Receiving addiction treatment: does drug choice matter?

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Statement of Originality

This report contains no material offered for the award of any other degree or diploma, or material previously published, except where due reference is made in the text.

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Abstract

Substance use has a prolific and wide-ranging adverse effect on people across Australia and the world at large, and the type of substances used vary greatly. To assess the effect of choice of substance on treatment outcome, analyses were performed on archival data from the non-profit treatment organisation DrugARM. The study assessed 1,282 cases of drug treatment, categorising the drugs used as alcohol, amphetamine, cannabis, and other drugs. Client demographic details were collected during initial contact, and the metrics of substance use frequency, severity of substance dependence, psychological and physical health, quality of life, self-esteem, distress, and disability were measured at pre- and post-treatment. Comparisons between pre- and post-treatment measures were performed, as well as chi-square tests on measure associations with drug groups, and ANOVA analysis of the change between tests. Measures were also evaluated for independent success of treatment. It was found that treatment rarely improved self-esteem or reduced a client's disability rating, and that drug of choice had minimal effect on most measures, with the results indicating that the only metrics which significantly differed in treatment outcome between clients were psychological health and severity of dependence, when comparing alcohol and amphetamine users. Otherwise, drug of choice had little effect on treatment. Overall, drug choice has a limited effect on the measurement of treatment outcomes. However, the significant difference in psychological health improvement would suggest that this area could use further advancement. Future research into drug treatment would be best served by focusing on discovering more about the possible connection between drug group and psychological health and investigating the value and impact of self-esteem to drug treatment outcomes.

Keywords: Substance use, treatment, drug choice, treatment outcomes

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Introduction

Substance Use Disorder

Substance use disorder is classified as a mental disorder in the DSM-5, primarily characterised by having an individual's continued and uncontrolled drug use despite negative physical, social, or personal consequences (Ciucă Anghel et al., 2023).

According to the National Study of Mental Health and Wellbeing (Australian Institute of Health and Welfare [AIHW], 2024), 3.3% of Australians between 16 and 85 have had a substance use disorder within the past 12 months, and 19.6% of people have experienced a substance use disorder in their lifetime.

Substance use disorders are highly correlated with both mental health disorders (Kalin, 2020) and poor physical health (Kayvan Ali et al., 2023). The National Mortality Database (AIHW, 2024) found that 1,693 people died from drug-induced deaths in 2022. The non-fatal consequences of drug abuse range from increased risk of chronic disease and poisoning (AIHW, 2024) to much higher rates of injuries requiring medical attention.

Despite this, some estimates suggest that only 11% (Kalin, 2020) to 23.6% (Substance Abuse and Mental Health Services Administration [SAMHSA], 2023) of individuals who would benefit from substance use treatment receive it. Even within that group, relapses and failed treatments where the disorder resists treatment or recurs post-treatment occur at rates of 40% to 60% (McLellan et al., 2000),. 26.9% of American adults who reported having substance use problems in their life did not consider themselves 'recovered' (SAMHSA, 2023).

Substance Addiction Mechanism

Substance addiction is a complex and developing field, but it is widely accepted that the neurotransmitter dopamine (Volkow et al., 2004), colloquially considered the 'happiness'

hormone, is commonly associated with addiction. It has been found that long-term abuse of cocaine can result in the reduction of traditional dopamine transmission in the brain, resulting in a disruption to normal brain function that rewards continued intake of the addictive substance (Volkow et al., 2004).

Similarly, research has shown that there can be a significant neurological impact during the early stages of treatment. Studies by Blaine et al. (2020) indicated disruption in the neurological response patterns of alcoholic patients who had abstained from drinking for treatment. The ability for these patients to properly regulate their stress and alcohol-related responses differed significantly from control data, and the severity of this disruption was reliably predictive of relapse during treatment.

Drug Use and Addiction Careers

Addiction susceptibility is not uniform, and many demographics have been observed to have higher predilections towards substance use disorders than others. People who identify with marginalised gender (AIHW, 2024) or sexual (Kalin, 2020) identities, as well as individuals who identify as Aboriginal or Torres Strait Islanders or are otherwise culturally diverse (AIHW, 2024) have been identified as having higher proportions of substance use disorder.

Furthermore, while there is little research on how substance use disorders differ between even broad categories of substance, there are comparisons between substance users in the literature to draw from. Monga et al. (2007) found distinct patterns in data concerning illegal opioid users who also used other drugs, categorising users into three distinct and identifiable classes that contained commonalities in both use pattern and demographic characteristics, such as rates of homelessness or the presence of depression. Further, Simon et al. (2001) found distinctions between methamphetamine and cocaine users, finding that methamphetamine users

tended to distribute their drug usage more evenly throughout the day and at a lower frequency than cocaine users, who tended to take smaller quantities of drug more frequently, with a leaning towards evening use. Sutherland and Willner (1998) even found distinctions in the pattern of drug use in adolescents, finding that abuse of alcohol was highly correlated to the co-abuse of other substances, and even that the preferred type of alcohol was predictive of the rate of co-abuse.

Clinically Significant Change

It is important to define a level of change that can be considered 'clinically significant.' Although it is possible to determine a statistically significant level of change, that does not inherently mean that the level of change was clinically significant, or that the change substantiates the effort of the treatment itself. Kim et al. (2023) found that even among clinicians, determining the clinical significance of a change is highly variable and often inaccurate. For the purposes of psychological treatments, a clinically significant change is a change that should quantifiably bring a client closer towards 'normal functioning' (Jacobson & Truax, 1991). For this purpose, Jacobson and Truax established the concept of a reliable change index (RCI). Although the RCI tends to be more applicable for small-scale data (Zahra, 2010), it is broadly applicable to any degree of statistical analysis.

One metric that needs to be established is the efficacy of treatment outcomes. As with Jacobson and Truax's (1991) definition of a clinically significant change, a successful treatment can be evaluated by whether or not the post-treatment state of a patient has undergone a clinically significant change towards the preferred state, and whether or not that change has resulted in the desired outcome.

For example, a hypothetical client is currently experiencing a level of distress scored at 9, where any score above or equal to 5 is considered clinically concerning. If the RCI for this measure is a score of 2, then a post-treatment score of 6 would be a sign that treatment reliably improved the distress levels of the client. However, the treatment did not reduce the client below the clinically significant level, and thus it could be argued that the treatment was unsuccessful. Although there was an improvement in the client's quality of life, they did not improve to the desired degree.

Further, the inverse of this is the preservation of a positive state. If a client presented at a distress of 3, and post-treatment found their distress to be 5, then this, too, was an unsuccessful treatment. However, if their initial distress was 3, and their post-treatment distress was also 3, the treatment could either be considered to have no effect, which would be true, but it also is arguably a successful treatment, as it did not result in a negative effect. This is a complex metric which must be evaluated on a case-by-case basis, but it is incredibly powerful in the sorting and collation of results.

Type of Substances

Alcohol

Alcohol is a recreational drug that acts as a depressant, meaning it has a sedative effect on the nervous system, and produces effects ranging from impaired vision, lowered inhibitions, increased body heat, and even arrhythmias (Ciucă Anghel et al., 2023) while under the effects of the substance. Furthermore, alcohol is known (Kalin, 2020) to affect the neurological development of foetuses if alcohol is consumed during pregnancy, even when consumed in relatively low quantities.

While the consumption of alcohol is entirely legal in Australia over the age of 18, the use of alcohol beyond recommended guidelines is a serious health concern. Among those over the

age of 14, 31% of people (AIHW, 2024) reported consuming a ‘risky’ quantity of alcohol, which is defined as beyond 10 standard drinks per week or 4 standard drinks in a day (NHMRC, 2020). It is the most common drug that people seek treatment for, accounting for 43% of treatment episodes from 2022-23 (AIHW, 2024).

Methamphetamines

Methamphetamines, and amphetamines at large, are a stimulant, which create sudden and intense states of euphoria and pleasure in users. Physical effects include anything from psychosis to restlessness and impulsive behaviours to hallucinations (Ciucă Anghel et al., 2023), among a litany of other possible effects.

Despite a purportedly low usage rate of 1%, methamphetamines were found to be one of the most common causes of drug-related hospitalisations and deaths (AIHW, 2024), accounting for 24% of the illicit drug use burden of disease and injury (AIHW, 2024). It is also one of the most commonly treated drugs, with 24% of treatment episodes presenting methamphetamines as the principal drug of concern.

The death rate attributed to methamphetamines has been on the rise, doubling from 2009 to 2015. Mortality rates among methamphetamine users is elevated three to six times that of population norms, and is otherwise associated with a wide range of heart-related health concerns (Darke et al., 2017) even when non-fatal.

Cannabis

Cannabis, or marijuana, is the most commonly used illicit drug in Australia from 2022-2023 (AIHW, 2024), with 11.5% of Australians having used it in the past year, 51% of whom used it at least monthly. The global prevalence of cannabis abuse is also high, with anywhere from 2.5% to 19% of adults (Hayley et al., 2017) classifying as dependent. Cannabis has a

motley range of effects that can vary between euphoria and anxiety, disinhibition and obsessions, and can even induce eating disorders (Ciucă Anghel et al., 2023).

The medicinal use of cannabis is a relatively new and controversial topic, but the abuse of the drug remains dangerous, with severe dissociative symptoms and higher rates of suicide attempts being correlated with cannabis abuse (Yücens et al., 2019). Furthermore, there is a relationship between the abuse of cannabis and the additional abuse of other addictive substances (Hayley et al., 2017), as well as between the abuse of cannabis and the presence of mental health disorders (Moore et al., 2021).

Opioids

Opioids are a broad class of drug which include traditional painkillers and more illicit substances such as heroin (AIHW, 2024). Usage in Australia is low, with less than 0.1% of Australians having used heroin in the past 12 months as of 2023 (AIHW, 2024), but opioid use overall is responsible for 32% of the illicit drug use burden of disease and injury.

Opioids are a depressant, similar to alcohol, but have exacerbated addictive properties. The short-term effects of opioids can include euphoria, nausea, itchiness, drowsiness, a reduced experience of pain, and a dry mouth (AIHW, 2024), while the long-term effects can be anything from the development of neurochemical dependencies to weight loss (Ciucă Anghel et al., 2023).

Treatment outcome and drug types

Research on broad substance use treatment outcomes is somewhat limited. Many studies focus primarily on the treatment outcomes of one substance, such as the work done by Coleman-Cowger and Catlin (2013) examining tobacco use among adolescents, or Bonar et al. (2014) studying synthetic cannabinoid use. Similarly, studies are often restricted by demographic, such as with Reingle Gonzalez et al. (2018), who studied the differences in substance use and

substance use treatment by gender among subjects in probation, or Jeffirs et al. (2019) and their work assessing the difference between single and poly-drug use disorders, but solely in veterans with post-traumatic stress disorder. While all of these works have great value in their respective fields, their scope is narrow, and it is difficult to generalise and compare their findings when faced with the numerous drugs substance users can use. Furthermore, both among these studies and studies which try for a broader approach, the assessed variables are often limited, and rarely assess treatment outcomes in greater depth than addiction from the perspective of clinical change.

There are, however, more dimensions to treatment than the presence of addiction, and the road to recovery is often both complex and winding. If addiction were to arise as a response to stress, then an important component of addiction treatment would need to include the alleviation of that stress. As such, it is important to establish how, if at all, currently implemented treatment processes affect such metrics.

Prior research would suggest that the primary factors contributing to an improvement in substance use disorder symptoms are primarily the length of treatment (Anglin et al., 1997), the early implementation of treatments (Coleman-Cowger & Catlin, 2013), and treatment retention (Simpson et al., 1997), but little evidence exists that states what effect — if any — drug group has on client improvement.

Research aim

The aim of this research is to determine if and how drug of choice affects treatment outcome. This will establish which variants of substance abuse disorder should be investigated more thoroughly in the future, and the directions in which further research and treatment development would be most effectively aimed. It will assess this through multiple metrics, and

consider the clinical improvement associated across the matrices of physical and psychological health, quality of life, disability, self-esteem, and psychological distress, in addition to the reduction of substance use. Additionally, this paper will identify some of the constraints of current substance abuse reporting methods and provide recommendations to streamline and improve such methods in future.

To achieve these aims, several research questions were developed:

1) Does treatment reduce drug use to a clinically significant extent?
2) Which aspects of well-being are clinically improved by treatment?
3) Are there differences in treatment outcome between groups taking different substances?

We hypothesise that treatment will reduce drug use by a clinically significant extent, that treatment will improve the psychological and physical health, quality of life, self-esteem and psychological distress experienced by clients, and that there will be significant differences in the degree of improvement across treatment outcomes that can be attributed to drug group.

Method

Participants

The study used archival data from DrugARM Australia, a non-profit organization providing alcohol and other drug counselling services. The participant data provided consists of four phases of data collection:

The *eligibility screening*, or *initial contact* phase, assessed participants on entry requirements. In this phase, participant demographic information such as date of birth, country of birth, preferred language, nationality, gender, drug (and method) of use, and mental health conditions were recorded. Additionally, the ADAPT addiction dimensions were recorded during this phase.

The *initial assessment* (pre-treatment) consisted of measures completed before commencing treatment. This recorded client responses to the SDS, the ATOP, the Kessler-10, the SISE, the WHODAS, and other treatment-relevant questions such as a client's history of overdose and drug use.

The *follow up* (post-treatment), completed at the conclusion of treatment, included all the measures used in both the *eligibility screening* and *initial assessment*, excluding a few miscellaneous details such as date of birth and mental health conditions — items that should not have changed significantly or at all between pre- and post-treatment.

The *discharge information*, data collected upon the discharge of a client from counselling services, included the reason for participant discharge, their date of discharge, their treatment delivery setting, and the main treatment type provided to them via DrugARM.

While the data included 7,343 initial contact records (5,068 unique participants) the number of clients who progressed to initial assessment only numbered 3,981 (2,967 unique

participants) and further dropped to 1,634 (1,184 unique participants) upon reaching the follow up stage, where clients were thus discharged due to completing treatment. However, the discharge information included 7,277 entries, with 5,167 unique participants. Due to this discrepancy, data was only collected from clients who completed all four phases, had minimum two months of treatment time, and were recorded as having completed treatment in the discharge information, reducing the valid treatment cases to 1,282 with 967 unique participants. This results in 315 of the included cases being additional cases of treatment for the same individual that continued after the conclusion of the first case. The final sample size of the study is 1,282.

The University of Southern Queensland Human Research Ethics Committee approved the analysis of archival data and all procedures used in this study.

Measures

Participant Information

DrugARM collected client information in keeping with the Alcohol and Other Drug Treatment Services National Minimum Data Set (AODTS NMDS). This includes information such as a client's gender, date of birth, country of birth, indigenous status, principal drug of concern, and method of use. Age was calculated from date of birth and phase completion date, and the age at initial contact was used in this study.

Measurement of Success in Treatment

Developing measures to quantify whether a treatment is 'successful' is complex and highly dependent on the treatment and the aims of the researcher. However, for the purposes of this study, a 'successful' treatment outcome will follow the Clinical Outcomes and Quality Indicators (COQI) guidelines described by Lintzeris and Holmes (2021). In this study, a successful treatment manifests in at least one of three ways: a reliable, clinically significant

change that improves the metric tested beyond an otherwise defined clinical level; a reliable, clinically significant change where the value of the change is positive and beneficial to the client; or the lack of deterioration in a score that is above a certain clinical threshold. In short, it is an outcome that is both desirable and reliable for any given measure.

In this vein, this paper will be using 'success,' 'no success' or 'unsuccessful,' and 'no change' to describe the results of many different tests, all of which are measured on their own merits. In some cases, 'no success' and 'no change' can be viewed as equivalent, as neither is 'successful,' but the delineation thereof is highly dependent on individual aims and the measure involved.

For example, in the measurement of self-esteem, a minimum change of two is required for a score to be reliable. Therefore, any change in score that is less than two (positive or negative) can be considered 'no change.' A score of at least +2 would be considered a 'success,' and a score of -2 would be considered a case with 'no success,' or 'unsuccessful.'

However, in the case of clinical dependence, 'success' can be measured by the reduction of a dependent user below the dependent threshold, 'no success' can be measured by a dependent user remaining dependent or a non-dependent user become dependent, and 'no change' can be measured by a non-dependent user remaining non-dependent.

Severity of Dependence Scale

The Severity of Dependence Scale (SDS) was developed to provide a short assessment piece (Gossop et al., 1995) which could accurately determine the level to which any drug-using individual was 'dependent' on their drug of choice. It is designed to be wholly non-specific and broadly applicable across medical fields for a variety of drugs, regardless of the method of intake or its classification.

The SDS is a five-item Likert scale scored from 0–3, with total scores ranging from 0–15, where a higher score indicates a higher degree of dependence. The psychometric properties of the scale are sound, with the Cronbach α scores of all items between 0.8 and 0.9 (Gossop et al., 1995). Further studies have established that the SDS can be broken down for individual drugs (Lawrinson et al., 2007) to establish cut-off points, where a score above a certain level will indicate a clinically significant level of dependence. These can be found in Table 5 (Bruno et al., 2009; Castillo et al., 2010; Cuevas et al., 2000; Gossop et al., 1995; Grande et al., 2009; Kaye & Darke, 2002; Lawrinson et al., 2007; Swift et al., 1998; Topp & Mattick, 1997).

A ‘successful’ treatment outcome in this measure is defined as the decrease of a score below the clinically significant threshold for the drug being used. An instance of ‘no change’ is where the client did not meet the threshold for clinical dependence to begin with, and ‘no success’ is where a client became or remained dependent upon follow-up.

Australian Treatment Outcomes Profile (ATOP)

The Australian Treatment Outcomes Profile (ATOP) is a 22-item assessment which records the substance use rates of various substances and screens for general health and wellbeing over a 4-week period (Lintzeris & Black, 2020). It can be used to identify not only the substance(s) being used by an individual, but can also measure their risks of overdose, homelessness, experiencing domestic violence, child neglect, and psychological/physical health problems. The ATOP is validated and reliable (Deacon et al., 2021).

Substance use was divided between the discrete categories of alcohol, amphetamine, benzodiazepine, cannabis, heroin, nicotine, other opioids, and other substances. Quantity of use was recorded per user per drug, with measurements varying greatly between individuals (i.e. alcohol could be reported in standard drinks or bottles/cans, while cannabis could be reported in

joints, grams, pipes, etc.). Frequency of use was a continuous variable recorded as the number of days in the past month where any amount of the substance had been used. Health and well-being over the previous 28-day-period was measured with multiple item sets; items 1–2 assessed work/education conditions, items 3–4 assessed housing, item 5 dependents, item 6 arrests, items 7–8 experience of violence, items 9–10 psychological/physical health, and item 11 quality of life.

The ATOP has also been assessed as a measure of clinically meaningful change in substance use across ATOP tests (Deacon et al., 2023). This assessment allows the ATOP to be used as a measure of treatment outcome, where a reduction in substance use of 30% (min. 4 days) can be evaluated as clinically significant, and where a change of 2+ points in the psychological health, physical health, or quality of life (PPQ) scores is significant. While it does not present a measurement of addiction severity or dependence, it does measure the effectiveness of treatment.

The measurement of a successful treatment relies on the guidance provided by the ATOP Manual (Lintzeris & Holmes, 2021), which posits two 'brackets' in which clients can fit for each metric. For drug use, this is 'low' (≤12) and 'high' (>12); for PPQ values, this is 'no clinical concern' (>5) or 'clinical concern' (≤5). The success of a treatment outcome is determined by the bracket a client fits into and by the clinical significance of their change, and can be observed in Table 1, reproduced from the work of Lintzeris and Holmes (2021).

Table 1. *Metrics for Successful Treatment of ATOP Variables*

Frequency of substance use at first measurement	Relative change in frequency of substance use in previous 28 days at second measurement	Change category	Treatment Outcome
Low (≤12 days in previous 28)	Increased by ≥4 days use compared to first measurement	Significant increase	Unsuccessful
	Reduced by ≥4 days use compared to first measurement	Significant decrease	Successful

	Increase or decrease of <4 days use compared to first measurement	No significant change	Successful
	No change from zero use	Maintained no use	Successful
High (>12 days in previous 28)	≥30% increase in days use compared to first measurement	Significant increase	Unsuccessful
	≥30% decrease in days use compared to first measurement	Significant decrease	Successful
	<30% increase or decrease in days use compared to first measurement	No significant change	Unsuccessful
Rating of PPQ variables at measurement A	Relative change in rating of PPQ variables at second measurement	Change category	Treatment Outcome
Clinical concern (score of ≤5 on 0-10 scale)	Score increase of ≥2 from score at first measurement	Significant increase	Successful
	Score decrease of ≥2 from score at first measurement	Significant decrease	Unsuccessful
	Increase or decrease of <2 from score at first measurement	No significant change	Unsuccessful
No clinical concern (score of > 5 on 0-10 scale)	Score increase of ≥2 from score at first measurement	Significant increase	Successful
	Score decrease of ≥2 from score at first measurement	Significant decrease	Unsuccessful
	Increase or decrease of <2 from score at first measurement	No significant change	Successful

Note. PPQ stands for Psychological, Physical and Quality of Life, referring to their measure as health indicators in the ATOP.

Addiction Dimensions for Assessment and Personalised Treatment (ADAPT)

The Addiction Dimensions for Assessment and Personalised Treatment (ADAPT) is used to assess addiction severity, problem complexity, and recovery strength (Marsden et al., 2014). Each of these variables can be used to identify the potential points to focus on during treatment and can be utilized by counsellors to improve and personalize the treatment process. Each variable is scored by summing the questions related to that metric, where severity is assessed with items 1–3, complexity is measured by items 4–10, and strength by items 11–14. The

ADAPT has been found reliable, with Spearman's *k* between 0.40 and 0.63 for all items (Marsden et al., 2014).

The World Health Organization Disability Assessment Schedule (WHODAS)

The World Health Organization Disability Assessment Schedule (WHODAS) 2.0 is a standardized measure that provides a metric to determine the degree to which a person can be considered 'disabled' (*Measuring Health and Disability: Manual for WHO Disability Assessment Schedule (WHODAS 2.0)*, 2010). It measures six primary domains: 'Cognition,' 'mobility,' 'self-care,' 'getting along,' 'life activities,' and 'participation' over the past month, the sum of which can be calculated into a whole value from 0–100%, where 0% has no disability present and 100% has full disability.

Clinically significant change in the WHODAS is defined as a change in the total score of at least 10% (Higgins et al., 2021). For example, a change from 30% to 40% would be clinically significant. Higgins et al. (2021) also found the Cronbach α coefficient of the scale to be 0.91 and thus determined it reliable.

A 'successful' treatment outcome in this measure is the reduction of the WHODAS score by at least 10%, with 'no success' being an increase of 10% or more. Scores between these two can be considered to have 'no change.'

The Kessler-10

The Kessler Psychological Distress Scale (K-10, or Kessler-10) is a simple measure that can be used to screen for serious mental illness, by measuring psychological distress in an individual through a 10-question set. The higher an individual scores, the higher their likelihood of having a serious mental disorder is (Kessler et al., 2003), with scores over 20 likely to have some mental illness present and scores over 30 likely to have a severe mental illness present

(Andrews & Slade, 2001). The K-10 scored a Cronbach α reliability score of .93 (Kessler et al., 2003).

A clinically significant change in the K-10 can be measured by the change in score, where a score being reduced below a total of 23 (Rickwood et al., 2015) can be considered significant. A score that started above 23 and lowered below it can be considered 'successful,' a score that started below 23 and remained below 23 can be considered 'no change,' and a score that ended above 23 can be considered 'no success.'

Robin's Single-Item Self-Esteem Scale

Robin's Single-Item Self-Esteem (SISE) is a simple, yet effective measure of a client's general self-esteem. It is composed of the single statement "I have high self-esteem" with a Likert scale from 1 ("not very true of me") to 7 ("very true of me"), with higher scores indicating higher self-esteem. It has been found to be reliable (Robins et al., 2001) when evaluated against other measures of self-esteem, and scores a .75 using the Heise procedure to test for reliability, the applicable procedure for a single-item scale.

A metric for clinically significant change in the SISE can be measured using a formula based on Jacobson and Truax (1991) and refined by Zahra (2010), which determines the RCI to be a change greater than 2. Therefore, 'success' is an improvement in score of at least two, 'no success' is a reduction of at least two, and 'no change' is any other value.

Procedure and Data Cleaning

Microsoft Excel was used for most of the data cleaning.

The form the data took was four separate Excel spreadsheets, each beginning with a client ID and client code. The four Excel spreadsheets were the Eligibility Screening or Initial Contact data, the Initial Assessment data, the Follow Up data, and the Discharge Information

data. Although information across all four were related to one another and could be matched, repeat entries by a client ID were not separated, and a significant component of data cleaning was matching records to one another when a client had undertaken multiple distinct treatments.

The data was first narrowed down by selecting only client codes who were listed as having completed treatment according to their discharge information, a list which was then compared across the three other datasheets and filtered for codes which appeared in all four datasets, to only use clients with a full pre-post-treatment dataset.

Each client code was then assigned a unique identifier based on their position chronologically, with .1, .2, .3 appended to the appropriate entry (where the first entry had .1 appended, etc).

Results from the ATOP drug use were stored in Initial Assessment and Follow Up, the data from which was extracted per the principal drug of concern (PDOC) stated in a client's Initial Contact data. In all instances the data were extracted for the PDOC, regardless of its presence/lack thereof or the presence of other substances, even where those other substances appeared to constitute a higher usage rate, as treatment would be directed towards the PDOC.

In instances where it appeared the PDOC was improperly recorded – either by being partially or wholly placed in the other substances category when it belonged in one of the ATOP's discrete categories, the data was read from the appropriate category in lieu of its proper classification and/or combined with other relevant data.

To limit the data, only entries with over two months of treatment, a discharge date between 2019 and 2022, and had both treatment measures were considered. For analysis, data was both broken down as the entire dataset and by the PDOC, where the PDOC was categorised by the broad category of drug it fit within as per the ATOP categories. It was further categorised

into the four categories of amphetamine, cannabis, alcohol, and other drugs, due to the low frequency (2% at highest) of drugs outside those primary three.

Data Analysis

All data analysis was conducted in IBM SPSS Version 29, with a significance value of $p < .05$. Normality checks were not applicable to this data due to the size of the dataset (Mishra et al., 2019). Descriptives and frequencies composed the participant demographic information, and chi-square tests were used to establish the significance of relationships. Paired sample t-tests were used to establish the significance of changes between pre- and post-treatment values both within the entire sample set and within the drug group subcategories of alcohol, amphetamine, cannabis, and other drugs. ANOVA tests and Tukey post-hoc tests tested the relations between drug group and pre-post-treatment values.

Results

Participant's demographic and clinical characteristics

Table 2 shows the demographic characteristics of the sample.

There were a total of 1282 cases in the sample, comprised of 62.9% (n = 806) male subjects, 36.8% (n = 472) female and 0.4% (n = 4) not classified as either. The mean age of subjects was 38.82 (SD = 11.083, range = 16–82) years.

The two major categories of principal drug were alcohol (32.0%, n = 410) and amphetamines (42.8%, n = 549). Cannabis comprised 14% (n = 180) of the sample, and all other drugs were concatenated to fill the remaining 11.2% (n = 143) as none individually exceeded 2.6% (n = 33) of the total subject count.

Table 2. *Sociodemographic Characteristics of Participants at Baseline*

Characteristics	Drug Code									
	Alcohol		Amphetamine		Cannabis		Other Drugs		Full sample	
	n	% or *M*	*n*	% or *M*	*n*	% or *M*	*n*	% or *M*	*n*	% or *M*
Gender										
Male	250	61.0	335	61.0	123	68.3	98	68.5	806	36.8
Female	160	39.0	212	38.6	57	31.7	43	30.1	472	62.8
Another term			2	0.4					2	0.2
Not stated							2	1.4	2	0.2
Country of Birth										
Australia	328	80	488	88.9	164	91.1	116	81.1	1096	85.5
Other	82	20	61	11.1	16	8.9	27	18.9	186	14.5
Age at Test		44		36		34		41		39
Months of Treatment		4		4		4		4		4

Outcome change over time within groups

The treatment outcomes overall can be observed in Table 3, while the mean difference for all treatment outcomes, excluding ATOP Work and ATOP Education, were statistically significant (see Table 4), and improved from pre- to post-treatment.

Table 3. *Treatment Outcomes of Participants*

Characteristics	Drug Code									
	Alcohol		Amphetamine		Cannabis		Other Drugs		Full sample	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
ATOP Clinically Meaningful Change										
Success	267	65.1	473	86.2	121	67.2	129	90.2	990	77.2
No Success	143	34.9	76	13.8	59	32.8	14	9.8	292	22.8
Quality of Life										
No Success	55	13.4	70	12.8	31	17.2	28	19.6	184	14.3
Success	355	86.6	479	87.2	149	82.8	115	80.4	1098	85.7
Physical Health										
No Success	88	21.5	124	22.6	41	22.8	35	24.5	288	22.5
Success	322	78.5	425	77.4	139	77.2	108	75.5	994	77.5
Psychological Health										
No Success	89	21.7	110	20.0	37	20.6	29	20.3	265	20.7
Success	321	78.3	439	80.0	143	79.4	114	79.7	1017	79.3
Dependence Treatment Outcome										
No Change	63	15.4	274	49.9	54	30.0	39	27.3	430	33.5
No Success	233	56.8	151	27.5	79	43.9	77	53.8	540	42.1
Success	114	27.8	124	22.6	47	26.1	27	18.9	312	24.3
Self-Esteem Treatment Outcome										
No Success	4	1.0	10	1.8	4	2.2	6	4.2	24	1.9
Success	50	12.2	74	13.5	17	9.4	23	16.1	164	12.8
No Change	356	86.8	465	84.7	159	88.3	114	79.7	1094	85.3
WHODAS Treatment Outcome										
No Success	36	8.8	62	11.3	23	12.8	19	13.3	140	10.9
Success	74	18.0	106	19.3	32	17.8	36	25.2	248	19.3

Characteristics	Drug Code									
	Alcohol		Amphetamine		Cannabis		Other Drugs		Full sample	
	n	*%*	*n*	%	*n*	%	*n*	%	*n*	%
No Change	300	73.2	381	69.4	125	69.4	88	61.5	894	69.7
Kessler-10 Outcome										
No Success	151	36.8	160	29.1	57	31.7	51	35.7	419	32.7
No Change	142	34.6	250	45.5	74	41.1	50	35.0	516	40.2
Success	117	28.5	139	25.3	49	27.2	42	29.4	347	27.1

Note. WHODAS stands for World Health Organization Disability Assessment Schedule.

Table 4. *Outcome Measures Throughout Treatment*

Treatment Measure	Full Sample						
	Pre-test	Post-test	Paired Tests				
	M	*M*	*M. Dif*	*SD*	t	*p*	Hedge
Severity of Dependence	5.21	3.43	-1.775	4.150	15.32	< .001	4.152
Total Drug Used	8.81	6.39	-2.417	8.598	10.063	< .001	8.603
Kessler-10	23.54	17.92	-5.622	12.358	16.288	< .001	12.365
WHODAS	16.90	14.80	-2.103	11.617	6.481	< .001	11.624
Self-Esteem	3.94	4.73	0.792	1.522	-18.626	< .001	1.523
ATOP Work	4.89	4.71	-0.183	8.179	0.799	0.424	8.184
ATOP Education	0.82	0.70	-0.119	3.470	1.232	0.218	3.472
ATOP QoL	5.77	7.00	1.230	2.308	-19.087	< .001	2.309
ATOP Physical Health	6.53	6.75	0.218	2.176	-3.595	< .001	2.177
ATOP Psychological Health	5.71	6.80	1.094	2.464	-15.903	< .001	2.465

Note. WHODAS and QoL stand for World Health Organization Disability Assessment Schedule and Quality of Life, respectively.

Clinically Meaningful Change

Clinically meaningful change was recorded for 77.2% (n = 990) of the sample, and 57.9% (n = 742) did not have a high enough score on the SDS to be classified as clinically dependent on follow-up.

The highest rate of clinically meaningful change in total drug usage was in other drugs, with 90.2% (n = 129). Amphetamines followed with 86.2% (n = 473), cannabis with 67.2% (n = 121), and finally alcohol with 65.1% (n = 473). This was a decrease in total drug usage of at least 30% (min. 4 days) post-treatment, and a chi-square test found a significant association between drug code and the presence of clinically meaningful change ($\chi^2 = 82.992$, $p < .001$).

However, ANOVA tests (Table 5) found that drug code was generally inconsequential to the reduction of drug use ($p = .070$, $F[3, 1282] = 2.356$, $\eta^2 = .005$) with Tukey post-hoc analyses (located in Table 6 when significant) finding no significant differences between groups.

Psychological distress measured by Kessler-10

The sample had 32.7% (n = 419) unsuccessful treatment outcomes for the K-10, with 40.2% (n = 516) recording no change and 27.1% (347) dropping below the clinically significant marker of 23.

The treatment outcome of the K-10 was notable, with a significant relationship between K-10 outcome and drug ($\chi^2 = 13.987$, $p = .030$). Treatment was only successful for 28.5% (n = 117) of alcohol users, 25.3% (n = 139) of amphetamine, 27.2% (n = 49) of cannabis, and 29.4% (n = 42) of other drugs.

ANOVA testing did not find any significant variance based on drug code for the K-10 reduction.

Self-Esteem

Self-esteem, when measured with an RCI of 2, had 85.3% (n = 1094) of the sample not changing, with only 12.8% (n = 164) improving and a mere 1.9% (n = 24) not improving. There were no significant differences between groups.

WHODAS

There were only 19.3% (n = 248) successful cases where the WHODAS score improved, with 69.7% (n = 894) not changing and 10.9% (n = 140) deteriorating.

Treatment resulted in a reduction to the WHODAS score at a rate of 18.0% (n = 74) for alcohol, 19.3% (n = 106) for amphetamines, 17.8% (n = 32) for cannabis and 25.2% (n = 36) for other drugs, and most frequently had no significant change (73.2%, 69.4%, 69.4% and 61.5%, respectively).

Similarly, ANOVA tests found the variance between drug groups incredibly non-significant.

Table 5. *One-way Analyses of Variance in Treatment Outcomes by Drug Code*

Treatment Measure	Drug Code	Variables				
		M	*SD*	F(3, 1282)	*p*	η^2
SDS Reduction				5.672	< .001	.013
	Alcohol	2.31	4.487			
	Amphetamines	1.24	3.863			
	Cannabis	2.01	3.711			
	Other Drugs	1.00	4.516			
Total Drug Used Reduction				2.356	.070	.005
	Alcohol	3.14	9.786			
	Amphetamines	1.77	6.969			
	Cannabis	3.01	10.553			
	Other Drugs	2.08	7.721			
WHODAS Change*				.258	.856	.001
	Alcohol	2.28	11.01			
	Amphetamines	2.25	11.84			
	Cannabis	1.53	10.65			
	Other Drugs	2.10	13.54			
Kessler 10 Change*				.534	.659	.001
	Alcohol	5.50	12.39			
	Amphetamines	5.84	12.03			
	Cannabis	4.71	12.08			
	Other Drugs	6.28	13.81			
QoL Change				1.202	.308	.003
	Alcohol	1.36	2.19			

Treatment Measure	Drug Code	Variables				
		M	*SD*	F(3, 1282)	*p*	η^2
	Amphetamines	1.24	2.32			
	Cannabis	1.12	2.36			
	Other Drugs	.97	2.52			
Physical Health Change				1.734	.158	.004
	Alcohol	.36	2.20			
	Amphetamines	.06	2.15			
	Cannabis	.33	2.06			
	Other Drugs	.29	2.38			
Psychological Health Change				4.225	.006	.010
	Alcohol	1.34	2.53			
	Amphetamines	.81	2.35			
	Cannabis	1.26	2.44			
	Other Drugs	1.27	2.63			

*Note. *Measure has been reverse-coded. All positive values are improvements. WHODAS and QoL stand for World Health Organization Disability Assessment Schedule and Quality of Life, respectively*

Table 6. *Tukey Post Hoc Analyses of Significant Treatment Outcomes*

Treatment Measure	Drug Code	Post Hoc		
		Alcohol	Amphetamines	Cannabis
SDS Reduction				
	Alcohol	.		
	Amphetamines	1.07*	.	
	Cannabis	.30	-.76	.
	Other Drugs	.31	.76	-.01
Psychological Health				
	Alcohol	.		
	Amphetamines	.52*	.	
	Cannabis	.08	-.44	.
	Other Drugs	.06	.46	-.02

*Note. *p < .05.*

Group comparisons on treatment outcome change

Clinical Dependence

When evaluating the clinical cut-off for dependence, where a follow-up status of 'Dependent' was considered not successful, 56.8% (n = 233) of alcohol users did not have a successful treatment outcome. This was 53.8% (n = 77) for other drugs, 43.9% (n = 79) for cannabis, and 27.5% (n = 151) for amphetamines. The difference was significant ($\chi^2 = 144.981$, $p < .001$).

ANOVA found that drug code was significant to the reduction of dependence ($p = <.001$, $F[3, 1282] = 5.672$, $\eta^2 = .013$) with Tukey post-hoc analyses finding a significant difference between alcohol (M = 2.31, SD = 4.487) and amphetamine (M = 1.24, SD = 3.863) users.

However, there were differences in the rates of initial dependence based on drug code. 79.0% (n = 324) of alcohol users began treatment dependent, compared to 43.9% (n = 241) of amphetamine users and 65.6% (n = 118) of cannabis users.

Psychological Health, Physical Health, and Quality of Life

Psychological and physical health, as well as quality of life, improving post-treatment was uniformly common, with around three-quarters (79.3% [n = 1017], 77.5% [n = 994], and 85.6% [n = 1098]) of all clients having a positive outcome, with no notable differences between drug groups.

Neither physical health nor quality of life had significant variance by drug group when tested with ANOVA, but psychological health was found to be significant ($p = .006$, $F[3, 1282] = 4.225$, $\eta^2 = .010$). Tukey post-hoc analysis found a significant difference between alcohol (M = 1.34, SD = 2.53) and amphetamine (M = .81, SD = 2.35) users.

Demographic Associations

There was an association between gender and drug used ($\chi^2 = 24.807$, $p = .003$), with women composed of 33.9% (n = 160) alcohol, 44.9% (n = 212) amphetamine, 12.1% (n = 57) cannabis and 9.1% (n = 43) other drugs, compared to men's 31.0% (n = 250) alcohol, 41.6% (n = 335) amphetamine, 15.3% (n = 123) cannabis and 12.2% (n = 98) other drugs.

There did not appear to be any association between ADAPT score and drug of choice, but chi-square tests suggested that there was a significant association between drug of choice and age ($\chi^2 = 470.094$, $p < .001$), and between drug and country of birth ($\chi^2 = 21.864$, $p < .001$).

Discussion

The aim of this paper was to establish what, if any, differences there were to be found between the treatment outcomes of different drug types — e.g. alcohol compared with amphetamines. The key research questions in this study were whether drug use was reduced to a clinically significant extent by treatment, which aspects of well-being were clinically improved by treatment, and whether different drug groups produced significantly different results in treatment outcomes.

The current study examines the differences in treatment outcomes between cases of treatment for alcohol, amphetamines, cannabis, and all other drugs, with 1,282 cases in the final sample. However, before data cleaning, there were initially 3,981 pre-treatment datasets and 1,634 post-treatment datasets, demonstrating that only 32.2% of cases ended up in the final sample, and only 41% of cases made it to post-treatment.

Amphetamine users were the most prolific in the dataset, composing 42.8% (n = 549) of the sample. This is inconsistent with the reported rates of national amphetamine usage (*National Drug Strategy Household Survey 2022–2023*, 2024), but are likely representative not of traditional usage rates but purely of the rates at which amphetamine users seek treatment, which appears to be disproportionately high compared to other substance users.

Across all groups, clinically meaningful change (i.e. a reduction in substance use of 30% from pre- to post-treatment) was observed (77.2%) across all substances, with amphetamine users having the highest rate (86.2%) of meaningful change. Further, 24.3% of cases resulted in the clinical dependence of the individual dropping below the critical level.

In terms of improvements to health criterion, self-esteem, and the Disability Assessment Schedule were minimally impacted by treatment. However, 77.5%, 79.3% and 85.6% of cases

had improvements to their physical health, psychological health, and quality of life (respectively), suggesting that treatment is efficacious in these departments but does not have any significant result on self-esteem or disability reduction.

It was hypothesised that treatment outcomes would differ significantly between drug groups. While the models for addiction and addictive behaviour are contiguous across drug groups, the differences in presentation and effect between alcohol, amphetamine, and cannabis are significant, to the extent that attempting comparison between the groups can sometimes seem contradictory.

Further, the historical presence of groups such as Alcoholics Anonymous seems to suggest some intrinsic intra-drug quality to recovery, where recovery ought to be linked to the substance being used and the circumstances around it. While Alcoholics Anonymous and similar groups have been found to be reasonably successful (Kelly et al., 2020), these groups are — as the name would imply — rather insular.

Despite this context, however, the data suggests that the treatment outcomes do not differ, broadly, between different substances, and that the systems used by DrugARM are improving the well-being of clients across the board. There are some significant differences between treatments — for example, the rate of clinical improvement in drug use between alcohol and amphetamine users was significantly different — but most treatment outcomes are consistent regardless of drug type. Significant differences in improvement were only observed at the solely statistical level when comparing alcohol and amphetamine users, and only in severity of dependence and in psychological health outcomes.

The suggestion implicit in these findings is that treatment is effective at improving the well-being of people with substance use disorders. Treatment has significant variance in efficacy

of drug reduction based on the drug being used, but the clinical effect of treatment on the client is consistent and significant regardless of drug or substance quantity. To put it plainly, treatment, across the board, improves many aspects of client life.

Despite this, however, the aspects of self-esteem and disability are not significantly improved by treatment. Disability measure not improving is reasonable and expected, as many aspects of the questionnaire fall outside the scope of pure drug use treatment (including questions about ‘walking a long distance’ and ‘taking care of household responsibilities’), and thus often being irrelevant to the matter of drug use.

Self-esteem is an interesting metric to evaluate, as the majority of cases simply did not have any significant change, suggesting that treatment does very little to the self-image of people with drug use disorders.

Further, the sole areas of genuine significance were in the rates of clinical improvement in drug dependence between alcohol and amphetamine users, and the rates of psychological improvement. Psychological improvement was broadly effective, with 78.3% of alcohol users and 80.0% of amphetamine users improving their psychological health over the course of treatment, and with no significant difference existing in the success measure, it is unlikely that this significance holds much weight. The minutiae of psychological improvement may differ, but the rates of success do not.

However, the same cannot be said for clinical improvement. Where 27.5% of amphetamine users did not have a successful treatment outcome, it was 56.8% of alcohol users that had the same result. With the chi-square being significant ($\chi^2 = 144.981$, $p < .001$), and ANOVA finding the mean reduction of dependence also significant, there is absolutely a connection between the rate of clinical improvement and drug group.

However, the connection is not quite as clear as it would seem. It should be noted that, where 15.4% of alcohol users had ‘no change’ recorded, 49.9% — nearly half — of amphetamine users also recorded ‘no change.’ This aligns with only 21.0% of alcohol users being initially non-dependent compared with amphetamine’s 56.1%. To extend from that, the rates of success were quite similar, with 27.8% of alcohol users and 22.6% of amphetamine users no longer being dependent upon follow-up.

This would suggest that amphetamine users are much more likely to go to treatment at an ‘earlier’ stage of drug use than alcohol users, whereas alcohol users would much more often seek treatment when their alcohol use has gotten out of control, likely due to amphetamines being an illicit substance and alcohol being an encouraged societal norm.

The connection can then be drawn not between drug group and treatment, as the data would suggest, but between the success of treatment and how early it occurs in the addiction cycle. This is heavily supported by existing research, which suggests that treatment is most effective when implemented early on (Coleman-Cowger & Catlin, 2013), as client resistance to treatment has been observed to increase over time, likely as the client gets more and more adjusted to taking the drug frequently.

Future Research

Areas of future research stemming from this work are limited, but areas which should be investigated further are the effect of drug treatment on self-esteem and disability, as well as the effects of drug on clinical recovery.

Limitations

There are numerous limitations with the dataset and this research, and the validity of these results can only be considered with these in mind.

First and foremost, the longitudinal value of these results is questionable at best. As the post-treatment results were all immediately at the end of treatment, and there are no follow-up results beyond that, there is no way of accounting for relapses or the potential of 'good behaviour' persisting only during active treatment. It is entirely possible — however unlikely — for every single case of improvement in this sample set to have returned to their initial rates of drug use after treatment concluded.

Secondly, this reading of the data did not, due to complexity restraints, pay great mind to the degree of change between pre/post measures beyond the presence of clinically significant change. A value of 28 pre-test reducing to 14 is clinically significant, and was coded as such, but was coded the same as 28 reducing to 11, 16 reducing to 7 or 4 reducing to 0. Further study would benefit from measuring the degree of change in cases of significant change, but an appropriate metric for comparison would need to be used.

Further, the data only stretched to the principal drug of concern, and did not factor in comorbid usage, either in reduction or demographic.

Future Considerations

It should be noted that there is an obvious discrepancy between the treatment cases and the presence of unique IDs. An alternate line of research for this study could have attended to the treatment outcomes per client ID, rather than treatment session, and such a study would have merit. However, for the purposes of this study, the data was assessed as if all treatment cases were unique individuals, to more effectively evaluate the program being offered by DrugARM, and to simplify the statistical analysis required. A study that analysed participants via a multiple-instance repeated measures design, or measured the efficacy of treatment from the first treatment

to the final treatment could be worth conducting but would be ill-advised with current data collection methods.

Part of the rationale for not attempting this kind of study in the first place was due to the inconsistencies within the data itself. As previously stated, there were 5,068 unique participants in the first phase of data collection, which dropped to 2,967 in the second and 1,184 in the third, but there were 5,167 unique participants recorded in the final phase. Properly recording longitudinal data in this fashion would have required much more complex data collation and cleaning that lies outside of the scope of this paper. Even when reducing the final phase to only including participants who were discharged due to the full completion of treatment, there were still 1,794 participants, a number which is distinctly unequal to any other phase of data collection. While this can be managed in the process of data cleaning, to some extent, it is abundantly clear that the data storage is somewhat flawed in its current implementation.

The simplest way to minimise this issue would be to include a treatment round affix with any identifying codes already present, as was performed in the data cleaning of this study. Appending a simple .1 to the first full treatment case (from initial contact through to discharge) and shifting to .2 in future treatment would greatly improve the legibility of current data.

Additionally, several aspects of the treatment could be massively improved with a more automated computer program handling much of the data entry. Many entries were improperly coded, where a drug that fell under the amphetamine category was coded in ‘other,’ almost always due to the term being used for the drug being a colloquial one, such as ‘speed.’ A program capable of reading the drug name entered and matching it against a database would do wonders for limiting human error and would simplify the process of treatment overall.

Conclusion

Drug use treatment is broadly effective across many drug types, and drug of choice has little impact on the effectiveness of treatment in ameliorating the living conditions of clients. Treatment is very consistently successful across the board at improving many aspects of a client's life, including decreasing substance use, even when it does not remove or reduce a client's dependence or wholly remove their use of the drug. Our approach to drug use treatment should not depend on drug choice.

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Appendix A

Table 7. *Threshold for Clinical Dependence of Drugs in Dataset*

Listed Drug of Concern	Threshold for Dependence	ABS Standard Classification Code	Classification
Alcohol	3	2101	Alcohol
Alprazolam (kalma, xanax)	7	2401	Other Drugs
Amphetamine	5	3101	Amphetamine
Anabolic Androgenic Steroids, n.e.c.	N/A	4199	Other Drugs
Benzodiazepines	7	2400	Other Drugs
Buprenorphine	5	1201	Other Drugs
Cannabinoids	3	7101	Cannabis
Cannabis	3	7199	Cannabis
Cocaine	3	3903	Other Drugs
Codeine	5	1101	Other Drugs
Dexamphetamine	5	3102	Amphetamine
Diazepam (valium, anterex, ducene)	7	2403	Other Drugs
Gamma-hydroxybutyrate	N/A	2501	Other Drugs
Heroin	5	1202	Other Drugs
Ketamine	N/A	2202	Other Drugs
LSD	N/A	3504	Other Drugs
MDA	5	3403	Amphetamine
MDMA (Ecstasy)	4	3405	Amphetamine
Methadone	N/A	1305	Other Drugs
Methamphetamine	5	3103	Amphetamine
Methylamphetamine	5	3103	Amphetamine
Morphine	N/A	1102	Other Drugs
Nicotine	N/A	3906	Other Drugs
Opioid analgesic	5	1100	Other Drugs
Opioid Antagonists, n.e.c.	5	9299	Other Drugs
Other Drugs of Concern	N/A	9000	Other Drugs
Oxandrolone	N/A	4108	Other Drugs
Oxycodone	5	1203	Other Drugs
Pain killers	5	1000	Other Drugs
Panadeine Forte	5	1101	Other Drugs
Phernergan	N/A	2905	Other Drugs
Seroquel	N/A	5605	Other Drugs
Speed	5	3403	Amphetamine
Temazepam (normison, temaze, euhypnos)	7	2408	Other Drugs
Testosterone	N/A	4112	Other Drugs
Tramadol	N/A	1307	Other Drugs
Yandi	3	7199	Cannabis

Note. Missing values do not imply a lack of any potential dependence threshold – rather, no existing dependence threshold was known to the researcher at the time of publication.

(Bruno et al., 2009; Castillo et al., 2010; Cuevas et al., 2000; Gossop et al., 1995; Grande et al., 2009; Kaye & Darke, 2002; Lawrinson et al., 2007; Swift et al., 1998; Topp & Mattick, 1997)