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Substance Use Disorder Treatment Outcomes: Methodological Overview of Metrics and Criteria

Marta Narváez-Camargo¹ | Oscar Lozano-Rojas^{1,2} | Cinta Mancheño-Velasco¹ | Antonio Verdejo-García³ 

¹Department of Clinical and Experimental Psychology, University of Huelva, Huelva, Spain | ²Research Centre of Natural Resources, Health and the Environment, University of Huelva, Huelva, Spain | ³School of Psychological Sciences and Turner Institute for Brain and Mental Health, Monash University, Melbourne, Australia

Correspondence: Antonio Verdejo-García (antonio.verdejo@monash.edu)

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ABSTRACT

Aim: The heterogeneous metrics and criteria used to assess the effectiveness of substance use disorders treatment hinders cross-study comparisons. This review aims to parse such heterogeneity by analysing the operational definitions of variables used to derive metrics and outcome criteria, contributing to the standardisation process.

Methods: We conducted a systematic review in PubMed and PsycINFO between January 2000 and October 2023. We included published studies on substance use disorders that featured at least one of seven ‘a priori’ defined variables commonly used to obtain metrics and criteria for treatment effectiveness. The review process and reporting followed Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.

Results: Were identified three areas that can be used to define metrics and criteria associated with treatment outcome: as ‘substance use’ (abstinence and relapses), ‘treatment process’ (readmission, dropout, retention, and adherence) and ‘general wellbeing’ (quality of life). Operational definitions and metrics and criteria used were overall inconsistent.

Conclusions: The establishment of guidelines for evaluation of treatment outcomes is imperative, as heterogeneity is still present in the literature. We recommend that future trials provide outcomes metrics relevant to the identified categories, and that standardisation efforts continue toward harmonised criteria to report and interpret those metrics.

1 | Introduction

Substance use disorders (SUDs) represent a pervasive and critical global health challenge, consistently ranking as one of the leading causes of morbidity and mortality (Degenhardt et al. 2017). According to the United Nations Office on Drugs and Crime World Drug Report (United Nations Office on Drugs and Crime 2024), in

2022, approximately 64 million people worldwide suffered from SUD, equivalent to 1 in 81 people. This figure represents a 3% increase compared with that in 2018. Therefore, the need for evidence-based treatment is noteworthy (Pickering et al. 2017). Evidence on treatment efficacy is mixed, while some studies have shown that more than half of patients seem to be in recovery (Jones et al. 2020), other studies have reported recovery rates

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lower than 10% (Kelly et al. 2017). These inconsistent findings could be due to what it means to be ‘in recovery’ or ‘treatment effectiveness’ (W. L. White 2007).

As in other mental health interventions, outcome measurement, encompassing metrics and criteria, is crucial for determining the effectiveness of interventions. Since the 1990s, numerous studies on the effectiveness and efficacy of treatments have been conducted using a wide range of outcome variables (Alves et al. 2017). Historically, SUD research has prioritised substance use terms—such as abstinence- for evaluating treatment. However, in alignment with harm-reduction models - an approach aimed at minimising the adverse consequences of drug use, accepting that some users will not cease consumption (Single 1995)- some authors point out that a more comprehensive view extends beyond the frequency and quantity of use (Tiffany et al. 2012). This paradigm has been recognised by regulatory agencies such as, the Food and Drug Administration (FDA), which has shown a keen interest in developing no-abstinence-based endpoints (Kiluk et al. 2019) or assessing the broader negative consequences of drug use. In addition, different studies have also highlighted the need to analyze variables related to the therapeutic process (Penzstadler et al. 2017). Those, such as retention or adherence to treatment, are associated with long-term outcomes such as, reduced drug use, therapeutic success, improved quality of life (QoL), or a reduced likelihood of future drug use problems (Gaulen et al. 2022). Consequently, researchers and clinicians are embracing this novel paradigm, incorporating variables such as QoL and other treatment process indicators.

Based on the aforementioned arguments, the utilisation of substance use, QoL, and treatment process variables to inform the development of outcome metrics and criteria to define effectiveness is a practice that has gained considerable traction within the scientific literature, particularly in the context of evaluating treatment outcomes (Dacosta-Sánchez et al. 2022; Tiffany et al. 2012). However, 2 decades prior, W. White and Godley (2005) highlighted the lack of consensus in the standardisation of outcome measures (i.e., metrics and criteria) used to determine treatment outcomes. These problems make cross-study comparisons difficult and can limit the use of meta-analytical techniques (Donovan et al. 2012). Consequently, the lack of certainty could limit the ability of healthcare professionals to make scientific-based informed decisions (Karnik et al. 2022).

Therefore, given the substantial heterogeneity in the current literature, there is a need to harmonise the metrics and criteria used to SUD treatment outcomes to enable comparability across studies. To progress toward this goal, we conducted a systematic review covering seven variables commonly used in the specialised literature to define metrics and criteria for outcome evaluation, namely abstinence, retention (Wiessing et al. 2018), adherence/engagement (S. Reif et al. 2021), dropout (H. H. Brorson et al. 2013), quality of life (Bratu et al. 2023), readmission (Böckmann et al. 2019; Donisi et al. 2016), and relapse (Moe et al. 2022). Our review focused on addressing the following questions: What metrics are used to operationalise these variables, and what criteria are applied to evaluate treatment effectiveness based on those metrics? Accordingly, our main objectives were to examine the literature: (i) to analyze the operational definitions of the seven ‘a priori’ defined variables and (ii) to

examine the metrics and criteria used to evaluate and determine intervention outcomes.

2 | Methods

A systematic literature review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Page et al. 2021). The systematic review protocol was pre-registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the registration code CRD42024500356.

2.1 | Search Strategy

Searches were conducted on 18 October 2023 in two widely used databases for health and behavioral sciences (Falagas et al. 2008): PubMed and PsycINFO. The search was limited to articles published between January 1, 2000 and search date, to capture contemporary research. Additionally, it was restricted to studies involving the adult population, ensuring sample homogeneity. The search strategy was limited to the title field and included (Addiction OR Substance use disorder OR Substance abuse disorder) AND (Abstinence OR Adherence OR Dropout OR Engagement OR Quality of Life OR Relapse OR Retention OR Readmission). These terms were selected for their common use in the literature for evaluating treatment effectiveness in patients with SUD and have been frequently analysed in prior studies (Böckmann et al. 2019; Bratu et al. 2023; H. H. Brorson et al. 2013; Donisi et al. 2016; Moe et al. 2022; S. Reif et al. 2021; Wiessing et al. 2018). The concept of engagement was included because, in the literature, researchers use both ‘engagement to treatment’ and ‘treatment adherence’ synonymously (Morandi et al. 2017).

All initial results were exported from their databases to the systematic review software site Rayyan (Ouzzani et al. 2016), yielding a total of 1068 publications. A first screening based on title and abstract was conducted, applying the following exclusion criteria:

1. Gray literature (to ensure the inclusion of peer-reviewed empirical studies).
2. Non-English full text available.
3. Studies include participants under 18 years old.
4. Studies focusing on tobacco or behavioral addictions. Research related to tobacco use disorder was excluded to maintain methodological consistency. This is because such studies frequently utilise disparate outcome measures (e.g., abstinence as the sole metric) and are often conducted in distinct treatment settings, such as primary care, which differ from those employed for other SUD.
5. Case reports.
6. Systematic reviews.

After this initial screening, 407 papers underwent full-text screening by one of the authors to determine which ones met selection criteria. Two other authors contributed to resolve

uncertain cases and agreed on the final selection of articles. The inclusion criteria were defined as follows:

1. The sample consisted of individuals diagnosed with SUD who received treatment in any modality (outpatient or inpatient).
2. The study examined at least one of the following variables: adherence, engagement, relapse, readmission, retention, QoL, dropout, or abstinence. Studies investigating risk factors for one of the previous variables using at least two time-point measures (pre-post) of the outcome.

Finally, 110 studies were included in the review. Figure 1 describes the process of selection checking according to PRISMA.

The extracted data are summarised in three categories. The substance use-related variables included 'abstinence' and 'relapse.' The treatment process-related variables were 'dropout,' 'retention,' 'readmission,' and 'engagement'. Lastly, the third category included 'quality of life'. To facilitate identification of the studies

included in the systematic review, those that met the inclusion criteria have been marked with an asterisk (*) in the reference section.

3 | Results

3.1 | Variables Related to Substance Use

A total of 44 studies included variables related to substance use, with 20 using 'abstinence' and 22 'relapse' (Tables 1 and 2).

Regarding the operational definitions of these terms, most of the studies ($n = 16$) defined abstinence based on reported use of alcohol or illicit drugs, applying the criteria of no reported used. In line with this, for relapse, nine of the 22 studies considered zero reported consumption as the criterion for 'no relapse'. However, 13 studies differ from that. For example, Palma-Álvarez et al. (2021) defined the criteria for relapse as 'three consecutive positive urinalyses of the substance that the patient

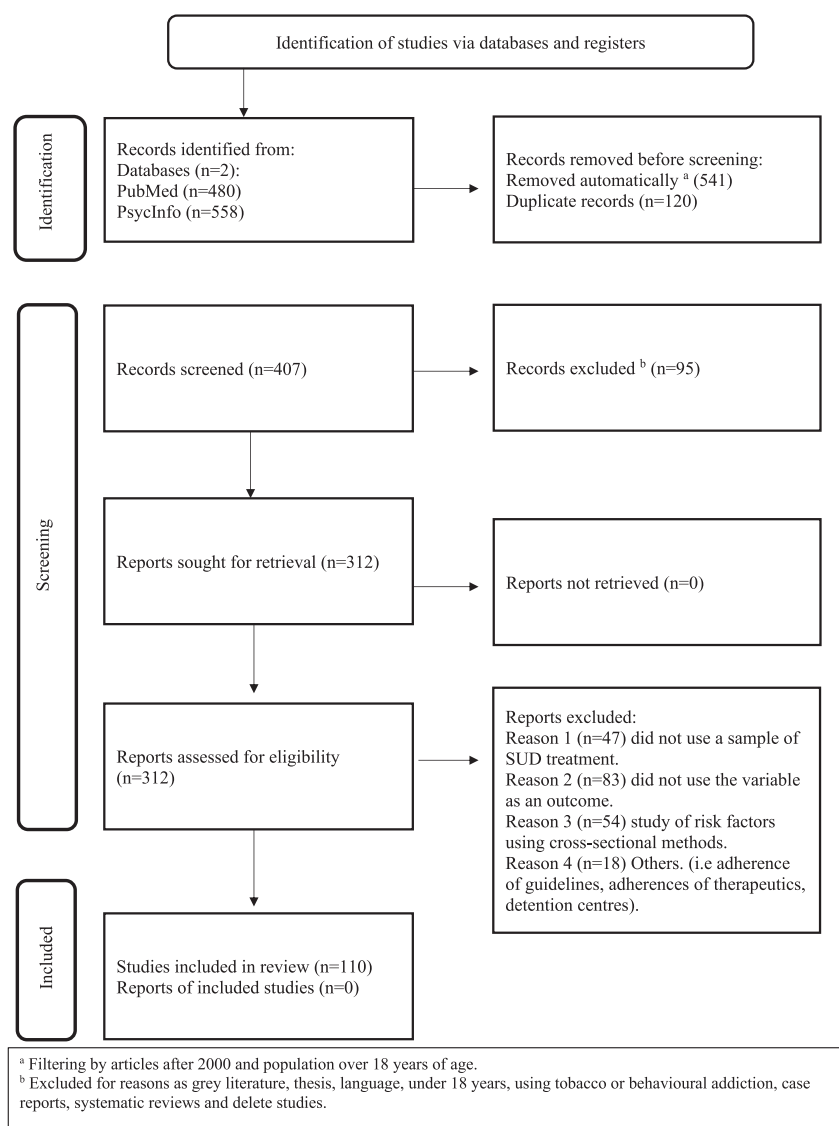


FIGURE 1 | PRISMA flow diagram.

TABLE 1 | Variables related to substance use-abstinence.

Abstinence		Types of metrics					Criteria	
		n	Country	Substance (in-out-patient)	Type of intervention	Self-report	Biological	¿What the authors considered as an abstinence patient?
Giuffredi et al. (2003)	100	Italy	AUD	Outpatient	—	Urine or blood test for alcohol, andImmunoenzymatics samples for others.	Zero positive test.	A day
Ilgen et al. (2005)	2,967	USA	SUD	Inpatient	HDLF (alcohol), TOPS (drug use)	—	No report of drug or alcohol use.	Last 3 months
Norman et al. (2007)	134	USA	SUD	Outpatient	TLBF	Random toxicological screens.	No report of drug or alcohol use and zero positive toxicological screen.	Last 3 months
Schaefer et al. (2008)	429	USA	SUD	Outpatient	ASI	—	No report of drug or alcohol use.	Last 30 days
García-Rodríguez et al. (2009)	96	Spain	Cocaine	Outpatient	—	Mean percentage of negatives in a quick screen test for 24 weeks	—	—
McKellar et al. (2009)	3856	USA	SUD	Both	Ad hoc	—	No report of drug or alcohol use.	Last 3 months
Van Der Woerd et al. (2010)	218	USA	SUD	Inpatient	Ad hoc-59 items scale.	—	Complete abstinence. 'No report slip or relapse' harm reduction: 'Reported to drink or do drugs less'; relapse: reported using the 'same' or 'more' than before treatment.	—
Pyne et al. (2011)	495	USA	SUD	Inpatient	Ad hoc	—	Reported No use of 15 categories of alcohol or street drugs.	Last 30 days
Schaefer et al. (2011)	28	USA	SUD	Both	ASI	—	Reported no alcohol or drug use.	Last 30 days
Hagedorn et al. (2013)	330	USA	SUD	Outpatient	TLBF. Percentage of days abstinent of the past 30 days.	Number of negative urine and breath samples during 8 weeks.	—	—
Trocchio et al. (2013)	1136	USA and Sweden	SUD	Both	Ad hoc	—	Reported no alcohol or drug use.	Last 30 days
Frimpong et al. (2016)	11,533	USA	SUD	Both	Ad hoc	—	Reported no use of drugs at successful discharge.	Last 30 days

(Continues)

TABLE 1 | (Continued)

Author (date)	n	Country	Substance	Type of intervention (in-out-patient)	Types of metrics			Criteria	
					Self-report	Biological	¿What the authors considered as an abstinence patient?	¿Which is the period considered?	
Aldemir et al. (2018)	88	Turkey	SUD	Outpatient	—	Urine analysis.	—	2 Weeks	
Wakeman et al. (2017)	399	USA	SUD	Inpatient	ASI	—	Any change in ASI for alcohol and drug use compared to baseline.	30 days post discharge	
Van Hagen et al. (2019)	102	Netherlands	Dual diagnosis	Outpatient	TLBF	—	Reported no alcohol or drug use.	Last 30 days	
Lander et al. (2020)	454	USA	OUD	Outpatient	Ad hoc	Negative urine drug screening	Reported no alcohol or drug use and zero positive samples	2 months	
Daigre et al. (2021)	404	Spain	Dual diagnosis	Outpatient	Europ-ASI for principal substance.	—	Reported no use of the major problem substance.	Last 3 months	
Fine et al. (2021)	1467	USA	OUD	Outpatient	—	Urine toxicology for opioids.	No detectable opioids in the urine.	A year	
Palma-Álvarez et al. (2021)	126	Spain	SUD	Outpatient	—	Urine and breath analysis	'Time of abstinence' (months until the first relapse).	A year	
Luderer et al. (2022)	206	USA	SUD	Outpatient	TLFB	Urine/breath screen	No reported used and zero positive screening.	12 weeks	

TABLE 2 | Variables related to substance use-relapse.

Relapse								
Author (date)	n	Location	Population	Type of intervention	Type of metric		Criteria	
					Self-report	Biological	¿What the authors considered as a relapse?	¿Which is the period considered?
Xie et al. (2005)	169	USA	Dual diagnosis	Outpatients	TLFB	Urine screen	Any evidence of abuse or dependence.	6 months
Brunette et al. (2006)	169	USA	Dual diagnosis	Outpatient	TLFB	Urine screen	Any evidence of abuse or dependence.	6 months
Krupitsky et al. (2006)	414	Russia	OUD	Outpatient	TLFB	Urine and breath. (Urine only for opioids).	Three consecutive opioid-positive urine tests and signs of withdrawal reported on the TLFB. Differentiate relapse from slip.	Last week
Mattson et al. (2010)	173	USA	SUD	Outpatient	TLFB	—	Reported consume six or more standard drinks in a single day or engage in any illicit drug.	6 months
Nordfjærn (2011)	352	Norway	SUD	Both	Ad hoc	—	Previous attendance to a treatment program.	—
Krupitsky et al. (2013)	301	Russian	OUD	Outpatient	TLFB	Urine and breath. (Urine only for opioids).	Three consecutive opioid-positive urine tests and signs of withdrawal reported on the TLFB. Differentiate relapse from slip.	Weekly
Bowen et al. (2014)	286	USA	SUD	Both	TLFB	Urine screen	Heavy drink was 4 or more drinks per occasion for women and 5 or more for men.	12-month
Li et al. (2014)	69	China	Heroin	Outpatient	Ad hoc	Urine screen	Used heroin or increased the number of days for other substances by at least 50%.	Last month
Engel et al. (2015)	106	—	AUD	—	TLFB	—	Any alcohol consumption of > 60 g/day in males and > 48 g/day in females for 2 days.	20 weeks
Amaro and Black (2017)	200	USA	SUD	Inpatient	TLFB	Urine and breath screen	Used substance after intervention and continued use regularly on more than one-third of days from first use to follow-up.	8 months
Vo et al. (2016)	56	USA	OUD	Outpatient	Ad hoc	Urine screen	Any positive urine test or reported use.	A week

(Continues)

TABLE 2 | (Continued)

Relapse								
Author (date)	n	Location	Population	Type of intervention	Type of metric		Criteria	
					Self-report	Biological	¿What the authors considered as a relapse?	¿Which is the period considered?
McPherson et al. (2017)	198	USA	SUD	Inpatient	Ad hoc	—	Reported return to substance use after a period of abstinence.	6 months
Marshall et al. (2018)	58	UK	SUD	Outpatient	Ad hoc	—	Reported return to normal use.	4 weeks
Stohs et al. (2019)	149	USA	AUD	Inpatient	Ad hoc	—	Any reported alcohol consumption.	3 months
Aryan et al. (2020)	100	Iran	ODU	Inpatient	—	Urine sample	Presence of amphetamine on a urine sample.	—
Kargin and Hiçdurmaz (2020)	58	Turkey	SUD	Outpatient	—	Urine sample	Presence of substances on a urine sample.	1 week
Mancheño et al. (2021)	182	Spain	Dual diagnosis	Outpatient	Ad hoc	—	—	6 months
Palma-Álvarez et al. (2021)	126	Spain	ODU	Outpatient	—	Urine sample	Three consecutive positive urinalyses for the more problematic substance.	—
Betancourt et al. (2022)	40,909	USA	SUD	Both	Ad hoc	—	Discrete event, which occurs when a person resumes drug use or as a process which occurs over time.	At discharge
Andersson et al. (2023)	611	Norway	SUD	Inpatient	Ad hoc	—	Reported return to regular use, or reported using alcohol or drug 2–4 times per week.	4 weeks
Camchong et al. (2023)	60	USA	AUD	Inpatient	TLFB	—	Consuming one drink.	4 months
Waite et al. (2023)	6633	USA	SUD	Both	Ad hoc	—	Return to a higher level of treatment after discharge.	6 months

used in the first instance or the more problematic one'. Additionally, two of the studies considered being readmitted to treatment as relapse (Nordfjærn 2011; Waite et al. 2023).

The literature also reflects the distinction between 'slip' and 'relapse', with five studies addressing this. For instance, Krupitsky et al. (2006) defined relapse using three different criteria: reported daily heroin use, three consecutive positive tests or the presence of withdrawal symptoms, and a slip as: reported occasional heroin use, less than three consecutive opioid-positive urine tests and no withdrawal symptoms.

For both variables, the main type of data collection was self-reports. Among the studies including abstinence, a wide variety of instruments have been used, such as the *Addiction Severity Index* (ASI) (McLellan et al. 1992), its European version (EuropASI) (Blacken et al. 1994), the *Timeline Follow-*

back (TLFB) (Sobell and Sobell 1992), the *Health and Daily Living Form* (Moos et al. 1990), *Treatment Outcomes Prospective Studies inventories* (Hubbard et al. 1989), and ad-hoc interviews. For relapse, only the TLFB (Sobell and Sobell 1992) and ad-hoc interviews were used. The TLFB was the most used measure for both variables (Figure 2). Regarding biological measures, nine of the studies on abstinence and 11 of the relapse papers included urine, exhaled air, or blood samples. Fourteen studies combined both measures (i.e., biological and self-reported). Two studies (Mattson et al. 2010; Norman et al. 2007) used a collateral informant measure (e.g., family or friends).

The observed period varied widely, ranging from daily measures to 1 year after treatment onset. Most commonly, the last 30 days ($n = 11$) or the last 3 months ($n = 11$) were used to assess substance use (Figure 3).

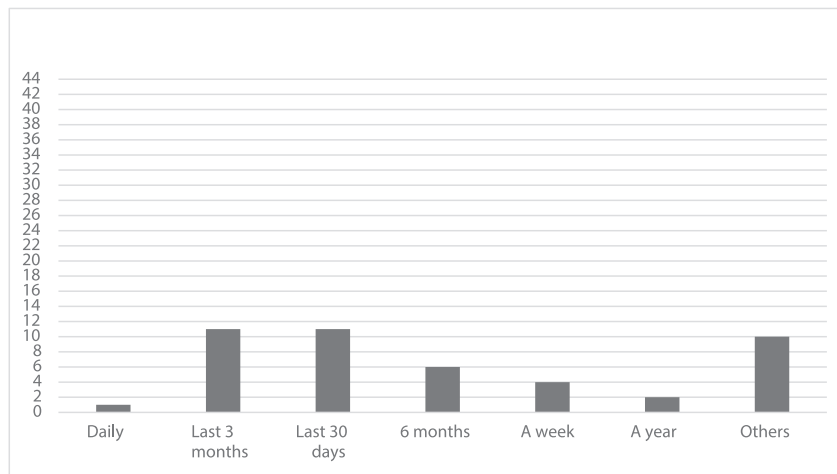


FIGURE 2 | Assessment period for substance use measures.

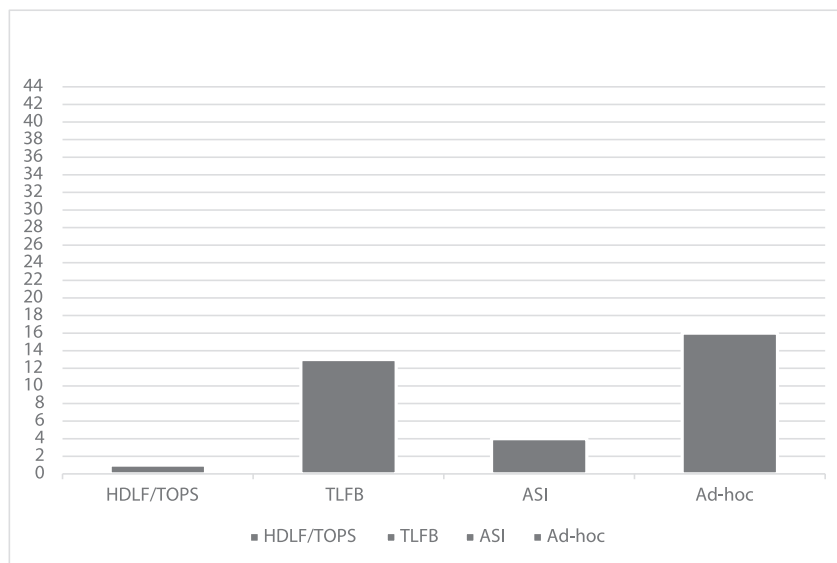


FIGURE 3 | Scales used for substance use measures.

3.2 | Variables Related to the Treatment Process

3.2.1 | Readmission

Eight papers (Table 3) examined readmission rates, all conducted in hospital settings. Regarding the operational definition, five studies considered readmission as a new substance-related or psychiatric admission following initial discharge. In contrast, three of them reflected any new hospitalisation as the criteria to consider the patient as readmitted (e.g., emergency admissions). Only Gryczynski et al. (2021) and Maturana et al. (2023) analysed data from a large setting of treatments.

In terms of the follow-up period, there was a great variety, ranging from 30 days after discharge to 9 years after discharge. 1-month or 6-month periods were the most common.

Concerning the metric of the variable, five studies dichotomised it (readmission vs. no readmission) based on previously established criteria for analysing readmission rates. Three studies

examined the time until new readmission, and only one analysed the number of days spent in the hospital after discharge.

3.2.2 | Dropout

Dropout was reported in 24 studies (Table 4). Dropout was usually operationalised as 'stopping treatment before clinical recommendation'. However, specific criteria varied, from 'failure to return for the next session' (Jarneck et al. 2019) to 'being in treatment for less than 6 months' (Padyab et al. 2015). Two of these studies (Tull and Gratz 2012; Tull et al. 2013) considered discharge due to disciplinary infractions as dropping out of treatment.

Regarding measurement concerns, none of the studies reported a specific metric; instead, they dichotomised the variable, to enable calculation of dropout rates. The dropout rates ranged from 12% to 73%. Follow-up periods ranged from 30 days to 5 years, with 3 months being the most common.

TABLE 3 | Variables related to treatment process-readmission.

		Readmission						
Author (date)	n	Type of		Follow-up period	Metric	Criteria	Data from (setting)	
		Country	intervention					Population
Brennan et al. (2000)	12,417	USA	Hospital	SUD	4 years retrospectively	Electronic record.	Criteria. Any substance-related hospitalisation	MEDPAR database.
Smelson et al. (2012)	102	USA	Hospital	Dual diagnosis	6 months after the index hospitalisation	Number of days hospitalised in a psychiatric unit after being discharged.	—	One veterans hospital.
Mark et al. (2013)	121,271	USA	Hospital	Dual diagnosis	8–30 days following discharge	Electronic record.	Readmitted with M/SUD in 8–30 days following discharge.	One missouri hospital
Reifetal. (2017)	30,439	USA	Hospital	SUD	90 days after discharge	Electronic record.	New behavioural health admission in 90 days	All baltimore Centres.
Geniş et al. (2020)	264	Turkey	Hospital	AUD	6 months	Electronic hospital record.	A new hospitalisation	—
Rowell-Cunsolo et al. (2020)	768,219 (admissions)	USA	Hospital	SUD	30 days	Electronic hospital record.	New hospital readmission within 30 days of discharge.	Three hospitals.
Gryczynski et al. (2021)	400	USA	Hospital	Dual diagnosis	12 months after discharge	Electronic hospital record.	All new hospital readmissions	Hospitals in Maryland and Washington DC
Maturana et al. (2023)	107,559 (admissions)	Chile	Both	SUD	9 years	Electronic record.	Return to SUD treatment after discharge	Inpatient and outpatient SUD treatment programs in Chile.

Abbreviation: SUD: Substance Use Disorder.

TABLE 4 | Variables related to treatment process-dropout.

Author (date)	<i>n</i>	Country	Type of intervention	Population	Follow-up period	Criteria	Dropout-rate
Veach et al. (2000)	509	USA	Outpatient	SUD	18 months	Dropout: administrative discharge, against staff advice, cancelled, no show and refuse admission.	27.7%
Zilberman et al. (2003)	80	Brazil	Outpatient	Women SUD	3 months	Missing three appointments in a row, or declining treatment.	33%
Hawkins et al. (2008)	107	USA	Outpatient	SUD	8 weeks	Not attending a single group for 2 or more consecutive weeks and not attending any group meetings for the 8 weeks.	41.4%
Graff et al. (2008)	61	USA	Outpatient	Dual diagnosis	12 weeks	Missing the last 4 groups.	19.7%
Schulte et al. (2010)	124	UK	Outpatient	SUD	90 days	Failure to attend at least two treatment sessions and not having made any other contact with the service or been referred to another treatment.	—
Fernández-Montalvo and López-Goñi (2010)	102	Spain	Outpatient	Cocaine use disorder	12 months	Discontinuing the treatment without being discharged.	30.4%
Tull and Gratz (2012)	159	USA	Inpatient	SUD	45 days	The patient voluntarily left treatment against staff recommendation or, being asked to leave due to engagement in treatment-interfering behaviours.	20.8%
Tull et al. (2013)	214	USA	Inpatient	SUD	45 days	Left the treatment against medical advice or leave treatment due to breaking rules of the treatment program'.	12%
Padyab et al. (2015)	4515	Sweden	Outpatient	SUD	6 months	Being in treatment for less than 6 months.	59%
Elmqvist et al. (2016)	122	USA	Inpatient	SUD	35 days	Voluntarily chose to leave treatment early or were administratively discharged for violating the centre's rule.	17.21%
Thylstrup and Hesse (2016)	172	Denmark	Outpatient	Dual diagnosis	10 months	Being discharged for any other reason than completing the treatment.	48.9%
Basu et al. (2017)	7991	India	Outpatient	SUD	30 days	Not follow up within 30 days of the initial contact.	61%
Belleau et al. (2017)	126	USA	Inpatient	Dual diagnosis	8 weeks	Attended less than 8 therapy sessions.	38.8%
Szafranski et al. (2017)	51	USA	Outpatient	Dual diagnosis	12 weeks	Completing at least one treatment session and discontinuing treatment before completion of the full treatment protocol.	43.1%
Brorson et al. (2019)	40	Norway	Inpatient	SUD	2 years	Discontinued treatment before recommended discharge.	68%
Jarnecke et al. (2019)	46	USA	Outpatient	Dual diagnosis	12 weeks	Failed to return for the indicated session.	36.9%
Bourion-Bédès et al. (2020)	175	France	Outpatient	AUD/ODD	3 months	No longer in care at the end of the 3 months.	30.3%

(Continues)

TABLE 4 | (Continued)

Author (date)	<i>n</i>	Country	Type of intervention	Population	Follow-up period	Criteria	Dropout-rate
Gori et al. (2020)	49	Italy	Inpatient	SUD	14 months	Prematurely stopped the residential treatment.	24%
Durand et al. (2021)	2035	Ireland	Outpatient (MMT)	ODU	5 years	A person who did not receive a new methadone prescription within 7 days of the end of the coverage of a prescription.	54%
López-Goñi et al. (2021)	57	Spain	Both	SUD	2 years	—	[37.9%–50%]
Palma-Álvarez et al. (2021)	126	Spain	Outpatient	SUD	1 year	Left the treatment process more than 20 days after any scheduled appointment without any justification.	—
Lien et al. (2021)	128	Norway	—	SUD	6 months	Leaving the clinic before the planned completion.	32%
Gallefoss et al. (2022)	262	Norway	Outpatient	SUD	10 weeks	Three missed appointments within a time frame of 10 sessions.	19%
Gainer et al. (2023)	544	USA	Both	SUD	2 years	The last kept appointment before a 60 days or more absence in follow-up appointments or the end of the analysis period.	[69%–73%]

3.2.3 | Retention

Of the 23 papers reviewed that included retention (Table 5), 11 focused on residential treatment settings.

SAMHSA's National Outcomes domains (SAMHSA 2003) defined retention as the length of stay from the date of the first service to the date of the last service. This definition was only used in seven of the studies. The most common definition of retention was 'continued in treatment at a specific time (e.g., 30 days)' but criteria varied across studies (e.g., being in treatment at 3 months, 30 days, 6 weeks, or 4 weeks).

The most common way to measure this variable was using a dichotomous measure. The follow-up periods ranged from 21 days to 10 years. The retention rates ranged from 25.3% to 90%.

3.2.4 | Adherence/Engagement

Adherence/engagement was reported in 22 of the papers (Table 6). Seven studies focused on medication adherence, with four addressing adherence to methadone or buprenorphine. Regarding the metric used, 10 papers measured it qualitatively as being engaged. However, most of them (60%) used a quantitative measure, varying from the number of months attending treatment to the mean number of sessions completed and establishing different cutoff points (e.g., attending at least three treatment sessions). Two studies used ad-hoc scales to evaluate treatment adherence.

The follow-up periods varied between 1 week to 12 months, with 6 months of follow-up being the most common.

3.3 | Outcomes of General Wellbeing

3.3.1 | Quality of Life (QoL)

Out of the studies reviewed, 19 assessed QoL. Most of these studies were conducted after 2015 ($n = 14$) (Table 7).

Regarding the metric, the studies in the review utilised self-administered scales, employing a total of 8 different instruments. The most frequently used scale was the WHOQOL-BREF (Skevington et al. 2004) (Figure 4), which is a shortened version of the *World Health Organisation's QOL instrument* (WHOQOL). Other scales included the QoL-5 (Lindholt et al. 2002), a 5-item instrument measuring self-perceived QoL with items relating to mental and physical health, relationships, and existential aspects, and the Q-LES-Q-SF (Endicott et al. 1993), which employs 16 items to assess QoL across areas of daily functioning.

Only two instruments were specific to SUD patients: the QOLI (Daley et al. 2005) and the QoL-DA (Wan et al. 2011). The remainder were designed for the general population (e.g., WHO-QOL) or patients with chronic conditions (e.g., Q-LES-Q-SF).

The studies measured QoL at least twice, at baseline, with 6 months being the most common follow-up. Most of the studies were conducted in outpatient services, with only six being conducted in inpatient facilities or including both types.

4 | Discussion

This review examines seven variables commonly used in SUD treatment assessment. Our results highlight that a substantial

TABLE 5 | Variables related to treatment process-retention.

Retention							
Author (date)	<i>n</i>	Country	Type of intervention	Population	Follow-up period	Criteria	Rate of retention
Veach et al. (2000)	509	USA	Outpatient	SUD	18 months	Retained: continuing care, completed treatment, transferred to inpatient, and referred out.	72.3%
Swartz et al. (2003)	1764	USA	Both	SUD	2 years	Remained in treatment each subsequent wave.	90%
Zilberman et al. (2003)	80	Brazil	Outpatient	Women SUD	3 months	Continuing in treatment 3 months or longer.	[67%–41.3%]
García-Rodríguez et al. (2009)	96	Spain	Outpatient	Cocaine use disorder	6 months	Metric. The mean number of weeks patients were retained. No established criteria.	19.2 weeks
Choi et al. (2013)	1317	USA	Inpatient	Dual diagnosis	12 months	Dichotomous variable as client stayed in treatment for at least 30 days or not.	43.65%
Tull et al. (2013)	214	USA	Inpatient	SUD	30–45 days	Metric. The proportion of days in treatment-to-treatment contract length. No established criteria.	—
Vo et al. (2016)	56	USA	Outpatient	OOD	24 weeks	Metric. The number of weeks in treatment until dropout or discharge is reported in two ways: (1) the date of the last contact; and (2) the date of formal administrative discharge (4 weeks without any attendance). No established criteria.	40%
Wild et al. (2016)	271	Canada	Inpatient	SUD	6 weeks	Retention was continued in treatment at follow-up. Metric. Used a combined measure of retention and cognitive involvement: (1) no longer in treatment, (2) retained with lower cognitive involvement; (3) retained with longer cognitive involvement.	66.5%
Maremmani et al. (2016)	2016	Italy	Inpatient	SUD	1 year	Refers to patients who were still in treatment at the end of the study or were leaving for reasons unrelated to the treatment itself.	39%
Wilder et al. (2017)	189	USA	Outpatient (MMT)	OOD	60 days	Still enrolled in treatment at delivery.	51.9%
Marshall et al. (2018)	58	UK	Outpatient	SUD	4 weeks	Metric. Reported by the participant or the group leader. Coded as 0: attrition from treatment or 1: Remaining in treatment	86.20%

(Continues)

TABLE 5 | (Continued)

Retention							
Author (date)	n	Country	Type of intervention	Population	Follow-up period	Criteria	Rate of retention
Black and Amaro (2019)	200	USA	Inpatient	Women SUD	150 days	Metric. Number of days in treatment. No established criteria	94.4 days
Kraemer et al. (2019)	164,224	USA	Both	SUD	60 days	≥ 25 SUD visits or ≥ 25 days in residential treatment	—
Stuebing et al. (2019)	47	USA	Inpatient	Dual diagnosis	21 days	‘Treatment completion’: Treatment plan objectives are met, including completing the length of stay, ongoing abstinence while in treatment, attending 75% of groups and preparing discharge plans.	[62.4%–87.2%]
Lander et al. (2020)	454	USA	Outpatient	OUD	10 years	Metric. The number of days between their most recent visit date and their treatment start date. Coded as: less than 90 days; 90–365 days, more than a year. No established criteria.	485.3 days
Askari et al. (2020)	152,196 discharges	Columbia and Puerto Rico	Outpatient	Dual diagnosis	2 years	Retention as a binary variable. (1) Length of stay greater or equal to 180 days; (2) length of stay equal or greater than 365 days.	31.2% more than 180; 15.2% more than 365.
Galvin et al. (2020)	472	USA	Both	OUD	4 years	Retention and engagement: Participation in integrated obstetrical care and the expected number of prenatal and postpartum visits, participation in any of the SUD treatment options and negative toxicological results	[25.3%–35.5%]
Lee et al. (2021)	52	USA	Outpatient (MMT)	OUD	8 weeks	Active prescription for any form of buprenorphine 8 weeks after release, percentage of weeks any form of buprenorphine was prescribed, and percentage of weeks participants were retained on study	[35%–69%]
Mark et al. (2021)	177,115	USA	Both	SUD	4 years	Treatment retention: (1) treatment episode was 30 days or longer; 0 otherwise.	60% treatment retention
Rivera et al. (2021)	245	USA	Inpatient	Women SUD	12 months	Metric. Days in treatment. No established criteria	4 months
Palma-Álvarez et al. (2021)	126	Spain	Outpatient	SUD	1 year	Metric. Months that the patient was in the treatment. No established criteria	8.76 months

(Continues)

TABLE 5 | (Continued)

Retention							
Author (date)	<i>n</i>	Country	Type of intervention	Population	Follow-up period	Criteria	Rate of retention
Orocio-Contreras and Nieto-Caraveo (2022)	161	Mexico	Outpatient	SUD	12 weeks	Completed 12 weeks' outpatient program. Only if they attendance at least 80% of the scheduled sessions.	40.3%
Wakeman et al. (2022)	1857	USA	Outpatient	SUD	75 days	If they completed a visit in the 45–75-day period after first visit.	38%

Abbreviation: SUD: substance use disorder.

heterogeneity in definitions, metrics and criteria used to assess treatment efficacy, and effectiveness is still present in the literature. Therefore, we consider the implications of the synthesised literature, categorising variables into three domains: substance use, related to the treatment process, and QoL. The study provides general recommendations to achieve a consensus grounded in scientific literature.

4.1 | Substance Use

In agreement with Maisto et al. (2016) and Sliedrecht et al. (2022), the review found a lack of concordance in the definitions of the variables. One of the main debates is whether treatment success should be established with a criterion of complete abstinence or whether a reduction in use constitutes a valid criterion. The predominant view in the literature—in line with our results—is to consider total cessation. However, a more nuanced criteria—reduction of use—is included in some of the studies. In agreement with harm reduction frameworks, studies have shown that low-risk use is an acceptable measure of treatment success, being similar to abstinence in terms of subsequent normalisation of psychosocial functioning (Aldridge et al. 2016; Kapadia et al. 2021; Kline-Simon et al. 2013). Also, considering a clinical approach, reductions in use have a clear impact on service management and retention rates in different populations (Bailey et al. 2024; Philips and Labrow 2000).

Although 'reduction in use' appears to be a valid indicator of treatment effectiveness with notable clinical advantages, our review highlights a critical issue: the absence of consensus in the specific criteria for reduction of use and the metric used. This undermines the construct validity, given the difficulty in ensuring that the measurements align with the theoretical concept. Given the clinical relevance of this issue, researchers should continue their efforts to further investigate this, build a robust evidence base, and work toward establishing a consistent definition of what constitutes 'reduction in use'.

In that sense, our review shows that including a categorical definition, which divides patients into 'abstinence' or 'relapse' simplifies interpretation, analysis and facilitates cross-study comparisons. However, many authors argue that such measurements may lead to a loss of information (Moon and Lee 2020; Witkiewitz et al. 2019). Also, this dichotomous classification lacks

discrimination, as it classified individuals who have reduced substance use and are at relatively low risk as 'relapsing'—equating them with those who have resumed harmful pre-treatment use levels (Maisto et al. 2016; Van Hagen et al. 2019). To maintain the advantages of categorical definitions while addressing this limitation, we propose a three-tier classification: slip, relapse and abstinence. Differentiating between these groups allows for a more nuanced understanding of recovery.

Another methodological issue to consider is the instrument used. Most of the studies included self-report measures, which are susceptible to retrospective bias (Van Der Woerd et al. 2010) or social desirability (Frimpong et al. 2016). However, widely used instruments, such as the TLFB—the most used instrument of the present review—or the ASI, have been reported to have good validity (Fals-Stewart et al. 2000; Ljungvall et al. 2020; McCann et al. 2024). Additionally, it is cost-effective and straightforward to implement (Hjorthoj et al. 2012). The ASI has also been translated into various languages (Sharma et al. 2022; W. Luo et al. 2012) and tested in patients with psychiatric comorbidities (Susukida et al. 2020), providing evidence of external validity. However, it would be advisable to include some bias measures.

Biological measures are other of the most common metrics used. These methods are considered well-established with high accuracy and reliability (Donovan et al. 2012). A principal disadvantage was the short detection window, except for hair detection (Bharat et al. 2023; Donovan et al. 2012). Additionally, preventing test adulteration requires significant resources. In a recent meta-analysis about the level of agreement between self-reports and biological measures, the authors concluded that the level of agreement was mostly excellent (Bharat et al. 2023). Considering this, standardised scales appear to be the most accurate methods for measuring substance use. However, when resources allow, it is advisable to complement these tools with biological measures to enhance the accuracy of the assessment.

Finally, another methodological issue that could affect the comparison across-study was the period of study. The most common was the last 30 days. However, there was a great variety between daily measurements and the last 8 months. Evidently, the utilisation of a measure from the previous month or last 8 months does not yield equivalent results. In that sense, the results of the effectiveness of treatments could be biased, as the construction we are trying to measure could change with time.

TABLE 6 | Variables related to treatment process-adherence/engagement.

Adherence/Engagement						
Author/Year	n	Country	Type of intervention	Population	Follow-up period	Criteria
Krupitsky et al. (2006)	414	Russia	Outpatient	ODD	Weekly	Adherence to naltrexone- the remaining capsules at each appointment and the presence of riboflavin in the urine.
Hawkins et al. (2008)	107	USA	Outpatient	SUD	8 weeks	Attended one group during the week.
Brown et al. (2011)	251	USA	Both	Dual diagnosis	12 months	Attending at least three treatment sessions.
Gaudiano et al. (2011)	4	USA	Inpatient	Dual diagnosis	6 months	Medication adherence and appointments adherence. Metric. MCQ (medication compliance questionnaire). Criteria for full adherence (100%), partial adherence (< 75% or ≥ 75%), and complete nonadherence (0%).
Schaefer et al. (2011)	28	USA	Both	SUD	6 months	Metric. Number of consecutive months following discharge that the patient had two or more SUD or psychiatric continuing care clinic visits or inpatient admissions.
Smelson et al. (2012)	102	USA	Hospital	Dual diagnosis	6 months	(1) Attendance at an outpatient session within 14 days of hospital discharge; (2) attendance at an outpatient session at the end of the 8-week intervention period.
Krupitsky et al. (2013)	301	Russian	Outpatient	ODD	Weekly	Adherence to naltrexone: The remaining capsules at each appointment and the presence of riboflavin in the urine.
Bowen et al. (2014)	286	USA	Both	SUD	12 months	Metric. Weekly supervision of audio-recorded sessions by 2 raters. Point adherence with different scales. No established criteria.
Walley et al. (2015)	215	USA	Both	Dual diagnosis	6 months	2 addiction treatment clinical visits on any day within the first 14 days and 2 additional visits within the next 30 days.
Bensley et al. (2016)	302.406	USA	Both	SUD	1 year	Engagement in first month: Had three or more visits within 30 days. Engagement at 3 months: Two or more visits in each month. Other measures: HEIDIS engagement: Having two or more additional visits within 30 days of initiation.
Morandi et al. (2017)	30	Switzerland	Outpatient	SUD	12 months	Metric. Assessed by case managers with two items rating appointment and medication adherence on a scale ranging from 0 (no adherence) to 10 (total adherence). Two other treatment adherence items assessing psychotropic medication compliance and appointment attendance were incorporated.
Northrup et al. (2017)	29	USA	Inpatient	SUD	9 months	Metric. attendance at 7 planned visits.
Englander et al. (2019)	208	USA	Inpatient	SUD	1 year	HEIDIS definition: Two or more of the following occurring on at least two separate days within 34 days of discharge: (1) a filled prescription for medication treatment; (2) a procedure code for SUD treatment; (3) a clinic visit with and SUD code.

(Continues)

TABLE 6 | (Continued)

Adherence/Engagement						
Author/Year	<i>n</i>	Country	Type of intervention	Population	Follow-up period	Criteria
Kraemer et al. (2019)	164,224	USA	Both	SUD	30 days	Continued prescription or methadone clinic visits at 30 days after the first episode.
Durand et al. (2021)	2035	Ireland	Outpatient (MMT)	OUD	5 years	Metric. Proportion of methadone doses dispensed (not missed) over the previous 30 days.
Elison-Davies et al. (2021)	1830	UK	Outpatient	CUD	12 months	Three metrics: (i) Completed a follow-up assessment; (ii) the number of BCTs completed (out of 12); (iii) the total number of BCTs completed (each could be completed more than once).
Daigre et al. (2021)	404	Spain	Outpatient	Dual diagnosis	6 months	Metric. As the time in months until the dropout.
Fine et al. (2021)	1467	USA	Outpatient	OUD	6 months	Having positive buprenorphine positive toxicologic screen.
Luderer et al. (2022)	206	USA	Outpatient	SUD	—	Attending the scheduled interviews by the staff.
Wakeman et al. (2022)	1857	USA	Outpatient	SUD	75 days	Completion of 2 or more visits during an episode of care.
Gainer et al. (2023)	544	USA	Both	SUD	2 years	Initiating treatment and completing at least two treatment visits within 34 days of the initiation visit.
Peterkin et al. (2023)	151	USA	Outpatient	SUD	30 days	Metric. The mean difference of completed in-person outpatient visits, telemedicine outpatient visits, and telephone encounters 30 days and after receiving the prepaid phone.

Abbreviations: BCT: behavioural change techniques; HEIDIS: healthcare effectiveness data and information set; MCQ: medication compliance questionnaire; SUD: substance use disorders; TAF: treatment assessment form.

Considering these methodological issues, Moe et al. (2022) point to different recommendations that should be considered: First, the patient's objective (abstinence or reduction in consumption) should be assessed; second, it is important to include the difference between 'slip' and 'relapse' and finally, the use of self-report measures. As noted by Perestelo-Perez et al. (2011), a shared decision with the patient—in terms of whether pursue abstinence or just a reduction of substance use—may be a promising strategy for the achievement of treatment goals. In that sense, measures should align with it: for harm reduction or well-being, assess consumption reduction, whereas for full recovery, abstinence should be the target (Van Den Brink et al. 2006). Second, regarding the difference between 'slip' and 'relapse', it is important to make this distinction to identify patients who have experienced a slip in the recovery process—which is considered a normal part of recovery (Moe et al. 2022)—versus those who have returned to previous patterns of use. Finally, self-report measures are widely, valid and reliable used to assess substance use. Additionally, bias measures should be included and, to avoid memory bias, some diary measures should be considered. Regarding the time of assessment, researchers should continue investigations to achieve a consensus.

Finally, it is important to assess not only drug use but also other aspects, as recovery from addiction cannot be reduced to a measure of use (Martinelli et al. 2023).

4.2 | Related to Treatment (Readmission, Dropout, Retention, and Adherence/Engagement)

Our review found that *Readmission* is primarily studied within hospital settings and is commonly used to assess healthcare quality (Durbin et al. 2007; Rumball-Smith and Hider 2009). However, several methodological issues were noted. First, our review, in line with Rumball-Smith and Hider (2009), shows that there is a lack of consensus in the operational criteria. While most of them referred to it as being hospitalised again, some included substance-related hospitalisation, whereas others counted all types of readmissions, which could influence reported rates (Fischer et al. 2014). For example, including all types of readmissions could lead to an overestimation of the readmission rate.

The 'time window' for measuring readmission also varied from 30 days to 9 years. Short windows may miss related readmissions (Fischer et al. 2014; Rumball-Smith and Hider 2009). Most of them used an electronic record, however, the absence of data on readmission to different hospitals may lead to under-reporting, as patients readmitted to other facilities may not be monitored (Fischer et al. 2014). In this sense, the use of general electronic health records with an anonymous patient code could lead to the researcher being informed of a patient's readmissions in different settings.

TABLE 7 | Variable-quality of life.

Author (date)	n	Location	Type of intervention	Population	When it is measure?	Metric	Criteria	Mean baseline	Mean follow-up
Daley et al. (2005)	439	USA	Both	Women SUD	Base and 6 months	QOLI	Improvement in the QOLI mean.	0.68	0.87
Kertesz et al. (2005)	274	—	Inpatient	SUD	Base and at least 2 out of 4 follow-ups (6,12,18,24 months)	SF-36 HRQOL (MCS and PCS) QOLR- scale.	Differences of 5 points in the areas. Increase in the mean.	MCS: [27.7–29.8] PCS: [45.6–49.4]	MCS: [33.4–43.7] PCS: -
Martin et al. (2008)	75	—	Inpatient	SUD	Base, and discharge.	QOLR- scale.	Increase in the mean.	—	—
Brown et al. (2011)	251	USA	Both	Dual diagnosis	Base, 6 months, and 12 months	BQOL	—	—	—
Pyne et al. (2011)	495	USA	Inpatient	SUD	Baseline and 6 months	QWB-SA and SF-6D.	A change in the subscales scores.	QWB-SA: 0.60	QWB-SA: 0.63
Muller and Clausen (2015)	35	Norway	Inpatient	SUD	Base and 10 weeks	WHOQOL-BREF	—	SF-6D: 0.71	SF-6D: 0.76
Pasareanu et al. (2015)	202	Norway	Inpatient	SUD	Base and at 6 months	QoL-5.	≥ 0.2 score improvement.	59% low scores.	Improvements in 26% > 0.20
Cruz-Feliciano et al. (2017)	136	Puerto Rico	Outpatient	Dual diagnosis	Baseline and at 6 months	WHOQOL-Bref (Spanish version).	Statistically significant increase in the score.	[55.8–59.9]	[60.6–65.8]
Marceau et al. (2017)	50	Australia	Inpatient	SUD	One week before intake and at 4 weeks	Q-LES-Q-SF	Increase in the total score.	[0.55–0.62]	[0.61–0.71]
O'Sullivan et al. (2017)	76	USA	Outpatient	SUD	3 months	Flourishing scale (Diener et al. 2010)	Statistically significant difference between groups.	—	—
Aldemir et al. (2018)	88	Turkey	Outpatient	SUD	Base and at 6 weeks	WHOQOL-Bref.	Statistically significant changes in subscales.	—	—
Poliarsky et al. (2018)	60	Argentina	Outpatient	SUD	—	Q-LES-Q-SF	—	—	—
Flores-García et al. (2019)	64	Norway	Outpatient	SUD	Base and 12 months	WHOQOL-BREF	Statistically significant changes in the score.	[11.2–13.2]	[11.2–13.2]
Jahani et al. (2019)	186	Iran	Outpatient (MMT)	SUD	1 month and 12 months	Health-related QoL.	Statistically significant changes.	181.37	189.67
Abdollahi and Haghayegh (2020)	60	USA	Outpatient	SUD	Base and 3 months	WHOQOL	Statistically significant changes in the mean score.	[4.38–15.92]	[4.38–15.92]

(Continues)

TABLE 7 | (Continued)

Author (date)	n	Location	Type of intervention	Population	When it is measure?	Metric	Criteria	Mean baseline	Mean follow-up
Bourion-Bédès et al. (2020)	175	France	Outpatient	AUD/ODUD	Base	Q-LES-Q-SF.	—	52.9	—
Zhu et al. (2020)	100	China	Outpatient	ODUD	Base and 6 months	QOL-DA.	Statistically significant differences between groups.	[32.36–47.86]	[27.41–48.23]
Lien et al. (2021)	128	Norway	—	Women SUD	Base and 6 months.	QoL-5.	—	53/63	63/70
Craft et al. (2023)	216	USA	Outpatient (buprenorphine)	ODUD	Base, 6, 12 and 24 months	WHOQOL-BREF.	Statistically significant difference between groups	—	—

Abbreviations: BQOL: brief quality of life interview; Q-LES-Q-SF: quality of life enjoyment and satisfaction questionnaire short form; QOL-5: quality of life- 5; QOL-DA: quality of life dementia assessment. QOLI: quality of life inventory; QWB-SA: quality of well-being self-administered scale. SF-36: short-form six dimension. SF-36: 36-item short form health survey; WHOQOL: world health organization quality of life.

There is also debate about whether readmission is a good indicator of the effectiveness of treatment. Repeated readmissions cause a high burden on healthcare systems and patients (Jencks et al. 2009). However, some authors have pointed out that from a clinician's point of view, early readmission, especially for patients with SUDs, could help prevent further deterioration of the medical and social situation (Böckmann et al. 2019). In such cases, readmission may reflect patients proactively seeking support and anticipating a potential relapse. Future research should explore the relationships between readmission and different treatment aspects, such as relapse and QoL. Moreover, to standardise the measure, a new admission should only be considered a new substance-related readmissions.

Dropout was a consistent measure across studies. The criteria were generally defined as 'stopping treatment before clinical recommendation'. Normally, establishing a dichotomised measure. However, there are some inconsistencies, with studies including 'being expelled from inpatient services' as dropping out (Padyab et al. 2015; Tull et al. 2013), and some have established different cutoff points, for example 'no longer in care at the end of a 3-month' (Bourion-Bédès et al. 2020).

Dropout is sometimes seen as synonymous with treatment failure, even when clients may have reasonable positive outcomes. It might be useful to understand how drop-out is used in other health settings, such as when patients leave primary care after feeling better (Walker 2009). Combining drop-out with other aspects could provide a more comprehensive understanding of recovery.

Retention is widely recognised as an indicator of treatment quality (Dennis et al. 2020; Schulte et al. 2010), and it is correlated with many positive long-term outcomes, including mental health improvements and reduced drug use (Basu et al. 2017; Gallefoss et al. 2022; Lynch et al. 2021). Given its predictive value, retention has evolved from a solid predictor to an outcome itself, becoming a primary treatment goal (Gallefoss et al. 2022; Schulte et al. 2010; Walker 2009). Some authors suggest that retention should be studied with session attendance, as it provides more information on the therapeutic process (Pulford et al. 2010; Viera et al. 2020). Only four of the studies included in the review used a combined measure (Galvin et al. 2020; Kraemer et al. 2019; Orocio-Contreras and Nieto-Caraveo 2022; Wakeman et al. 2022).

Adherence is also related to positive post-treatment outcomes, such as QoL (Gainer et al. 2023; Lynch et al. 2021). However, adherence has been inconsistently defined across studies. Most studies in our review used a dichotomised measure (adherence vs. no adherence) which could cause a loss of information and statistical power (Burgette and Paddock 2017; Tueller et al. 2016). However, dichotomised measures make it easier for clinicians to interpret the results and facilitate decision-making (DeCoster et al. 2009).

Determining the appropriate cutoff point for retention and adherence is a challenge. Dacosta-Sánchez et al. (2022) found that a 3-month retention period was the best predictor of treatment discharge, which aligns with Orocio-Contreras and Nieto-Caraveo (2022) findings that 90 days in treatment is

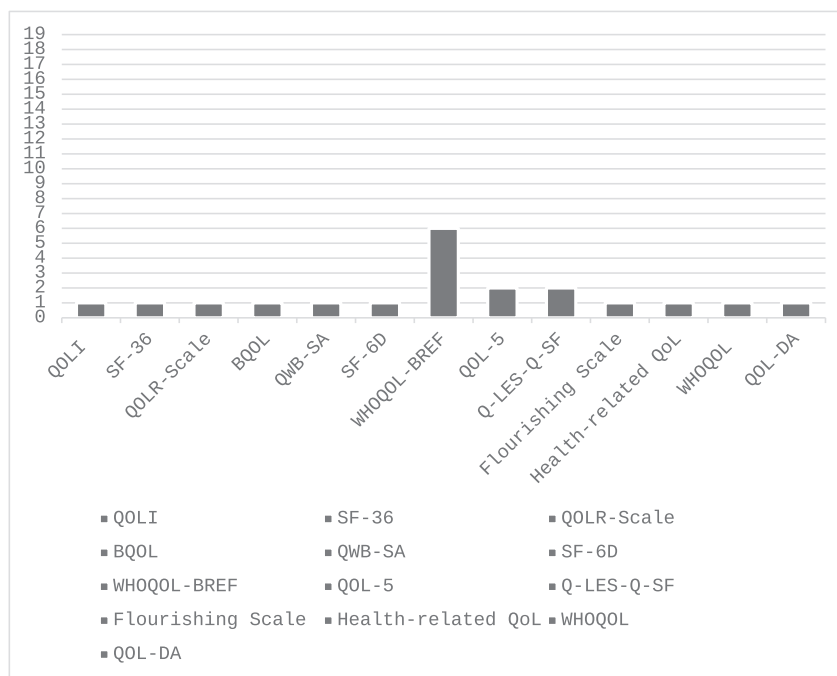


FIGURE 4 | Scales used for quality of life measures.

related to better treatment results. Regarding attendance, Dacosta-Sánchez et al. (2022) reported that the proportion of session attendance was the best predictor of successful discharge without readmission. However, none of the studies in the review used the proportion of session attendance as the definition of engagement.

We recommend using a dichotomised measure of retention (at least 3 months) alongside session attendance proportion (number of attended appointments/number of appointments) as the criteria for this domain. A comprehensive analysis of treatment process, considering factors such as readmissions, dropouts, and retention, along with adherence to the treatment program, will offer a clearer picture of future treatment effectiveness. However, it is important to note that these are indicators of the treatment process and should be evaluated with other domains (e.g., QoL) to determine treatment effectiveness.

4.3 | Quality of Life (QoL)

Incorporating QoL measures into SUD treatment services is increasingly important for reflecting the patient's perspective on their recovery process (Laudet 2011; Kelley and Incze 2023).

However, findings in QoL studies are inconsistent and difficult to interpret due to variations in methodologies, instruments, domains, and populations (Morgan et al. 2004). These findings are in line with our results. However, all of them used self-administered scales, and the most common was the WHOQOL-BREF. The WHOQOL instrument provides a valuable tool for capturing multiple dimensions of QoL (Harper and Power 1998; Wong et al. 2018). The WHOQOL, as well as the short version, has demonstrated robust psychometric properties in the general population, making it a reliable and valid tool (Bratu et al. 2023).

It is also important to use an instrument that assesses different areas, apart from physical domains, as individuals with SUD often experience a decline in general QoL (Birkeland et al. 2018; Kim et al. 2020). In these senses, the WHOQOL emphasises four areas: physical, psychological, and social problems and environmental factors.

In our review, most of the studies included were performed in the last 10 years, demonstrating the recent incorporation of diverse recovery metrics beyond 'abstinence.' These are more focused on the patient's perception of incorporation and satisfaction with the process and well-being.

4.4 | Limitations

This review has certain limitations, particularly the initial selection of a particular set of variables. The selected variables reflect commonly used variables consistently used across studies, thus enabling the comparison and synthesis of information. However, this strategy left out other potentially significant treatment outcomes (e.g., employment, family and social status, overdose) which precluded us from expanding the conclusions of the present study. However, the outcomes included cover three domains that have been identified as the primary focus of treatment efficacy and effectiveness measurement in the extant literature (substance use, QoL and treatment indicators). Moreover, it is important to consider other approaches to obtain a complete view of the evaluation of treatment.

In that sense, some expert consensus has been reached. The most recent study was performed by Karnik et al. (2022), whose aim was to reach a consensus on the evaluation of opioid use disorder (OUD) treatment. After a Delphi consensus study, they proposed the use of five items related to five domains, most of

which are in line with this review's recommendations. First, a 'drug use' item—defined as having two negative screenings within 21 days—was employed. While this measure may be useful for clinicians, we recommend that, from a research perspective, TLFB measures of substance use be included for longitudinal assessments, as they are cost-effective. Second, the duration of treatment was considered the number of continuous days in treatment (not more than 30 days from the last expected day of dosing medication). However, our review focused on all SUDs (except for tobacco) -which are not always treated by medication-, so we proposed the assessment of duration by a dichotomous measure (being in treatment for at least 3 months) and included adherence (by the proportion of appointment attendance). This consensus also includes nonfatal overdose and fatal opioid poisoning to assess the worsening consequences of drug use. Finally, they included an item on patients' global impression of improvement, which could be useful in terms of time and resource costs for clinicians. However, if possible, we encourage the use of a QoL measure for research purposes.

Additionally, other instruments, such as the QoL10 (Muller and Clausen 2015), the InterRAI quality of life survey (H. Luo et al. 2021), and the *Time to Relapse Questionnaire* (Adinoff et al. 2010), have shown strong reliability and validity in predicting variables such as relapse.

Moreover, taking in consideration other limitations, only one author performed screening for inclusion and exclusion criteria, which may have increased the risk of potential selection errors, although all uncertain cases were discussed with two other researchers. Also, the bias in the included studies or the methodologies used were not included as a criterion for the selection.

Notwithstanding these limitations, the present systematic review synthesises the extant literature on seven variables associated with SUD treatments evaluation, highlighting significant inconsistencies in definitions and methodologies and offering recommendations to enhance standardisation.

4.5 | Recommendations

Based on the results of the present review, we recommend incorporating to outcome evaluation relevant metrics and clearly defined criteria for each of the three identified areas: substance use, treatment process, and QoL.

For substance use, we suggest the implementation of a self-report scale (e.g., TLFB or ASI) in combination—when feasible- with a biological measure. A collaborative goal-based approach between patients and clinicians concerning the reduction or cessation of substance use is also recommended. Future research should aim to establish a standardised cut-off point to differentiate between a slip and a relapse and determine an appropriate follow-up time.

For the treatment process, the retention of patients for a minimum of 3 months in treatment, combined with adherence as measured by proportion of attendance, is proposed. These measures provide insight into the patient's engagement with the treatment program.

Finally, as noted by Kelley and Incze (2023), we recommend including a QoL assessment (e.g., WHOQOL-BREF) to assess a general outcome of the patient's perception of recovery or, as proposed by Karnik et al. (2022), at least one item of patient global impression of improvement, particularly in clinical settings where time and resources may be limited.

5 | Conclusions

Establishing standardised measures is vital for improving the consistency, effectiveness, and overall understanding of SUD treatments. To this end, the present review makes specific recommendations that may contribute to paving the way for future consensus-building efforts that will advance the field. This presents an initial step in the process of the standardisation of outcome-related metrics and criteria and can inform the design of future studies.

Author Contributions

Marta Narváez-Camargo: conceptualization, data curation, formal analysis, investigation, methodology, software, supervision, validation, visualization, writing – original draft, writing – review and editing. **Oscar Lozano-Rojas:** conceptualization, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – review and editing. **Cinta Mancheño-Velasco:** conceptualization, investigation, methodology, supervision, validation, writing – review and editing. **Antonio Verdejo-García:** conceptualization, funding acquisition, investigation, methodology, project administration, resources, software, supervision, writing – review and editing.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The authors have nothing to report.

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