Psychiatry Research 276 (2019) 283–289

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Psychiatric factors affecting recovery after a long term treatment program for substance use disorder

Constanza Daigre[a,b,c,d,*], Marta Perea-Ortueta[a,b,c,e], Marta Berenguer[f], Oriol Esculies[f], Marta Sorribes-Puertas[a,b,c,e], Raúl Palma-Alvarez[a,b,c,e], Nieves Martínez-Luna[a,b,c,e], Josep Antoni Ramos-Quiroga[a,b,c,d,e], Lara Grau-López[a,b,c,d,e]

[a] Addiction and Dual Diagnosis Unit, Hospital Universitari Vall d'Hebron Spain
[b] Group of Psychiatry, Mental Health and Addiction, Vall d'Hebron Research Institute (VHIR), Spain
[c] Department of Psychiatry and Legal Medicine, Universitat Autònoma de Barcelona, Spain
[d] Biomedical Network Research Centre on Mental Health (CIBERSAM), Spain
[e] Department of Psychiatry, Hospital Universitari Vall d'Hebron, Barcelona, Catalonia, Spain
[f] Projecte Home Catalunya, Barcelona, Spain

ARTICLE INFO

Keywords:
Substance use disorders
Psychiatric comorbidity
Addiction treatment
Therapeutic community
Psychotherapy
Treatment adherence

ABSTRACT

Psychiatric comorbidity can negatively impact the course of addictions. Psychiatric features of patients who continued treatment after the first stage of an addiction program have not been sufficiently analysed. Therefore, only these patients were included in order to compare psychiatric comorbidity and clinical factors between patients who were able or not to complete a long term substance-free program. Treatment-completion status of 245 patients was systematically recorded. Addiction severity, psychiatry comorbidity, and psychological symptoms were evaluated. No significant differences were found regarding comorbid psychiatric diagnoses and the completion of the treatment. Longer treatment duration (OR: 1.22; $p < 0.01$), higher educational level (OR: 2.37; $p = 0.02$), and cocaine dependence as main substance (OR: 3.68; $p < 0.01$) were found to be related to increased likelihood in completing the treatment. Patients with higher severity of alcohol consumption (OR: 0.06; $p = 0.02$) and more depressive symptoms (OR: 0.95; $p = 0.01$) completed the treatment less frequently. Moreover, differences regarding employment problems, treatment facilities, anxiety symptoms, dysfunctional impulsivity, and mental HRQoL were found. It is concluded that comorbid psychiatric diagnoses do not determine treatment outcomes. However, therapeutic and psychological factors have a major influence on the likelihood to complete a long-term treatment program.

1. Introduction

Substance use disorders (SUDs) are a major concern worldwide because of their powerful psychosocial and public health impact. SUDs are chronic diseases in which relapse and treatment non-completion are frequent (Grau-López et al., 2012). Several negative health consequences are associated with substance abuse, and psychiatric comorbidity is common in substance users (Peacock et al., 2018). Psychiatric comorbidity, namely a dual diagnosis, has a high impact on psychosocial functioning of substance users and is linked to the impairment of their overall quality of life (Daigre et al., 2017). It is important to investigate the comorbidity of psychiatric disorders in patients with SUDs due to its high prevalence and clinical severity. The prevalence of dual diagnosis ranges from 50% to 75% according to the methodological variables (Araos et al., 2017; Compton et al., 2003; Levin et al., 2004; Torrens et al., 2015). Regarding the co-existence of mental disorders and SUD, previous research has shown that depression is one of the most common disorders (Compton et al., 2007; Grant et al., 2004; Herrero et al., 2008). Moreover, other disorders frequently diagnosed in patients with SUD are anxiety disorders, attention deficit hyperactivity disorder (ADHD), and personality disorders, especially borderline and antisocial personality disorders (Biederman et al., 1998; Compton et al., 2007; Daigre et al., 2013; Herrero et al., 2008; Torrens et al., 2015). Some psychological features such as impulsivity have been associated with the development and maintenance of addictions, and these features also play an important role in the psychosocial severity of addiction (Valero et al., 2014; Verdejo-García et al., 2008). Moreover, anxiety and depressive symptoms have been related to higher addiction

* Correspondence to: Psychiatry Department, Hospital Universitari Vall d'Hebron, Passeig Vall d'Hebron, 119-129, 08035 Barcelona, Spain..
E-mail address: cdaigre@vhebron.net (C. Daigre).

https://doi.org/10.1016/j.psychres.2019.05.026
Received 9 November 2018; Received in revised form 15 May 2019; Accepted 15 May 2019
Available online 16 May 2019
0165-1781/

severity and more relapses (Agosti and Levin, 2006; Boden and Fergusson, 2011; Smith and Book, 2008).

Because a dual diagnosis is common among patients with SUD, an integral therapeutic approach is necessary to improve the probability of recovery (Flynn and Brown, 2008; Kelly et al., 2012; McGovern et al., 2014). There are different types of settings and approaches for the treatment of patients with SUD, including inpatient and outpatient programs, which can include group therapy, individualized counselling, or a combination of both (National Institute on Drugs, 2018).

Psychiatric comorbidity can negatively impact the course of addictions. It has been concluded that individuals with psychiatric comorbidities face challenges that impair their ability to complete treatments (Compton et al., 2003; González-Saiz et al., 2014; Krawczyk et al., 2017; Torrens et al., 2015). However, other studies have reported no association or inconsistencies regarding the relationship of psychopathology and dropout rates or worse treatment outcomes (Kaminer et al., 1992; Levin et al., 2004; Messina et al., 2000; Wise et al., 2001). Many questions still need to be discussed and clarified regarding the impact of other mental disorders on SUD treatment outcomes because there are variations in the results relating to the type of psychiatric comorbidity, the psychological variables included, main substance consumption, the diagnostic assessment tools used, and the treatment setting (Compton et al., 2003; González-Saiz et al., 2014; Grau-López et al., 2012; Havassy et al., 2004; Polcin et al., 2015).

A major justification for this research is about the period of time studied. The first few months of treatment are critical for therapeutic abandonment. Dropout rates are particularly high before three months among patients in residential treatments. A large part of the literature has focused on this period of time (González-Saiz et al., 2014; Krawczyk et al., 2017; Mulder et al., 2009; Nielsen and Scarpitti, 2002; Vergara-Moragues et al., 2013). However, the factors related to treatment outcomes of patients who have passed the first stage of treatment have not been sufficiently analysed. Therefore, in this study, patients who had gone through the first stage of treatment were only included, with the aim of comparing psychiatric comorbidity between SUD patients who were able or not to complete a long term substance-free program.

2. Material and methods

A prospective study was conducted on a clinical sample of adult patients who were treated for SUD between February 2011 and September 2016. The present study was developed as a collaboration between two health centres. Participants were patients undergoing treatment at *Projecte Home Catalunya* and were referred for psychological assessment to the Addiction and Dual Diagnosis Section (ADDS) at *Vall d´Hebron* University Hospital in Barcelona, Spain.

The included patients were over 18 years of age, met substance-dependence criteria according to the DSM-IV-TR, had remained abstinent from substance consumption for at least 3 months in a long-term substance-free program, and had signed the informed consent prior to participation. Their abstinence or consumption status was recorded from self-reports through the therapeutic process. Patients who started treatment at *Projecte Home Catalunya* were required to have stable medical and psychiatric comorbidities. The study was approved by the Vall d'Hebron Hospital Ethics Committee. Patients did not receive any financial compensation. Patients who did not meet these criteria were not included in the study. This study is part of more extensive research on the comorbidity of SUDs.

2.1. Procedure

Projecte Home Catalunya, a non-governmental organisation, was developed as a treatment and rehabilitation centre that offers different treatment facilities depending on the patient's progress. Inpatient treatment includes two phases: the first is community therapy (intensive psychotherapeutic interventions during which patients have limited contact with the community, and they are always accompanied), and the second phase is focused on re-entry into society (intensive psychotherapeutic interventions wherein patients learn to be part of the community without accompaniment). The program also offers outpatient treatment (group and individual treatment at least two times per week). Finally, the day-centre treatment is focused on activities and interventions to promote substance abstinence and social functioning during the day. *Projecte Home Catalunya* treats SUDs from a biopsychosocial approach to promote maturation and personal growth. The treatment is carried out at different levels by providing motivation for change, assistance to reach and maintain substance abstinence, and support to achieve social and labour reinsertion at the highest levels. The treatment aims for participants to live drug-free lifestyles; substance consumption is not allowed. The duration of the treatment in *Projecte Home Catalunya* depends on the needs of the patients; however, in the therapeutic community, treatment usually lasts around eight months, which is additional to the ambulatory treatment before and after the therapeutic community treatment. On the other hand, Vall d'Hebron Hospital is a public centre that has a multidisciplinary team of trained professionals who perform comprehensive psychological assessments.

After three months of abstinence, patients in community therapy at *Projecte Home Catalunya* were referred to psychological assessment at the Addiction and Dual Diagnosis Section of Vall d'Hebron Hospital. This allowed patients who were diagnosed with co-occurring disorders to be assigned to a treatment plan that better fulfilled their needs. Thus, patients with psychiatric comorbidities received integrated treatment for co-occurring disorders by *Projecte Home Catalunya* in collaboration with the corresponding psychiatrist of the public mental health service.

The assessment process consisted of four interview sessions conducted by trained psychiatrists and psychologists. The psychiatrists recorded sociodemographic features and performed an assessment of the clinical variables. Psychologists assessed addiction severity, comorbidity, and other mental disorders and evaluated several symptoms and psychological features.

2.2. Measures

2.2.1. Treatment completion or treatment non-completion

Patients who completed all the stages of the treatment graduated to *Projecte Home.* The status of each patient`s progress depending whether they were able to complete or not the treatment was recorded by his or her main therapist. The electronic health records of the participants were studied to determine the two comparison groups of the study. The category treatment completion included therapeutic discharge (patients have managed to maintain abstinence and can re-enter the community) and therapeutic discharge with follow-up (patients have managed to maintain abstinence; however, it is advisable to continue follow-up after discharge). On the other hand, treatment non-completion included voluntary discharge, treatment abandonment, and expulsion. The therapist also recorded the treatment facilities used.

2.2.2. Sociodemographic and clinical features

To systematize this information, an ad-hoc designed questionnaire was used. The variables included sex, age, nationality, educational level, marital status, and substance consumption.

2.2.3. Addiction severity

The Spanish version of the European Addiction Severity Index (EuropASI) was used to determine severity. This is a semi-structured interview that collects information about general medical status, occupational and economical status, alcohol consumption, consumption of other drugs, legal problems, family and social relationships, and psychological status. Composite scores ranging from 0 to 1 are used, with higher scores indicating greater severity (Sánchez-Hervás et al., 2009).

2.2.4. Health-related quality of life (HRQoL)

The Short-Form 36 (SF-36) includes 36 questions used to measure functional health and well-being from the patient's perspective (Iraurgi Castillo et al., 2004). The SF-36 provides scores in eight health domains that can be aggregated into two summary measures: The Physical Component Summary (Physical HRQoL) and the Mental Component Summary (Mental HRQoL) (Ware and Sherbourne, 1992). Each scale is transformed into a 0–100 scale, wherein the lower the score, the more is the disability (mean 50 ± 10 for both the PCS and MCS). The equivalence of the SF-36 summary health scores, estimated using standard and country-specific algorithms in 10 countries, including Spain, was tested; the use of standard scoring algorithms is recommended to provide more external validity (Ware and Kosinski, 2001).

2.2.5. Depressive symptoms

The Beck Depression Inventory (BDI-I) Spanish version was used to assess the presence of depressive symptoms during the past two weeks (Conde and Useros, 1974). The BDI is a 21-item self-report rating inventory that measures characteristic attitudes and symptoms of depression (Beck et al., 1961).

2.2.6. Trait and state anxiety

The State-Trait Anxiety Inventory (STAI) is a commonly used tool used to measure trait and state anxiety. The Spanish version was used (Spielberger et al., 1970) in the present study. This inventory can be used in clinical settings to diagnose anxiety. It has 20 items for assessing trait anxiety and 20 items for assessing state anxiety. Higher scores indicate greater anxiety.

2.2.7. Functional and dysfunctional impulsivity

The impulsivity inventory of Dickman (FIDI) is a self-report measure. Functional impulsivity is the tendency to make quick decisions when the situation implies a personal benefit, which implies a decision-making process with calculated risk. Dysfunctional impulsivity is the tendency to make quick decisions when this type of decision-making is not optimal and without consideration of negative consequences (Dickman, 1990). The Spanish version was used (Chico et al., 2003) in this study. This questionnaire has shown good psychometric properties in clinical samples (Adan, 2012) and SUD samples (Pedrero Pérez, 2009).

2.2.8. Axis I psychiatric comorbidity

The Spanish version of the Semi-Structured Clinical Interview for Axis I Disorders of the DSM-IV (SCID-I) was used to describe comorbidity with axis I disorders (First et al., 1998). A kappa value of 0.70–1 was has been reported between two interviewers (Segal et al., 1994). However, worse psychometric features have been found when compared with other instruments, such as the Psychiatric Research Interview for Substance and Mental Disorders (Torrens et al., 2004).

2.2.9. Attention deficit hyperactivity disorder (ADHD)

Conners' Adult ADHD Diagnostic Interview for the DSM-IV (CAADID-II) was used to evaluate ADHD symptoms in children and adults as described in the *Diagnostic and Statistical Manual of Mental Disorders* (Epstein and Kollins, 2006). The validated Spanish version was used (Ramos-Quiroga et al., 2012) in this study.

2.2.10. Personality disorders

The Spanish version of the Semi-Structured Clinical Interview for Axis II Personality Disorders of the DSM-IV (SCID-II) was used to describe comorbidity with personality disorders (First, 1997).

2.3. Data analysis

Bivariate and multivariate analyses were performed. First, a description of all variables as percentages, means, and standard deviations was conducted. To compare patients who completed and did not complete the treatment, chi-square test was used for nominal variables and Student's *t*-test was used for quantitative variables. Finally, only the statistically significant variables were included in the logistic regression analysis. A conditional entrance method was used to select variables in the model. The dependent variable was the status at the end of treatment according to whether the treatment was completed or remained incomplete (0 = treatment non-completion and 1 = treatment completion). All statistical hypotheses were two-sided and a value of $p < 0.05$ was considered statistically significant. SPSS version 20 for Windows was used for all analyses.

3. Results

Considering the inclusion criteria and that the psychologists who performed the assessment have limited availability, 48.9% of the patients who were in treatment at community therapy during the time of the study were included. Hence, the study sample consisted of 245 patients. Five cases were excluded because they did not have records at the end of treatment, and 23 patients were excluded because they did not attend the evaluation process.

The status at the end of treatment and the process of assigning groups on the basis of treatment completion is shown in Table 1. Of all the participants, 39.2% completed the treatment and 60.8% did not complete the treatment.

As shown in Table 2, regarding sociodemographic variables, patients with a higher educational background completed the treatment more frequently. No significant differences were observed regarding the average age, nationality, or civil status. The European Addiction Severity Index (EuropASI) results showed that patients with more alcohol consumption and employment problems at the time of psychological assessment had more difficulties in completing the treatment.

Regarding treatment facility, patients who attended a social re-entry program after therapeutic community and outpatient treatment had better results at the end of treatment. The mean time of treatment, measured in months, was significantly greater in patients who were better evaluated by the therapists and completed their treatment (see Table 2).

Table 3 shows the comparison of current psychiatric comorbidity and psychological symptoms between patients who were or not able to complete the program. Significant differences were found for the type of substance used; patients with cocaine abuse completed the treatment more frequently, while patients with cannabis abuse had more difficulties in completing the treatment. No significant differences were found for psychiatry comorbidity evaluated by diagnostic interviews, including depression, anxiety, psychotic disorders, and ADHD. No significant differences were found regarding each personality disorder, neither when they were grouped by clusters.

Regarding other psychological variables, which do not constitute a

Table 1
Status at the end of treatment according to treatment completion and composition of the comparison groups.

	n	%
Treatment completion. Achieved therapeutic objectives		
Therapeutic discharge	76	31
Therapeutic discharge with follow-up	20	8.2
Total	96	39.2
Treatment non-completion. Not achieved or partially achieved therapeutic objectives		
Abandonment	36	14.7
Expulsion	29	11.8
Voluntary discharge	84	34.3
Total	149	60.8
Total sample	245	100

Table 2
Sociodemographic variables, related to consumption variables and treatment facility type according to treatment completion.

	Total n = 245	Treatment completion n = 9639.2%	Treatment non-completion n = 14960.8%	Statistic X^2/t	p
Sociodemographic variables					
Sex Women	19.2%	14.7%	22.2%	2.06	0.151
Man	80.8%	85.3%	77.8%		
Mean age (years)	34.5 ± 8.1	35.6 ± 8.1	33.9 ± 8.6	1.56	0.114
Spanish nationality	89.4%	91.7%	87.9%	0.864	0.353
Married (civil status)	22.2%	21.1%	23%	0.127	0.722
Secondary education or more	42.5%	51.6%	36.2%	5.423	0.02
Addiction severity (EuropASI)	**Mean score ± standard deviation**				
Medical	0.17 ± 0.28	0.17 ± 0.27	0.17 ± 0.28	0.012	0.990
Employment-support status	0.55 ± 0.32	0.50 ± 0.29	0.59 ± 0.34	2.024	0.044
Alcohol	0.15 ± 0.16	0.11 ± 0.15	0.16 ± 0.17	2.02	0.018
Drugs	0.14 ± 0.11	0.13 ± 0.12	0.14 ± 0.1	0.59	0.558
Legal	0.14 ± 0.22	0.13 ± 0.21	0.14 ± 0.23	0.82	0.413
Social-familiar	0.33 ± 0.26	0.32 ± 0.25	0.34 ± 0.27	0.69	0.491
Psychological	0.33 ± 021	0.3 ± 0.21	0.35 ± 0.21	1.54	0.126
Treatment facility type					
Inpatient treatment	58.2%	54.7%	60.4%	765	0.382
Community therapy	56.3%	53.1%	58.4%	0.461	0.417
Reentry	32.2%	42.7%	25.5%	7.142	0.005
Outpatient treatment	33.5%	44.8%	26.2%	8.271	0.003
Day-centre treatment	25.7%	19.8%	29.5%	2.411	0.089
Month of treatment	12.2 ± 7.1	19.6 ± 6.5	9.3 ± 5.7	9.585	0.0001

mental disorder by themselves, more depressive symptoms assessed by the BDI were associated with treatment non-completion. Similarly, patients with more anxiety symptoms, both state and trait, with more dysfunctional impulsivity and a worse score in mental HRQoL less frequently met their therapeutic objectives.

As shown in Table 4, after the bivariate analysis, two logistic regression models were analysed using status at the end of treatment, with treatment completion as the dependent variable. The first model included sociodemographic variables, consumption related variables and the therapeutic resources used by patients. The following variables were statistically significant and were included in the logistic regression analysis: educational level (secondary education or more), employment-support status, alcohol addiction severity score in EuropASI, outpatient treatment, social reintegration, and months of treatment. We found that higher educational level, less alcohol severity (EuropASI),

Table 4
Results of logistic regression analysis of features associated with treatment completion.

	Wald	gl	Sig.	OR
Model 1: Sociodemographic variables related to consumption variables and therapeutic resources				
Month of treatment	44.731	1	0.0001	1.218
Alcohol addiction severity (EuropASI)	5.732	1	0.017	0.061
Educational level	5.570	1	0.018	2.366
Model 2: Current psychiatric comorbidity and psychological symptoms				
Cocaine dependence (Chief complaint)	7.978	1	0.005	3.6732
Depressive symptoms (BDI)	6.601	1	0.010	0.947

Table 3
Current psychiatric comorbidity and psychological symptoms of patients according to treatment completion.

	Total n = 245	Treatment completion n = 9639.2%	Treatment non-completion n = 14960.8%	*Statistic* X^2/t	p
Complaint reason (substance)					
Opiate dependence	11.5%	9.5%	12.9%	0.637	0.425
Cocaine dependence	68.9%	78.9%	62.1%	7.463	0.006
Alcohol dependence	29.4%	31.6%	27.9%	0.378	0.539
Cannabis dependence	14.5%	8.4%	18.6%	4.712	0.030
Current dual diagnosis (axis I disorders)	51.4%	52.7%	50.5%	0.082	0.775
Depressive disorder	15%	11.4%	17.5%	0.757	0.276
Anxiety disorder	13.2%	12.9%	13.4%	0.11	0.918
Psychotic disorder	7.8%	10%	6.2%	0.824	0.364
Substance induced psychotic symptoms	64.5%	63.8%	65.0%	0.031	0.86
ADHD	25.7%	25.6%	25.7%	0.69	0.988
Any personality disorder	45%	45.7%	44.6%	0.259	0.611
Cluster A personality disorder	5.8%	4.3%	6.9%	0.525	0.469
Cluster B personality disorder	33.3%	34.3%	32.7%	0.048	0.826
Cluster C personality disorder	5.9%	7.1%	5%	0.342	0.559
Dual diagnosis (including axis I and personality disorders)	67.7%	70.6%	65.6%	0.449	0.503
Psychological symptoms	**Mean score ± standard deviation**			**t**	**p**
Depressive symptoms (BDI)	16.26 ± 9.8	14.42 ± 9.6	18.11 ± 10.1	2.76	0.011
State anxiety (STAI)	28.8 ± 13.1	26.86 ± 12.5	30.75 ± 13.7	1.75	0.049
Trait anxiety (STAI)	31.91 ± 12.7	29.48 ± 11.5	34.32 ± 13.8	2.56	0.013
Functional impulsivity (FIDI)	33.05 ± 8.2	33.51 ± 7.2	32.63 ± 8.9	0.611	0.542
Dysfunctional impulsivity (FIDI)	37.7 ± 7.6	35.96 ± 8.7	38.98 ± 6.7	2.3	0.023
Physical HRQoL	52.2 ± 9.4	52.81 ± 9.1	51.80 ± 9.8	1.81	0.071
Mental HRQoL	35.9 ± 14.2	38.62 ± 14.0	33.71 ± 14.2	2.1	0.040

and more months of treatment were factors independently associated with increased likelihood of complete the treatment (Nagelkerke R^2 = 0.435; constant value 0.329, std. error = 0.145, 78.1% corrected predicted).

On the other hand, a logistic regression was conducted including the variables about current psychiatric comorbidity and psychological symptoms that were statistically significant in the bivariate analysis: cocaine and cannabis dependency as chief complaint, depressive symptoms (BDI), state anxiety (STAI), trait anxiety (STAI), dysfunctional impulsivity (FIDI), and mental HRQoL. It was found that the patients with more depressive symptoms were less able to complete the treatment, and patients with cocaine use disorder completed the treatment more frequently, even after controlling for confounding variables related to psychological comorbidity (Nagelkerke R^2 = 0.143; constant value 0.334, std. error = 0.18, 71.7% corrected predicted).

4. Discussion

This study focused on clinical features of patients who had gone through the first stage of treatment and had remained abstinent for at least 3 months. The results show that comorbid psychiatric diagnoses do not determine whether patients were able to complete a long-term treatment. However, addiction related variables, duration of treatment and other psychological factors as depressive symptoms are critical for achieving better outcomes.

The results confirm that the prevalence of psychiatric comorbidity among SUD patients is very frequent. Our data are consistent with those of previous studies performed under similar settings (Araos et al., 2017; Compton et al., 2003; González-Saiz et al., 2014; Levin et al., 2004). In the present study, 39.2% of patients completed the treatment, and patients with longer treatment periods more frequently achieved treatment completion. Several studies have highlighted the high rates of drop-out rates among patients with SUDs (González-Saiz et al., 2014; Kaminer et al., 1992; Levin et al., 2004; Nielsen and Scarpitti, 2002). Improving retention is still a challenge to mental health care providers, and it should be a therapeutic objective. Taking into account the high frequency of patients abandoning the treatment, other therapeutic facilities such as harm-reduction programs and psychosocial approaches become even more important through the course of addiction.

We found a relationship between higher educational level and treatment completion in the multivariate analysis. These results are in line with those of previous studies that point out that patients with higher educational levels have less severe dependence, better social status and employment, and better outcomes (Adamson et al., 2009; Christensen et al., 2017; McCaul et al., 2001). In this sense, employment problems were related to worse retention in the present and other studies (McCaul et al., 2001).

Patients with more alcohol consumption problems had more difficulties in completing the treatment; this result remained the same even after logistic regression analysis. Stress associated with alcohol abuse may be a marker of patients' risk for illicit substance use (Moitra et al., 2013). Although alcohol consumption is not the main problem, it should be addressed to improve drug-free treatment retention for the patient (Klimas et al., 2014; Martinotti et al., 2017).

Regarding the substance being abused, patients with cocaine abuse disorder are the most prevalent, and they more frequently completed the treatment than other patients; this result remained the same even after a multivariate analysis. More externalizing disorders have been identified among individuals addicted to cocaine (Comin et al., 2016; Minnes et al., 2017). A structured and disciplined setting, which are characteristics of this therapeutic program, probably help cocaine users to complete the treatment. Another plausible explanation is that patients with a cocaine SUD are more willing to complete a program of this type when compared with patients with an opiate SUD; this is because the former group do not have as many harm-reduction programs as the latter group, which can impact treatment outcomes. More studies are needed to contrast and interpret the results. Cannabis use disorder was associated with treatment non-completion in the bivariate analyses. Previous studies showed that cannabis users seek treatment less frequently and that they have lower risk perception than other substance abusers (Plan Nacional sobre Drogas, 2015; Roncero et al., 2012). This lower risk perception could explain the higher abandonment rates.

Regarding dual diagnosis and treatment completion, no statistically significant differences were observed. It is not possible to directly compare these results with other studies because the sample studied includes patients who have already passed the first stage of treatment. Furthermore, patients with psychiatric comorbidities received integrated treatment for both disorders, including psychotherapeutic and pharmacological interventions to improve both the SUDs and psychopathological symptoms. This finding shows that psychiatric comorbidity is still frequent in patients with three months of abstinence, but it does not determine treatment outcomes.

Notwithstanding the above, the results related to psychological features provide evidence about the significance of psychological symptoms as evaluated by dimensional questionnaires on treatment completion. Depressive symptoms were independently associated with worse outcomes after logistic regression. On the bivariate level, non-completion was more frequent among patients with more anxiety symptoms, more dysfunctional impulsivity, and worse mental HRQoL. The association between depressive symptoms and less frequent treatment completion is in accordance with several studies that have highlighted the importance of depression in drug treatment outcome. Patients with depression have been shown to have worse outcomes and post-discharge use of alcohol, cocaine, and heroin in longitudinal studies (Agosti and Levin, 2006; Boden and Fergusson, 2011; Compton et al., 2003; Samet et al., 2013). Regarding anxiety symptoms, the findings of the present study are consistent with previous studies that suggest that anxiety disorders are intertwined in both the development and maintenance of SUDs (Smith and Book, 2008).

Worse scores were found in dysfunctional impulsivity in patients who did not achieve treatment completion. Patients with SUD usually have greater impulsivity than controls, and it is a risk factor in developing an addiction (Rodríguez-Cintas et al., 2016; Valero et al., 2014; Verdejo-García et al., 2008). Furthermore, studies have found that mental disorders associated with impulsivity, such as ADHD or borderline personality disorder, have an impact on the therapeutic success of treatment in a therapeutic community (Vergara-Moragues et al., 2013).

Patients with mental HRQoL impairment completed their treatment less frequently. This variable has been associated with more psychiatric comorbidity and more addiction severity (Calsyn et al., 2004; Daigre et al., 2017). HRQoL scores have been used as severity measures for several mental disorders (Vilagut et al., 2005); therefore, it is not surprising that a higher quality of life impairment was associated with a worse treatment outcome, especially in the mental component.

The limitations of this study include that *Projecte Home Catalunya* is a drug-free program, and this should be considered to extrapolate the results to more permissive treatment programs. Moreover, because substance consumption is not allowed, it was not a variable included in the study design; thus, it would be interesting to have consumption data during the follow-up in the longer term. The restrictive selection procedure limits the extrapolation of the results, and it does not allow a direct comparison of the results with other studies that focused on the association between psychiatric comorbidity and treatment outcomes. Moreover, psychological and pharmacological treatment can impact the variable related to achievement of objectives. We do not have data regarding the first three months for patients in *Projecte Home Catalunya* due to the study design; however, this study includes data about treatment outcomes until graduation and the last stages of treatment. On the other hand, symptom overlap with substance effects has been controlled by the three months of abstinence. As a strength of the study,

it should be mentioned that the validity of the data was provided by a comprehensive protocol, which was systematically implemented to assess clinical variables and psychiatric comorbidity. Another strength is that the clinical sample studied included different types of SUDs and treatment facilities. Finally, it was possible to conduct this study because of the collaboration between the two health centres.

These findings show that psychiatric comorbidity is still common in patients who have achieved three months of abstinence; however, it did not determine treatment outcomes. Other therapeutic and psychological factors were closely associated with the likelihood to complete a long-term treatment program. Considering that a longer treatment duration was strongly associated with better outcomes, to promote retention in substance abuse treatment should be an objective. Moreover, psychological features such as depression, anxiety and impulsivity symptoms should be assessed and addressed because those were associated with worse outcomes. Furthermore, addiction severity variables should not be overlooked due to their impact on the outcomes. Taking these results into account, an integrated and individualized approach is essential to achieve long-term abstinence.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.05.026.

References

Adamson, S.J., Sellman, J.D., Frampton, C.M.A., 2009. Patient predictors of alcohol treatment outcome: a systematic review. J. Subst. Abuse. Treat. 36, 75–86. https://doi.org/10.1016/j.jsat.2008.05.007.

Adan, A., 2012. Impulsividad funcional y disfuncional en jóvenes con consumo intensivo de alcohol (binge drinking). Adicciones 24, 17. https://doi.org/10.20882/adicciones.113.

Agosti, V., Levin, F.R., 2006. One-year follow-up study of suicide attempters treated for drug dependence. Am. J. Addict. 15, 293–296. https://doi.org/10.1080/10550490600754333.

Araos, P., Vergara-Moragues, E., González-Saiz, F., Pedraz, M., García-Marchena, N., Romero-Sanchiz, P., Ruiz, J.J., Campos-Cloute, R., Serrano, A., Pavón, F.J., Torrens, M., Rodriguez De Fonseca, F., 2017. Differences in the rates of drug polyconsumption and psychiatric comorbidity among patients with cocaine use disorders according to the mental health service. J. Psychoact. Drugs 49, 306–315. https://doi.org/10.1080/02791072.2017.1342151.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., Erbaugh, J., 1961. An inventory for measuring depression. Arch. Gen. Psychiatry 4, 561–571.

Biederman, J., Wilens, T.E., Mick, E., Faraone, S.V., Spencer, T., 1998. Does attention-deficit hyperactivity disorder impact the developmental course of drug and alcohol abuse and dependence? Biol. Psychiatry 44, 269–273.

Boden, J.M., Fergusson, D.M., 2011. Alcohol and depression. Addiction 106, 906–914. https://doi.org/10.1111/j.1360-0443.2010.03351.x.

Calsyn, D.A., Saxon, A.J., Bush, K.R., Howell, D.N., Baer, J.S., Sloan, K.L., Malte, C.A., Kivlahan, D.R., 2004. The Addiction Severity Index medical and psychiatric composite scores measure similar domains as the SF-36 in substance-dependent veterans: concurrent and discriminant validity. Drug Alcohol. Depend. 76, 165–171. https://doi.org/10.1016/j.drugalcdep.2004.04.018.

Chico, E., Tous, J.M., Lorenzo-Seva, U., Vigil-Colet, A., 2003. Spanish adaptation of Dickman's impulsivity inventory: its relationship to Eysenck's personality questionnaire. Person. Individ. Differ. 35, 1883–1892. https://doi.org/10.1016/S0191-8869(03)00037-0.

Christensen, H.N., Diderichsen, F., Hvidtfeldt, U.A., Lange, T., Andersen, P.K., Osler, M., Prescott, E., Tjønneland, A., Rod, N.H., Andersen, I., 2017. Joint effect of alcohol consumption and educational level on alcohol-related medical events: a danish register-based cohort study. Epidemiology 28, 872–879. https://doi.org/10.1097/EDE.0000000000000718.

Comín, M., Redondo, S., Daigre, C., Grau-López, L., Casas, M., Roncero, C., 2016. Clinical differences between cocaine-dependent patients with and without antisocial personality disorder. Psychiatry Res. 246, 587–592. https://doi.org/10.1016/j.psychres.2016.10.083.

Compton, W.M., Cottler, L.B., Jacobs, J.L., Ben-Abdallah, A., Spitznagel, E.L., 2003. The role of psychiatric disorders in predicting drug dependence treatment outcomes. Am. J. Psychiatry 160, 890–895. https://doi.org/10.1176/appi.ajp.160.5.890.

Compton, W.M., Thomas, Y.F., Stinson, F.S., Grant, B.F., 2007. Prevalence, correlates, disability, and comorbidity of dsm-iv drug abuse and dependence in the United States. Arch. Gen. Psychiatry 64, 13.

Conde, V, Useros, E, 1974. Spanish adaptation of the behavioral assessment scale for depression Beck. Revista de Psiquiatría y Psicología Médica de Europa y América Latina 12, 153–167.

Daigre, C., Grau-López, L., Rodríguez-Cintas, L., Ros-Cucurull, E., Sorribes-Puertas, M., Esculies, O., Bones-Rocha, K., Roncero, C., 2017. The role of dual diagnosis in health-related quality of life among treatment-seeking patients in Spain. Qual. Life Res. 26, 3201–3209. https://doi.org/10.1007/s11136-017-1668-4.

Daigre, C., Roncero, C., Grau-López, L., Martínez-Luna, N., Prat, G., Valero, S., Tejedor, R., Ramos-Quiroga, J.A., Casas, M., 2013. Attention deficit hyperactivity disorder in cocaine-dependent adults: a psychiatric comorbidity analysis. Am. J. Addict. 22, 466–473. https://doi.org/10.1111/j.1521-0391.2013.12047.x.

Delegación del Gobierno para el, Plan Nacional sobre Drogas, 2015. Encuesta Domiciliariosobre Alcohol y otras Drogas (EDADES). URL http://www.pnsd.gob.es/home.htm (Accessed 9.9.18).

Dickman, S.J., 1990. Functional and dysfunctional impulsivity: personality and cognitive correlates. J. Pers. Soc. Psychol. 58, 95–102.

Epstein, J.N., Kollins, S.H., 2006. Psychometric properties of an adult ADHD diagnostic interview. J. Atten. Disord. 9, 504–514. https://doi.org/10.1177/1087054705283575.

First, M.B., 1997. User's guide for. The Structured Clinical Interview for DSM-IV Axis II Personality Disorders: SCID-II.

First, R.L.S., Gibbon, M., Janet, B.W., Williams, M.B., 1998. Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I), Clinician Version, Administration Booklet. By M.B. First. first ed. American Psychiatric Publishing Incorporated.

Flynn, P.M., Brown, B.S., 2008. Co-occurring disorders in substance abuse treatment: issues and prospects. J. Subst. Abuse Treat. 34, 36–47. https://doi.org/10.1016/j.jsat.2006.11.013.

González-Saiz, F., Vergara-Moragues, E., Verdejo-García, A., Fernández-Calderón, F., Lozano, O.M., 2014. Impact of psychiatric comorbidity on the in-treatment outcomes of cocaine-dependent patients in therapeutic communities. Subst. Abuse 35, 133–140. https://doi.org/10.1080/08897077.2013.812544.

Grant, B.F., Stinson, F.S., Dawson, D.A., Chou, S.P., Dufour, M.C., Compton, W., Pickering, R.P., Kaplan, K., 2004. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Arch. Gen. Psychiatry 61, 807–816. https://doi.org/10.1001/archpsyc.61.8.807.

Grau-López, L., Roncero, C., Daigre, C., Gonzalvo, B., Bachiller, D., Rodriguez-Cintas, L., Egido, Á., Casas, M., 2012. Risk factors for relapse in drug-dependent patients after hospital detoxification. Adicciones 24, 115–122.

Havassy, B.E., Alvidrez, J., Owen, K.K., 2004. Comparisons of patients with comorbid psychiatric and substance use disorders: implications for treatment and service delivery. Am. J. Psychiatry 161, 139–145. https://doi.org/10.1176/appi.ajp.161.1.139.

Herrero, M.J., Domingo-Salvany, A., Torrens, M., Brugal, M.T., ITINERE Investigators, 2008. Psychiatric comorbidity in young cocaine users: induced versus independent disorders. Addiction 103, 284–293. https://doi.org/10.1111/j.1360-0443.2007.02076.x.

Iraurgi Castillo, I., Póo, M., Márkez Alonso, I., 2004. Valoración del índice de salud sf-36 aplicado a usuarios de programas de metadona: valores de referencia para la Comunidad Autónoma Vasca. Revista española de salud Pública 78, 609–621.

Kaminer, Y., Tarter, R.E., Bukstein, O.G., Kabene, M., 1992. Comparison between treatment completers and noncompleters among dually diagnosed substance-abusing adolescents. J. Am. Acad. Child Adol. Psychiatry 31, 1046–1049. https://doi.org/10.1097/00004583-199211000-00008.

Kelly, T.M., Daley, D.C., Douaihy, A.B., 2012. Treatment of substance abusing patients with comorbid psychiatric disorders. Addict. Behav. 37, 11–24. https://doi.org/10.1016/j.addbeh.2011.09.010.

Klimas, J., Tobin, H., Field, C.-A., O'Gorman, C.S.M., Glynn, L.G., Keenan, E., Saunders, J., Bury, G., Dunne, C., Cullen, W., 2014. Psychosocial interventions to reduce alcohol consumption in concurrent problem alcohol and illicit drug users. Cochrane Database Syst Rev. doi:10.1002/14651858.CD009269.pub3.

Krawczyk, N., Feder, K.A., Saloner, B., Crum, R.M., Kealhofer, M., Mojtabai, R., 2017. The association of psychiatric comorbidity with treatment completion among clients admitted to substance use treatment programs in a U.S. national sample. Drug Alcohol. Depend. 175, 157–163. https://doi.org/10.1016/j.drugalcdep.2017.02.006.

Levin, F.R., Evans, S.M., Vosburg, S.K., Horton, T., Brooks, D., Ng, J., 2004. Impact of attention-deficit hyperactivity disorder and other psychopathology on treatment retention among cocaine abusers in a therapeutic community. Addict. Behav. 29, 1875–1882. https://doi.org/10.1016/j.addbeh.2004.03.041.

Martinotti, G., Cinosi, E., Santacroce, R., Papanti, D., Pasquini, A., Mancini, V., Corbo, M., Fiori, F., Sarchione, F., Marchetti, D., Verrocchio, M.C., Di Giannantonio, M., Torrens, M., Schifano, F., Morlan Coarasa, M.J., Merino Del Villar, C., 2017. Substance-related psychopathology and aggressiveness in a nightlife holiday resort: results from a pilot study in a psychiatric inpatient unit in Ibiza. Hum. Psychopharmacol. 32. https://doi.org/10.1002/hup.2586.

McCaul, M.E., Svikis, D.S., Moore, R.D., 2001. Predictors of outpatient treatment retention: patient versus substance use characteristics. Drug Alcohol. Depend. 62, 9–17.

McGovern, M.P., Lambert-Harris, C., Gotham, H.J., Claus, R.E., Xie, H., 2014. Dual diagnosis capability in mental health and addiction treatment services: an assessment of programs across multiple state systems. Adm. Policy Ment. Health 41, 205–214. https://doi.org/10.1007/s10488-012-0449-1.

Messina, N., Wish, E., Nemes, S., 2000. Predictors of treatment outcomes in men and women admitted to a therapeutic community. The Am. J. Drug Alcohol Abuse 26, 207–227. https://doi.org/10.1081/ADA-100100601.

Minnes, S., Min, M.O., Kim, J.-Y., Francis, M.W., Lang, A., Wu, M., Singer, L.T., 2017. The association of prenatal cocaine exposure, externalizing behavior and adolescent substance use. Drug Alcohol. Depend. 176, 33–43. https://doi.org/10.1016/j.drugalcdep.2017.01.027.

Moitra, E., Anderson, B.J., Stein, M.D., 2013. Perceived stress and substance use in methadone-maintained smokers. Drug Alcohol. Depend. 133, 785–788. https://doi.org/10.1016/j.drugalcdep.2013.08.010.

Mulder, R.T., Frampton, C.M.A., Peka, H., Hampton, G., Marsters, T., 2009. Predictors of 3-month retention in a drug treatment therapeutic community. Drug Alcohol. Rev. 28, 366–371. https://doi.org/10.1111/j.1465-3362.2009.00050.x.

NIDA National Institute on Drug. Types of treatment programs [WWW Document]. URLhttps://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/drug-addiction-treatment-in-united-states/types-treatment-programs(accessed 8.9.18).

Nielsen, A.L., Scarpitti, F.R., 2002. Predicting retention in a therapeutic community for incarcerated substance abusers. J. Offend. Rehabil. 34, 47–65. https://doi.org/10.1300/J076v34n03_04.

Peacock, A., Leung, J., Larney, S., Colledge, S., Hickman, M., Rehm, J., Giovino, G.A., West, R., Hall, W., Griffiths, P., Ali, R., Gowing, L., Marsden, J., Ferrari, A.J., Grebely, J., Farrell, M., Degenhardt, L., 2018. Global statistics on alcohol, tobacco and illicit drug use: 2017 status report. Addiction. https://doi.org/10.1111/add.14234.

Pedrero Pérez, E.J., 2009. Assessment of functional and dysfunctional impulsivity in substance-addicted patients by means of Dickman's Inventory. Psicothema 21, 585–591.

Polcin, D.L., Korcha, R.A., Bond, J.C., 2015. Interaction of motivation and psychiatric symptoms on substance abuse outcomes in sober living houses. Subst. Use Misuse 50, 195–204. https://doi.org/10.3109/10826084.2014.962055.

Ramos-Quiroga, J.A., Bosch, R., Richarte, V., Valero, S., Gómez-Barros, N., Nogueira, M., Palomar, G., Corrales, M., Sáez-Francàs, N., Corominas, M., Real, A., Vidal, R., Chalita, P.J., Casas, M., 2012. Criterion and concurrent validity of conners adult ADHD diagnostic interview for DSM-IV (CAADID) Spanish version. Rev. Psiquiatr. Salud. Ment. 5, 229–235. https://doi.org/10.1016/j.rpsm.2012.05.004.

Rodríguez-Cintas, L., Daigre, C., Grau-López, L., Barral, C., Pérez-Pazos, J., Voltes, N., Braquehais, M.D., Casas, M., Roncero, C., 2016. Impulsivity and addiction severity in cocaine and opioid dependent patients. Addict. Behav. 58, 104–109. https://doi.org/10.1016/j.addbeh.2016.02.029.

Roncero, C., Rodríguez-Cintas, L., Barral, C., Fuste, G., Daigre, C., Ramos-Quiroga, J.A., Casas, M., 2012. Treatment adherence to treatment in substance users referred from Psychiatric Emergency service to outpatient treatment. Actas Esp. Psiquiatr. 40, 63–69.

Samet, S., Fenton, M.C., Nunes, E., Greenstein, E., Aharonovich, E., Hasin, D., 2013. Effects of independent and substance-induced major depressive disorder on remission and relapse of alcohol, cocaine and heroin dependence. Addiction 108, 115–123. https://doi.org/10.1111/j.1360-0443.2012.04010.x.

Sánchez-Hervás, E., Secades-Villa, R., José Santonja Gómez, F., Zacarés Romaguera, F., García-Rodríguez, O., 2009. Addictive severity in cocaine addicts measured with the europasi: differences between composite scores and severity ratings. Am. J. Addict. 18, 375–378. https://doi.org/10.3109/10550490903077952.

Segal, D.L., Hersen, M., Van Hasselt, V.B., 1994. Reliability of the structured clinical interview for DSM-III-R: an evaluative review. Compr. Psychiatry 35, 316–327.

Smith, J.P., Book, S.W., 2008. Anxiety and substance use disorders: a review. Psychiatr. Times 25, 19–23.

Spielberger, C.D., Gorsuch, R.L., Lushene, R.E., 1970. The State-Trait Anxiety Inventory. Preliminary Test Manual for Form X. State University, Tallahassee: Florida Spanish adaptation, Cuestionario de Ansiedad Estado-Rasgo. Manual, 1986, Madrid: Tea Ediciones.

Torrens, M., Mestre-Pintó, J.-I., Domingo-Salvany, A., 2015. European monitoring centre for drugs and drug addiction. Comorbidity of Substance Use and Mental Disorders in Europe. Publications Office, Luxembourg.

Torrens, M., Serrano, D., Astals, M., Pérez-Domínguez, G., Martín-Santos, R., 2004. Diagnosing comorbid psychiatric disorders in substance abusers: validity of the Spanish versions of the psychiatric research interview for substance and mental disorders and the structured clinical interview for DSM-IV. Am. J. Psychiatry 161, 1231–1237.

Valero, S., Daigre, C., Rodríguez-Cintas, L., Barral, C., Gomà-I-Freixanet, M., Ferrer, M., Casas, M., Roncero, C., 2014. Neuroticism and impulsivity: their hierarchical organization in the personality characterization of drug-dependent patients from a decision tree learning perspective. Compr. Psychiatry 55, 1227–1233. https://doi.org/10.1016/j.comppsych.2014.03.021.

Verdejo-García, A., Lawrence, A.J., Clark, L., 2008. Impulsivity as a vulnerability marker for substance-use disorders: review of findings from high-risk research, problem gamblers and genetic association studies. Neurosci. Biobehav. Rev. 32, 777–810. https://doi.org/10.1016/j.neubiorev.2007.11.003.

Vergara-Moragues, E., González-Saiz, F., Lozano, O.M., Verdejo García, A., 2013. Psychiatric profile of three-month retention in cocaine-dependent patients treated in a therapeutic community. J. Stud. Alcohol. Drugs 74, 452–459.

Vilagut, G., Ferrer, M., Rajmil, L., Rebollo, P., Permanyer-Miralda, G., Quintana, J.M., Santed, R., Valderas, J.M., Domingo-Salvany, A., Alonso, J., 2005. El Cuestionario de Salud SF-36 español: una década de experiencia y nuevos desarrollos. Gaceta Sanitaria 19, 135–150.

Ware, J.E., Kosinski, M., 2001. Interpreting SF-36 summary health measures: a response. Qual. Life Res. 10, 405–413 discussion 415–420.

Ware, J.E., Sherbourne, C.D., 1992. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med. Care 30, 473–483.

Wise, B.K., Cuffe, S.P., Fischer, T., 2001. Dual diagnosis and successful participation of adolescents in substance abuse treatment. J. of Subst. Abuse Treat. 21, 161–165. https://doi.org/10.1016/S0740-5472(01)00193-3.