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## **Psychosocial factors related to dropout in substance use disorder inpatient treatment: a longitudinal study**

### **Fatores psicossociais relacionados ao abandono do tratamento de transtorno por uso de substâncias em internações prolongadas: um estudo longitudinal**

### **Factores psicosociales relacionados con el abandono del tratamiento por trastorno por uso de sustancias en hospitalizaciones de larga duración: un estudio longitudinal**

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## **ABSTRACT**

Background: Substance use disorder (SUD) is associated with psychological, biological, and social problems. To date, existing treatments have a high dropout rate. Objective: This study

aimed to investigate the psychosocial factors related to dropout from prolonged inpatient treatment due to SUD. Methods: A nine-week longitudinal follow-up study of 148 adult men inpatient for treatment for SUD. Psychosocial measures, aspects related to treatment, substance use, and sociodemographic data were collected using self-completed questionnaires. The main outcome was treatment dropout nine weeks after initial contact. Binomial logistic regression was used to evaluate the association of variables with dropout. Results: Prolonged inpatient treatment dropout was related to anxiety, depression, stress, self-judgment, expression of anger, positive and negative affect, negative urgency, lack of perseverance, and impulsivity, but not to sociodemographic characteristics or characteristics related to the substances consumed and the history of use. Conclusion: Psychological factors, such as negative emotional states and impulsivity, were the main predictors of dropout. These results highlight the relevance of emotional management skills to a male population in preventing the treatment dropout associated with SUD.

**Keywords:** substance use disorder, mental health, treatment, dropout.

## RESUMO

**Introdução:** O transtorno por uso de substâncias (TUS) está associado a problemas psicológicos, biológicos e sociais. Os tratamentos existentes até o momento apresentam uma alta taxa de abandono pelos pacientes. **Objetivo:** O objetivo desse estudo foi investigar os fatores psicossociais relacionados ao abandono do tratamento para o TUS em internações prolongadas. **Metodologia:** Foi realizado um estudo longitudinal de nove semanas com 148 homens adultos internados para o tratamento de TUS. Medidas psicossociais, aspectos relacionados a tratamentos anteriores, ao uso de substâncias e dados sociodemográficos foram coletados por meio de questionários de autopreenchimento. O principal desfecho observado foi o abandono do tratamento, nove semanas após o contato inicial. Para avaliar os fatores associados ao abandono do tratamento utilizou-se a análise por regressão logística binomial. **Resultados:** Foi observado que o abandono do tratamento prolongado esteve relacionado com fatores psicológicos, como ansiedade, depressão, estresse, autojulgamento, expressão de raiva, afeto positivo e negativo, urgência negativa, falta de perseverança e impulsividade, mas não com características sociodemográficas ou relacionadas às substâncias e histórico de consumo. **Conclusão:** Fatores psicológicos, como estados emocionais negativos e impulsividade, foram os principais preditores do abandono. Estes resultados evidenciam a relevância de habilidades de manejo emocional na diminuição do dropout de tratamentos associados ao TUS.

**Palavras-chave:** transtorno por uso de substâncias, saúde mental, tratamento, abandono.

## RESUMEN

**Introducción:** El trastorno por uso de sustancias (TUS) se asocia con problemas psicológicos, biológicos y sociales. Los tratamientos existentes hasta la fecha tienen un alto índice de abandono por parte de los pacientes. **Objetivo:** El objetivo de este estudio fue investigar los factores psicossociales relacionados con el abandono del tratamiento por TUS en hospitalizaciones prolongadas. **Metodología:** Se realizó un estudio longitudinal de nueve semanas con 148 hombres adultos hospitalizados para el tratamiento del TUS. Se recogieron medidas psicossociales, aspectos relacionados con tratamientos previos, consumo de sustancias y datos sociodemográficos a través de cuestionarios autocumplimentados. El principal resultado observado fue el abandono del tratamiento nueve semanas después del contacto inicial. Para evaluar los factores asociados al abandono del tratamiento se utilizó el análisis de regresión logística binomial. **Resultados:** Se observó que el abandono del tratamiento prolongado se relacionó con factores psicológicos, como ansiedad, depresión, estrés, autocrítica, expresión de

ira, afecto positivo y negativo, urgencia negativa, falta de perseverancia e impulsividad, pero no con factores sociodemográficas o relacionadas con sustancias e historial de consumo. Conclusión: Los factores psicológicos, como los estados emocionales negativos y la impulsividad, fueron los principales predictores del abandono. Estos resultados resaltan la relevancia de las habilidades de gestión emocional para reducir el abandono de tratamientos asociados al TUS.

**Palabras clave:** trastorno por uso de sustancias, salud mental, tratamiento, abandono.

## 1 INTRODUCTION

Excessive consumption of psychoactive substances is considered a significant public health problem in Brazil and around the world, with high rates of morbidity and mortality. Generally, a large number of individuals initiate drug use, and a smaller, but significant number, progress to a substance use disorder (SUD) (Parsegian *et al.*, 2022; World Drug Report, 2022).

SUD is a chronic, relapsing disease characterized by compulsive drug seeking and use despite negative consequences. Many people with SUD try to quit using drugs, recognizing the harm it causes to their lives (Heilig *et al.*, 2019). The current treatments for this disorder, such as prolonged inpatient treatment, have high dropout rates (Gibson *et al.*, 2022; Smith *et al.*, 2006). SUD is a multifactorial condition characterized by difficulty in controlling consumption, low adherence to treatments (Gibson *et al.*, 2022; Witkiewitz; *et al.*, 2019), and a high relapse rate (Andersson *et al.*, 2019; McLellan *et al.*, 2000).

SUD is also characterized by psychological comorbidities, especially anxiety and depression (LAI *et al.*, 2015). A systematic review and meta-analysis with data from different countries indicated that around 30% of people with SUD had an anxiety disorder and 20% had a major depression disorder in the last 12 months (Lai *et al.*, 2015). According to the same study, when SUD is specifically due to substance dependence, these rates reach 50% and 40% respectively, well above the averages of 3.6% for anxiety and 4.4% for depression within the World Population that is estimated by the World Health Organization (UNODC, 2022).

Negative affect is among the main predictors of substance use, recovery, and difficulties in treatment outcomes (Larimer ME, 1999). This would occur via a dynamic relationship, where these emotional states that comprise negative affect increase the likelihood of substance use and vice versa (Koob, 2021). Therefore, individuals consume drugs abusively to promote pleasure, escape from reality, and/or prevent the symptoms that emerge during withdrawal (Koob, 2021).

There are a limited number of treatments for SUD and they have often limited efficacy (Gibson *et al.*, 2022). It should be noted that inpatients tend to have greater psychosocial problems, such as anxiety and mental disorders, than patients in outpatient programs (De Leon G., 2010). These problems reduce patients' adherence to treatment (Castillo-Carniglia *et al.*, 2019; Danieli *et al.*, 2017; Weber *et al.*, 2021; Zaleski *et al.*, 2017).

Although the literature contains many studies about successful treatment of SUD, studies on treatment abandonment are much less common, particularly for prolonged inpatient treatment in underdeveloped countries (Dekel *et al.*, 2019). In a systematic review, Lappan and collaborators demonstrated that the aspects most related to dropout were the characteristics of the treated population, the target substance, and the type and duration of treatment carried out (Lappan *et al.*, 2020). Although this important study also relates dropout to the presence of some mental disorders, the authors did not delve deeper into understanding the psychological factors that could be related. Furthermore, in this review, data from underdeveloped countries are restricted and null in the Brazilian population (Lappan *et al.*, 2020).

In Brazil, despite the large number of patients suffering from this disorder, there are no published data relating to these associations. This is particularly worrying given the fact that patients who remain in treatment for longer are much less likely to relapse (Condelli; Hubbard, 1994; González-Saiz *et al.*, 2014). Given this information gap, it is essential to understand the factors that can lead users to dropout, so that alternatives might be developed to prevent dropout and improve treatment adherence and patients can benefit from the intervention received.

Therefore, the objective of the present study was to investigate the associations between sociodemographic factors, history of drug use, psychological and emotional aspects of patients with SUD, and abandonment of long-term inpatient treatment.

## 2 METHODS

### 2.1 STUDY DESIGN

This study entails a longitudinal examination involving adult male inpatients receiving treatment for Substance Use Disorder (SUD), with a follow-up period lasting nine weeks. It is a secondary analysis of a randomized clinical study that evaluated the effect of mindfulness practices in a population diagnosed with SUD (Félix-Junior *et al.*, 2023). This article was written according to the recommendations of the STROBE guide for epidemiological studies (Félix-Junior *et al.*, 2023; Vandembroucke *et al.*, 2007).

## 2.2 SETTING

The institutions (n=3) included in the study are therapeutic communities that offer treatment in an inpatient model lasting approximately six months, predominantly for homeless people or otherwise in a social vulnerability condition. Treatment was voluntary and based on coexistence, discipline, and values, with standardized daily activities that consist of participating in meetings based on the 12 steps program, spirituality, physical education, labor therapy, and relapse prevention, and is divided into three phases: i) reception/ initial detoxification; ii) the treatment itself; and iii) social reintegration. Data collection took place during the nine-week treatment phase.

## 2.3 PARTICIPANTS AND PROCEDURES

We only considered patients who remained in prolonged inpatient treatment and those who had dropout or relapse after 9 weeks of follow-up, consisting of 148 men undergoing treatment for SUD in prolonged inpatient treatment. Participants were recruited from a list of men who were hospitalized for treatment for SUDs and who were interested in participating after an explanatory lecture regarding the main study, described in Felix et al., 2023 (Félix-Junior *et al.*, 2023).

The inclusion criteria were: a) agreeing to participate in the research, b) being male and aged over 18 years old, c) having been substance-free for more than 15 days, d) being in treatment for at least five days and literacy (reading and writing) in Portuguese language, e) being hospitalized at the time of data collection at baseline, f) dropping out for treatment because of relapse or withdrawal from treatment. The exclusion criteria were: a) having been diagnosed with psychotic disorders by the responsible physician, b) having a severe cognitive impairment that prevented completion of the scales; c) having suicidal ideation, or; d) patients whose reason for dropping out was related to work, their clinical condition, worsening of their psychiatric condition, death, family pressure, change in treatment regimen, change of housing or for unrecorded reasons.

Participants were assessed at the beginning of the research (T0) and divided into groups (dropout and non-dropout) after 9 weeks of phase ii of hospitalization. The data used for the analysis were obtained at T0 and the main outcome was investigated 9 weeks later.

The sample size was calculated with G\*Power 3.1 software using a power of 80% and  $\alpha$  error probability of 0.05.

The study was approved by the Research Ethics Committee of the Federal University of São Paulo (nº: 3.183.805). There was no financial reward for participants and all principles of the Helsinki Declaration of 1975 were followed.

## 2.4 MEASUREMENTS

Self-report paper-based questionnaires were completed on paper and administered on a single occasion in the presence of a researcher and a member of the institution's staff, in a private location provided by the institution. Participants took an average of 30 minutes to complete the questionnaires.

The following questionnaires were completed:

### 2.4.1 Sociodemographic Questionnaire

This questionnaire was created by the researchers and evaluated in previous research (Félix-Junior *et al.*, 2023) with this population to obtain sociodemographic information about gender, age, profession, education, marital status, family income, housing, any previous criminal history, and the date of entry into the institution.

### 2.4.2 Substance Use History Questionnaire

The substance use history questionnaire was used to obtain the history, type, and relationship with substance use, as well as previous treatments, diagnoses, age at first use, and first treatment (Félix-Junior *et al.*, 2023).

### 2.4.3 The Depression, Anxiety and Stress Scale (DASS21)

Data on depression, anxiety, and stress were collected using the Depression, Anxiety, and Stress Scale (DASS 21) which is composed of 21 items divided into depression, anxiety, and stress subscales. Responses are given using a Likert scale from 0 to 3, with 0 being “does not apply at all” to 3 “applies most of the time”. The participant was asked to consider their feelings during the past week. The Portuguese version of DASS 21 has been validated for use in Brazil (Vignola; Tucci, 2014). Cronbach's  $\alpha$  was 0.93 in our sample.



#### **2.4.4 The Urgency, Premeditation, Perseverance, and Sensation Seeking Impulsive Behavior Scale – Short Version (UPPSP Short)**

The UPPSP scale was used, which assesses five facets of impulsivity: positive urgency, negative urgency, premeditation, perseverance, and sensation seeking (Cyders *et al.*, 2014). Responses are given on a four-point Likert scale, from 1 to 4, with 1: “strongly agree”, and 4: “strongly disagree”. The scale has been validated for use in Brazil (Sediyama *et al.*, 2017). The Cronbach's  $\alpha$  was 0.71 in our sample.

#### **2.4.5 The State-Trait Anger Expression Inventory (STAXI2)**

Anger was assessed using the subscales of the State-Trait Anger Expression Inventory (STAXI2). The inventory assesses anger and has been validated in Portuguese (Azevedo *et al.*, 2010). It comprises 42 questions and responses are given on a Likert scale ranging from 1 to 4, with 1 being “rarely” and 4 “almost always”. The following subscales were analyzed: Anger Expression-In, Anger Expression-Out; Anger Control-In, Anger Control-Out; and the Anger Expression Index, which is a measure of total anger based on the scores of Anger Expression (In and Out) and Anger Control (In and Out) subscales, according to the scale orientation. Cronbach's  $\alpha$ , was 0.79 in our sample.

#### **2.4.6 The Self-Compassion Scale**

Self-compassion data were collected using the Self-Compassion Scale, validated for use in Brazil (Souza; Hutz, 2016). There are six subscales: self-kindness, severe self-criticism, common humanity, overidentification, mindfulness, isolation, and total self-compassion. Cronbach's  $\alpha$  was 0.77 in our sample.

#### **2.4.7 Positive and Negative Affect Scale (PANAS)**

Positive and negative affect were assessed using the Positive and Negative Affects Scale (PANAS) (Carvalho *et al.*, 2013), which is composed of 20 items, 10 related to positive affect and 10 to negative affect. Cronbach's  $\alpha$  was 0.75 in our sample.



## 2.5 DATA ANALYSIS

All data were collected on paper forms and then transferred to the Research Electronic Data Capture (REDCap) web application by an independent research assistant. Descriptive analyses used mean and standard deviation for continuous variables and frequency and percentages for categorical data. Two binomial logistic regression models were used to estimate Odds Ratios (OR) of the association between psychosocial factors and dropout. The first logistic regression model was the crude model (univariate), and the second model (multivariate) was adjusted by age, homelessness, main drug leading to treatment, number of previous prolonged inpatient treatment, and initiation of regular use. The reference category was patients who had dropped out. All analyses were performed using JAMOV. The minimum level of significance adopted was 5%.

## 3 RESULTS

### 3.1 SAMPLE DESCRIPTION

At baseline, the sample comprised 148 participants, of whom 41 had dropped out of treatment after 9 weeks, with 107 remaining adherent. The participants' average length of stay was 93.4 days (SD = 69.5; Min-Max = 15-46) and their mean age was 39.9 years (SD = 9.74; Min-Max = 18-68, n = 148). The participants' characteristics were collected at baseline (T0), including substance use data before entering treatment (Table 1). The mean age was 40.6 years (SD = 9.74) for patients who remained in treatment and 38.3 (SD = 10) for those who dropped out, ranging from 18 to 68 years.

Regarding sociodemographic characteristics of the patients who remained in treatment, 40 (37.4%) had completed primary education, 51 (47.7%) had completed secondary education and 16 (14.9%) had started higher education. Fifty-eight of the participants (54.2%) were single, 20 (18.7%) were married and 29 (27.1%) were divorced. Also, 47 (43.9%) were white, 38 (35.5%) were mixed race and 22 (20.6%) were of another race. In the dropout group, 18 (43.9%) had completed primary education, 16 (39.0%) had completed secondary education and seven (17.1%) had started higher education. Twenty-five (60.9%) were single, four (9.8%) married and 12 (29.3%) divorced. And finally, 19 (46.4%) were white, 19 (46.4%) were mixed race and three (7.2%) were of another race.

Regarding housing data, among the patients who remained in treatment, 10 (9.4%) were homeless before entering treatment, 19 (17.8%) had paid work and 102 (72.8%) had committed a previous crime. In the dropout group, 5 (12.2%) were homeless before entering treatment, 9 (22.0%) had paid work, and 38 (65.8%) had committed a previous crime.

On drug use, patients who continued treatment had an average of 98.3 (SD=76) days without using the drugs, their first use was at 18 years old (SD=5.9) and had reached frequent use at 22.6 (SD=7.7). The number of patients who were diagnosed with cocaine/crack use disorder was 8 (7.5%), 22 (20.6%) alcohol, and 77 (72.0%) used multiple drugs; 46 (43.0%) patients reported cocaine as the main drug causing the problem, 53 (49.5%) alcohol and 8 (7.5%) other drugs.

The dropout group had an average of 80.7 (SD=47.2) days without using the drug and made their first use at 17.6 years old (SD=6.03) and frequent use at 20.9 years old (SD=5.8). Two (4.9%) patients were diagnosed with cocaine/crack use disorder, 7 (17.1%) with alcohol, and 32 (78.0%) used multiple drugs. 19 (46.3%) patients reported cocaine as the main drug causing the problem, 21 (51.2%) used alcohol and 1 (2.4%) considered other drugs.

Patients who remained hospitalized had an average of 4.91 (SD=5.5) previous treatments, 2.3 (SD=1.0) in prolonged inpatient treatment, and the first of these with an average age of 30.7 (SD=10.3) years. The dropout sample had a history of dropping an average of 7.64 (SD=12.8) previous treatments, 2.6 (SD=1.2) stays in prolonged inpatient treatment, and the first of these at an average age of 27.6 years (SD=8.5).

We found no significant statistical differences between the dropout and non-dropout groups about sociodemographic and drug use-related characteristics.  $p>0.05$ . (**Table 1**).

Table 1. Sociodemographic and drug use-related characteristics in the non-dropout and dropout groups with means and percentages.

		Non- dropout (n=107)	Dropout (n=41)
<b>Age, mean (SD)</b>		40.6 (9.6)	38.3 (10)
<b>Education</b>	<i>Up to first grade</i>	40 (37.4%)	18 (43.9%)
	<i>Up to second grade</i>	51 (47.7%)	16 (39.0%)
	<i>Above second grade</i>	16 (14.9%)	7 (17.1%)
<b>Civil status</b>	<i>Single</i>	58 (54.2%)	25 (60.9%)
	<i>Married</i>	20 (18.7%)	4 (9.8%)
	<i>Widowed</i>	29 (27.1%)	12 (29.3%)
<b>Race</b>	<i>White</i>	47 (43.9%)	19 (46.4%)
	<i>Mixed-race</i>	38 (35.5%)	19 (46.4%)
	<i>Others</i>	22 (20.6%)	3 (7.2%)
<b>Homeless people, n(%)</b>		10 (9.4%)	5 (12.2%)
<b>Work, n(%)</b>	<i>Working</i>	19 (17.8%)	9 (22.0%)
	<i>No working</i>	88 (82.2%)	32 (78.0%)
<b>Criminal behavior</b>		102 (95.3%)	38 (92.7%)

<b>Days without use, mean (SD)</b>		98.3 (76)	80.7 (47.2)
<b>Age first use, mean (SD)</b>		18 (5.93)	17.6 (6.03)
<b>Age frequent use, mean (SD)</b>		22.6 (7.66)	20,9 (5.84)
<b>SUD, n (%)</b>	<i>Cocaine/Crack</i>	8 (7.5%)	2 (4.9%)
	<i>Alcohol</i>	22 (20.6%)	7 (17.1%)
	<i>Polydrug</i>	77 (72%)	32 (78.0%)
<b>Main drug causing problem, n (%)</b>	<i>Cocaine/Crack</i>	46 (43.0%)	19 (46.3%)
	<i>Alcohol</i>	53 (49.5%)	21 (51.2%)
	<i>Others</i>	8 (7.5%)	1 (2.4%)
<b>Age at first treatment, mean (SD)</b>		30.7 (10.3)	27.6 (8.5)
<b>Previous treatments, mean (SD)</b>		4.91 (5.5)	7.64 (12.8)
	<i>Prolonged inpatient treatment</i>	2.3 (1.02)	2.55 (1.18)

Subtitle 1: Sociodemographic and drug use-related characteristics in the non-dropout and dropout groups with means and percentages.

Source: Prepared by the authors.

### 3.2 PREDICTORS OF TREATMENT DROPOUT

#### 3.2.1 Demographic Factors and Factors Related to Substance Use

Table 2 presents data for sociodemographic, and historical factors related to drug use. None of the demographic factors such as age, education, marital status, skin color, homelessness, work, and crimes committed were associated with treatment dropout. For the variables related to drug use: days without use, age of first use, frequent use, main drug causing the problem, substance that caused the use disorder, craving scale scores; in addition to characteristics related to treatment, such as age at first treatment and number of previous treatments, were also not related to treatment dropout (**Table 2**).

Table 2: Crude and adjusted odds ratios for sociodemographic, and drug use associated with treatment dropout (ref. non- dropout) (N=148).

		<b>Crude OR (95% CI)</b>	<b>Adjusted OR <sup>a</sup> (95% CI)</b>
<b>Age, mean (SE)</b>		0.97 (0.93-1.10)	0.98 (0.94-1.03)
<b>Education (ref. up to first grade)</b>			
	<i>up to second grade</i>	0.70 (0.32-1.54)	0.73 (0.40-1.53)
	<i>Above second grade</i>	0.83 (0.28-2.48)	0.81 (0.32-2.35)
<b>Civil status (ref. single)</b>			
	<i>Married</i>	0.46(0.14-1.50)	0.53(0.3-1.34)
	<i>Widowed</i>	0.96 (0.42-2.18)	0.95 (0.35-1.98)
<b>Race (ref. white)</b>			
	<i>Mixed-race</i>	0.38 (0.57-3.34)	0.40 (0.60-3.35)
	<i>Others</i>	0.54 (0.14-2.10)	0.69 (0.29-1.98)
<b>Homeless people</b>		1.35 (0.43-4.21)	1.64 (0.49-5.50)
<b>Work</b>		1.30 (0.54-3.17)	1.19 (0.41-3.47)
<b>Criminal behavior</b>		1.61 (0.37-7.07)	1.76 (0.29-10.78)
<b>Days without use</b>		0.99 (0.99-1.00)	1.0 (0.98-1.00)
<b>Age of first use</b>		0.99 (0.92-1.05)	1.04 (0.94-1.14)
<b>Age of frequent use</b>		0.96 (0.91-1.02)	0.97(0.91-1.03)

SUD (ref. Alcohol)			
	<i>Cocaine/Crack</i>	0.79 (0.13-4.60)	0.68 (0.09-5.13)
	<i>Polydrug</i>	1.31 (0.51-3.36)	0.96 (0.30-3.08)
Main drug leading to treatment (ref. Cocaine)			
	<i>Alcohol</i>	0.96 (0.46-2.00)	1.00 (0.42-2.36)
	<i>Others</i>	0.30 (0.04-2.59)	0.55 (1.02-5.54)
Age at first treatment		0.96 (0.93-1.01)	0.98 (0.91-1.05)
Previous treatments		1.04 (0.99-1.09)	1.04 (0.99-1.09)

SE - Standard Error; wgt - weighted.

<sup>a</sup> - Adjusted by variables age, homelessness, main drug leading to treatment, number of previous prolonged inpatient treatment, and initiation of regular use.

\* p<0.05.

Subtitle 2: Crude and adjusted odds ratios for sociodemographic, and drug use associated with treatment dropout  
Source: Prepared by the authors.

### 3.2.2 Psychological Factors

Regarding patients' psychological factors, anxiety (aOR=1.34, 95% CI: 1.20-1.50), depression (aOR=1.31, 95% CI: 1.17-1.46), and stress (aOR=1.33, 95% CI: 1.18-1.50 ) were associated with dropout.

When assessing impulsivity, the total impulsivity index (aOR=1.10, 95% CI: 1.06-1.31) was associated with dropout, as well as the subscales negative urgency (aOR=1.14, 95% CI: 1.01-1.30), and lack of premeditation (aOR =1.21, 95% CI: 1.06-1.38). Regarding the self-compassion scale, the self-judgment subscale (aOR=1.50, 95% CI: 1.29-1.77) was related to dropout, but we did not find significant differences for the other subscales (Table 3).

Table 3: Crude and adjusted odds ratios for anxiety, stress, depression, impulsivity, self-compassion, and mindfulness scales in patients whose treatment dropout (ref. no dropout) (N=148).

	Crude OR (95% CI)	Adjusted OR <sup>a</sup> (95% CI)
Anxiety	1.34 (1.21-1.48)*	1.34 (1.20-1.50)*
Stress	1.33 (1.19-1.48) *	1.33 (1.18-1.50) *
Depression	1.32 (1.19-1.46) *	1.31 (1.17-1.46) *
Impulsivity	1.12 (1.04-1.20) *	1.10 (1.06- 1.31) *
Negative Urgency	1.16 (1.03-1.30) *	1.14 (1.01-1.30) *
Positive Urgency	1.09 (0.92-1.30)	0.92 (0.79-1.07)
Lack of perseverance	1.19 (0.97-1.45)	0.90 (0.76-1.07)
Lack of premeditation	1.20 (1.07-1.36) *	1.21 (1.06-1.38) *
Sensations	1.23 (0.98-1.54)	1.03 (0.91-1.17)
Self-compassion	0.99 (0.97-1.02)	1.00 (0.93-1.09)
Self-kindness	1.02 (0.95-1.10)	1.00 (0.93-1.09)
Self-judgment	1.47 (1.29-1.69) *	1.50(1.29-1.77) *
Sense of humanity	0.94 (0.83-1.06)	1.00 (0.91-1.11)
Isolation	1.06 (0.90-1.23)	0.99 (0.87-1.13)
Mindfulness	1.04 (0.92-1.17)	0.95 (0.83-1.08)
Overidentification	1.09 (0.98-1.21)	0.93 (0.85-1.02)

SE - Standard Error; wgt – weighted;

<sup>a</sup> - Adjusted by variables age, homelessness, main drug leading to treatment, number of previous prolonged inpatient treatment, and initiation of regular use. \* p<0.05.

Subtitle 3: Crude and adjusted odds ratios for anxiety, stress, depression, impulsivity, self-compassion, and mindfulness scales in patients whose treatment dropout  
Source: Prepared by the authors.

### 3.2.3 Expression of Anger, Positive, and Negative Affects

Regarding the self-compassion, only the self-judgment subscale (aOR=1.50, 95% CI: 1.29-1.77) was related to dropout. We found no significant differences for the other subscales.

Regarding the construct of anger measured by STAXI, the subscales that are related to continuity in treatment were: expression of anger outward (aOR=2.2, 95% CI: 1.57-3.06), expression of anger inward (aOR=1.88, 95% CI: 1.48-2.39), and the anger expression index (aOR=1.21, 95% CI: 1.08-1.26). No significant differences were found for the other subscales.

Finally, on the PANAS scale, a higher positive affect was associated with a lower dropout (aOR=0.75, 95% CI: 0.68-0.83), while a higher report of negative affect was associated with a greater dropout (aOR=1.12, 95% CI: 0.99-1.11) (Table 4).

Table 4: Crude and adjusted odds ratios for anger expression, positive and negative affects in patients who treatment dropout (ref. non-dropout) (N=148).

	Wgt% (95% CI)	Adjusted OR <sup>a</sup> (95% CI)
<b>Expression of anger</b>	1.10 (1.03-1.17) *	1.21 (1.08-1.26) *
<i>Temper</i>	1.04(0.93-1.16)	1.03 (0.91-1.18)
<i>Trace of anger</i>	1.03 (0.96-1.10)	1.03 (0.95-1.12)
<i>Anger Expression Out</i>	2.04 (1.59-2.62) *	2.20 (1.57-3.06) *
<i>Anger Expression In</i>	1.88 (1.50-2.37) *	1.88 (1.48-2.39) *
<i>Anger Control Out</i>	0.96 (0.88-1.05)	0.96(0.86-1.06)
<i>Anger Control In</i>	0.96 (0.90-1.05)	0.95(0.87-1.03)
<b>Positive affect</b>	0.76 (0.69-0.83) *	0.75 (0.68-0.83) *
<b>Negative affect</b>	1.13 (1.03-1.25) *	1.12 (1.00-1.11)*

SE - Standard Error; wgt - weighted.

a - Adjusted by variables age, homelessness, main drug leading to treatment, number of previous prolonged inpatient treatment, and initiation of regular use.\* p<0.05.

Subtitle 4: Crude and adjusted odds ratios for anger expression, positive and negative affects in patients who treatment dropout.

Source: Prepared by the authors.

Lastly, sensitivity analyses were conducted, categorizing groups based on the randomization in the primary study, to account for the potential influence of mindfulness on

patient dropout (Félix-Junior *et al.*, 2023). The sensitivity analysis yielded results consistent with those presented in the tables above.

#### 4 DISCUSSION

Our results show that psychological factors related to emotional management, such as anxiety, depression, stress, anger expression index, impulsivity, and positive and negative affect were associated with dropout in prolonged inpatient treatment of substance use disorder. Likewise, the higher the patients score on the subscales of anger (outward expression and inward expression subscales), impulsivity (negative urgency, and lack of premeditation subscales), and self-compassion (self-judgment subscale), the greater the chance of participants belonging to the dropout group. Interestingly, sociodemographic factors, treatment history, and factors associated with drug consumption were not associated with dropout.

Previous studies showed that therapeutic success correlates with the time that patients remain undergoing treatment (Condelli; De Leon, 1993; Condelli; Hubbard, 1994; González-Saiz *et al.*, 2014; Lappan *et al.*, 2020). Also, evidence shows that relapses and consequent treatment dropout are related to patient characteristics, including sociodemographic factors, factors related to previous substance use, and psychological factors (Condelli; De Leon, 1993; González-Saiz; Vergara-Moragues, 2021a). However, the results found so far are limited and contradictory (González-Saiz; Vergara-Moragues, 2021a).

Hess and collaborators (2019) carried out a study to observe the social characteristics correlated with the number and length of stay of women in prolonged inpatient treatment. No difference was seen in respect of the factors of age, race, education, and criminal history (Hess; De Almeida, 2019). Our data agree with these findings, as we did not observe a relationship between these sociodemographic factors and treatment dropout.

On the other hand, the literature shows that the profile of patients with prolonged inpatient treatment is young, man, single, unemployed, living alone, with a criminal record, and having only completed primary education (Dekel *et al.*, 2004; Edlund *et al.*, 2004; Fernández-Calderón *et al.*, 2015; Lappan *et al.*, 2020; Machado *et al.*, 2021). In addition, González-Saiz *et al.*, (2014) observed that the profile of hospitalized patients was male, single, unemployed men, and with a low level of education (González-Saiz *et al.*, 2014). However, it is important to note that the methodology of these studies differs from ours, as they only analyzed the profile of hospitalized patients, not relating these characteristics to continuity or abandonment of treatment. In addition, the research cited considered samples of Western, educated, and rich



countries data, which limits direct comparisons and generalizability to other cultures and countries, which is equivalent to approximately only 12% of the world's population, according to the American Psychological Association (APA, DSM-5, 2013). Therefore, it is necessary to expand this information to developing countries, places where most of the population suffering from substance use disorders live (UNODC, 2022).

Studies demonstrate a relation between dropouts with the classes of drugs used, and the time of first use (LAPPAN *et al.*, 2020; RIBEIRO *et al.*, 2012). It was apparent that individuals who had multiple drug use disorders and started using drugs early had a higher rate of prolonged inpatient treatment and greater social and medical losses (Fernández-Calderón *et al.*, 2015; Lappan *et al.*, 2020). Another study also observed that polydrug users, who had been using drugs for a longer period, showed an increase in treatment dropout (RIBEIRO *et al.*, 2012). Our results differ from those in the literature as we did not find an association between dropout and drug-related characteristics or time of use.

Regarding mental health, De Leon and Unterrainer (2020) pointed out that issues related to the individual's feelings and perceptions, such as premeditation, readiness for change, and positive affect are more relevant to staying in prolonged inpatient treatment than sociodemographic and environmental variables (De Leon; Unterrainer, 2020). Our data is in line with these findings, which demonstrate a relationship between the presence of positive affect and the desire for change with a lower number of dropouts among these patients.

The main risk factors associated with the use of drugs are difficulties in managing emotions (APA DSM-5, 2013). In a study carried out in Spanish therapeutic communities, it was seen that approximately 58% of patients who had psychological disorders had a worse response to treatment and were less likely to remain in prolonged inpatient treatment compared to those who did not have mental problems (risk ratio of 1.61) (González-Saiz *et al.*, 2014; González-Saiz; Vergara-Moragues, 2021b).

Regarding self-compassion, there is evidence that patients with greater self-compassion presented better emotional regulation strategies, resulting in less alcohol and cannabis consumption (Wisener; Khoury, 2021). In addition, Phelps and colleagues (2018) (Phelps *et al.*, 2018) demonstrated that SUD risk has an inverse relationship with self-compassion. Our study highlights that higher scores of self-judgment, an inverse subscale of self-compassion, elevate the likelihood of individuals discontinuing treatment. These results suggest that fostering self-compassion could serve as a valuable adjunct in treating substance use disorders, particularly by focusing on techniques that mitigate self-criticism (Phelps *et al.*, 2018; Wisener; Khoury, 2021).



Added to this, a relationship was observed between the development of substance use disorder and high levels of psychiatric comorbidities (Melhem Junior *et al.*, 2024; O'leary *et al.*, 2022). These lead to a decrease in the effectiveness rate.

Thus, noting that psychological factors and emotional regulation are identified as predictors of dropout, it is extremely important that the treatments offered focus and work on improving these factors, to obtain strategies that aim to maintain patients in treatment and reduce the chance of relapses.

## 5 STRENGTHS AND LIMITATIONS

The main strength of this study is that it evaluated psychosocial factors among a sample from an underdeveloped country, such as Brazil, and the reasons related to treatment dropout in prolonged inpatient treatment. Data from developing countries, with cultural and social characteristics in the vast majority of published studies make it possible to expand the understanding of behavior in different contexts and develop strategies to enhance adherence that are specifically tailored to these populations. Thus, through understanding the protective factors related to the permanence of patients in treatment it is possible to use adjuvant techniques that control the expression of negative affect, improve treatments, prolong the length of stay, reduce relapse, and thus increase the chance of recovery.

As a limitation, it should be noted that this study was carried out only in a sample of adult men, not observing the behavior of women and adolescents, population groups that also have samples of high rates of SUD. Another limitation is that the patients were not at the same treatment time, which may have influenced the data collected.

## 6 CONCLUSION

The results of this study identified the reasons associated with dropout in patients treated for SUDs during prolonged inpatient treatment. Our findings demonstrated that sociodemographic factors and those related to a history of substance abuse were not associated with dropout, but that aspects related to mental health were associated with abandoning treatment. Thus, our results highlight the need to prioritize the development of emotional regulation skills and care related to symptoms of mental disorders such as depression, anxiety, and stress, to reduce treatment dropout and potential relapses, and improve the treatments offered to patients suffering from SUD.

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## **8 DECLARATION OF CONFLICT OF INTERESTS**

ARN is the director of the Brazilian center that conducts MBRP training with financial incentives. The remaining authors declare that they have no conflicts of interest.

## **9 ACKNOWLEDGMENTS**

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## **10 DATASET**

This study is a component of a broader investigation governed by stringent protocols regarding the release of the dataset prior to the publication of results. We are pleased to offer access to the dataset for review purposes. Upon acceptance of the manuscript, we will make the dataset fully accessible for academic use.

Research Ethics Committee of the Federal University of São Paulo: nº: 3.183.805.

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