socio-demographic variables among outpatients than in-patients, reflecting a relatively

homogeneous outpatient population. Differences in access to health services between countries, and subsequent differences in patient composition in specialty mental health services might explain the non-congruent findings.

## **Strengths And Limitations**

A major strength of this study is the large unselected sample of psychiatric patients. Moreover, the current study represents one of very few studies reporting the prevalence of substance use among in-patients and outpatients in specialty mental health services.

There are several limitations. The reliability of substance use reporting in the current study may be a limitation. The current measure of substance use was based on combined information from the clinician's recordings of a co-occurring SUD diagnosis and reports of the patients' use of alcohol and illicit substances during the four weeks preceding treatment. Research shows that substance use problems are under-reported and underdiagnosed in mental health care [24–26]. The reliability of substance use reporting is likely to depend on the patient–therapist relationship, and on the extent to which the patient participated in completing the form. Information about which patients participated in completing the form was not included in the current analysis. In addition, the study design emphasizes patients in long-term treatment and patients with more frequent consultations, as they were more likely to be receiving treatment at any given time. One possible consequence of this is that the census included relatively more patients who were familiar with mental health services, and if so, those who were more likely to report on their substance use [28].

Moreover, reported substance use may not fulfil the diagnostic criteria for SUD, thus the current measure of substance use does not represent a clinically significant psychiatric co-morbidity. Consequently, the results from the present study may not be comparable with research using clinically validated substance use measures. Additionally, the current results may not generalize to countries with different structures of mental health and addiction treatment services. However, it is reasonable to believe that our findings can generalize to systems with public health services with separated rather than integrated specialized treatment for mental illness and SUD.

## **Conclusion And Implications**

The current study included patients from the general psychiatric patient population to provide further knowledge about patients at risk for co-morbid substance abuse. Patient characteristics associated with substance use include having a severe mental illness, being a young male and being socially deprived. Clinicians may want to target patients with these characteristics in efforts to identify and prevent emerging substance abuse and improve treatment outcomes. Future research should determine the clinical consequences of substance use in the general psychiatric patient population and investigate whether efforts designed to identify and manage substance use are effective in improving the treatment process and outcome.

## List Of Abbreviations

ICD: International Classification of Diseases; RHA: regional health authority; SUD: substance use disorders.

## Declarations

### Ethics approval and consent to participate

This study comprised full mapping of patients in all psychiatric wards and departments conducted on behalf of the national health authorities. Each patient's clinician was responsible for completing one form per patient. Written consent was obtained from the patients, but the clinician completed the forms for all patients, including those who did not give their consent. In the latter case, no personal identification number was collected. Data was anonymized for the analyses. The study was approved by The Regional Committee for Medical and Health Research Ethics (reg.no. 2012/848).

### Consent for publication

Not applicable

### Availability of data and materials

The data that support the findings of this study are available from author SOO upon reasonable request.

### Competing interests

The authors declare that they have no competing interests.

### Funding

No funding was provided for this study.

### Authors' contributions

HWA participated in designing the study, drafted the manuscript and completed final edits of the manuscript. SEL participated in designing the study, supervised the analyses and interpretation of data, and provided critical review of the manuscript. TR critically reviewed and revised the manuscript. SOO was responsible for the idea and design of the study, carried out the statistical analyses and contributed in drafting the manuscript. All authors read and approved the final manuscript as submitted.

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## Tables

**Table 1** Prevalence of substance use among in-patients and outpatients

Psychiatric disorders	N	Men (%)	Any substance use females (%)	Any substance use males (%)	Any substance use (%)
In-patients					
Schizophrenia	601	69.9	25.1	50.0	42.6
Other psychoses	235	49.3	24.3	29.5	27.2
Bipolar disorder	222	38.5	13.4	39.3	24.3
Depression	340	34.6	21.9	30.2	24.7
Anxiety	62	43.5	34.3	55.6	43.5
Post-traumatic stress disorder	75	20.0	31.7	40.0	33.3
Eating disorders	71	1.4	10.1	0.0	9.9
Personality disorders	84	33.8	37.7	51.9	42.9
Other psychiatric disorders	668	48.2	26.2	38.0	31.4
Total	2358	48.0	24.0	42.0	32.4
Outpatients					
Schizophrenia	1641	64.2	14.9	31.2	25.7
Other psychoses	840	47.9	15.8	23.7	19.5
Bipolar disorder	1604	37.2	9.2	18.2	12.7
Depression	5253	32.9	8.0	15.8	10.6
Anxiety	2438	35.3	8.1	16.7	11.0
Post-traumatic stress disorder	1479	29.5	8.5	14.4	10.2
Eating disorders	761	3.2	8.1	12.5	8.3
Personality disorders	1670	27.4	13.4	16.4	14.3
Other psychiatric disorders	7481	40.0	11.1	21.9	15.3
Total	23167	36.9	10.1	20.0	13.9

**Table 2** Psychiatric diagnosis and most frequently used drug type among in-patients and outpatients in mental health services

Psychiatric disorders	Alcohol	Opioids	Cannabis	Sedatives	Stimulants	Multiple drug use	Any substance use
In-patients (n = 2,358)							
Schizophrenia	8.7	5.3	23.8	9.0	20.8	23.3	42.6
Other psychoses	7.2	3.0	13.6	8.1	10.2	13.6	27.2
Bipolar	11.3	1.4	7.7	8.1	4.5	7.7	24.3
Depression	10.6	0.3	3.8	12.9	1.8	5.3	24.7
Anxiety	19.4	0.0	3.2	21.0	1.6	9.7	43.5
PTSD <sup>1</sup>	14.7	4.0	6.7	17.3	5.3	12.0	33.3
Eating disorders	4.2	0.0	5.6	1.4	1.4	2.8	9.9
Personality disorders	10.7	3.6	11.9	17.9	11.9	13.1	42.9
Other psychiatric diagnoses	10.6	2.2	9.7	11.8	7.6	12.3	31.4
Total	10.0	2.7	12.3	10.9	9.8	13.4	32.4
Outpatients (n = 23,167)							
Schizophrenia	8.8	2.4	9.2	5.1	11.2	12.1	25.7
Other psychoses	6.8	0.4	7.6	5.2	4.6	5.2	19.5
Bipolar disorder	7.2	0.2	3.5	2.4	0.9	2.1	12.7
Depression	6.1	0.2	1.9	2.8	0.6	1.4	10.6
Anxiety	5.0	0.3	2.2	4.0	0.8	1.7	11.0
PTSD <sup>1</sup>	3.9	0.5	2.7	3.4	1.1	1.7	10.2
Eating disorders	5.1	0.1	2.1	1.2	0.5	1.1	8.3
Personality disorders	6.2	0.4	3.8	4.4	2.0	3.1	14.3
Other psychiatric diagnoses	6.6	0.9	5.1	4.1	2.4	3.8	15.3
Total	6.3	0.6	4.0	3.7	2.2	3.3	13.9

<sup>1</sup> Post-traumatic stress disorder

**Table 3** Demographic and socio-demographic characteristics of patients in mental health services with substance use

	In-patients			Outpatients		
	No substance	Substance	$\chi^2$	No substance	Substance	$\chi^2$
	use	use		use	use	
n (%)	n (%)	n (%)	n (%)	n (%)		
<i>Diagnosis</i>			74.67			304 (8)
Schizophrenia	345 (57)	256 (43)	(8)	1220 (74)	421 (26)	
Other psychoses	171 (73)	64 (27)		676 (80)	164 (20)	
Bipolar disorder	168 (76)	54 (24)		1400 (87)	204 (13)	
Depression	256 (75)	84 (25)		4698 (89)	555 (11)	
Anxiety	35 (56)	27 (44)		2169 (89)	269 (11)	
PTSD	50 (67)	25 (33)		1328 (90)	151 (10)	
Eating disorders	64 (90)	7 (10)		698 (92)	63 (8)	
Personality disorders	48 (57)	36 (43)		1432 (86)	238 (14)	
Other psychiatric disorders	458 (69)	210 (31)		6336 (85)	1145 (15)	
<i>Gender</i>			84.02			463 (1)
Female	912 (76)	284 (24)	(1)	12989 (90)	1452 (10)	
Male	643 (58)	458 (42)		6722 (80)	1725 (20)	
<i>Age</i>			54.61			30.26
18-23 years	233 (67)	116 (33)	(6)	3145 (87)	474 (13)	(6)
24-29 years	199 (57)	148 (43)		3431 (85)	591 (15)	
30-39 years	305 (61)	191 (39)		4929 (87)	720 (13)	
40-49 years	284 (71)	116 (29)		4060 (86)	634 (14)	
50-59 years	236 (72)	92 (28)		2213 (84)	409 (16)	
60-69 years	140 (74)	48 (26)		791 (82)	174 (18)	
≥70 years	155 (82)	33 (18)		651 (85)	111 (15)	
<i>Education</i>			24.54			148 (2)
High education	272 (78)	78 (22)	(2)	4246 (90)	498 (10)	
Medium education	584 (68)	269 (32)		8774 (88)	1250 (12)	
Low education	739 (64)	416 (36)		6937 (83)	1462 (17)	
<i>Main source of income</i>			34.75			154 (2)
Income from labour	170 (74)	61 (26)	(2)	5562 (90)	604 (10)	
Health-related benefits	961 (63)	553 (37)		10148 (84)	1973 (16)	
Other economic support	464 (76)	149 (24)		4247 (87)	633 (13)	
<i>Marital status</i>			43.35			253 (2)
Married/cohabitant/partner	378 (78)	105 (22)	(2)	8159 (90)	866 (10)	
Separated/divorced/widow(er)	289 (70)	126 (30)		2579 (85)	464 (15)	
Single/unmarried	868 (63)	520 (37)		8902 (83)	1854 (17)	

Note. All chi-square tests:  $p < 0.0001$

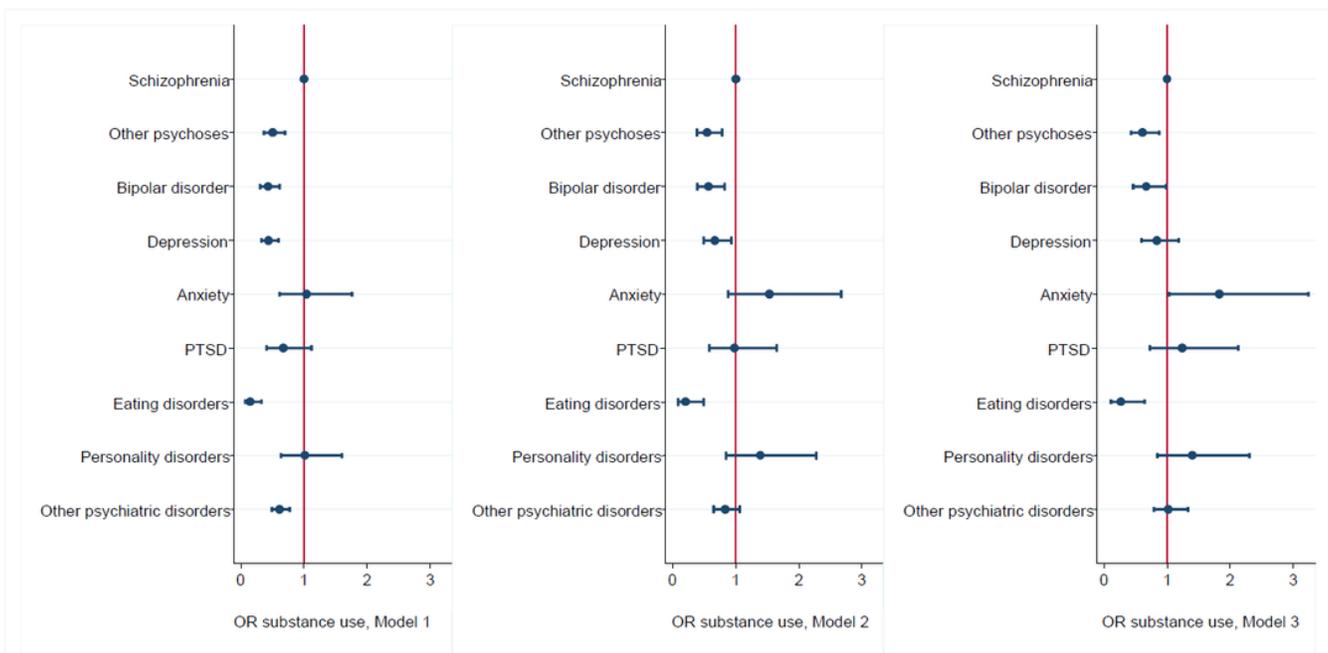
**Table 4** Regression results (logit) where the dependent variable is 0 (no co-occurring substance use) or 1 (co-occurring substance use) showing odds ratios and standard errors for in-patients (N=2,358) and outpatients (N=23,167)

	In-patients			Outpatients		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
<i>Diagnosis: Base (Schizophrenia)</i>						
Other psychoses	0.50*** [0.085]	0.55*** [0.100]	0.61*** [0.11]	0.70*** [0.073]	0.78** [0.084]	0.88 [0.095]
Bipolar disorder	0.43*** [0.077]	0.57*** [0.11]	0.67** [0.13]	0.42*** [0.040]	0.49*** [0.048]	0.66*** [0.067]
Depression	0.44*** [0.067]	0.68** [0.11]	0.83 [0.15]	0.34*** [0.025]	0.43*** [0.032]	0.61*** [0.048]
Anxiety	1.04 [0.28]	1.54 [0.43]	1.82** [0.53]	0.36*** [0.031]	0.45*** [0.040]	0.63*** [0.058]
Post-traumatic stress disorder	0.67 [0.17]	0.98 [0.26]	1.24 [0.34]	0.33*** [0.034]	0.43*** [0.046]	0.59*** [0.064]
Eating disorders	0.15*** [0.060]	0.21*** [0.091]	0.27*** [0.12]	0.26*** [0.037]	0.42*** [0.064]	0.58*** [0.090]
Personality disorders	1.01 [0.24]	1.39 [0.35]	1.39 [0.36]	0.48*** [0.043]	0.63*** [0.060]	0.79** [0.076]
Other psychiatric disorders	0.62*** [0.072]	0.83 [0.10]	1.02 [0.14]	0.52*** [0.034]	0.64*** [0.043]	0.86** [0.062]
<i>Gender: Base (female)</i>						
Male		1.99*** [0.20]	1.98*** [0.20]		2.13*** [0.086]	1.99*** [0.082]
<i>Age: Base (18–23 years)</i>						
24–29 years		1.37* [0.23]	1.33* [0.23]		1.09 [0.074]	1.26*** [0.090]
30–39 years		1.15 [0.18]	1.15 [0.19]		0.89* [0.058]	1.12 [0.081]
40–49 years		0.82 [0.14]	0.81 [0.15]		0.94 [0.063]	1.19** [0.091]
50–59 years		0.81 [0.14]	0.78 [0.15]		1.12 [0.084]	1.41*** [0.12]
60–69 years		0.83 [0.18]	0.86 [0.20]		1.31*** [0.13]	1.65*** [0.18]
≥ 70 years		0.50*** [0.12]	0.55** [0.15]		1.11 [0.13]	1.47*** [0.19]
<i>Education: Base (High education)</i>						
Medium education			1.21 [0.20]			1.03 [0.062]
Low education			1.52** [0.25]			1.36*** [0.085]
<i>Income: Base (Income from labour)</i>						
Health-related benefits			1.37* [0.25]			1.39*** [0.076]
Other economic support			1.00 [0.21]			1.15** [0.080]
<i>Marital status: Base (Married/cohabitant/partner)</i>						
Separated/divorced/widow(er)			1.81*** [0.30]			1.46*** [0.097]

Single/unmarried			1.36**		1.61***	
			[0.20]		[0.082]	
Constant	0.74***	0.43***	0.18***	0.35***	0.20***	0.070***
	[0.061]	[0.069]	[0.053]	[0.020]	[0.017]	[0.0086]
Observations	2.358	2.251	2.192	23.167	22.161	21.905

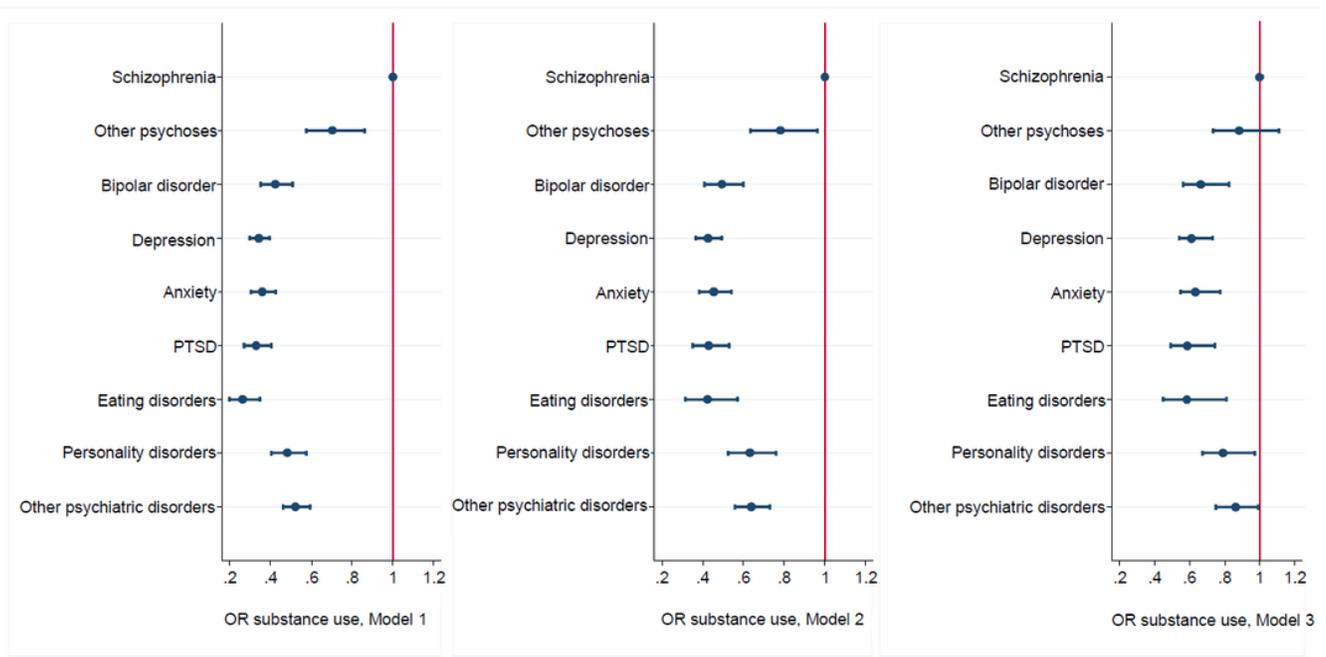
Standard error in parentheses. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

## Figures



**Figure 1**

Regression results showing odds ratios and confidence intervals for in-patients: Model 1 (diagnoses only), Model 2 (diagnoses, gender and age), Model 3 (diagnoses, gender and age, level of education, main source of income and marital status), N = 2358.



**Figure 2**

Regression results showing odds ratios and confidence intervals for outpatients: Model 1 (diagnoses only), Model 2 (diagnoses, gender and age), Model 3 (diagnoses, gender and age, level of education, main source of income and marital status), N = 23,167.