Chapter 7

Poly substance use and mental health of substance users presenting for treatment

Jessica De Maeyer
Kathy Colpaert
Serge Cogels
Maarten De Schrijver
Wouter Vanderplasschen

7.1 Introduction

An increase in poly substance use has been demonstrated over the past years. This tendency has been noticeable in society, but has also been observed among substance users who ask for treatment in specific drug treatment services. However, information of service providers in Belgium is rather limited.
Therefore, the specific aims of this study were to determine the prevalence of poly substance use in an integrated sample of substance users, seeking treatment in psychiatric hospitals, long-term residential treatment settings, detoxification units or outpatient methadone maintenance services and to investigate variables that could predict poly substance use in the last 30 days. Specific attention will be given to the characteristics of poly substance users and the extent and type of psychiatric disorders in this population.

7.2 Methods

7.2.1 Sample and data selection

This study is based on an integrated sample of two cross-sectional studies. The first study is a multi-center, cross-sectional study in 11 units for substance abuse treatment, situated in a psychiatric hospital in the provinces of East- and West-Flanders (Belgium) (n=274). The methodology of this study is extensively described in chapter 5. The second study wad based on a clinical sample of individuals seeking in- or outpatient substance abuse treatment in specialised drug treatment settings (n=55). This study was set up in 3 types of treatment services, methadone maintenance treatment, detoxification and long-term residential treatment (e.g. therapeutic communities) in Belgium. Data were collected between April 1st and December 31st 2010. In order to be eligible for the study participants had to (a) be older than 18, (b) be able to speak Dutch or French, (c) be treated for

an initial drug problem. Individuals were excluded if they (a) had Korsakoff syndrome or limited cognitive abilities or (b) suffered from acute psychotic symptoms. Informed written consent was obtained from all participants prior to their inclusion in the study. Participation was entirely voluntary and confidentiality was assured. Individuals received a voucher for participation in the study. In total, 55 participants were interviewed in the second study during the nine months data collection.

Table 1: Overview of treatment settings of the second sample

Type of Treatment Setting	N	%
Methadone maintenance treatment	25	45.4
Detoxification	16	29.1
Long-term residential treatment	14	27.3

7.2.2 Data analysis

Both samples were merged in one database and afterwards the total sample (n=329) was split up in two subgroups based on the presence or absence of recent poly-drug use (last 30 days). Poly substance use was defined as the use of different substances on the same day (Cf. EuropASI; Raes, Lombaert & Keymeulen, 2008). A descriptive profile of both, single drug users and poly substance users is presented including sociodemographic characteristics, substance use and psychological wellbeing. To test statistically significant differences between the single and poly substance use group, chi^2-tests was applied in case of categorical variables (when > 20% of the cells had an expected count < 5, the Fischer's exact test was used) and a *t*-tests for continuous variables. When the overall chi^2 was significant, custom tables were used to evaluate which specific categories of each variable were significant. ASI composite scores were computed to analyse the severity of problems on different life domains (physical health, employment, legal situation, family relations, alcohol and drug use, psychological health). Afterwards, binary logistic regression was used to assess factors (continuous and categorical) independently associated with recent poly substance use (the dependent variable). After the bivariate comparisons by substance use group

(poly-drug use and single drug use) 18 predictors (variables with a p value <0.05 (except for gender)) were initially included in the binary logistic regression model: gender, age, civil status, living situation, employment, legal status, mean number of suicide attempts, mean number of hospital admissions ever, mean number of convictions, living with someone with alcohol problems, ASI composite score for drugs, ASI composite score for employment, ASI composite score for legal status, ASI composite score for psychological status, having at least one personality disorder, having at least one anxiety disorder, having at least one mood disorder, suicidal risk. In a next step, the recursive feature elimination method as implemented by the R-package Caret (for more details, see Kuhn, 2008) was used to prespecify the important variables to include in our final prediction model. To prevent overfitting, 10-fold cross-validation was applied. Within each of the 10 resampling iterations, whereby one sample was held back to test model performance, several models were fit. The process started by fitting a logistic regression model using all 18 variables. The rankings - indicating the variable importance - were calculated based on the residual deviances of the variables included into the model. Next, the least significant variable was eliminated from the model and the model with the remaining 17 candidate predictors was fit. This procedure was repeated until one variable was left in the model (cfr. backward selection). For each model, the prediction accuracy was calculated using the held-back sample of the current iteration. In a final step, the average performance was calculated over all 10 cross-validation samples and the model with the highest average prediction accuracy was selected.

7.3 Results

7.3.1 Poly substance use and drug-related behaviour

Sixty-four percent of the combined sample (n=211) reported recent poly-drug use (last 30 days).

In terms of drug and alcohol use ever and during the last 30 days, no differences were found for the use of alcohol (both every amount and excessive use) between both groups. For drugs, a significantly higher prevalence of use was reported for all substances, except for hallucinogens (ever and recent use), ecstasy (recent use) and buprenorphine (recent use) in the group of poly substance users. However, buprenorphine and hallucinogens were only used by a limited number of individuals in both groups. In general, poly substance users have been significantly more in treatment for drug problems than single drug users (p = .000) (22.0% - 48.3%). In accordance with the findings on past and recent alcohol use, no differences were found with regard to treatment history for alcohol problems. Injecting drugs occurred less frequently (7.7%) in the group of single drug users, while almost a quarter (24.2%) of the poly substance users (24.2%) had ever injected drugs (p=.000).

Table 1: Comparison of drug and alcohol use ever and during the last 30 days (according to ASI definition) between single and poly substance users

	EVER				RECENT			
	Single N=118	**Poly N=211**	**Pearson Chi²**	**P**	**Single N=118**	**Poly N=211**	**Pearson Chi²**	**P**
Alcohol (every amount) (%)	95.8	96.2	.040	.842	76.1	84.4	3.418	.064
Alcohol (>= five glasses) (%)	88.1	90.0	.291	.590	66.9	73.9	1.809	.179
Cannabis (%)	22.0	45.5	17.858	.000**	3.4	30.3	33.502	.000**
Heroin (%)	11.9	30.3	14.269	.000**	.8	21.3	26.391	.000**
Methadone (%)	7.6	24.6	14.511	.000**	2.5	19.0	17.948	.000**
Buprenorphine (%)	1.7	6.6	3.992	.046*	.8	1.9	.556	.456
Other opiates (%)	6.8	22.7	13.664	.000**	.0	5.7	6.965	.005**
Benzodiazepines (%)	41.5	76.3	39.646	.000**	11.0	63.5	84.358	.000**
Antidepressants %)	33.9	71.1	42.903	.000**	7.6	51.2	62.657	.000**
Cocaine (%)	18.6	36.0	10.924	.001**	2.5	22.7	23.590	.000**
Amphetamines (%)	16.9	33.2	10.027	.002**	1.7	11.4	9.742	.002**
Hallucinogens (%)	7.6	14.2	3.146	.076	.0	1.7	1.799	.296
Ecstasy (%)	14.4	28.9	8.801	.003**	.8	4.3	3.000	.102

* p < .05; ** p < .01

When looking at the severity ratings of the EuropASI single drug users had significantly higher severity scores for the domain alcohol use, while poly

substance users reported worse scores for the domains 'employment', 'drug problems', 'legal problems' and 'psychological health'. Comparable findings were retrieved when looking at the ASI composite scores, however no significant differences were found for the composite score of alcohol use in favour of the poly substance users.

Table 2: severity rating on all domains of the EuropASI: comparison between single and poly substance users

	Single N=118	Poly N=211	T-value	Df	P
Medical Problems [SD]	2.51 [2.13]	2.62 [2.33]	-.414	327	.679
Employment, Education, Income Problems [SD]	2.73 [2.10]	3.46 [2.05]	-3.052	320	.002**
Alcohol Problems [SD]	5.47 [2.36]	4.69 [2.61]	2.750	263.297	.006**
Drug Problems [SD]	1.64 [2.65]	3.75 [3.03]	-6.550	270.293	.000**
Legal Problems [SD]	1.33 [1.90]	2.09 [2.18]	-3.317	270.962	.001**
Family and Social Problems [SD]	3.48 [2.08]	3.62 [1.91]	-.609	327	.543
Psychological Problems [SD]	1.33 [1.90]	2.09 [2.18]	-5.165	327	.001**

* $p < .05$; ** $p < .01$

Table 3: Composite scores on all domains of the EuropASI: comparison between single and poly substance users

	Single N=118	Poly N=211	T-value	Df	P
Medical Problems [SD]	.23 [.31]	.26 [.34]	-.832	326	.406
Employment, Education, Income Problems (economic situation) [SD]	.62 [.44]	.78 [.37]	-3.436	206.361	.001**
Employment, Education, Income Problems (satisfaction work situation) [SD]	.21 [.29]	.21 [.30]	.130	298	.896
Alcohol Problems [SD]	.45 [.30]	.45 [.33]	.103	256.807	.918
Drug Problems [SD]	.05 [.11]	.16 [.14]	-7.714	292.972	.000**
Legal Problems [SD]	.08 [.15]	.16 [.22]	-3.573	311.721	.000**

Family Problems [SD]	.15 [.20]	.19 [.22]	-1.942	311	.053
Social Problems [SD]	.09 [.18]	.11 [.17]	-.599	321	.550
Psychological Problems [SD]	.25 [.23]	.38 [.22]	-5.430	327	.000**

* p < .05; ** p < .01

7.3.2 Sociodemographic and social characteristics

Table 4 demonstrates the sociodemographic characteristics of both groups. Poly substance users were significantly younger, were less often employed and lived more often from a health insurance benefit, were less often married and lived more often with family, friends or in varying living situations compared with single drug users. Poly substance users lived more often with someone with an alcohol problem compared with single drug users. No significant differences were found with regard to living with someone with a drug problem, satisfaction with leisure time and number of close friends.

Poly substance users had a more severe legal situation, with a significantly higher mean number of convictions, more legal problems in the past, and a higher number of individuals on probation.

With regard to their physical health poly substance users have been significantly more hospitalized for medical complaints compared with single drug users (p = .007). However, when looking at chronic and recent medical complaints no significant differences were retrieved between both groups.

Table 4: Comparison of sociodemographic characteristics between single and poly substance users

Characteristics	Single N=118	Poly N=211	Pearson Chi² or T-value	Df	P
Mean age [SD]	42.20 [10.86]	39.34 [11.40]	2.221	327	.027*
Men (%)	74.6	71.1	.460		.498
Civil status (%)			10.192		.006**
- *Married ˆ*	28.0	14.2			
- *Divorced*	29.7	29.9			
- *Single ˆ*	42.4	55.9			
Highest degree of education (%)			.089		.957
- *Primary or none*	19.5	20.9			
- *Secondary*	61.0	60.2			
- *Higher*	19.5	19.0			
Living situation last 30 days (%)			13.950		.007**
- *With partner and/or child(ren)*	40.7	31.8			
- *With parents or other family ˆ*	8.5	17.1			
- *Alone*	25.4	26.5			
- *In controlled environment*	25.4	19.0			
- *With friends or in varying living situations ˆ*	.0	5.7			
Legal situation last 30 days (%)			19.978		.001**
- *None ˆ*	70.3	46.4			
- *None, but legal problems in the past ˆ*	7.6	22.7			
- *Case pending/On bail*	11.9	16.1			
- *Probation/Parole ˆ*	3.4	5.2			
- *Other*	6.8	9.5			
Mean number of convictions [SD]	0.43 [1.34]	1.00 [2.02]	-3.034	317.751	.003**
Working situation last 30 days (%)			18.489		.001**
- *Part-time or full-time employed ˆ*	36.8	17.7			
- *Health insurance benefits ˆ*	22.2	35.9			
- *Unemployed*	22.2	31.1			
- *Other (student; retired; ...)*	4.3	4.3			
- *In controlled environment*	14.5	11.0			
Mean number of working days last 30 days [SD]	6.85 [9.34]	3.77 [7.89]	3.024	210.230	.003**
Mean number of hospital admissions ever [SD]	2.71 [2.59]	3.79 [4.62]	-2.703	326.997	.007**

* $p < .05$; ** $p < .01$

7.3.3 Psychological problems, prevalence of Axis I mood and anxiety disorders and Axis II personality disorders

Based on the findings of the EuropaASI, poly substance users experienced significantly more feelings of depression (ever), difficulties in understanding, concentration and remembering (ever and last 30 days) and reported a higher percentage of prescribed medication for psychological problems (ever and last 30 days). Generally, poly substance users reported a higher number of days with psychological problems in the last month. Furthermore, poly substance users were at higher risk for suicide, since they had significantly more serious thoughts of suicide (ever and last 30 days), and a significantly higher prevalence and mean number of suicide attempts. However, no significant differences were found between both groups regarding physical, sexual, or emotional abuse, ever or in the last 30 days and no differences were found regarding their treatment history (outpatient and inpatient) for psychological problems.

Table 5: Recent (last 30 days) and past psychological and emotional problems: comparison between single and poly substance users

	EVER				RECENT			
	Single N=118	**Poly N=211**	**Pearson Chi² or T-value**	**P**	**Single N=118**	**Poly N=211**	**Pearson Chi² or T-value**	**P**
Psychological problems (%)								
- *Depression*	61.9	73.5	4.783	.029*	30.5	40.8	3.408	.065
- *Anxiety or tension*	67.8	70.6	.284	.594	43.2	46.9	.417	.518
- *Trouble understanding, concentration, remembering*	29.7	46.0	8.380	.004**	25.4	38.9	6.087	.014*
- *Hallucinations*	10.2	13.3	.681	.409	1.7	4.7	1.996	.158
- *Trouble controlling violent behaviour*	42.4	46.4	.507	.476	16.9	21.3	.915	.339
- *Prescribed medication for psychological problems*	60.2	82.9	20.798	.000**	27.1	72.0	61.950	.000**
- *Serious thoughts of suicide*	39.0	53.6	6.435	.011*	11.0	28.0	12.711	.000**
- *Attempted suicide*	23.7	40.3	9.198	.002**	3.4	5.2	.578	.447
Mean number of suicide attempts [SD]	0.32 [.665]	1.27 [2.384]	-5.412 (df=263.368)	.000**				
Mean number of days with psycho-emotional problems [SD]					10.83 [12.65]	16.07 [12.66]	-3.600 (df=327)	.000**

* p < .05; ** p < .01

When looking at the prevalence of Axis I mood disorders, poly substance users reported significantly more often at least one mood disorder. When looking at the specific categories, a higher prevalence of depressive episodes was retrieved in the group of poly substance users. The same situation was found for anxiety disorders. Almost 60% of the poly substance users had experienced at least one anxiety disorder, compared with 34.3% of the single drug users (p = .000). Significantly higher prevalence rates were reported for all different anxiety disorders for poly substance users, except for specific phobia and panic disorder.

Table 6: Prevalence of Axis I mood and anxiety disorders: comparison between single and poly substance users

	Single N=118	***Poly N=211***	***Pearson Chi²***	***P***
Mood disorders				
- *Depressive episode (%)*	26.5	38.6	4.182	.041*
- *Manic episode (%)*	1.0	1.2	.021	1.000
- *Dysthymia (%)*	6.7	15.9	3.528	.060
Anxiety disorders				
- *Panic Disorder (%)*	2.9	7.0	2.045	.153
- *Agoraphobia (%)*	5.9	14.0	4.341	.037*
- *Social phobia (%)*	6.9	15.2	4.184	.041*
- *Specific phobia (%)*	4.5	8.0	1.134	.287
- *Obsessive-compulsive disorder (%)*	5.9	16.4	6.450	.011*
- *Generalised anxiety disorder (%)*	20.6	32.2	4.261	.039*
- *Post-traumatic stress disorder (%)*	1.0	10.0	8.392	.004**
At least one mood disorder (%)	31.4	49.1	8.238	.004
At least one anxiety disorder (%)	34.3	59.1	15.656	.000**

* p < .05; ** p < .01

Furthermore, when looking at the prevalence of Axis II personality disorders more than half of the poly substance users reported at least one personality disorder, which is significantly higher compared with 30.4% of the single drug users. With regard to the specific personality disorders, significantly higher scores were only reported in cluster B for borderline disorders in favour of the single drug users.

Table 7: Prevalence of Axis II personality disorders: comparison between single and poly substance users

	Single N=118	Poly N=211	Pearson Chi²	P
Paranoid PD (%)	7.8	10.6	.667	.414
Schizoid PD (%)	5.2	6.3	.150	.698
Schizotypical PD (%)	4.4	4.3	.000	.987
Antisocial PD (%)	7.0	14.0	3.616	.057
Borderline PD (%)	15.7	35.3	14.028	.000**
Histrionic PD (%)	1.8	2.4	.151	1.000
Narcissistic PD (%)	.0	2.9	3.397	.092
Avoidant PD (%)	12.2	13.5	.119	.730
Dependent PD (%)	5.3	7.7	.700	.403
Obsessive-Compulsive PD (%)	10.4	9.7	.049	.824
[Depressive] (%)	7.0	8.2	.163	.687
[Passive-Aggressive] (%)	2.6	4.9	.958	.392
Cluster A (%)	11.4	16.9	1.752	.186
Cluster B (%)	18.4	41.5	17.691	.000
Cluster C (%)	18.4	23.2	.990	.320
At least one PD (%)	30.4	50.7	12.385	.000**

* p < .05; ** p < .01

7.3.4 Sociodemographic, drug and mental health related variables predicting poly substance use

A binary logistic regression was carried out to investigate which variables predict poly substance use in the last 30 days. Data of 309 unique individuals were entered in the analysis. A test of the full model (79.9%) versus a model with intercept only (64.4%) was statistically significant: $\chi^2(df=16) = 122.174$, $p<.000$. Three variables emerged in the best fit model as significant determinants for clients to belong to the poly substance use group (cf. Table 8). Employment status ($p = .008$), the ASI composite score for psychological health ($p = .001$) and the ASI composite score for drugs ($p = .000$). The 1.302 odds ratio for the ASI composite score for psychological health and the 2.379 odds ratio for the ASI composite score for drugs indicate that the odds of belonging to the poly substance use group increase, for each unit increase on the ASI psychological health and drug composite score (95% C.I.: 1.115 to 1.521; p=.001 and 95% C.I.: 1.709 to 3.312; p<.001). The odds ratios of the employment status dummy variables compare each status except employed, to the status employed. For the health insurance benefit status, the 4.269

odds ratio means that the odds of belonging to the poly substance use group for individuals on health insurance are 4.269 times higher than for those of employed individuals (95% C.I.: 1.874 to 9.725; p=.001). The predictor living situation approached significance (p=.097) and the .290 odds ratio means that the odds of belonging to the poly substance use group for individuals in a controlled environment are only .290 times those of individuals living with partner and/or children (95% C.I.: .102 to .824; p=.020). Although there is no main effect of legal status (p=.195), the 3.236 odds ratio for legal problems in the past means that the odds of belonging to the group of poly substance users for individuals with no current legal problems, but legal problems in the past are 3.236 times higher than for those who have no legal history (95% C.I.: 1.178 to 8.887; p=.023). Furthermore, the number of hospital admissions ever approached significance, whereby a higher number of hospital admissions results in a higher chance of belonging to the group of poly substance users (95% C.I.: .996 to 1.207; p=.060).

Table 8: Binary logistic regression predicting membership of the poly substance use group (compared to the single drug use group) (N=309)

							95% C.I. for Exp(B)	
	B	S.E.	Wald	Df	p-value	Exp(B)	Lower	Upper
Employment status (Ref. cat.: part-time or full-time employed)			13.663	4	.008**			
- *health insurance benefits*	1.451	.420	11.935	1	.001**	4.269	1.874	9.725
- *unemployed*	.566	.447	1.602	1	.206	1.761	.733	4.232
- *other (student, retired)*	1.410	.728	3.755	1	.053	4.096	.984	17.051
- *controlled environment*	.652	.685	.905	1	.341	1.919	.501	7.345
Legal situation (Ref. cat.: no legal situation)			6.095	4	.195			
- *legal problems in the past*	1.174	.516	5.188	1	.023*	3.236	1.178	8.887
- *case pending / on bail*	.589	.454	1.682	1	.195	1.803	.740	4.392
- *probation / parole*	.584	.816	.513	1	.474	1.793	.362	8.876
- *other*	.384	.629	.372	1	.542	1.468	.428	5.037
Living situation (Ref. cat.: living with partner and/or children)			6.313	3	.097			
- *family, friends, varying living situations*	-.278	.534	.270	1	.603	.758	.266	2.159
- *alone*	.077	.382	.041	1	.840	1.080	.511	2.286
- *controlled environment*	-1.237	.533	5.396	1	.020	.290	.102	.824
At least one mood disorder	.359	.342	1.099	1	.295	1.432	.732	2.800
Number of hospitalisations for physical complaints	.092	.049	3.537	1	.060	1.097	.996	1.207
Number of suicide attempts	.215	.162	1.762	1	.184	1.239	.903	1.702
ASI composite score psychological problems	.264	.079	11.136	1	.001**	1.302	1.115	1.521
ASI composite score drugs	.867	.169	26.351	1	.000**	2.379	1.709	3.312
Constant	-2.329	.437	28.378	1	.000	.097		

* p < .05; ** p < .01

7.4 Discussion

The findings of this study demonstrate that poly substance use is the rule rather than an exception. At least 64% of the clients currently in treatment for substance abuse problems reported recent poly substance use in the last month. One can assume that this number is even an underestimation of reality, since a number of the individuals included in the study have been living in a controlled environment the last 30 days, making it less easy to use several substances at the same day. Considering this finding one might question the tendency in substance abuse treatment to focus on the primary substance of abuse. This substance specific point of view ignores the complexity of the situation of substance users, who often use different substances in the same time frame.

The results of the bivariate analyses demonstrate that poly substance users generally have more severe problems than single drug users. These difficulties are not limited to their drug use, but affect a large number of social dimensions in their life (e.g. family situations, legal status, employment) often interfering with their recovery process.

One of the goals of this study was to get insight in the psychological health of poly substance users. When looking at the findings of the domain psychological health of the EuropASI we see that poly substance users are at higher risk for committing suicide compared with single drug users, and report a higher number of days with psychological problems. The fact that 72% of the poly substance users got medication prescribed for psychological problems during the last month also illustrates worse psychological health in the group of poly substance users. The scores of the diagnostic instruments confirm these findings, illustrating that poly substance users significantly more often experienced mood and anxiety disorders, as well as personality disorders, resulting in a high prevalence of co-occurring psychiatric problems.

Further analyses of the above mentioned findings by use of binary logistic regression demonstrated a strong impact of psychological health, intensity of drug problems and employment status on poly substance use. However, it was the ASI composite score for psychological health, not the diagnostic instruments used to measure personality, and mood an anxiety disorders that showed an impact on poly substance use. Poly substance users reported a higher number of days with psychological problems in the last month, and a higher percentage of individuals with prescribed medication for psychological problems. This finding demonstrates that rather the psychological complaints as reported by the client, than the presence of psychiatric disorders (as defined by the DSM-IV) have an impact on belonging to the group of poly substance users. Therefore, we urge for more attention to patient reported measures and instruments, based on clients' own experiences, rather than focusing on the presence or absence of a diagnosed disorder.

7.4.1 Limitations of the study

This study highlights the prevalence of poly substance use in a varied sample of drug users, seeking treatment for drug abuse problems. However, the dispersion of the sample is rather unequally divided. The majority of the sample (83.3%) consisted of individuals seeking treatment in specific psychiatric units, with a large number of individuals mainly suffering from alcohol dependence.

Second, despite the fact that the co-occurrence of psychological problems and drug abuse problems has clear clinical implications, the cross-sectional character of the study limits the possibility to investigate the relationship between cause or consequences of poly substance use and poor mental health.

Finally, the lack of a clear definition on the concept of 'poly substance use' hampers the comparison with (inter)national data on this subject. It results in conflicting findings, limiting the availability of concrete assistance for clinical practice.

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