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Shared decision making in patients with substance use disorders: A one-year follow-up study

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ABSTRACT

Patient-centered care in therapeutic processes has been associated with better clinical outcomes, however, it remains a poorly studied aspect in Substance Use Disorder (SUD). The study aimed to evaluate patient's preferences, perceived participation in treatment decisions and activation level; and how they predict retention, pharmacological adherence and substance use during one-year follow-up. Logistic regression models were used to analyze the association between independent variables, along with a wide number of sociodemographic and clinical covariates, and outcomes. Most patients prefer a shared or passive role when making decisions about their treatment, and showed concordance between their preferred and perceived roles. In the univariate models, perceiving more involvement than desired showed a higher likelihood of treatment discontinuation at 12 months, and substance use at 6 and 12 months. No significant associations were found between the remaining decisional variables or the degree of activation with the assessed outcomes. A majority of SUD patients prefer and perceive to be involved in the decision-making process about their treatment. Patients perceiving more involvement than desired might experience an excess of responsibility that could negatively influence treatment continuation and substance use. Limitations of the study preclude any definitive conclusion, and more research is needed to confirm these results.

1. Introduction

Substance Use Disorders (SUD) are complex, multifactorial, and chronic health conditions in which the patient's awareness of their illness, motivation and the degree to which barriers to treatment are eliminated, play a relevant role. Substance use is the source of serious health problems, of increasing frequency, affecting 11.2 % of the world population; contributing to 21.1 % of all deaths. The 2020 United Nations World Drug Report noted that in 2017 there were 167,000 deaths associated with SUD; meaning the loss of 21 million years due to disability or death (Messas et al., 2019; World Drug Report, 2020, s. f.). These figures, together with their economic consequences, have forced public health systems to implement preventive and therapeutic interventions of proven effectiveness and cost-effectiveness, such as the International Standards for the Treatment of Drug Use Disorders Draft for Field Testing (2020). In fact, only 16 % of the people affected by SUD receive treatment (Pirie, T., and National Treatment Indicators Working Group, 2015; World Drug Report, 2020) and therefore one of the main objectives continues to be linking and retaining of the patient to the treatment (Marchand et al., 2019). Several studies have shown that greater retention is related to better health outcomes, as well as allowing therapeutic goals to be achieved. The high rate of dropouts in SUD

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patients makes studying and improving this parameter crucial (Daigre et al., 2021; Friedrichs et al., 2016). To this end, efforts have been made to identify barriers and facilitators to improve access by offering healthcare resources and treatment options of different organizational complexity (hospitalizations, ambulatory care centers, day hospitals and therapeutic communities) (Muthulingam et al., 2019). Some authors have argued that a more focused or Patient-Centered Care (PCC), defined as a more consistent with the values, needs and wishes of the patient care and carried out involving patients in discussions and decisions about their health, could help to achieve this goal (Mead and Bower, 2000). One of the main tools to carry out PCC is shared decision making (SDM); a bilateral communicative process in which the health care provider and the patient try to reach an agreement on the treatment, based on the available scientific evidence about the potential benefits and risks of the different treatment options, considering also how these potential consequences are valued by the patient (Charles et al., 1999). SDM, therefore, aims to include the patient's preferences in the decision-making process, and it is especially relevant in the management of chronic diseases and "preference-sensitive" medical decisions when different treatment options offer a similar balance between risks and benefits.

Previous studies indicate that a greater degree of involvement in dealing with addictions is associated with greater treatment satisfaction (Brener et al., 2009), and a reduction in the severity of the SUD and the comorbid psychiatric pathologies (Joosten et al., 2009). SDM has been also linked to better outcomes in the treatment of SUD patients, improving self-control and reducing substance use (Joosten et al., 2009, 2011). It is not clear, however, how and to what extent patients want to be involved in this therapeutic process. Some studies indicate that patients prefer more information than responsibility when deciding (Joosten et al., 2011). Friedrichs et al. (2016), in a systematic review on SDM in patients with SUD, found only two studies reporting on patients desire to play an active role in the choice of treatment, either by choosing the treatment option themselves or sharing the decision with the clinician (Neuner et al., 2007; Sobell et al., 1992). Besides, sometimes, the patient's therapeutic objectives could not coincide with those offered by the professional (Alves et al., 2017; Hodgins et al., 1997).

In the PCC context, a distinction is made between the patient's preferences regarding their treatment and their participation (Montori et al., 2013). SDM focuses on the process itself and tries to include these preferences within the clinical encounter. As stated, it is not known to what extent the preferences of the patients and the SDM are sufficiently implemented during the clinical encounter, and the degree of participation that the patients with SUD want to have (Marchand et al., 2019).

The objective of the study is to evaluate the preferences about participation in decision making, the degree of patients' perceived SDM and activation; and how these factors influence treatment retention, pharmacological adherence and abstinence from the substance during a year follow-up in an outpatient center. The hypothesis was that a lower perceived participation in the decision-making process, a lower concordance between perceived and preferred role in participation, and a lower degree of activation are associated with worse results.

2. Method

This is a cohort prospective observational study, carried out in the outpatient service for addictions of the Hospital Vall d'Hebron (Barcelona, Spain). The study was approved by the hospital's Ethical Committee, and it was carried out following the principles of the Helsinki Declaration (World Medical Association, 2013). The article has been made following the recommendations of the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guideline for cohort studies (Cuschieri, 2019).

2.1. Setting

The Vall d'Hebron outpatient center for addiction treatment serves individuals with SUD who live in the northern neighborhoods of Barcelona, an area with a lower socioeconomic level than the average of the city. The center offers an integrative treatment approach for behavioral and all substance addictions based on a combination of individual psychotherapy based on motivational interviewing and psychopharmacological treatment based on international guidelines.

2.2. Participants

We included consecutive patients who met the following criteria: 1) age between 18 and 65 years, 2) meeting SUD criteria according to DSM-5; 3) ability to understand and fill out the research questionnaire, in the opinion of the physician; and 4) signature of the informed consent. Both new patients and patients who already were under treatment at the center were included. Exclusion criteria were: 1) present a state of intoxication at the time of the interview, 2) decompensated psychiatric disorder, and 3) not fluent in Spanish.

2.3. Recruitment and assessment process

The recruitment and assessment process was performed by trained psychiatrists and psychologists. A convenience sample method was used. All consecutive new patients and patients who already were under treatment at the center were invited to participate whether they met the inclusion criteria. Those who accepted, signed informed consent. There was no financial compensation for participation.

Baseline data was collected in at least two visits for patients' usual outpatient treatment, carried out by the psychiatrist and/or the psychologist in charge of the patient. At 6 and 12 months, computerized clinical records were reviewed regarding attendance at scheduled visits, discharge or disassociation from the center, and substance use. Patients who had not discontinued treatment at both time points filled out the questionnaire on medication adherence.

2.4. Measures

All psychometric and clinical scales used have been previously validated in Spain.

Independent variables:

- The Control Preference Scale (CPS): a self-reported scale with two items and five response options, that evaluate the patient's preference and perception, respectively, about their involvement in the decision-making process (De Las Cuevas and Peñate, 2016; Degner et al., 1997). Options range from a completely active role (the patient makes the decision) to a completely passive one (the doctor decides without the participation of the patient), with a shared decision in the midpoint. For analysis purposes, scores were collapsed into three categories: active (considering or not doctor's opinion), shared and passive (considering or not patient's opinion).
- Shared Decision-Making Questionnaire (SDM-Q-9): a self-reported single-factor 9-item scale, which assessed the doctor's promotion of SDM in consultation as perceived by the patient (De las Cuevas et al., 2015; Kriston et al., 2010). Items are answered on a Likert scale ranging from 0 (completely disagree) to 5 (completely agree). The total score is transformed to a 0–100 scale, with higher scores indicating higher levels of SDM.
- Patient Activation Measure (mental health version, PAM-MH): a self-report questionnaire that assesses patients' self-perceived knowledge, skills, confidence, and involvement in the management of chronic diseases (Green et al., 2010; Moreno-Chico et al., 2017). It consists of 13 items to be answered on a Likert scale ranging from (1) totally disagree to (4) totally agree. The total score is transformed to

a 0–100 scale using calibration tables, provided under license. Higher scores indicate a higher degree of activation.

Dependent variables:

- Retention: clinical records and professionals' reports were used to assess treatment continuation (yes/no). Discontinuation was defined as not attending a scheduled appointment without prior justification, or during the subsequent 30 days. This definition allows an objective measure of retention according to a specific time frame period, and it has been previously used in other studies evaluating retention in SUD patients (Daigre et al., 2021; Palma-Álvarez et al., 2021; Ros-Cucurull et al., 2018).
- Medication adherence was assessed with the Spanish version of the Simplified Medication Adherence Questionnaire (SMAQ) (Knobel et al., 2002). It is made up of six questions that evaluate different aspects related to pharmacological compliance: forgetfulness, routine, adverse effects and number of omissions. A patient is classified as non-compliant if he/she answers any response in the sense of non-adherence, or reports having missed more than two doses in the last week, or more than two full days not taking the medication in the last three months.
- Substance use: it was measured by a multi-panel urine drug test for the most common drugs (opioids, cannabis, cocaine, benzodiazepines, and amphetamines) and by a breath alcohol test. Substance use urinalysis was conducted twice weekly during the follow-up. Active use or relapse was defined as three consecutive positive urine tests for the main substance or the substance that caused the most problems for the patient (according to clinical judgment and supported by the information provided by the ad-hoc questionnaire and the EuropASI on social, medical, psychological and psychiatric issues). This definition has been used in previous studies (Grau-López et al., 2012; Roncero et al., 2019).

Covariables

Sociodemographic variables included were: age, gender, education, marital status and job status. For the regression analyses, education was dichotomized into no studies/primary vs. secondary/university/other, marital status into married/coupled vs. single/separated/widow, and job status into active vs. non-active. We also assessed substance use at baseline (yes/no), previously under follow-up/new patient and other substance consumption variables.

The Zuckerman–Kuhlman Personality Questionnaire (ZKPQ) was used to determine the basic personality dimensions. It consists of 99 items on 5 scales. Neuroticism–Anxiety, Activity, Sociability, Impulsiveness/Sensation seeking, and Aggressiveness/hostility (Gomà-i-Freixanet et al., 2008).

The European Addiction Severity Index (EuropASI) was used to measure addiction severity, main substance and general consumption of the substance. It is a semi-structured interview that collects medical, occupational, legal, family, social, psychological problems, and substance use history (Bobes et al., 2017; Kokkevi and Hartgers, 1995).

The 36-Item Short-Form Health Survey (SF-36) was used to measure the physical and psychological quality of life from the patient's perspective. The questionnaire provides scores in 8 spheres, and these are aggregated into the physical dimension and the mental dimension (Vilagut et al., 2005; Ware and Sherbourne, 1992).

The Spanish versions of the Semi-Structured Clinical Interview for DSM-IV Axis-I Disorders (SCID-I) and Axis-II Disorders (SCID-II), were used to assess patients' psychiatric comorbidities. Both have shown high inter-rater reliability for categorical diagnosis (First and Gibbon, 2004).

2.5. Sample size

We aimed to recruit at least 200 participants. Based on the recommended formulae (20 * Number of predictors) / Probability of the less frequent outcome value (Austin and Steyerberg, 2017), this size would offer adequate power for univariate models with an outcome probability of 0.10, and for a model with three independent variables (SDM-9-Q, PAM and one scale from the CPS) and an outcome probability of 0.30.

2.6. Statistical analysis

Descriptive statistics (means, standard deviations, percentages) were calculated for the study variables. The association between the three independent variables at baseline was analyzed by means of Pearsons' correlation and linear regression.

The associations of the independent variables, and the included covariates, with the outcomes were analyzed separately for the periods 0–6 and 6–12 months. First, univariate analyses were carried out for each predictor; we used multilevel logistic regression models, including the health provider as a random effect in order to adjust for patients' clustering. This model was then compared with the logistic model by means of the likelihood ratio test, and the latter was used if the test's result was not significant. Those variables with p-values lower than 0.10 in the univariate analyses were introduced together in a multivariate model (model 1). Multicollinearity was assessed by means of the variance inflation factor (VIF) and those variables with VIF > 4 were excluded (model 2). For the multivariate models, a p-value < 0.05 was considered significant.

For each model, potential misspecification was explored with the linktest Stata command. This test rebuilds the model using the predicted value and predicted value squared as predictors. A non-significant result of the former term or a significant value of the latter indicates potential specification errors.

We report four goodness-of-fit indexes: the pseudo-R^2, the Hosmer–Lemeshow test, the Akaike's Information Criterium (AIC) and the Bayesian Information Criterium (BIC). The models' predictive performance was assessed by calculating sensitivity, specificity, correctly classified cases and the area under the receiver operating characteristic (ROC) curve (AUC). Finally, we further refined the models excluding non-significant predictors until the AIC and BIC were minimized (model 3).

Missed scores were not imputed. Only in the case of substance use, we carried out an additional analyses assuming that none of the lost participants were abstinent at each time point (worst-case scenario).

3. Results

From March 2019 to June 2021, 214 patients were recruited by 10 mental health providers (median = 16, range 10–62). The sociodemographic characteristics of the recruited sample are detailed in Table 1. The mean age was 44 years old, two-thirds were men, and 56.8 % had only primary or no formal studies. Seventy-one percent were active substance users at the start of the study, and 37.4 % were new patients. Forty-nine percent of the participants were being treated for alcohol dependence, 28.5 % for cocaine and 7.9 % for opioids, whereas other drugs showed values under 5 %. Half of the sample had been diagnosed with an Axis-I mental disorder, and almost one-third had a personality disorder diagnosis.

At 6 months, one patient had died and another one was discharged. Between 6–12 months, five patients died and one was discharged. These eight patients were excluded from the corresponding analyses.

At 6 months, the rate of treatment retention was 81.6 % (173/212). Among these, 126 had been prescribed medication and there was only one missed value on this variable. Between 6–12 months, 69.4 % of patients (143/206) were compliant with appointments (with only two missed values on medication adherence for those prescribed). In addition to these retained patients, data on medication adherence and substance use were available, respectively, for 20 and 9 out of the 63 patients who discontinued (Fig. 1).

At baseline, missed values ranged from 0 to 4.7 % across all

Table 1
Sample Characteristics ($n = 214$).

Sociodemographic	N (%)
Age, mean (sd)	43.98 (11.6)
Women	72 (33.6 %)
Education ($n = 213$)	
No studies	25 (11.7 %)
Primary	96 (45.1 %)
Secondary	65 (30.5 %)
University	27 (12.7 %)
Marital status ($n = 210$)	
Single	84 (40.0 %)
Married/coupled	86 (40.6 %)
Separated/divorced	39 (18.6 %)
Widow	1 (0.5 %)
Job status ($n = 209$)	
Employed	64 (30.6 %)
Unemployed	74 (35.4 %)
Sick leave	23 (11.0 %)
Pensioner	40 (19.1 %)
Other	8 (3.8 %)
Clinical	
New patient	80 (37.4 %)
Substance use at baseline	153 (71.5 %)
Under treatment for	
Alcohol	105 (49.1 %)
Cocaine	61 (28.5 %)
Opioid	17 (7.9 %)
Cannabis	9 (4.2 %)
Benzodiazepine	6 (2.8 %)
Amphetamine	4 (1.9 %)
Analgesic	1 (0.5 %)
Polydrug	11 (5.1 %)
Current or past dependence	
Alcohol	124 (57.9 %)
Cocaine	98 (45.8 %)
Opioid	28 (13.1 %)
Cannabis ($n = 212$)	54 (25.5 %)
Benzodiazepine	18 (8.4 %)
Polydrug ($n = 212$)	44 (20.1 %)
Psychiatric comorbidities	
Depressive disorder ($n = 211$)	68 (32.2 %)
Bipolar disorder ($n = 210$)	8 (3.8 %)
Anxiety ($n = 210$)	33 (15.7 %)
Adaptive disorder ($n = 210$)	13 (6.2 %)
Psychotic disorder ($n = 213$)	9 (4.2 %)
Eating disorder ($n = 212$)	4 (1.9 %)
Personality disorder ($n = 205$)	63 (30.7 %)

variables, except for the PAM (11.2 %) (Appendix, Table A1). None of the included variables were significantly associated with having a missed score in the PAM (Appendix, Table A2).

Internal consistency (Cronbach's alpha) of the psychometric scales used was 0.90 (SDM-9-Q), 0.84 (PAM), 0.96 (SMAQ), 0.87 (ZKPQ-Neuroticism), 0.61 (ZKPQ-Aggression/hostility), 0.72 (ZKPQ-Activity), 0.79 (ZKPQ-Impulsiveness), 0.79 (ZKPQ-Sociability), 0.79 (SF-36 physical) and 0.82 (SF-36 mental).

3.1. SDM-related variables and patient activation

Most patients preferred a shared (46.9 %) or passive (38.7 %) role in the decision-making process, and 38.1 % and 50.1 %, respectively, perceived that they played those roles. Two-thirds (66.5 %) of the patients showed concordance between their preferred and perceived roles, whereas 23 % perceived less control than they wanted, and 10.5 % were given more participation than desired.

Mean scores on the SDM-9-Q and the PAM were respectively 69.0 (sd = 21.6) and 56.8 (sd = 14.4), indicating moderate levels of perceived SDM and activation. These two variables showed a significant correlation (Pearson $r = 0.22$, $p = 0.003$). Patients who preferred an active role, based on the CPS, scored significantly higher on the PAM than those who preferred a shared role. ($B = 5.22$, $p = 0.003$). No other significant associations were observed between the CPS (perceived role and role matching) and the other two scales.

3.2. Predictors of the clinical outcomes

In all univariate analyses, the multilevel model with the psychiatrist as a random effect did not significantly differ from the simple logistic model, with the likelihood ratio test yielding most χ^2 values near to zero. Therefore, we used the more parsimonious logistic model. In the appendix, Tables A3-A6 show the univariate models and the initial results of the multivariate models (model 1) (Table 2).

3.2.1. Treatment retention

Decision-related variables (CPS, SDM-9-Q) and patient activation (PAM) did not significantly predict retention at 6 months (Table 3). In the final model, being abstinent at baseline (OR = 0.13, 95 % CI: 0.04, 0.46), a higher score on the ASI-Drug use subscale (OR = 0.86, 95 % CI: 0.75, 0.98) and lower sociability scores (OR = 0.89, 95 % CI: 0.81, 0.99), significantly related to continuation (Table 4). The pseudo-R^2 was 0.18, the model correctly classified 84.16 % of the patients and the AUC was 0.78.

Retention during 6–12 months was significantly predicted in the final multivariate model by not being a new patient (OR = 0.49, 95 % CI: 0.25, 0.95), and having a mood disorder (OR = 2.12, 95 % CI: 1.02, 4.41) (Table 4). Participants who perceived more involvement than desired were less likely to be retained compared to those with matched preferences (OR = 0.39, 95 %CI: 0.15, 1.98; $p = 0.046$), but the difference did not reach significance in the multivariate model (OR = 0.38, 95 %CI: 0.14, 1.06; $p = 0.061$). Excluding any of the non-significant predictors did not improve model fit, assessed by the AIC. The pseudo-R^2 was 0.11, the model correctly classified 74.62 % of the patients and the AUC was 0.72.

3.2.2. Medication adherence

The rate of adherent patients at 6 months was 84 % (105/125). The CPS, SDM-9-Q and PAM did not significantly predict medication adherence (Table 5). In the multivariate model, significant predictors were: not being a new patient (OR = 0.26, 95 % CI: 0.08, 0.92), having an Axis-I mental disorder (OR = 5.03, 95 % CI: 1.27, 19.87), and not having a personality disorder (OR = 0.22, 95 % CI: 0.06, 0.79) (Table 6). After excluding non-significant predictors (model 3), the model's fit improved and substance use at baseline (OR = 0.19; 95 %CI: 0.04, 0.98) and the ASI-Employment and support subscale (OR = 0.78; 95 %CI: 0.62, 0.98) became significant. The pseudo-R^2 was 0.26, the model correctly classified 88.79 % of the patients and the AUC was 0.82.

Between 6–12 months, 73.2 % of the patients (93/127) were adherent to medication. The significant variables in model 2 were not being a new patient (OR = 0.29, 95 % CI: 0.10, 0.82), having a depressive disorder (OR = 3.58, 95 %CI: 1.13, 11.29) and not having a personality disorder (OR = 0.26, 95 % CI: 0.09, 0.75) (Table 6). In model 3, the ASI-Medical status subscale also obtained a significant result (OR = 0.81, 95 %CI: 0.70, 0.95). The pseudo-R^2 was 0.19, the model correctly classified 75.00 % of the patients and the AUC was 0.79.

3.2.3. Substance use

Between baseline and 6 months, 40 % of participants (70/175) had presented substance use. In the univariate models, participants who perceived more involvement than desired, compared to those with matched preferences, were significantly more likely to present substance use (OR = 2.63, 95 % CI: 1.04, 6.63) (Table 7). However, in the multivariate model, the result became non-significant, although its exclusion clearly worsened the model's fit, assessed by the AIC and BIC (Table 8). Significant predictors were substance use at baseline (OR = 7.08, 95 % CI: 2.71, 18.51) and a higher score on the ASI employment/support subscale (OR = 1.19, 95 % CI: 1.03, 1.37). In model 3, being a new patient entered in the model significantly associated to a higher

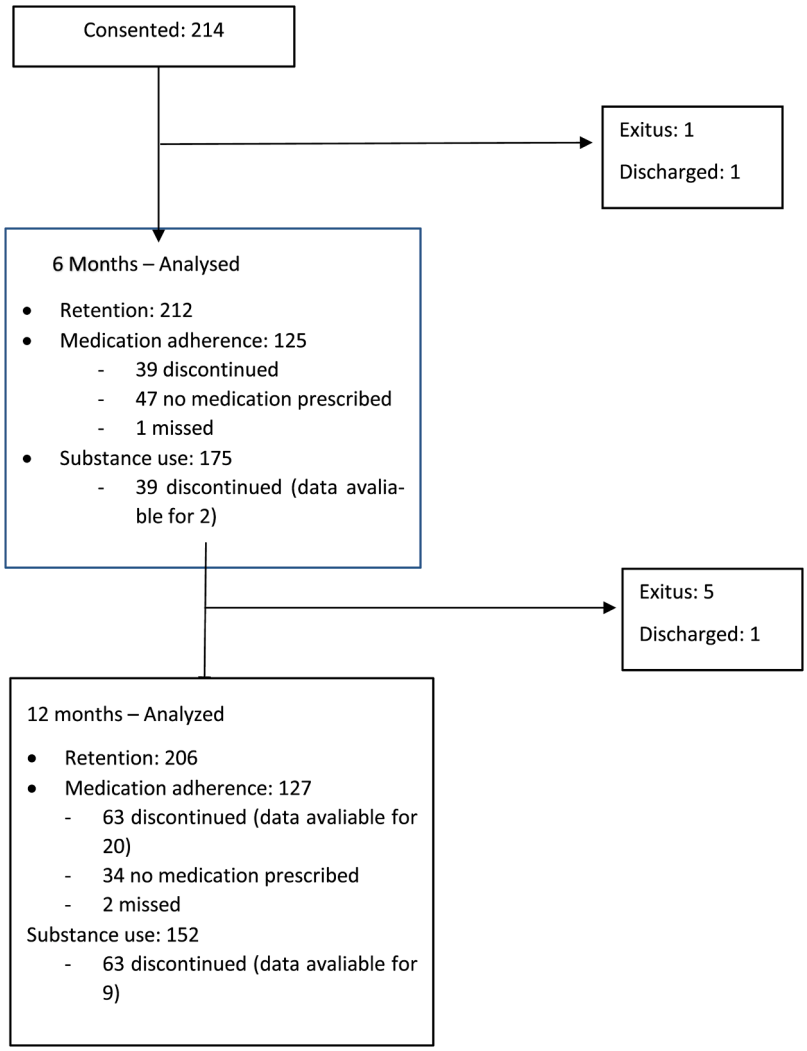

Fig. 1. Flow chart of the study.

Table 2
Decisional variables and patient activation.

CPS	
Preferred role (n = 209)	
Active	30 (14.4 %)
Shared	98 (46.9 %)
Passive	81 (38.7 %)
Perceived role (n = 210)	
Active	24 (11.4 %)
Shared	80 (38.1 %)
Passive	106 (50.1 %)
Role matching (n = 209)	
Less than desired	48 (23.0 %)
Matched	139 (66.5 %)
More than desired	22 (10.5 %)
SDM-9-Q (0–100) (n = 211), mean (sd)	69.0 (21.6)
PAM (0–100) (n = 190), mean (sd)	56.8 (14.4)

CPS: Control Preferences Scale; PAM: Patient Activation Measure; SDM-9-Q: Shared decision making questionnaire.

likelihood of substance use (OR = 2.18, 95 %CI: 1.03, 4.61). The pseudo-R^2 was 0.21, the model correctly classified 71.10 % of the patients and the AUC was 0.77. In the worst-case scenario, the significant predictors were the same (appendix, Table A6).

Between 6–12 months, the rate of substance use was 28.9 % (44/152). Patients who perceived more involvement than desired were also significantly more likely to present substance use, but the p-value felt slightly above the significance level (p = 0.051). In the multivariate models, the result was not significant, but again its exclusion worsened the model's fit. Significant predictors were substance use at baseline (OR = 4.23, 95 % CI: 1.41, 12.69) and the ASI-Family status subscale (OR = 1.18, 95 % CI: 1.00, 1.36). In model 3, the ASI-Legal status subscale became significant (OR = 1.24, 95 %CI: 1.03, 1.48). The pseudo-R^2 was 0.13, the model correctly classified 73.79 % of the patients and the AUC was 0.76.

In the worst-case scenario, only substance use at baseline was significant (appendix, Table A6).

4. Discussion

This study aimed to explore the control preferences, SDM perception and activation of people treated by SUD, as well as the longitudinal association of these variables with the evaluated behavioral outcomes. The results of the CPS show that most patients prefer a shared (47 %) or passive (39 %) role when making decisions about their treatment. Previous research in patients with SUD has focused mainly on treatment preferences (Friedrichs et al., 2016), and studies on participation preferences are very scarce and limited in their scope (Neuner et al., 2007; Sobell et al., 1992). A recent study in Germany with patients with alcohol use disorders showed a quite lower rate of passive role preference (10 %) (Friedrichs et al., 2018), whereas in our study patients with

Table 3
Univariate logistic regression models for treatment retention with decisional variables and patient activation as independent variables.

	0–6 months			6–12 months		
CPS	**N**	**OR (95 % CI)**	**P**	**N**	**OR (95 % CI)**	**P**
Preferred role (ref: shared)	207			202		
Active		0.99 (0.33, 2.97)	0.982		0.60 (0.25, 1.46)	0.262
Passive		0.73 (0.34, 1.56)	0.450		0.94 (0.48, 1.81)	0.843
Perceived role (ref: shared)	208			203		
Active		1.06 (0.32, 3.59)	0.925		0.65 (0.25, 1.71)	0.384
Passive		0.89 (0.42, 1.90)	0.764		1.05 (0.55, 2.02)	0.877
Role matching (ref: matched)	207			202		
Less than desired		0.84 (0.36, 1.98)	0.611		0.66 (0.32, 1.35)	0.251
More than desired		0.53 (0.19, 1.51)	0.236		0.39 (0.15, 0.98)	**0.046**
SDM-9-Q	209	1.00 (0.99, 1.02)	0.717	203	1.01 (0.99, 1.02)	0.286
PAM	189	1.01 (0.98, 1.04)	0.499	183	1.00 (0.98, 1.02)	0.926

Significant p-values are shown in bold.
CI: Confidence Interval; CPS: Control Preferences Scale; OR: Odds ratio; PAM: Patient Activation Measure; SDM-9-Q: Shared decision making questionnaire.

current or past alcohol dependence showed the same rate that the overall sample. The preferences' distribution reported in our study is similar to that observed in Spanish mixed psychiatric samples (De Las Cuevas et al., 2020; De Las Cuevas and Peñate, 2016; Mundal et al., 2021), and therefore this difference with the German study could be explained by cultural differences between countries, as seen in other medical conditions (Yennurajalingam et al., 2018). Regarding the association between participation preferences and outcomes, we have not found significant results. Neuner et al. (2007) found a significant association between tobacco and alcohol self-reported use and a lower preference for involvement in decision-making, but this was a cross-sectional analysis in trauma patients treated for acute injury, not diagnosed with SUD. In mixed psychiatric samples, Mahone et al. (2008) did not observe a significant association between a preferred role in SDM and self-reported medication adherence; whereas De las Cuevas et al. (2014) found that patients who preferred a passive role showed better adherence than those who preferred an active role. Regarding the perception of involvement, these two studies did not obtain significant associations with adherence, as also happened in our study.

Approximately one-third of the participants perceived more or less involvement than they preferred, indicating that there is still room for improvement in the matching of patients' preferences and professionals' promotion of involvement in this sample. Nonetheless, the observed

Table 5
Univariate logistic regression models for medication adherence with decisional variables and patient activation as independent variables.

	0–6 months			6–12 months		
CPS	**N**	**OR (95 % CI)**	**P**	**N**	**OR (95 % CI)**	**P**
Preferred role (ref: shared)	124			127		
Active		0.60 (0.17, 2.07)	0.419		0.58 (0.10, 3.25)	0.539
Passive		1.80 (0.56, 5.79)	0.324		0.86 (0.33, 2.29)	0.769
Perceived role (ref: shared)	124			127		
Active		0.77 (0.17, 3.45)	0.734		0.57 (0.10, 3.32)	0.535
Passive		2.24 (0.77, 6.54)	0.140		1.19 (0.43, 3.31)	0.736
Rol matching (ref: matched)	124			127		
Less than desired		1.28 (0.39, 4.25)	0.685		0.94 (0.37, 2.42)	0.904
More than desired		1.58 (0.18, 13.63)	0.679		0.39 (0.11, 1.42)	0.155
SDM-9-Q	124	0.98 (0.96, 1.01)	0.242	126	1.00 (0.99, 1.01)	0.738
PAM	115	0.98 (0.95, 1.02)	0.395	117	0.98 (0.95, 1.02)	0.414

Significant p-values are shown in bold.
CI: Confidence Interval; CPS: Control Preferences Scale; OR: Odds ratio; PAM: Patient Activation Measure; SDM-9-Q: Shared decision making questionnaire.

Table 4
Final multivariate logistic models on patient retention.

0–6 months (n = 202)					6–12 months (n = 197)		
	Model 2[a]		Model 3[b]			Model 2[c]	
Baseline predictors	OR (95 % CI)	p	OR (95 % CI)	p	Baseline predictors	OR (95 % CI)	p
Married/couple	2.32 (0.96, 5.57)	0.061	2.31 (0.96, 5.56)	0.061	Substance use	0.53 (0.23, 1.25)	0.148
Substance use	0.13 (0.04, 0.50)	**0.003**	0.13 (0.04, 0.46)	**0.002**	New patient	0.49 (0.25, 0.95)	**0.035**
New patient	0.88 (0.38, 2.02)	0.764	–	–	Opioids	2.73 (0.72, 10.31)	0.139
ASI-DU	0.86 (0.75, 0.98)	**0.026**	0.86 (0.75, 0.98)	**0.023**	Mood disorder	2.12 (1.02, 4.41)	**0.043**
Alcohol	1.95 (0.82, 4.63)	0.130	1.99 (0.84, 4.68)	0.116	Role matching (ref: matched)		
Mood disorder	1.86 (0.74, 4.66)	0.184	1.87 (0.75, 4.68)	0.181	Less than desired	0.56 (0.25, 1.22)	0.143
Sociability	0.89 (0.80, 0.99)	**0.034**	0.89 (0.81, 0.99)	**0.035**	More than desired	0.38 (0.14, 1.06)	0.063
Linktest: p-values of PS and PS^2	0.001; 0.249		0.001; 0.249		**Linktest: p-values of PS and PS^2**	<0.001; 0.170	
Hosmer–Lemeshow χ^2 (p)	7.89 (0.444)		9.74 (0.284)		**Hosmer–Lemeshow χ^2 (p)**	7.27 (0.401)	
AIC / BIC	175.76 / 202.23		173.85 / 197.01		**AIC / BIC**	230.34 / 253.33	
Pseudo-R^2	0.18		0.18		**Pseudo-R^2**	0.11	
Sensitivity	98.17 %		98.17 %		**Sensitivity**	94.89 %	
Specificity	26.32 %		23.68 %		**Specificity**	28.33 %	
Correctly classified	84.65 %		84.16 %		**Correctly classified**	74.62 %	
AUC	0.78		0.78		**AUC**	0.72	

[a] Age excluded due to collinearity (VIF > 4).
[b] Non-significant predictors excluded until both AIC and BIC values were minimized.
[c] Age and SF-36 physical component excluded due to collinearity (VIF > 4). The exclusion of any predictor did not improve AIC. ASI: Addiction Severity Index; ASI-DU: Drug use; AIC: Akaike's information criterion; AUC: Area Under the Curve; BIC: Bayesian information criterion; CI: Confidence Interval; OR: Odds ratio; PS: Predicted score; VIF: Variance inflation factor. Significant p-values are shown in bold.

Table 6
Final logistic multivariate models on medication adherence.

0–6 months[a] (n = 116)					6–12 months (n = 119)				
	Model 2[a]		**Model 3[b]**			**Model 2**		**Model 3[b]**	
Baseline predictors	**OR (95 % CI)**	**p**	**OR (95 % CI)**	**p**	**Baseline predictors**	**OR (95 % CI)**	**p**	**OR (95 % CI)**	**p**
Substance use	0.19 (0.04, 1.04)	0.056	0.19 (0.04, 0.98)	**0.048**	Substance use	0.86 (0.25, 2.91)	0.803	–	–
New patient	0.26 (0.08, 0.92)	**0.037**	0.25 (0.07, 0.87)	**0.029**	New patient	0.29 (0.10, 0.82)	**0.020**	0.25 (0.10, 0.66)	**0.005**
ASI-ES	0.82 (0.64, 1.05)	0.109	0.78 (0.62, 0.98)	**0.031**	ASI-MS	0.86 (0.72, 1.01)	0.072	0.81 (0.70, 0.95)	**0.010**
ASI-AU	0.88 (0.70, 1.10)	0.263	–	–	ASI-ES	0.89 (0.75, 1.06)	0.200	–	–
ASI-FS	0.93 (0.74, 1.17)	0.548	–	–	ASI-AU	0.95 (0.79, 1.13)	0.547	–	–
Axis-I disorder	5.03 (1.27, 19.87)	**0.021**	4.61 (1.19, 17.79)	**0.027**	Depressive disorder	3.58 (1.13, 11.29)	**0.030**	3.43 (1.13, 10.43)	**0.030**
Personality disorder	0.22 (0.06, 0.79)	**0.020**	0.24 (0.07, 0.83)	**0.025**	Personality disorder	0.26 (0.09, 0.75)	**0.013**	0.21 (0.08, 0.57)	**0.002**
					SF-36 Mental	1.02 (0.98, 1.06)	0.350	–	–
Linktest: p-values of PS and PS^2	0.003; 0.285		0.004; 0.246		**Linktest: p-values of PS and PS^2**	0.002; 0.799		0.019; 0.278	
Hosmer–Lemeshow χ^2 (p)	5.56 (0.696)		12.83 (0.118)		**Hosmer–Lemeshow χ^2 (p)**	7.53 (0.480)		5.97 (0.543)	
AIC / BIC	91.16 / 113.19		88.73 / 105.25		**AIC / BIC**	126.22 / 151.23		123.25 / 137.19	
Pseudo-R^2	0.27		0.26		**Pseudo-R^2**	0.22		0.19	
Sensitivity	96.91 %		98.97 %		**Sensitivity**	91.95 %		90.91 %	
Specificity	31.58 %		36.84 %		**Specificity**	40.63 %		31.25 %	
Correctly classified	86.21 %		88.79 %		**Correctly classified**	78.15 %		75.00 %	
AUC	0.84		0.82		**AUC**	0.81		0.79	

[a] Age excluded due to collinearity (VIF > 4).
[b] Non-significant predictors excluded until both AIC and BIC values were minimized. AIC: Akaike's information criterion; ASI: Addiction Severity Index; ASI-ME: Medical status; ASI-ES: Employment and support; ASI-AU: Alcohol use; ASI-FM: Family status; AUC: Area Under the Curve; BIC: Bayesian information criterion; CI: Confidence Interval; OR: Odds ratio; PS: Predicted score; VIF: Variance inflation factor. Significant p-values are shown in bold.

Table 7
Univariate logistic regression models for substance use with decisional variables and patient activation as independent variables.

	0–6 months			**6–12 months**		
CPS	**N**	**OR (95 % CI)**	**P**	**N**	**OR (95 % CI)**	**P**
Preferred role (ref: shared)	171			150		
Active		1.34 (0.63, 2.85)	0.443		1.74 (0.47, 6.40)	0.407
Passive		0.54 (0.14, 2.02)	0.443		1.16 (0.48, 2.82)	0.741
Perceived role (ref: shared)	172			151		
Active		2.22 (0.56, 8.88)	0.259		1.80 (0.39, 8.38)	0.454
Passive		0.73 (0.43, 1.23)	0.259		0.90 (0.51, 1.60)	0.717
Role matching (ref: matched)	171			150		
Less than desired		1.76 (0.85, 3.64)	0.129		1.42 (0.79, 2.58)	0.244
More than desired		2.63 (1.04, 6.63)	**0.041**		2.35 (1.00, 5.53)	0.051
SDM-9-Q	174	0.99 (0.98, 1.01)	0.267	151	0.99 (0.98, 1.00)	0.071
PAM	161	1.00 (0.99, 1.01)	0.937	140	1.01 (1.00, 1.02)	0.161

Significant p-values are shown in bold.
CI: Confidence Interval; CPS: Control Preferences Scale; OR: Odds ratio; PAM: Patient Activation Measure; SDM-9-Q: Shared decision making questionnaire.

concordance is greater than the reported in Spanish psychiatric samples, which has been around 50 % (De las Cuevas et al., 2014; De las Cuevas et al.; 2020). This variable is the only one that has shown significant or near-significant associations with the outcomes. Concretely, patients who perceived more involvement than desired showed a subsequent higher likelihood of treatment discontinuation and substance use. However, this result is based only on 22 patients in the mentioned subgroup (16 at 6 months and 14 at 12 months) and the p-values in the multivariate models were non-significant, and therefore it must be interpreted as a mere hypothesis to be confirmed in future studies. De las Cuevas et al. (2014) found better self-reported medication adherence in psychiatric patients with matched preferences compared to those unmatched, but they did not compare separately patients with more and less involvement than desired. In certain pathologies, self-esteem or the patients' perception of his own abilities to make decisions is reduced. This circumstance has been associated with a lower desire to assume responsibilities and a subsequent preference for a more passive role in the consultation (Hamann et al., 2007). It has been pointed out how patients with SUD tend to have lower self-esteem and see themselves as more submissive subjects compared to other samples of patients without SUD, which could explain the observed relationship between perceiving more responsibility than desired and subsequent worsening in clinical results (Alavi, 2011; Joosten et al., 2011).

A recent systematic review evaluated the association between indicators of PCC and outcomes of substance treatment (Davis et al., 2020). Results showed positive associations with improved outcomes (substance and services use, psychological well-being), but only five studies included a patient-centered indicator other than satisfaction. Intervention studies have been very scarce, with mixed results (Davis et al., 2020). A randomized trial showed that a 5-session SDM intervention with SUD patients significantly improved primary substance use, addiction severity, quality of life and psychiatric problems at 3-month follow-up (E. a. G. Joosten et al., 2009). More recently, an uncontrolled pilot study also showed a reduction of drug use and craving in opioid users under a PCC program, with high retention at 3 months (Lynch et al., 2021), but a previous randomized trial did not show any

Table 8
Final logistic multivariate models on substance use.

0–6 months (n = 168)					6–12 months (n = 143)				
	Model 2[a]		Model 3[b]			Model 2[c]		Model 3[b]	
Baseline predictors	OR (95 % CI)	p	OR (95 % CI)	p	Baseline predictors	OR (95 % CI)	p	OR (95 % CI)	p
Substance use	7.08 (2.71, 18.51)	**<0.001**	7.18 (2.81, 18.32)	**<0.001**	Job status	0.65 (0.28, 1.53)	0.323	–	–
New patient	2.03 (0.95, 4.33)	0.068	2.18 (1.03, 4.61)	**0.042**	Substance use	4.23 (1.41, 12.69)	**0.010**	4.14 (1.52, 11.28)	**0.005**
ASI-MS	1.08 (0.94, 1.25)	0.294	–	–	ASI-LS	1.19 (0.97, 1.45)	0.088	1.24 (1.03, 1.48)	**0.022**
ASI-ES	1.19 (1.03, 1.37)	**0.021**	1.23 (1.09, 1.39)	**0.001**	ASI-FS	1.18 (1.00, 1.36)	**0.042**	1.17 (1.01 1.35)	**0.037**
ASI-AU	1.06 (0.93, 1.21)	0.367	–	–	Opioids	1.50 (0.42, 1.33)	0.530	–	–
ASI-FS	1.04 (0.88, 1.21)	0.669	–	–	Polydrug	0.96 (0.34, 2.75)	0.942	–	–
ASI-PS	0.96 (0.81, 1.14)	0.662	–	–	Personality disorder	1.30 (0.52, 3.22)	0.572	1.25 (0.53, 2.97)	0.613
Role matching (ref: matched)					Role matching (ref: matched)				
Less than desired	1.51 (0.61, 3.71)	0.372	1.58 (0.65, 3.85)	0.314	Less than desired	1.65 (0.62, 4.39)	0.319	–	–
More than desired	1.87 (0.55, 3.67)	0.319	1.90 (0.56, 6.42)	0.301	More than desired	1.86 (0.47, 7.46)	0.378	–	–
Linktest: p-values of PS and PS^2	<0.001; 0.802		<0.001; 0.412		**Linktest: p-values of PS and PS^2**	0.011; 0.258		0.142; 0.056	
Hosmer–Lemeshow, χ^2 (p)	8.58 (0.379)		14.38 (0.072)		**Hosmer–Lemeshow χ^2 (p)**	9.18 (0.327)		6.11 (0.634)	
AIC/BIC	196.84 / 228.08		191.66 / 210.44		**AIC/BIC**	165.60 / 195.23		161.51 / 176.40	
Pseudo-R^2	0.21		0.21		**Pseudo-R^2**	0.15		0.13	
Sensitivity	60.61 %		60.00 %		**Sensitivity**	31.71 %		26.19 %	
Specificity	80.39 %		78.64 %		**Specificity**	94.12 %		93.2 %	
Correctly classified	72.62 %		71.10 %		**Correctly classified**	76.22 %		73.79 %	
AUC	0.80		0.77		**AUC**	0.77		0.76	

[a] Acitivity trait and SF-36 mental component excluded due to collinearity (VIF > 4).
[b] Non-significant predictors excluded until both AIC and BIC values were minimized.
[c] Age, ASI-Employment and support, ASI-Psychiatric status and SDM-9-Q, excluded due to collinearity (VIF > 4). AIC: Akaike's Information Criterion; ASI: Addiction Severity Index; ASI-ME: Medical status; ASI-ES: Employment and support; ASI-AU: Alcohol use; ASI-LS: Legal status; ASI-FM: Family status; ASI-PS: Psychiatric status; AUC: Area Under the Curve; BIC: Bayesian information criterion; CI: Confidence Interval; OR: Odds ratio; PS: Predicted score; SDM-9-Q: Shared decision making questionnaire; VIF: Variance inflation factor. Significant p-values are shown in bold.

benefit for methadone patients (Schwartz et al., 2017). Neumann et al. developed an intervention for patients with trauma and risk of alcohol consumption. They applied a computerized tool that provided support in decision-making. The intervention was associated with a significant reduction in alcohol consumption at 6 months but not at 12 months follow-up (Neumann et al., 2006). Barrio et al. created an app for patients' phones that was developed based on the principles of SDM and obtained significant reductions in alcohol consumption and greater ability to achieve patients' own therapeutic goals (Barrio et al., 2017).

In somatic health conditions, SDM has been more frequently associated with improvement in affective aspects and knowledge than with outcomes such as adherence, acquisition of healthy habits, quality of life, or improvement in biological measures of health such as blood pressure (Aubree Shay and Lafata, 2015; Saheb Kashaf et al., 2017; Yun and Choi, 2019).

As commented above, research on the preferences of patients with SUD has focused on treatment or setting preferences. In some studies, when these preferences were satisfied, there was a tendency to observe, at least, less intense consumption tendencies or less substance use in previous days (Brown et al., 2002; Friedmann et al., 2004; Luty, 2004). In another study, improvements in ASI scores were obtained when the type of service offered by the provider matched what the patients wanted; with greater retention when the offered medical services coincided with what was desired by patients with cocaine SUD (Hser et al., 1999). Nonetheless, these results could not be confirmed by other studies characterized by their heterogeneous methodology and divergent results (Adamson et al., 2005; Marlowe et al., 2003; Sterling et al., 1997); indicating that preference matching is a suitable approach that should be further evaluated.

No significant differences were obtained regarding the degree of activation. Activation is an important aspect for self-care and management of chronic diseases (Rodriguez et al., 2019), however, it requires prior education and guidance. This could justify the findings of our study and would point out the importance of carrying out interventions to enhance the activation of patients (Newland et al., 2021). It is important to point out that there are a multitude of factors that can influence abstinence, retention and pharmacological adherence and therefore PCC/SDM is just one more element.

Addictions are disorders in which initially there may be little awareness of the disease or a tendency to self-deception in order not to completely abandon consumption. Given this particularity, an excess of responsibility on the part of the patient in the initial phases could be counterproductive and be associated with worse results. It is not uncommon for the professional to have to be firm in some of the initial recommendations to counteract the lack of initial motivation. It is important to note that both SDM and patient preferences can be applied in a multitude of treatment areas and it would be important to clarify which ones really provide the expected benefits.

This study has several limitations. First, we established the sample size in order to get adequate statistical power for univariate analyses and for multivariate models with the three independent variables. Therefore, the final multivariate models for retention at 6 months and mediation adherence could be underpowered. This also precludes the analysis of interactions between the study variables and potential moderators like type of addiction or presence of a mental disorder, since these analyses of interactions require very large sample sizes. Further, a larger sample size would have allowed it to be randomly divided into two subsamples, using the second as a validation sample. On the other side, a relevant

percentage of eligible patients did not participate due to their psychopathological state, the language barrier, or the lack of motivation to be included, and therefore the sample is not completely representative of the target population. Patients were evaluated in the same center where they receive treatment and not by an external assessor, and this could introduce to some extent a desirability bias. Another limitation is that only pharmacological adherence was evaluated and not the compliance and effect of the psychological interventions carried out in the center. Related to this, although we have included numerous covariates, specific factors such as the medication type, treatment modality or other aspects related to the clinical encounter were not assessed. The process of SDM was assessed only from the patients' perspective, and not by objective external observers (e.g., by audio-recording of consultations). Finally, results on medication adherence and substance use are restricted to completers, since most patients who did not comply with the appointments were missed for the analyses. Although lack of retention is a real aspect of clinical practice, the results obtained must be interpreted with caution.

Despite these limitations, the study adds valuable knowledge to a poorly researched issue, with a prospective design of a one-year follow-up. There are very few studies that evaluate SDM and activation in a clinical population with SUD, and although the results are only exploratory and subjected to the above-mentioned limitations, they raise some interesting insights that should be confirmed in future studies. A majority of SUD patients want to be involved to some extent in the decision-making process about their treatment, and perceive that their desire is respected by psychiatrists. Results suggest that it is not the preference nor the perception of SDM, but their matching, what might influence treatment outcomes. Contrary to other health conditions, where perceiving less involvement than desired may be more detrimental than the opposite, SUD patients who perceive more involvement than desired might experience an excess of responsibility and control that could negatively influence their compliance with appointments and substance use. More research is needed to confirm these results. In any case, exploring patient preferences for participating in treatment decisions and the degree of responsibility they wish to assume throughout the treatment,.will help professionals to adapt their promotion of SDM to the patients' desires and characteristics, and to establish accepted therapeutic objectives.

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Supplementary materials

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