

**An Exploration of the Nature and Prevalence of Substance Use in a Forensic
Population and an Evaluation of its Role in Recall to Hospital**

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:

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Overview

Part one of this major research project is a systematic review of the research into the psychological effects of synthetic cannabinoid (SC) use. This relatively new phenomenon continues to be a problem in specific populations despite attempts by the UK government to control distribution of SCs. The review highlights the paucity of rigorous, controlled research, whilst summarising the findings from an experimental study, cross-sectional research, internet surveys and qualitative interviews. There is evidence of an association between acute and prolonged SC use and a broad spectrum of psychological effects, including higher scores on anxiety and depression measures and impaired cognitive inhibition and long-term memory. Suggestions for future research are discussed.

Part two is an empirical paper describing a study assessing the prevalence of alcohol and other drug use in a forensic population. It also examines the role of alcohol, cannabis, SC and crack in recall to hospital following conditional discharge. Substance use was assessed retrospectively across four time points in a group of patients who had been formally recalled to hospital and in a group who remained on conditional discharge. The results suggest both alcohol and cannabis use may be important factors for outcomes following conditional discharge. The findings are discussed as well as the strengths and limitations of the study.

Part three is a reflection and critical appraisal on the undertaking of the major research project. It addresses some of the challenges that arose during the research process in the designing of measures, acquiring ethical approval and recruitment. It ends with a discussion of power, beyond statistics, in the research process.

Impact Statement

The findings presented here, in both the systematic review and empirical study, cover novel ground that will prove useful in informing future research in the area and the work of health care professionals and policy makers.

The literature review describes the potential impact that synthetic cannabinoid (SC) use – a relatively new phenomenon - can have on psychological well-being. Given the increase in popularity in more vulnerable populations, especially the prison population and the homeless, the consequences of using SCs, is of particular relevance to mental health and social care professionals. The review highlights the association of acute SC intoxication as well as prolonged use with a broad spectrum of psychological effects from increased positive symptoms of psychosis to impaired cognitive inhibition. It is hoped through publication of this review the findings will be able to inform future practice and policy.

The empirical study evidenced, for the first time, the association of different substance types on outcomes for forensic patients following conditional discharge. In particular, higher levels of cannabis use were found in patients who went on to be recalled to hospital compared to those who remained discharged. In addition, alcohol and cannabis use was found to be associated with shorter amount of time spent discharged in the community. It is clear from our findings that this methodology, looking at different types of substances independently, yields a better understanding of the relationship between substance use and readmission to hospital. Future research should continue to employ this method as opposed to broadly categorising substance use in general. This will be important in unpicking the association between different substances and adverse outcomes for patients in the forensic system. Clinically, the study highlights the importance of both alcohol and cannabis in outcomes for forensic

patients. It also revealed that clinicians pay little attention to alcohol use and it would in fact be useful to consider this separately from other drug use. It may be useful to offer assessment for problematic use of alcohol or cannabis in patients who are conditionally discharged, and to provide a range of interventions to treat these issues. This may go on to help reduce the risk of readmission to hospital. The study will be summarised and presented at the service where it was undertaken, and it is hoped through publication of these findings that it will go on to inform clinical practice and service development.

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Part 1: Literature Review

**An Exploratory Scoping Review of the Psychological Effects of Synthetic
Cannabinoid Use**

Abstract

Background and aims: Originally synthesised for medical research, synthetic cannabinoids (SCs) are now used globally as recreational drugs. With over 179 different SC compounds now available, many governments have attempted to criminalise them. Despite this, SCs continue to be marketed over the internet. Although modelled on Δ^9 -tetrahydrocannabinol (THC), SCs are in fact much more powerful than natural cannabis (NC). Whilst the psychological effects of using NC has been extensively researched, outcomes from SC use are less well known. Therefore, the current review aimed to synthesise the available research on the psychological consequences of SC use. **Method:** A computerised literature search of PsycINFO, Medline and Cumulative Index to Nursing and Allied Health (CINAHL) was conducted. Case-studies or case series and studies solely analysing case notes or existing databases were excluded. **Results:** Seventeen papers were included in the final review, one experimental study, seven cross-sectional studies, five internet surveys and four qualitative studies. In the one experimental study, SCs were shown to acutely impact some aspects of cognitive functioning and psychological well-being. In other research, participants classified as SC users, when not acutely intoxicated, were found to be impaired in cognitive tasks and greater psychological symptomatology compared to NC and non-cannabis users. A range of methodological limitations were noted across study designs. **Conclusions:** As SC use is increasing, especially in at-risk populations, there is an urgent need for research to inform users, healthcare professionals and policymakers. Acutely SC use can result in a range of adverse psychological outcomes, and SC users appear to experience impairments in behavioural, affective and cognitive domains, compared to NC and non-users. This

review highlights the difficulties of capturing the effects of these compounds due to their ever-increasing variety and dangerousness.

Introduction

Synthetic cannabinoids (SCs) were first developed in the 1960s as researchers explored potential medical uses of compounds that targeted cannabinoid receptors (Sedefov et al., 2009). Over the past ten years SCs have become a recreational drug, intended to mimic the effects of natural cannabis (NC). Since 2008, 179 different SC compounds had been notified to the European Monitoring Centre of Drugs and Drug Addiction (EMCDDA, 2018). Despite the prevalence of SC use being relatively low, the potential of the substances to cause harm is substantial. They are now increasingly used by more marginalised social groups, such as the homeless and the prison population (EMCDDA, 2018).

Prevalence of Synthetic Cannabinoid use

The prevalence of SC use is not well known and seems to vary between countries (Van Amsterdam, Nutt & Van den Brink, 2013). In 2011 the lifetime prevalence for adults in the UK was reported at 0.1% (ONS, 2012). However, higher prevalence rates of SCs were reported in particular groups, such as people who go to nightclubs, at 10.3% for lifetime use and 2.2% for use in the last year (Mixmag, 2012). In the UK prison system, use of SC is a particular concern. From a survey of prisoners across eight UK prisons, the prevalence of use of SCs within the last month had increased from 10% in 2015 to 33% in 2016, with 46% of those users using almost daily (EMCDDA, 2017).

Availability of Synthetic Cannabinoids and the Law

SCs are commonly referred to as ‘legal highs’ due their originally legal status, supposed natural herbal make-up and intended imitation of a controlled substance, NC. Historically, they were sold widely in ‘headshops’, which were retail outlets specialising in cannabis and tobacco-related paraphernalia, prior to regulations being

put into place. In the UK as these compounds began to be criminalised under the Misuse of Drugs Act, manufacturers would constantly update the compounds to stay within the law. To overcome this the government introduced the Psychoactive Substances Act in May 2016. Since then, no synthetic cannabinoid compound is legal to produce, supply or import for human consumption, even for personal use. Headshops in the UK have been prevented from selling SCs so that dealers and users now rely on internet sites to purchase the substances, as they continue to be in circulation online, often advertised as incense, bath salts or air fresheners and marked as 'not for human consumption' (EMCDDA, 2017).

Pharmacology of Synthetic Cannabinoids

Although SCs are modelled on Δ^9 -tetrahydrocannabinol (THC), the main psychoactive intoxicant in traditional NC, they typically have a much greater potency (Seely, Lapoint, Moran & Fattore, 2012). Their development began as scientists were investigating how cannabinoids affect the body and to see if they could work as medicines to treat a number of diseases, including neurodegenerative diseases, pain disorders and cancer (EMCDDA, 2017). Fourteen distinct groups of synthetic cannabinoids have now been developed including: the JWH compounds (so called as they were originally synthesised by John W Huffman), the CP compounds (a cyclohexylphenol series), the benzoylindoles, and the HU compounds (originally synthesised at the Hebrew University) (Fattore & Fratta, 2011). In 2015, samples analysed from headshops, online retailers and 10 prisons found the most commonly identified SCs were 5f-AKB-48 and 5F-PB-22 (Home Office, 2015).

Whereas THC is a partial agonist of the cannabinoid receptors, CB1 and CB2, most SCs act as full agonists at CB1 and are therefore much more powerful (Auwärter et al., 2009; EMCDDA, 2011) with a 4-5 times higher affinity (ElSohly, Gul, Wanas,

& Radwan, 2014) and a 40-660 times higher functional potency compared to cannabis (Van Amsterdam, Brunt, & Van den Brink, 2015).

Manufacturing of Synthetic Cannabinoids

The EMCDDA (2017) report that most SCs are manufactured by companies based in China. They are shipped in powder form to Europe where the retail product is created. *Daniana* (*Turnera diffusa*) and Lamiaceae herbs are commonly used as the plant base for smoking mixtures (EMCDDA, 2017). The SC compound is then dissolved using solvents such as acetone or methanol before being sprayed onto the plant material (EMCDDA, 2017). The product is then dried and packaged, usually in foil sachets to be distributed through the internet (Fattore & Fratta, 2011). SCs can also be sprayed onto paper, including children's drawings and solicitors' letters, in order to be smuggled into prisons (HM Inspectorate of Prisons, 2015).

Due to the continuous development of new SC compounds, it is not easy to determine the contents of each product or predict its pharmacological and toxicological characteristics (Ashton, 2012). For example, three weeks following legislative restrictions in Germany of the JWH-018 compound, the JWH-073 came into circulation, suggesting that the manufacturers had anticipated prohibition and already had synthesised an array of alternatives (Dresen et al., 2010; Lindigkeit et al., 2009).

Why are Synthetic Cannabinoids Used?

Avoiding detection in drug screening.

Currently, SC products are very difficult to detect by commonly used drug screening procedures (Papanti et al., 2013). Tests in immunoassays of bodily fluids have been developed to detect THC and other cannabinoids in NC, but as tests to detect SCs are not widely available, SC use will often be undetected. A survey of adults

reporting at least one-lifetime use of SC was carried out in 2012 and found that about 30% of users included the avoidance of drug testing among their reasons for using (Vandrey, Dunn, Fry & Girling, 2012). This motivation has also been evidenced through surveys in environments where routine THC screening is undertaken for example the US Military Forces (Bebarta, Ramirez, & Varney, 2012; Hurst, Loeffler & McLay, 2011; Johnson, Johnson & Alfonzo, 2011; Loeffler, Hurst, Penn & Yung, 2012), mining workers in Australia (Dillon & Copeland 2012) and prisons and probation services in Sweden (EMCDDA, 2011).

Marketing.

In some countries outside of the UK, SCs continue to be legal and therefore global marketing continues (Fattore & Fratta, 2011). Regulation of the drugs has proved difficult to enforce as online retailers can evade national jurisdiction to supply to countries other than their own. This proves a major challenge to control of these drugs as they can be purchased online with little difficulty (Griffiths et al., 2010). In particular, SCs alongside other NPSs, are sold through cryptomarkets on the Dark Web, that allow dealers to sell and users to buy substances under digital encryption to conceal their identities. Data from the Global Drug Survey in 2016, found that approximately 50% of those using NPS had bought the substances from cryptomarkets (Barratt, Ferris & Winstock, 2016).

SCs tend to be affordable and made to look attractive with brightly coloured packaging with cartoons and brand names such as “Black Diamond” and “Scooby Snax” (see Figure 1 for examples). This has raised concerns particularly for younger populations to whom packages may appear innocuous and tempting to those who are willing to try NC but are afraid of the legal consequences or reputation (Fattore & Fratta, 2011). This also creates an idea that SCs are safe drugs, as they are packaged,

marketed and sold as a product. Lack of safety information and use of brand names imply they are a safer alternative to NC (Fattore & Fratta, 2011).



Figure 1

Example of SC packaging

Positive effects.

According to discussions on retailers' websites, SC smokers may find drug effects similar to those of NC leading to the hypothesis that many users smoke it as a legal alternative to cannabis (Fattore & Fratta, 2011). The agonistic activity on CB1 receptors, by both SC and NC, is thought to account for the elevated mood and feeling of well-being reported by some users (Fattore & Fratta, 2011). However, some smokers report effects much stronger than those from NC, including physical relaxation, changes in perception and mild euphoria (Griffiths, Sedefov, Gallegos, &

Lopez, 2010). In the press and online, it has been reported that users feel like ‘zombies’ and can be seen staggering around following SC use (Cooke & Birchall, 2018).

Adverse Psychological Outcomes

Given that use of SCs recreationally is a relatively new phenomenon and its illegal nature, research in this area is in its infancy. It is made up mainly of uncontrolled studies for ethical as well as practical reasons. It has been suggested that the adverse side effects induced by SCs may be much more severe and occur more frequently than those induced by NC (Albertson, Chenoweth, Colby & Sutter, 2016; D’Souza et al., 2016; Gray, Bressington, Hughes & Ivanecka, 2016; Van Amsterdam et al., 2015).

Over the past ten years, alongside increases in reported recreational use, there has been a surge of case reports of individuals with no pre-existing mental health conditions experiencing acute psychotic reactions as well as anxiety, suicidality and other adverse psychological responses to SC use (Papanti et al., 2013 and Tait, Caldicott, Mountain, Hill & Lenton, 2016 for reviews). In some cases, these have resolved quickly and with minimal intervention, in others, there have been persistent difficulties (Müller et al., 2010; Müller, Kornhuber & Sperling, 2016; Van der Veer & Friday, 2011; Wilkinson, Radhakrishnan & D’Souza, 2014). Attempts to conduct larger scale research investigating these effects have mainly come from retrospective reviews of data from toxicology reports or poison hotline databases (Doğan et al., 2016; Forrester, 2011; Hermanns-Clausen et al., 2017; Hermanns-Clausen, Kneisel, Szabo, & Auwärter, 2013; Hoyte et al., 2012; Waugh et al., 2016). This research has evidenced a wide range of psychological and physical symptoms commonly including agitation, hallucinations, confusion, tachycardia, hypertension, chest pains and seizures.

There is also evidence of worsening of mental health difficulties in those with pre-existing conditions. This comes from a mixture of case-studies (Celofiga, Koprivsek, & Klavz, 2014; Leibu et al., 2013 for example) and retrospective case note reviews from records in psychiatric inpatient settings (Bassir Nia, Medrano, Perkel, Galynker, & Hurd, 2016; Manseau et al., 2017; Shalit et al., 2016 for example). These indicate acute psychiatric symptomatology following SC use, in some cases requiring intervention, ranging from sedation to ECT and hospitalisation. The severity of psychiatric symptoms in SC users has been observed to be greater than that of NC users (Bassir Nia et al., 2016; Pereira, Toteja, Khizar, & Galanter, 2016; Shalit et al., 2016).

Synthetic Cannabis and Psychosis

The association between NC and psychosis has been researched extensively, with a recently updated meta-analysis suggesting that the average cannabis users have a two-fold increase in risk compared to non-users and this rises to a four-fold increase in risk for the heaviest users (Marconi, Di Forti, Lewis, Murray & Vassos, 2016). An earlier review also found a 40% increase in risk of any psychotic outcome in individuals who had ever used cannabis (Moore et al., 2007). However, this association does not imply direct causation, with multiple potential factors contributing, including the AKT1 gene that has been shown to mediate the relationship between cannabis use and psychosis (Di Forti et al., 2012).

It is believed that THC is the main psychoactive component which is responsible for the association between psychosis and cannabis use (Iseger & Bossong, 2015). Other components of the cannabis plant such as cannabidiol (CBD) have been shown to exhibit putative antipsychotic and anxiolytic properties (Iseger & Bossong, 2015). While THC binds to the CB1 and CB2 receptors, CBD has a complex

pharmacological action which includes boosting levels of anandamide, an endogenous cannabinoid (Leweke et al., 2012).

There have been several studies that have reported that NC strains with a higher ratio of THC to CBD have stronger associations with psychosis (di Forti., et al 2015; Morgan & Curran, 2008; Schubart, Sommer, van Gastel, Goetgebuer, Kahn, & Boks, 2011). As SCs are more potent than NC and lack CBD it is thought that these compounds may have a stronger association with psychosis in comparison to NC (Murray, Quigley, Quattrone, Englund & Di Forti, 2016). A review in 2013 found that increasing numbers of cases of acute psychosis following SC use, dubbed ‘Spiceophrenia’, are occurring (Papanti et al., 2013).

Adverse Physical Health Outcomes

Several adverse physical health complications have been identified following SC use. These include cardiovascular effects such as tachycardia as well as more severe outcomes such as heart attacks, acute kidney injury, seizures and gastrointestinal problems evidenced from a mixture of case-reports and retrospective case note reviews (Tait et al., 2016 for a review). Death has also been recorded directly due to SC use in several cases (Behonick et al., 2014; Hoyte et al., 2012; Remane et al., 2012; Saito et al., 2013; Shanks, Dahn, Terrell., 2012; Streich, Rushton & Charlton, 2014). Potential mechanisms have included cardiac dysrhythmias or seizures, liver and kidney failure as well as indirect causes such as hypothermia (people found unconscious outdoors in winter); jumping from a building and suicide/self-harm (Tait et al., 2016).

As SCs have only recently become widely available, clinicians have limited experience with their adverse effects (Harris & Brown, 2013), and there is little

information about management of complications, particularly in vulnerable populations (Rosenbaum, Carreiro & Babu, 2012).

Current Review

Given the potential of SCs to have a significant impact on the mental health of users, the current review aimed to synthesise the available research on the psychological consequences of SC use. Previous reviews of the literature have focused on papers with small samples such as case-reports or case-series and research using information from poison hotline databases and toxicology reports (Brewer & Collins, 2014; Papanti et al., 2013 for examples). The current review attempted to outline the existing literature outside of these formats.

Review question.

What are the psychological consequences, including cognitive, affective and behavioural effects, of SC use?

Method

Search Strategy

A search strategy was used to identify the relevant studies from the following electronic databases:

- Medline (1961 – February 2018)
- Cumulative Index to Nursing and Allied Health (CINAHL) (1904 – February 2018)
- PsycInfo (1806 – February 2018)

These databases were chosen as they cover a range of areas of literature that may be relevant to the review question. The search terms consisted of two main concepts, synthetic cannabinoids and psychological outcomes.

The following keywords related to synthetic cannabinoids were used in the searches:

Spice OR K2 OR synthetic cannabis OR synthetic marijuana OR legal marijuana OR JWH

The following keywords related to psychological outcomes:

Psychological OR Psychiatric OR Cognition OR Neurocognition OR Affect OR Mood OR Behaviour OR Mental health OR Psychosis OR Schizophrenia OR Paranoia OR Hallucination OR Anxiety OR Panic OR Depression.

The syntax was amended to include functions such as * to allow for variations of forms of words to be searched at once, depending on the electronic database requirements. For example, synthetic cannabi* to allow for cannabis and cannabinoid.

Inclusion and Exclusion Criteria

This review is concerned with research involving SC use and which assesses psychological outcomes across behavioural, affective and/or cognitive domains. Studies assessing the impact of SC use on any of these domains were included. In particular, experimental, cross-sectional, qualitative studies and surveys were included. Case-studies or case series with small sample sizes and studies solely analysing case notes or existing databases were excluded. Studies had to be published in English, in peer-reviewed journals before February 2018. There was no restriction on the setting (e.g. inpatient, forensic settings, or high schools).

Participants.

Participants needed to be administered with SC or identified as SC users through self-report or screening of bodily fluids to be included.

Exposure.

Studies were included where participants were administered SCs or screened positive for the use of SCs or self-reported SC use. This included substances referred to as 'Spice', 'K2', 'Aroma' and other brand names.

Outcomes.

Studies that examined psychological outcomes, including measures of psychological symptomatology, psychiatric diagnosis and different cognitive domains were included.

Study Selection and Data Extraction

Results from the literature searches were exported into Endnote, a reference management software. Duplicate records were removed and the titles and abstracts were then screened for eligibility based on the inclusion criteria. The full-text of the remaining articles were then reviewed by the researcher (HA). She determined whether each study met criteria for inclusion in the review. Full details of the review process are shown in the PRISMA flow diagram (Figure 2).

Quality Assessment

From preliminary searches and due to the relative novelty of this research area it was anticipated that studies of varying designs would be included in the review. Many tools exist to assess the quality of studies with randomised designs, however, there are fewer for surveys or cross-sectional studies. Therefore, the Standard Quality Assessment Criteria, QualSysts (Kmet, Lee & Cook, 2004) was chosen to assess study

quality as it can be applied across study designs. It also has a partner scale for qualitative research, allowing comparisons to be drawn across the range of studies included. The quality assessment was not used to determine study eligibility in the review, however, it has been reported to inform the interpretation of the findings.

The tool consists of 14 questions for quantitative studies and 10 for qualitative, and not all questions apply for all study designs. From the ratings given for each question, a summary score can be produced which is then compared across study designs.

Results

Figure 2 shows the flow of articles through the review process.

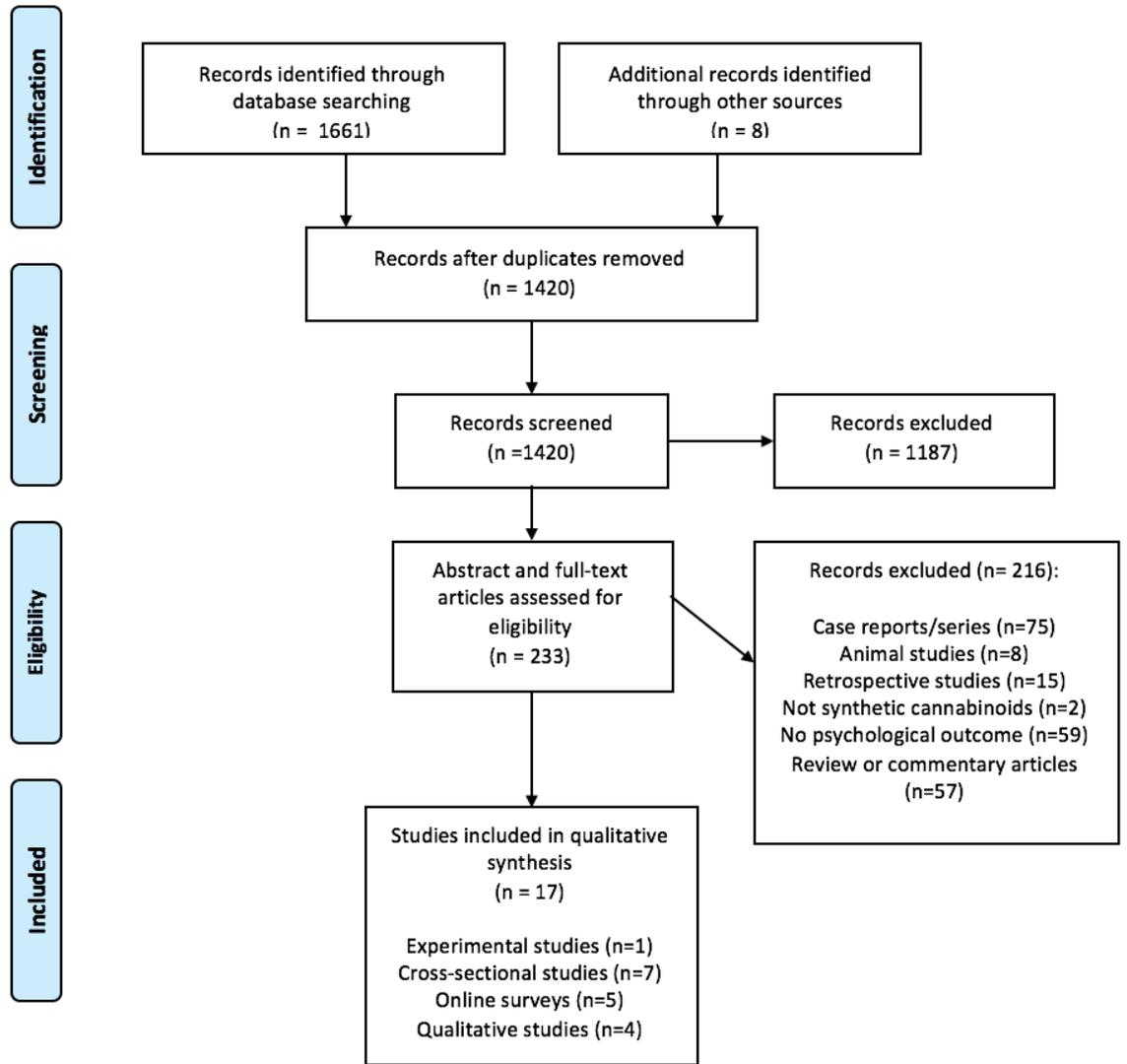


Figure 2

PRISMA diagram showing the review process

1661 records were identified from the database search. After duplicates were removed and titles screened, 233 abstracts and full-text articles were reviewed. Subsequently, 216 records were excluded due to not meeting the review inclusion criteria (see Figure 2 for more details).

Study Description

Table 1 shows a summary of the studies' characteristics, including country, design, population, sample size and quality assessment rating.

Overall, 17 papers were included in the study. This was made up of 1 experimental study, 7 cross-sectional studies, 5 online surveys and 4 qualitative studies. Nine studies included utilised comparison groups in their analysis. All included studies were published between 2011 and 2018 reflecting the recency of the development and use of these drugs.

Table 1

Descriptive information and quality assessment rating for all studies included in the review

<u>Reference</u>	<u>Country</u>	<u>Population</u>	<u>Sample size, total n</u>	<u>Comparison group</u>	<u>QualSysts rating (%)</u>
Experimental Studies					
Theunissen, et al. (2018)	The Netherlands	Healthy volunteers	6	No	68
Cross-sectional Studies					
Altintas, et al. (2016)	Turkey	Psychiatric inpatients	81	Yes	82
Blevins, et al. (2016)	USA	Adolescent cannabis users	252	Yes	79
Bonar, et al. (2014)	USA	Substance use treatment centre residents	396	Yes	71
Clayton, et al. (2017)	USA	High school students	13 624	Yes	91
Cohen, et al. (2017)	Hungary & Israel	Substance use treatment centre residents and psychiatric inpatients	122	Yes	82
Gunderson, et al. (2014)	USA	Adult cannabis users	42	No	86
Welter, et al. (2017)	Germany	Psychiatric inpatients	332	Yes	75
Internet Surveys					
Barratt, et al. (2013).	Australia	Users of SCs	316	No	86
Vandrey, et al. (2012).	Global	Users of SCs	168	No	70
Winstock, & Barratt (2013a)	Global	General population	14 966	No	80
Winstock, & Barratt (2013b)	Global	General population	15 200	Yes	90
Winstock, et al. (2015).	Global	General population	21 656	No	85

Qualitative Studies					
Every-Palmer (2011)	New Zealand	Forensic inpatients	15	No	25
Kassai, et al. (2017).	Hungary	Drug rehabilitation service users	6	No	75
Soussan, & Kjellgren (2014)	Sweden	Online drug forum users	254	No	90
Van Hout & Hearne (2017)	Republic of Ireland	Dependent SC users	6	No	60

Quality Assessment

The QualSysts (Kmet et al, 2004) tool was used to assess the quality of all the studies included in the review (see Table 1 for ratings). Scores ranged from 25% to 91%, with a mean rating of 76%, though only three studies scored below 70%. The lowest scoring study (Every-Palmer, 2011) lacked sufficient detail on the study aims, recruitment process, data collection or thematic analysis.

For many studies validation of exposure to SCs was problematic as routine urine screening does not capture this. As a result, all but one of the papers relied on self-reporting of SC use, which introduces uncertainty around the specific compounds ingested, leading to lower scores from the QualSysts measure.

Experimental Studies

The review determined that there has been one experimental study to date, where only 6 healthy experienced cannabis users, were administered an SC compound via inhalation (Theunissen, et al. 2018, see Table 2 for full information about the sample and outcomes measured). This study relies on a very small sample size, due to ethical restrictions and practical hazards of administering SCs for a research trial. The authors spent several years getting ethical approval for this. Regardless, the study is underpowered and therefore limited information can be generalised from the findings (Theunissen et al., 2018). This contributed to its quality rating being 68%.

The participants were given a series of questionnaires and cognitive tests and monitored for 12 hours following inhalation of the SC. The study used a quasi-randomised, within-subjects design, whereby tests were repeated on different days to each individual following placebo, 2mg and 3mg of the SC compound JWH-018. This compound was the first to be detected in a ‘legal high’ product in 2008 (EMCDDA,

2017), however, it was banned in the UK in 2009 under an amendment of the Misuse of Drugs Act 1971 (Misuse of Drugs Act 1971 (Amendment) Order 2009).

Following administration with JWH-018, results showed a significantly greater number of errors when following a moving target on a screen, in both the Critical Tracking Task (CTT) and Divided Attention Task (DAT) indicating poorer motor performance. They also showed longer stop-signal reaction times on the Stop Signal Task (SST), indicating impaired response inhibition. However, these significant differences were only found following a summation of the scores of the cognitive measures across all post-inhalation test times to create an overall score. There was no clear clinical justification or explanation for this, lowering the quality rating. Executive function, spatial memory and information processing did not show any significant differences between the three conditions. In addition, there were no clinically significant changes recorded from physical vital signs or ECG patterns across the three conditions.

Subjective scores of feeling 'high' showed that participants reported feeling more 'high' at both one and two hours after administration of the low-dose SC compared to placebo, this was not significant in the high dose. Subjective high scores correlated positively with concentrations of JWH-018 in serum after administration for both SC doses. The Profile of Mood States (POMS) showed that participants reported greater fatigue at 5 and 12 hours after administration of the high dose compared to the placebo, alongside increased ratings of arousal at 12 hours following the low dose compared to both placebo and the high dose. The Visual Analogue Scale (VAS) measure of drowsiness was significantly higher at the low dose compared to both the placebo and high dose. Similarly, the VAS composite of external perception,

measuring the level of misperception of an external stimulus, was higher for the low dose compared to the high.

Notably, many of the significant differences were between the 2mg condition and the placebo, with a non-significant difference between the placebo and the 3mg condition and/or the 2mg and 3mg condition, this implies an inverse dose relationship. However, a pharmacokinetic analysis revealed concentrations in the serum collected revealed no clear dose-concentration relationship. Administration of the 2 and 3 mg dose of JWH-018 produced relatively low concentrations of drug in the serum tests, and unexpectedly concentrations were lower in the 3 mg compared to 2mg conditions. The authors found residue in the pipes that were used for inhalation and post-hoc testing revealed considerable amounts of active substance (up to 70%) that was not inhaled which may have in part explained this pattern as well as the lack of dose-dependent effects and highlighted the ineffectiveness of this method of administration. This is clearly a methodological limitation of this study.

Table 2

Experimental study: demographic data and outcome measures

<u>Reference</u>	<u>Sample size (n)</u>	<u>Age mean (SD)</u>	<u>Gender % male (n)</u>	<u>Substance and detection method</u>	<u>Cognitive test</u>						<u>Subjective effect questionnaires</u>			
					<u>Information processing</u>	<u>Motor performance</u>	<u>Divided attention</u>	<u>Response inhibition</u>	<u>Executive function</u>	<u>Spatial memory</u>	<u>Subjective high</u>	<u>Mood</u>	<u>Psychedelic effects</u>	<u>Dissociation</u>
Theunissen, et al. (2018)	6	23.5 (3.57)	33.3 (2)	JWH-018, urine and blood tests	Digit symbol substitution	Critical tracking task	Divided attention task	Stop signal task	Tower of London	Spatial memory task	Subjective high rating on a visual analogue scale	Profile of mood states	Bowdle visual analogue scales	Clinician administered dissociative states scale

Cross-Sectional Studies

Seven cross-sectional studies were included in the review. Table 3 describes the structure of the studies, including information on comparison groups where applicable and outcomes measured. It also notes any age and gender differences reported.

As shown, studies vary in their study populations, ranging from those with psychosis following SC use (Altinas, Inanc, Oruc, Arpacioğlu & Gulec, 2016) to adult (Cohen et al., 2017; Gunderson, Haughey, Ait-Daoud, Joshi & Hart, 2014) and adolescent cannabis users who have ever used SCs (Blevins, Banes, Stephens, Walker & Roffman, 2016) to high school students who have used SCs and NCs (Clayton, Lowry, Ashley, Wolkin & Grant, 2017). In addition, all studies acknowledged an overlap between NC and SC use, with those having used SCs having typically also used NC.

From two studies it appears that SC users are generally younger (Bonar, Ashrafioun & Ilgen, 2014) and more likely to be male (Clayton et al., 2017) than non-SC users. These two studies also reported on ethnicity and while one found that SC users were significantly more likely to be white (Bonar et al., 2014) the other found that they were less likely to be white (Clayton et al., 2017). However, this difference may be related to their different study populations: high school students (Clayton et al., 2017) compared to substance use treatment patients (Bonar et al., 2014).

Psychosis and psychosis-related symptomatology.

Four studies assessed psychosis and psychosis-related symptomatology as an outcome (see Table 4 for data on psychological outcomes across the studies). Three studies looking at psychiatric populations administered validated scales (Altinas et al.,

2016; Bonar et al., 2014; Welter et al., 2017), with one of these also including a clinical diagnosis (Welter et al., 2017). The fourth study, comparing SC users to non-users from the general population, included a single question about subjective psychosis-related experiences (Blevins et al., 2016).

Bonar et al., (2014) found that amongst individuals in residential substance use disorder (SUD) treatment, those with SC lifetime use had higher scores in overall psychological distress, paranoid ideation and psychoticism as measured by the Brief Symptom Inventory subscales, compared to those with no history of SC use.

Welter et al., (2017) found that seventy percent of their sample of inpatient psychiatric patients who used SCs were diagnosed with a psychotic disorder, compared to sixty percent of NC users. Moreover, positive symptoms including persecutions, delusions, disorganisation and hallucinations, as assessed via a modified version of the PANSS, were experienced by a higher proportion of SC users than NC users. Negative symptoms, including motor retardation, blunted affect and emotional withdrawal, were, in contrast, experienced by a higher proportion of NC users than SC users. The authors, therefore, suggested that amongst psychiatric patients, SC users may experience more severe positive symptoms while NC users may experience more severe negative symptoms.

Altinas et al, (2016) used the full PANSS measure and similarly found significantly lower negative symptomology according to the PANSS negative subscale for patients who developed psychosis following a history of SC use compared to those with a diagnosis of schizophrenia and no history of SC use. These differences remained significant following adjustment for age differences between the groups. However,

there were no significant differences in positive symptoms between the two groups (Altinas et al., 2016).

Mood symptoms.

Mood symptoms were measured in four studies. Three of these used various validated scales (Altinas, et al., 2016; Bonar et al., 2014; Cohen et al., 2017) and one used single questions (Clayton et al., 2017). Two studies found significantly higher scores on depression measures for SC users compared to non-SC users (Bonar et al., 2014) and non-cannabis users (Cohen et al., 2017). Clayton et al., (2017) administered single questions assessing ever experience (yes/no) of feeling sad, having suicidal thoughts and attempting suicide. They found significantly higher reports of these symptoms in those who had ever used SCs compared to those who had never used any type of cannabis.

Anxiety.

Anxiety scales were administered in two studies (Altinas et al., 2016; Cohen et al, 2017). Altinas et al., (2016) found significantly higher scores in anxiety for participants with psychosis following SC use compared to patients with a diagnosis of Schizophrenia and no substance use history. These differences remained significant for patients over the age of 43 when adjusting for age differences between the two groups, however, the difference in anxiety scores was not significant for those under 43 years. Cohen et al., (2017) found significantly higher anxiety scores for SC users compared to both NC users and non-cannabis users.

Cognitive tasks.

Two studies administered cognitive tasks including tests of executive function, inhibition and long-term memory (Altinas et al., 2016; Cohen et al., 2017). Altinas et

al., (2016) administered the Frontal Assessment Battery (FAB) to investigate differences in executive function with subscales of mental flexibility, programming, sensitivity to interference, inhibition control and environmental autonomy. They found no significant differences on any of the subscales between patients with psychosis following SC use and those with a diagnosis of schizophrenia. However, Cohen et al., (2017) found SC users to be significantly impaired in working memory, cognitive inhibition and long-term memory compared to NC users and non-users as measured by the n-back task, the Stroop task and Buschke Selective Reminding task (BSRT) respectively, as defined in Table 3. Specifically, the authors found significantly lower accuracy on both the n-back and Stroop task and longer reaction times on the Stroop task (across matching and non-matching conditions) as well as significantly fewer words recalled on the long-term memory task for SC users compared to NC users and non-cannabis users. The authors did note, however, that the SC user group had significantly fewer years of education compared to the NC users and non-cannabis users and potentially this could have contributed to the effects observed (Cohen et al., 2017).

Other significant outcomes found included higher rates of sexual risk behaviours and physical fighting in high school students who used SC compared to those who use NC only or non-users (Clayton et al., 2017). SC users generally were more likely to use other substances including opioids, ecstasy, hallucinogens and methamphetamines (Bonar et al., 2014; Clayton et al., 2017).

Table 3

Cross-sectional studies: Group definitions, demographic data and outcome measures employed

<u>Reference</u>	<u>Groups</u> (n)	<u>Age mean</u> (SD)	<u>Gender</u> % male (n)	<u>Inclusion criteria</u>	<u>Psychological outcomes</u>
Altintas, et al. (2016)	Psychosis following SC use (50)	25.9 (5.5)	100 (50)	Self-report SC use for at least 4 months, not acute intoxication, no previous psychiatric diagnosis.	Brief Psychiatric Rating Scale Positive and Negative Syndrome Scale Frontal Assessment Battery (including subscales of conceptualisation, mental flexibility, programming, sensitivity to interference, inhibitory control and environmental autonomy) Hamilton Rating Scale for Depression Hamilton Anxiety Rating Scale
	Schizophrenia (31)	42.9 (11.6)	100 (31)	No personal or family history of SU and a diagnosis of schizophrenia	
Blevins, et al. (2016)	Lifetime SC use (72)	15.70 (1.02)	72.2 (52)	Self-report SC use ever	Subjective effects
	No lifetime SC use (180)	15.87 (0.94)	66.7 (120)	Self-report no SC use ever	

Bonar, et al. (2014)	Lifetime SC use (150)	30.0 (9.8) ^{****}	62 (93)	Self-report SC use ever	Beck Depression Inventory Global Severity Index, Paranoid ideation and Psychoticism subscales from the Brief Symptom Inventory (BSI)
	No lifetime SC use (246)	37.7 (10.2) ^{****}	70 (172)	Self-report no SC use ever	
Clayton, et al. (2017)	Lifetime SC use (1554)		57.8 (892) ^{b*}	Self-report SC use ever	Health risk behaviours including questions on mental health: Have you ever felt sad or hopeless; seriously considered attempting suicide; attempted suicide.
	Lifetime NC only (4585)		50.8 (2329) ^{b*}	Self-report NC use ever and no SC use	
	Non-use (9049)		50.0 (4525) ^{b*}	Self-report no NC or SC use ever	
Cohen, et al. (2017)	SC users (38)	26.57 (7.90)	76 (29)	Regular SC use on a monthly basis with minimal usage of at least 10 times in the last year.	Beck depression inventory Spielberger state-trait anxiety inventory Computerised tasks: N-back task (working memory, matching of symbols in a 1-back or 2-back condition). The Stroop task (inhibition, naming of colours of words in matching and non-matching conditions). Buschke Selective Reminding task (free recall of 16 bi-syllabic words following a diversion task).
	NC users (43)	26.98 (5.37)	53 (23)	NC use more than 10 times in the last year and no SC use in the last year.	
	Non-C users (41)	25.56 (3.03)	54 (22)	No NC or SC use in the last year.	

Gunderson, et al. (2014)	Regular NC users who use SC (21)			Regular NC users who have used SCs ever	Questions on subjective effects, withdrawal and adverse effects
Welter, et al. (2017)	SC users (21)	25.6 (6.8)	71.4 (15)	Self-reported SC use	Modified Positive and Negative Symptom Scale: 9 symptom measures (persecutions, delusions, disorganisation, hallucinations, grandiosity, motor retardation, blunted affect, poor rapport and emotional withdrawal) Psychiatric diagnoses.
	NC users (26)	31.8 (10.5)	61.5 (16)	Self-reported NC use	

*= $p < 0.05$; **= $p < 0.01$; ***= $p < 0.001$

^a Significant differences between the two groups found, test used not reported

^b Significant differences between the three groups found with a χ^2 test

Table 4

Cross-sectional studies: psychological well-being and cognitive outcomes

<u>Reference</u>	<u>Groups (n)</u>	<u>Overall psychological distress</u>	<u>Psychotic symptoms</u>				<u>Depression</u>	<u>Anxiety</u>	<u>Cognitive</u>
Altintas, et al. (2016)			<i>BPRS^a</i>	<i>PANSS^b overall</i>	<i>PANSS-</i>	<i>PANSS+</i>	<i>HRSD^c</i>	<i>HARS^d</i>	<i>FAB^e</i>
			<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>
	SC induced psychosis (50)		37.6 (13.7)	98.6 (24.8)	18.0 (6.5) ^{***}	28.3 (7.1)	14.5 (7.2)	17.8 (10.3) ^{***}	10.7 (3.7)
	Schizophrenia (31)		32.5 (9.1)	91.1 (16.5)	22.3 (6.0)	26.0 (5.4)	12.0 (7.5)	11.4 (9.4)	12.1 (4.3)
Blevins, et al. (2016)			<i>Paranoia</i>	<i>Hallucinations</i>			<i>Nervous/Panicky</i>	<i>Thought differently</i>	<i>Less coordinated</i>
			<i>% (n)</i>	<i>% (n)</i>			<i>% (n)</i>	<i>% (n)</i>	<i>% (n)</i>
	Current SC use (15)		67 (10)	40 (6)			53 (8)	67 (10)	67 (10)
Bonar, et al. (2014)		<i>GSF</i>	<i>Paranoid ideation (BSI^g)</i>	<i>Psychoticism (BSI)</i>	<i>BDI^h</i>				
			<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>			
	Lifetime SC use (150)		1.26 (0.79) ^{***}	1.43 (0.99) ^{***}	1.29 (0.94) ^{***}	24.9 (11.8) ^{***}			
	No lifetime SC use (246)		0.94 (0.79)	0.99 (0.89)	0.97 (0.94)	20.0 (12.8)			

<u>Reference</u>	<u>Groups (n)</u>	<u>Overall psychological distress</u>	<u>Psychotic symptoms</u>	<u>Depression</u>			<u>Anxiety</u>	<u>Cognitive</u>		
Clayton, et al. (2017)				<i>Sadness</i>	<i>Suicidal ideation</i>	<i>Suicide attempt</i>				
				%	%	%				
		Ever used SC (1554)		47.5 ^{q*}	32.7 ^{q*}	22.0 ^{q*}				
		Ever used NC only (4585)		36.8	22.2	11.1				
	Non-users (9049)		23.5	13.3	5.4					
Cohen, et al. (2017)				<i>BDI^h</i>		<i>SSTAIⁱ</i>	<i>n(1)-back^j</i>	<i>n(2)-back^k</i>	<i>Stroop^l</i>	<i>BSR^m</i>
				Mean (SD)		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
		SC users (38)		19.97 (10.95) ^{r,s***}		53.39 (11.04) ^{r,s***}	75.4 (24.34) ^{r,s*}	67.94 (21.37) ^{r,s*}	1078.52 (356.58) ^{r,s*}	7.00 (2.46) ^{r,s*}
		NC users (43)		5.76 (4.97)		39.24 (9.08)	97.25 (3.99)	91.54 (7.41)	869.62 (172.43)	10.43 (2.57)
	Non-C users (41)		5.80 (4.72)		39.13 (8.04)	97.39 (2.41)	90.56 (6.11)	870.53 (161.87)	11.05 (2.72)	

Reference	Groups (n)	Overall psychological distress	Psychotic symptoms	Depression	Anxiety		Cognitive	
Gunderson, et al. (2014)					Anxiety	Panic attack	Trouble thinking clearly	Fatigue
					% (n)	% (n)	% (n)	% (n)
	SC users (21)				14 (3)	10 (2)	38 (8)	5 (1)
Welter, et al. (2017)			Diagnosis of a psychotic disorder					
			% (n)					
	SC users (21)		71.4 (15)					
	NC users (26)		61.5 (16)					

*= $p < 0.05$; **= $p < 0.01$; ***= $p < 0.001$

BPRS^a = Brief Psychiatric Rating Scale

PANSS^b = Positive and Negative Syndrome Scale

HRSD^c = Hamilton Rating Scale for Depression

HARS^d = Hamilton Anxiety Rating Scale

FAB^e = Frontal Assessment Battery

GSI^f = Global Severity Index

BSI^g = Brief symptom inventory

BDI^h = Beck Depression Inventory

SSTAIⁱ = Spielberger state-trait anxiety inventory

n(1)-back^j = n-back task, 1-back condition, % correct reported

n(2)-back^k = n-back task, 2 back condition, % correct reported

Stroop^l = The Stroop task, incongruent condition, reaction time (ms) reported

BSR^m = Buschke Selective Reminding task, words recalled reported

ⁿ = Significant differences found between SC induced psychosis and Schizophrenia group, with a t-test

^o = Significant differences found between SC induced psychosis and Schizophrenia group, with a Mann-Whitney U

^p = Significant differences found between lifetime SC use and no lifetime SC use group, type of test not reported

^q = Significant differences found between ever used SC and non-user group, with a linear contrast

^r = Significant differences found between SC users and NC users, with an ANOVA

^s = Significant differences found between SC users and non-C users, with an ANOVA

Internet Surveys

There were 5 internet surveys reported, with information from a total of 3640 SC users, and these are detailed in Table 5. Both psychological and physical health symptoms have been reported as these are increasingly acknowledged to be inherently linked. These surveys do not employ validated measures but provide a useful overview of psychological effects and complications related to SCs through respondents indicating yes or no to certain experiences. As illustrated in Table 5 the data suggests SC users responding to internet surveys tend to be male and in their mid-twenties.

A range of psychological and physical acute effects have been documented through these surveys, with the most common being anxiety or panic reported by 14% - 82.6% and breathlessness reported by 38.1% - 56.5% of SC users across the surveys. Three studies asked about the length of effects and found generally these lasted for 1-2 hours (Barratt, Cakic & Lenton, 2013; Vandrey et al., 2012; Winstock & Barratt, 2013b). One survey compares effects between SC and NC users (Winstock & Barratt, 2013b). This shows significantly greater paranoia and significantly less sedation, increased appetite and impaired memory reported after SC use compared to NC.

Three of these studies utilise data from the Global Drug Survey which is run annually (Winstock & Barratt, 2013a, 2013b; Winstock, Lynskey, Borschmann & Waldron, 2015). Both papers published in 2013 rely on data from the 2011 survey and therefore there is overlap in these findings.

Table 5

Internet surveys: sample size and population, demographics and symptoms reported

<u>Reference</u>	<u>Sample size</u> <u>SC users</u>	<u>Inclusion</u> <u>criteria</u>	<u>Median Age</u> <u>(IQR)</u>	<u>Gender %</u> <u>male (n)</u>	<u>Psychological symptoms</u> <u>reported</u>	<u>Physical symptoms</u> <u>reported</u>
Barratt, et al. (2013).	316	Australian residents, over 18, who reported SC use on one more prior occasions.	27 (23 - 34)	77 (243)	Dissociation (22%) Paranoia (18%) Panic (14%) Depression (4%) Psychosis (4%)	Decreased motor coordination (28%) Dizziness (20%) Headache (18%) Slurred speech (14%) Nausea and vomiting (9%)
Vandrey, et al. (2012).	168	Ever used SC		83 (139)	Hallucinations (28%) Nervous/anxious (54%) Paranoia (54%) Trouble remembering (64%)	Heavy/sluggish (63%) Vomited (10%)
Winstock, and Barratt (2013a)	23	SC users who sought Emergency Medical Treatment in the last 12 months			Panic and anxiety (82.6%) Paranoia (56.5%) Feeling scared (52.2%) Seeing things (47.8%) Extreme agitation (34.8%) Hearing things (30.4%) Aggression (17.4%)	Breathing difficulties (56.5%) Very sweaty (52.2%) Chest pain (52.2%) Unable to talk (39.1%)

Winstock, and Barratt (2013b)	980	Use of SCs in last 12 months	23 (19 - 28)	79.6 (758)	Paranoia ^{a,***} Sedation ^{b,***} Increase in appetite ^{b,***} Impairment in memory ^{b,***}	
Winstock, et al. (2015).	2176	SC use in the last year	25 (20 - 34)	76.5 (1554)	n=21 (sought EMT) Panic and anxiety (81%) Paranoia (61%) Scared (61.9%) Agitation (47.6%) Auditory hallucinations (33.3%) Visual hallucinations (33.3%) Mood problems (28.6%) Aggression (9.5%)	n=21 Breathlessness (38.1%) Sweating (38.1%) Chest Pain (33.3%) Unable to talk (28.6%) Seizure /fits (19.0%) Bladder problems (9.5%)

*= $p < 0.05$; **= $p < 0.01$; ***= $p < 0.001$

^a = In comparison to NC significantly more

^b = In comparison to NC significantly less

Qualitative Studies

Four relevant qualitative studies were included in the review and are summarised in Table 6. They focus on the experiences of using SCs (Kassai et al., 2017) and developing dependence (Van-Hout & Hearne, 2017), adverse effects (Soussan & Kjellgren, 2014) and interaction with psychosis (Every-Palmer, 2011).

As shown in Table 6 a range of psychological effects were reported following consumption of SCs. Some quotes from the papers illustrating these effects are included below:

Anger: “Warm feelings, feel brilliant, but then when that feeling goes away, bad. Start feeling angry....” (Van-Hout & Hearne, 2017).

Paranoia: “I can’t touch it, it makes me really paranoid... I felt that something bad was leaping out at me” – Male, occasional SC use (Every-Palmer, 2011).

Anxiety: “It made me feel like my world was closing in. It made me feel anxious and worried and my heart was pounding.” – Male, occasional SC use (Every-Palmer, 2011).

Memory difficulties: “I tried watching Family Guy during intoxication, but the whole time I forgot what the episode was about.” (Soussan & Kjellgren 2014).

Emotionally numb: “the drug totally distorted my personality, it turned myself inside out... it made me blunt, and switched off my brain” - 23-year-old male. (Kassai et al., 2017).

Mood changes: “When I smoked I was wallowing in self-pity, I felt sorry for myself, I was alone, I didn’t care about anybody else, I hated everyone” – 20-year-old male. (Kassai et al., 2017).

Two papers reported themes about the unpredictability of both the physical and psychological effects of SCs (Kassai et al., 2017; Soussan & Kjellgren, 2014). In addition, two papers assessed effects across different time points of use: acute intoxication, hangover, dependence and withdrawal (Kassai et al., 2017; Van-Hout & Hearne, 2017). For acute intoxication, frequent symptoms reported were tachycardia and respiratory difficulties, nausea and dizziness, warm and happy feelings, agitation, restlessness and fear and paranoia (Kassai et al., 2014; Van Hout & Hearne 2017). The most common symptoms reported during the hangover period were sluggish and dull feelings, tiredness and dehydration (Kassai et al., 2014). Dependence and withdrawal were characterised by memory and concentration impairment, mood swings, disconnection, aches and pains, anxiety, agitation and paranoia (Kassai et al., 2017; Van-Hout & Hearne 2017). In addition, Van-Hout and Hearne (2017) elicited a theme on self-detoxification attempts where participants described suicidal ideation and physical symptoms such as diarrhoea, insomnia and sweating.

Table 6

Qualitative studies: sample size and population, methodology, the type or brand of SC, psychological and other outcomes reported

<u>Reference</u>	<u>Sample size</u> <u>SC users</u>	<u>Population</u>	<u>Method of data</u> <u>collection and</u> <u>analysis</u>	<u>Type or</u> <u>brand of SC</u>	<u>Psychological effects</u>	<u>Other effects</u>
Every-Palmer (2011)	15 Male 100%	Forensic inpatients identified by staff as having relapsed in the context of SC use.	Semi-structured interviews Thematic analysis	Aroma, Kronic, Skunk, Dream, Spice	Pronounced anxiety Psychotic relapse Paranoia	Shaking Dizzy Heart pounding
Kassai, et al. (2017).	6 Male 100% 20-27	Drug rehabilitation Self-identified SC users with problematic use for at least 2-6 years, abstinent for the past 1 month.	Semi-structured interviews Interpretative phenomenological analysis		Paranoia Relaxation Difficulty socialising Increased egoism Self-neglect Switch off brain Inability to sleep Feeling under control	Sweating

Soussan, and Kjellgren (2014)	254	Online drug forum users from one online forum	Internet posts on an online forum Thematic analysis		Sluggish/dull Disconnected and emotionally numb Fear and paranoia Panic attacks Disorientation Derealisation Mood swings Memory impairment Concentration difficulties	Nausea and dizziness Tachycardia and breathing difficulties Dehydration Muscle pain and tension
Van Hout and Hearne (2017)	6 SC dependent users 50% male	Dependent SC users as measured by the Severity of Dependence scale (scores above 7).	Semi-structured interviews Empirical Phenomenological Psychological five-step method	5f-AKB48 5F-PB-22	Agitation and restlessness Fear Paranoia Aggression Severe dissociation	Chest pain Aches and pains Palpitations Nausea Sweating Vomiting

Discussion

Overview

This review aimed to describe the current evidence of the psychological effects of SC use. Previous reviews of the literature have focused on papers with small samples such as case-reports or case-series and research using information from poison hotline databases and toxicology reports (Brewer & Collins, 2014; Papanti et al., 2013 for examples). The current review attempted to outline the existing literature outside of these formats. The review process highlighted four main types of research methodology: experimental, cross-sectional, surveys and qualitative.

There was a dearth of rigorous, peer-reviewed experimental research, with only one pilot study currently published (Theunissen et al., 2018). This was the first controlled study whereby a SC was administered with the intention of monitoring the cognitive and subjective effects of the drugs. Previous attempts have relied on self-experimentation from authors (Auwarter et al., 2008) or administration for developing technology to detect SCs in urine (Teske et al., 2010).

The current review findings suggest that acute SC intoxication results in impaired motor functioning, attention and response inhibition, but potentially protected executive function, spatial memory and information processing (Theunissen et al., 2018). The internet surveys provide a wealth of retrospective self-report data of the acute effects of SC use, with panic, anxiety, paranoia and breathlessness being reported most frequently. Similarly, the qualitative research provides a phenomenological account of the acute effects, with paranoia, fear and anxiety being mentioned in all of the studies.

SC users, not in the acute stages of intoxication, were found to have significant impairment in working memory, inhibition and long-term memory compared to NC and non-cannabis users (Cohen et al., 2017). SC users have been found to experience more anxiety, paranoia, psychoticism and depressive symptomatology compared to NC users and non-users (Bonar et al., 2014; Clayton et al., 2017; Cohen et al., 2017). In addition, SC users experiencing psychosis have been found to experience less severe negative symptoms and more anxiety than those with schizophrenia without co-morbid SC use (Altinas et al., 2016). Welter et al., (2017) found significantly greater positive symptoms and fewer negative symptoms in psychiatric patients using SC compared to those using NC only.

Although not the main outcome of the review, motives for use were recorded in 2 cross-sectional studies (Bonar et al., 2014; Gunderson et al., 2014), 3 surveys (Barratt et al., 2013; Vandrey et al., 2012; Winstock & Barratt, 2013b) and 2 qualitative papers (Every-Palmer, 2011; Van Hout & Hearne, 2017). Reasons reported for use included curiosity (50% Barratt et al., 2013; 91% Bonar et al., 2014; 78% Vandrey et al., 2012), legality (39% Barratt et al., 2013; Every-Palmer, 2011), to get high (89% Bonar et al., 2014; 67% Gunderson et al., 2014), relaxation or to relieve anxiety (71% Bonar et al., 2014; 48% Vandrey et al., 2012; Van Hout & Hearne, 2017), desirable effects (20% Barratt et al., 2013; 58% Vandrey et al., 2012; 58% Winstock & Barratt, 2013b), to avoid positive drug testing (8% Barratt et al., 2013; 71% Bonar et al., 2014; 57% Gunderson et al., 2014; 30% Vandrey et al., 2012; 14.5% Winstock & Barratt, 2013b; Every-Palmer, 2011), cost (Van-Hout and Hearne 2017; 8.7%, Winstock & Barratt 2013b), product consistency (Every-Palmer, 2011), perceived safety compared to NC (30% Bonar et al., 2014; Every-Palmer, 2011) and

easier to obtain than NC (23% Barratt et al., 2013; Every-Palmer, 2011; 48%, Gunderson et al, 2014; Van Hout & Hearne, 2017; 18.9% Winstock & Baratt, 2013 b).

Methodological Limitations

The review has highlighted several methodological limitations with the current research. The paucity of controlled experimental research is notable. The one available study (Theunissen et al., 2018) relies on a very small sample size as a result of ethical and practical limitations, however, this considerably limits the generalisability of these findings. Despite the novelty of the study, the issues with the ineffective method of administration of the substance, resulting in low concentrations in the serum, is another factor that limits the usefulness of these findings.

The cross-sectional research is variable in its quality, with a mean quality assessment rating of 81.9%. Studies ranged from using validated measures to less reliable, single-questions to evaluate psychological effects of SC use. In addition, the inclusion of participants always relied on retrospective self-report of SC use which introduces recall bias, whereby data may be unreliable. Furthermore, this method means these studies provide little information about the impact of specific compounds. No study blinded researchers to study group introducing further bias into the results and lowering the quality rating. Limited adjustments for confounding factors were made across these studies, apart from an acknowledgement of age and education level in two studies (Altinas et al., 2016; Cohen et al., 2017 respectively). It is likely that there will be pre-existing differences between those who do and do not use SC that may contribute to mental health and cognitive differences, such as concomitant effects of other drug use, that are not accounted for by the current cross-sectional research.

The mean quality rating of the internet surveys was 82.2%. A methodological limitation across all included surveys, bringing down their ratings, was the reliance on uncontrolled and purposive sampling. The Global Drug Survey is widely advertised through magazines and newspapers internationally. This type of sampling creates a response bias, whereby those who take part are more likely to have a greater interest in or experience with drugs and may not be representative of the wider general population. Two surveys focus specifically on SC users and recruitment relied on advertisement in internet forums and on social media platforms where SCs are discussed, again inviting further bias (Barratt et al., 2013; Vandrey et al., 2012). The samples are likely to over-represent those who have an extensive drug use history and are more engaged with online discussion groups, therefore these findings may not be representative of the wider populations of SC users. All the surveys rely on retrospective self-reporting of symptoms during the acute phase of taking SCs which introduces recall bias into the results, making them less reliable. None of the included surveys attempt to capture specific brands or compounds used therefore there is no way to attribute the effects reported to a specific SC compound.

The mean quality rating for the qualitative studies was 62.5%. Only two of the studies used verification procedures to establish the credibility of the analysis (Kassai et al., 2017; Soussan & Kjellgren, 2014) and none of the studies incorporated reflexivity bringing down the scores. In particular, one study undertaken in an inpatient setting relied on selection by staff and interviewing by a staff member, this may have had an influence on the participants' willingness to report the effects fully and honestly (Every-Palmer, 2011). In addition, this study relied on interviews being recorded by hand and then made into longer notes once completed as participants

declined audio recording. This will have introduced bias as what is recorded is shaped by what is remembered by the interviewer, which was not acknowledged in the paper.

One study attempted to control for type of SC taken and identified participants based on self-reported use of 5f-AKB48 and 5F-PB-22 (Van-Hout & Hearne, 2017), however, the details of how this was verified are not stated. The remaining studies collected limited information on specific compounds, with only one reporting brand names (Every-Palmer, 2011). One study used a validated measure (the Severity of Dependence Scale) to determine dependence on SCs in their sample (Van-Hout & Hearne, 2017) and another recruited those with who were seeking treatment for problematic SC use (Kassai et al., 2017), therefore these samples may have more experience with negative effects than SC users from the general population.

Sampling is a key issue across the cross-sectional, survey and qualitative research. The most common approach is purposive sampling which introduces bias into the results, again reducing the generalisability of findings. The literature acknowledges the difficulty finding users who specifically use SC, where there are comparisons drawn with NC the overlap between the use of the two drugs creates issues with associating effects with SC specifically, as SC users typically also use NC. The review found only one study conducted in a forensic setting (Every-Palmer, 2011) and no research with homeless or prison populations where SC use is prevalent.

Another limitation of current research is the lack of biological confirmation of SC use from immunoassays of bodily fluid. The technology for this is not yet widely available and only one study discusses serum levels of SCs (Theunissen et al., 2018). Instead, studies are dependent on self-reporting of SC use and this reduces the reliability as it introduces recall bias. In combination, the heterogeneity of the 179 SCs

available, and the insufficient data on specific compounds examined in each study further limits the interpretation of findings. Only the experimental study (Theunissen et al., 2017) and one qualitative study (Van Hout & Hearne, 2017) attempt to explore effects from a specific compound. However, the latter does not state how it does this, other than plainly stating it recruits participants who use 5f-AKB48 and 5F-PB-22. Therefore, we can only draw limited conclusions about specific SCs or SCs in general from the current research.

Review Limitations

The research reviewed is varied in both the research questions posed and the study population examined. A breadth of research questions have been collated, integrating findings of acute effects, from experimental administration and self-report data, with longer-term effects, from psychological measures and cognitive tasks taken from those self-identified as SC users. The review also relies on information across study populations, from cannabis users in the general population (Blevins et al., 2016; Cohen et al., 2017; Gunderson et al., 2014) to those with serious mental illness (Altinas et al., 2016; Every-Palmer 2011) to dependent users and those engaged with drug treatment (Kassai et al., 2017; Van Hout and Hearne 2017) to high school students (Clayton et al., 2017). This clearly limits the integration of the findings from these studies.

The majority of the reviewed research does not differentiate between the psychological effects of SCs according to different usage patterns, which limits the conclusions we can draw from the findings. Only two of the included studies specifically look at problematic (Kassai et al., 2017) and dependent (Van Hout & Hearne, 2017) users giving more useful information about a sub-group of the SC user

population. In addition, two cross-sectional studies specify a certain level of use to be categorised as an SC user (Altinas et al., 2016; Cohen et al., 2017). Other than this the research does not distinguish between those who have used SCs once and those who use regularly. In these cases, it is difficult to determine if the psychological effects observed are related to the prolonged use of SCs or provide information about the profile of those who might try SCs.

In addition, is important to note that these studies come from a time period when SCs have undergone several legal changes internationally. This will have had an impact on the production and availability of different compounds and the market continues to evolve today. Therefore, the review may not accurately represent the profile of psychological effects of SCs that are predominantly in circulation at the moment. As of December 2017, 179 SCs were notified to the EMCDDA (2018).

Clinical Recommendations

Given the diversity of available SC compounds and the limited available evidence highlighted from this review, making specific clinical recommendations currently is problematic. It is evident that SC use is becoming increasingly popular in some populations and actions taken by governments to reduce their availability appear inadequate. It is therefore imperative for clinicians to be aware of SC use and its broad range of potential consequences in order to provide support and advice to users around the impact and danger it can cause.

Research Recommendations

Given that SC use is a relatively recent phenomenon it is apparent that it is an under-researched area. However, the continual growth of this market suggests that SCs will continue to be widely available via the internet, from cryptomarkets on the Dark

Web and other cryptomarkets, and therefore pose an ongoing risk. More rigorous evidence on the effects of SC use is needed to inform clinical decisions and policy making.

Research methods need to be improved with the inclusion of biological confirmation of use, through testing samples, and an attempt to identify the specific compound used in order to inform the conclusions drawn. There is a need for more controlled lab studies looking at the acute effects of SC use. However as Theunissen et al., (2018) found, ethical approval for research with a large sample size is currently difficult to achieve due to the risks involved with administering SCs to participants. More naturalistic studies prospectively monitoring the acute effects for users in their own homes may be more possible, bypassing some of the ethical issues and reducing costs of getting SCs made at research quality.

Cross-sectional research could be improved with larger samples and therefore better powered studies to assess between groups of users and non-users. This research should attempt to control for the many potential confounding factors that may account for some of the group differences observed. Clearer categorisation in research of regular users compared to one-off users would also prove useful in mapping the prolonged psychological effects of SC use. There have been no longitudinal studies, following up large cohorts to map the effects of SC use prospectively over time, to date. A study of this kind would prove useful in the future.

Conclusions

SC use is a growing concern and there is an urgent need to bring together current knowledge to inform users, healthcare professionals and policymakers. This review integrates findings from a range of sources to evidence what we understand

about the impact of SCs at the moment. It is evident that SC use can result in a range of psychological outcomes as well as SC users being more impaired in behavioural, affective and cognitive domains, compared to NC and non-users. It also highlights the difficulties of capturing the effects of these compounds due to their ever-increasing variety and potential dangerousness. The latter has limited the possibility of large-scale controlled experimental research. Going forward, novel research methods with large samples are required to better understand the psychological consequences of taking these substances.

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Part 2: Empirical Paper

An Exploration of the nature and prevalence of substance use in a forensic population and an evaluation of its role in recall to hospital.

Abstract

Aims: The current study set out to determine the range of substances and patterns of use in a forensic population, specifically those under section 37/41 of the Mental Health Act, at different stages of engagement with an inner-city forensic service. In particular, the study aimed to compare substance use by those who have been formally recalled to hospital, with that of those who remain on conditional discharge in the community. **Method:** Data were collected from patients who had been formally recalled (Recalled group, n=18) and those who remain on conditional discharge (Discharged group, n=12). A full drug history was taken alongside psychological well-being and premorbid IQ measures. Case notes were also screened to gain demographic and other clinical information (e.g. diagnoses and offending history). **Results:** Comparisons between the Recalled and Discharged participants showed no group differences in demographic variables, offending history or psychological symptomatology. Cannabis use was significantly more prevalent in the Recalled group post-discharge and subsequently in the community compared to the Discharged group. Within-subjects analysis comparing substance use in the community at different time points found that the Discharged group were significantly *less* likely to be using cannabis post-discharge and subsequently in the community, compared to use at the time of their index offence. In contrast, the Recalled group, who showed no change in cannabis use across time. In addition, users of cannabis and alcohol post-discharge spent a significantly shorter amount of time in the community than non-users. **Conclusions:** The findings suggest that, in this sample, cannabis and alcohol are associated with recall to hospital.

Introduction

Substance Use, Mental Health and Violence

There is an increasing evidence base linking mental disorder, substance use and violent behaviour (Phillips, 2000 for a review), however, the specific nature of this relationship is unclear. A range of drugs, including alcohol, cannabis, crack and cocaine, have been linked to violent behaviour in both the general population and those suffering from mental illness (Pickard & Fazel, 2013 for a review). In the non-offending psychiatric population frequent use of both illicit drugs and/or alcohol, has been linked to poorer outcomes in well-being and psychosocial functioning (Rachbeisel, Scott & Dixon, 1999).

Odds of violence have been shown to be eight to ten-fold higher in individuals with severe mental illness who are also diagnosed with a substance use disorder, compared to the general population, whereas there is only around a two-fold increase for those with a serious mental illness who do not have this comorbidity (Fazel, Gulati & Linsell, 2009). As a result, increased rates of substance use disorders and co-morbid mental illness, known as dual-diagnosis, have been observed in forensic populations compared to general psychiatric inpatients (Wheatly, 2008). There is now growing evidence for improved outcomes for forensic patients following treatment for substance use disorder, including increased time spent in the community and abstinence from drugs (Derry & Batson, 2008; Miles, 2015).

Alcohol.

Alcohol has an established link with violence (see Boles & Miotto, 2003 for a review). Longitudinal research has shown an association between alcohol use and violent offending when controlling for a range of possible confounding factors (Boden, Fergusson & Horwood, 2012).

Cannabis and synthetic cannabis.

It is known that cannabis use is more prevalent in in patients with a psychotic illness, with an Australian study finding a lifetime prevalence of 97% and a last-year usage prevalence of 47% (Moore, Mancuso, Slade, Galletly, & Castle, 2012). Speculation about reasons for use have included ideas of self-medication to alleviate psychotic symptoms or reduce the side effects of antipsychotic medication. Previous studies have shown patients diagnosed with psychotic disorders are more likely to experience adverse effects from cannabis use than non-psychotic patients (D'Souza et al., 2016; Green, Young & Kavanagh, 2005). In particular, continued cannabis use following a psychotic episode is associated with heightened severity of positive symptoms, increased risk of relapse and longer length of hospital admissions (Schoeler et al., 2016).

Synthetic cannabis use is a relatively recent phenomenon, initially used recreationally as a way to mimic the effects of cannabis. However, these compounds tend to be much more potent than natural cannabis (Auwärter et al., 2009; EMCDDA, 2011). There is increasing evidence of worsening of mental health difficulties and poorer outcomes in those with pre-existing conditions following synthetic cannabis use (Bassir Nia, Medrano, Perkel, Galynker, & Hurd, 2016; Celofiga, Koprivsek, & Klavz, 2014; Leibur et al., 2013; Manseau et al., 2017; Shalit et al., 2016 for example). In the UK prison system, use of synthetic cannabis is a particular concern, with use within prisons having increased three-fold between 2015 and 2016 (EMCDDA, 2017). It has also been documented that synthetic cannabinoids induced adverse psychological effects in a forensic psychiatric sample in New Zealand (Every-Palmer, 2011).

Crack cocaine.

Crack cocaine has been associated with a greater risk of violence than intranasal cocaine (Vaughn, Fu, Perron, Bohnert & Howard, 2010). It has also been associated with worse mental health difficulties, with the severity of associated illness mediated by the frequency and intensity of use (Haasen et al., 2005).

Poly-substance use.

Polysubstance use has been shown to be more prevalent in criminal justice populations, and is associated with more psychological symptomatology (Håkansson, Schlyter & Berglund, 2011) and increased risk of reoffending (Baxter, Rabe-hesketh & Parrot, 1999; Håkansson & Berglund, 2012).

The Law – Section 37/41

In the UK, individuals who have committed a criminal offence but are deemed by a court to be required to be in hospital for treatment of a mental disorder can be subject to a Section 37 ‘hospital order’. This means the person will be sent to a specialist forensic hospital as opposed to receiving a prison sentence. A Section 41 ‘restriction order’ is sometimes added to this section if the individual is thought to be a risk of serious harm to the public. The restriction order means that the person cannot be granted leave of absence or be discharged from hospital without the express permission of the Secretary of State for Justice. Individuals on Section 37/41 usually receive a ‘conditional discharge’ when they are first discharged. This means conditions are set for their discharge, which, if broken renders them liable to be recalled to hospital (Mental Health Act, 2007).

Conditional Discharge

Conditional discharge from a forensic hospital can be a challenging transition period. Individuals are required to abide by legally enforceable conditions imposed by the Ministry of Justice, as well as face issues of reintegration into society after a lengthy period in hospital.

Conditions of discharge may include limits on travel, curfews, abstinence from recreational drugs and alcohol, attendance of appointments, structured day-time activity and compliance with medication and treatment (Coffey, 2012). Patients conditionally discharged are provided with support from clinical teams including Mental Health Nurses, Social Workers and Psychiatrists who they meet with at regular appointments. These allow for monitoring and supervision of both a patient's mental health and level of risk (Coffey, 2012).

In the UK, where an individual has a history of drug or alcohol use, abstinence is usually a requirement for conditional discharge from secure hospitals. Compliance with this is typically monitored by routine urine or saliva samples. Legally, patients can be formally recalled to hospital when they are in breach of their conditions, this includes a positive drug screen. However, recall to hospital is not intended to be used punitively and therefore could not be justified solely on failure to comply with terms of the discharge. If an individual no longer can remain safely in the community this would warrant a formal recall to hospital (Scott-Moncrieff, 2002). Recall, in reality, often results from a combination of factors such as drug use, medication non-compliance, relapse in mental health and/or an act or threat of violence (Hayes, Kemp, Large & Nielssen, 2014).

When there is substance use, the consequences usually can only be enforced retrospectively (Pickard & Fazel, 2013). For services this is problematic as the period

of increased risk has usually passed by this point. Technological advances such as trans-dermal alcohol monitoring devices and secure ankle bands allow for concurrent monitoring of alcohol use and location respectively. These are currently being trialled in forensic populations in the UK and non-psychiatric offending samples in the USA, (Loudenburg, Drube & Leonardson, 2011; Tully, Hearn & Fahy, 2014). This method allow for swift recall if conditions are contravened, either in terms of absconding or alcohol use. Early findings suggest reduced breaching of conditions with such methods, however one must not discount the ethical and legal issues this intense level of surveillance raises (Watson, Madhani, Mysoreka & Solitt, 2014).

Substance Use in a Forensic Setting

A previous study has examined substance use in a population of forensic patients in a medium secure unit in the UK (De Burca, Miles & Vasquez, 2013). Fifty-seven case records were reviewed and 21 interviews were conducted, to gather information on historical substance use. They specifically examined lifetime use and use at the time of their index offence for a range of substances. They found that alcohol was most commonly used, with three quarters of the sample reporting heavy daily use. Cannabis was the next most frequently report and then amphetamines. They also found that heavy past use of alcohol predicted assault offences, and no other types. In addition, that heavy past alcohol use correlated with the amount of past convictions.

Substance Use and Conditional Discharge

Follow-up studies looking at outcomes for released forensic patients have mainly focused on rates of reoffending, readmission to hospital and mortality (Fazel, Fiminska, Cocks & Coid, 2016 for a review). There have been differing findings about the role of substance use in recall to hospital and other outcomes following conditional

discharge. In Australia, a study retrospectively examined case records from 364 offenders to assess outcomes to those granted conditional and unconditional release from a forensic setting. Substance use was found to be the most common reason for revocation of conditional release (Hayes et al., 2014). In the USA, a review of the charts of 193 clients admitted to a forensic clinic in New Orleans over a ten-year period was conducted to assess factors relating to success on conditional discharge. Substance use or dependence was shown to be the strongest predictor of criminal incidents during conditional release, however, this was not associated with conditional release status (Manguno-Mire, Coffman, DeLand, Thompson & Myers, 2014). In a large retrospective cohort study in Sweden, data from 6505 patients' records was analysed (Fazel, Wolf, Fiminska & Larsson, 2016). Authors found having a diagnosis of a substance use disorder was associated with the increased risk of psychiatric readmission, violent offending and mortality.

In contrast, in the UK, a review of records for 1344 offenders who had been admitted to a medium secure unit over a four-year period, found that lifetime history of comorbid substance misuse or dependence was not significantly associated with risk of reoffending when discharged (Coid, Hickey, Latan, Zhang & Yang 2007). They did find that alcohol dependence was significantly associated with greater risk of reconvictions for arson specifically. Another UK study found that either alcohol or drug use after discharge was associated with reconviction across offence types, from analysis of 959 patients' records (Scott, Whyte, Burnett, Hawley & Maden, 2004). Riordan, Haque and Humphreys (2006), conducted reviews of the case notes of 75 discharged patients from forensic services in the UK and found that while historical drug misuse was a predictor of hospital readmission and serious incidents, it did not predict formal recall to hospital.

In all of these studies, historical data was gathered from case files so that information on the nature of substance use, what type of substances and frequency of use was not routinely captured. Three studies examined alcohol independently from substance use (Coid et al., 2007; Riordan et al., 2006; Scott et al., 2004). One study did record prevalence of different types of drug use, however this was not related to outcomes in the analyses (Scott et al., 2004).

Accuracy of Self-report and Case Note Records of Substance Use

The accuracy of case notes in documenting substance use has been questioned. An evaluation of a range of methods was conducted by Bloye, Razman, Leach, Davies and Hilton (2003). In this study, a comparison across self-report, case notes and clinicians' ratings of substance use prevalence and risk consequences was carried out. Similar to other research (De Burca, Miles & Vasquez, 2012; Smith, Frazer, Bower & Donovan, 1994), they found that case notes tended to under-estimate substance use compared to self-report methods. From this, it is evident that relying solely on case notes as a measure of substance use may be unreliable.

Substance Use at Different Time Points

In a Norwegian study follow-up interviews with thirty-eight patients discharged from a maximum-security hospital were used alongside case note reviews, in order to enhance access to clinical and psychosocial information (Bjorkly, Sanfli, Moger & Stang, 2010). The authors captured information about drug use at three different time points: lifetime use, during the stay in hospital and post-discharge. When comparing those who had been convicted of a crime since discharge to those who had not, they found that lifetime use was significantly greater in the group with convictions. However, drug use post-discharge was not significantly different in the

two groups. In addition, forty-two percent of individuals admitted using drugs on a daily or weekly basis since discharge, however, this did not significantly relate to whether they had been convicted of a crime during this period. It is unclear about the detail recorded in this study about substance use, authors describe structured interviews with fixed response options. Analyses of outcomes rely on the broad category of substance use, not differentiating between substance classes.

Current Research

There is a paucity of research unpicking the role of substance use in recall to hospital for forensic patients. The studies described above rely on crude measures of drug use providing little information on the types of substances and patterns of use that lead to negative outcomes. Conditional discharge often carries a stipulation of abstinence from substances, however, it is evident that this is not often adhered to (Bjorkly et al., 2010) and there is limited understanding of the specific nature of drug use which is linked to poorer outcomes such as reoffending, relapse and readmission.

Therefore, the current study seeks to further elucidate the link between substance use, mental health issues and recall to hospital for forensic patients. The study compares two groups of patients, those who have been recalled and those who remain on conditional discharge. We did not make specific directional hypotheses, as this is not appropriate given the exploratory nature of the project.

Research Questions.

1. What is the prevalence of alcohol, cannabis, synthetic cannabis and crack use in individuals recalled to hospital compared to those who remain on conditional discharge at different points of engagement with a Forensic service?

2. Is there a difference between substance use before the index offence, immediately following discharge and subsequently more recently in the community?
3. Is substance use associated with number of days spent in the community after discharge?
4. What is the interplay between psychological factors and recall to hospital.
5. What are the reasons reported by patients for recall to hospital?

Method

Design

The current study is an observational, between-subjects design comparing two groups of patients. Those who have been formally recalled under Section 37/41, the Recalled group, to those who remain conditionally discharged and living in the community under Section 41, the Discharged group, on measures of substance use and psychological well-being.

Ethical Approval

NHS Ethical approval was obtained from the London Bridge Research Ethics Committee (REC reference: 17/LO/0867; Appendix 1).

Participants

Power analysis.

A power analysis was conducted using the G*Power computer program (Faul, Erdfelder, Lang & Buchner, 2007) to determine sample size, specifying alpha = 5%, effect size = 0.36 and desired power = 80%. The estimated effect size was calculated based on a study by Bjorkly et al., (2010), an odds ratio was calculated based on the reported chi-squared results. In this study, the authors used a similar method of semi-

structured interviews in a forensic population to assess many factors including drug use. Assuming equal group sizes, a minimum total sample size of $n=56$ (28 in each group) would be required to detect a significant difference in the prevalence of substance users between the two groups using a chi-squared analysis.

Based on initial figures provided by the service there had been 59 formally recalled individuals from mid-2012 to the present day. Greater figures were expected for clients conditionally discharged having never been recalled.

Sample characteristics.

Inclusion criteria.

All participants were engaged with an inner-city forensic service, under Section 37/41 of the Mental Health Act, as inpatients at a medium or low secure unit, or under Section 41 and conditional discharged in the community. Due to the very limited number of females engaged with the service, only men were recruited.

Exclusion criteria.

We excluded those who were deemed to lack the capacity to consent or to be too risky to be assessed, as judged by their clinical team. In addition, those under the care of the learning disability forensic teams were excluded due to the significant cognitive demands of the measures and interview.

Recruitment.

The sample was recruited over a period of six months (November 2017 – May 2018). A report was drawn by the service managers in order to identify potential participants under the relevant Section, in total 97 individuals were found. A further six participants were identified through discussion between colleagues and within clinical teams. This list was then circulated to relevant teams for Clinical Psychologists

or other professionals working with the identified individuals. A member of the clinical team could then approach the potential participant to see if they were interested in taking part in the study, and gain consent for them to be contacted by the research team. In the Recalled group the majority of participants were in hospital and therefore there was a Clinical Psychologist linked to the relevant ward. Due to difficulties with recruitment, three participants from the Recalled group had subsequently been conditionally discharged again since their last recall. For the purpose of the study they completed the questions based on their discharge prior to their latest recall. For participants in the Discharged group, recruitment fell to Psychiatrists at review appointments, or Outreach and Substance Use Support Service workers at individual and group meetings. If the individuals were interested, a member of the research team would then make contact to discuss the study and provide them with the participant information sheet (Appendix 2). Participants were reimbursed £12 cash for their participation.

Please see Figure 1 for a diagram of the recruitment process. From the 35 potential recalled patients, 16 did not take part for various reasons, shown in Figure 1. From the 19 recalled patients who did take part, one was ineligible, nine were from the medium-secure unit, seven from the low secure and three from the community. From the 68 potential discharged patients, 56 did not take part, see Figure 1. All 12 of the discharged patients were in the community.

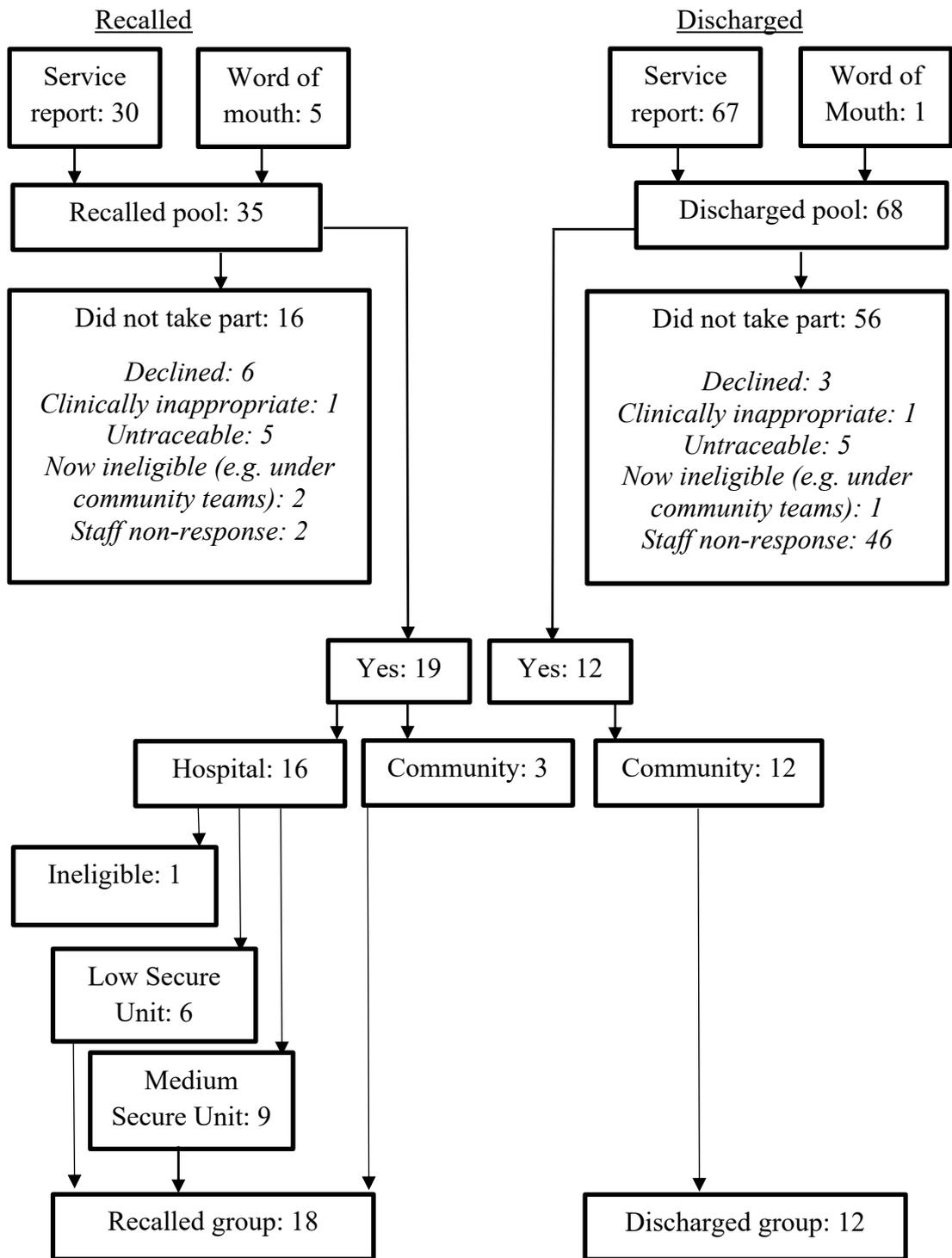


Figure 1
Flow diagram of the recruitment process

Measures

Consenting participants were provided with questionnaires which were administered in the form of a semi-structured interview. Following this, their case notes were reviewed.

Substance use.

Use history.

Existing measures for substance use were considered, however from the available measures, none were appropriate to be applied across different time-points due to the cognitive demands this would place on participants and the length of time it would take. Therefore, a bespoke substance use frequency measure was developed based on the timeline follow-back (TLFB; Fals-Stewart, O'Farrell, Freitas, MacFarlane, & Rutigiano, 2000; Sobell & Sobell, 1996), see Appendix 3 for an example of one section of the measure.

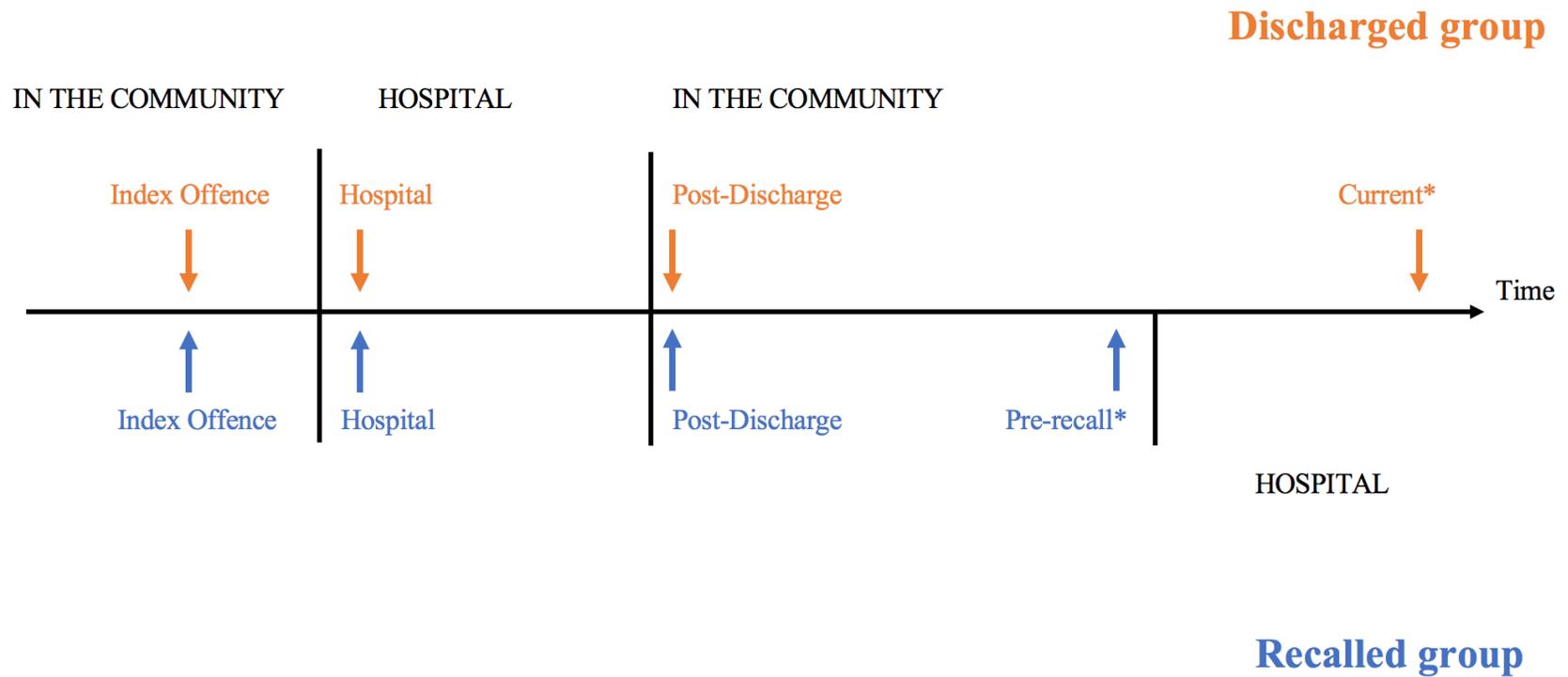
This focused on 4 main substances that had been identified by the Substance Use Support Service Lead in the team as the most commonly used among patients, and have been previously evidenced as problematic, either linked to violence or worsening mental health difficulties. These were alcohol, cannabis, synthetic cannabis and crack. The measure captured the variation in substance use at five different time points: at the time of Index Offence, whilst in Hospital (prior to the most recent discharge), Post-Discharge, Pre-Recall (Recalled group only) and Current use (Discharged group only). If a participant had been recalled multiple times they would be asked to think about the most recent discharge and recall. See Figure 2 for an illustration of the different time points.

As these questions relied on episodic memories, which are vulnerable to memory errors, such as simple forgetting, fabricating and telescoping (Barsky, 2002),

participants were first asked orientation questions to the relevant time-point, i.e. can you remember when your index offence occurred, what year was it, what month or season. This method is taken from the timeline follow-back measure and aims to improve accuracy of recollection through the use of multiple questions about an event, use of landmark events as retrieval cues, and reconstruction of past events.

Participants were then asked about frequency of use of each of the four substances in the relevant month period, e.g. in the one month leading up to your index offence or in the one month after you were last discharged how often did you use alcohol – every day, 4-6 days a week, 1-3 days a week, 1-3 days a month, less than monthly. Participants were provided with a visual scale to help report this (Appendix 4). Participants were also asked about the amount of each substance used, on a typical day. Participants were asked where possible to estimate the weight of substances, however, this was not always possible. Where users reported ‘a spliff’ or ‘a joint’, of either cannabis or synthetic cannabis, this was converted to 0.25g as has been shown is the average amount of cannabis in a spliff (Kögel et al., 2017).

Although substance users with serious mental illness may have difficulty accurately recollecting the specific amounts of substances used, it has been speculated that this information may not be central to understanding individuals’ substance use behaviours (Mueser, 2003). Rather, patterns of use, including types of drugs used and approximate frequency, are more reliable data.



*Use at these time points compared in analyses

Figure 2

Time points where historical and current alcohol and other substance use was assessed

Participants were also briefly asked about a range of other substances they may have used such as ketamine, opioids and amphetamines. They were asked to record if they had ever used and ever regularly used.

Dependency.

Dependency on drugs was measured using the Severity of Dependence Scale (SDS; Gossop et al., 1995). This is a 5-item scale that has been reported to be a reliable (Cronbach's $\alpha = 0.87$) and valid screening instrument for indexing dependence and severity of dependence across several substance classes (Gossop et al., 1995). Items ask about psychological components of dependence, impaired control over drug taking, preoccupation and anxieties about drug use.

Dependency was assessed referring to time points to reflect the period most recently the community. For those in the Recalled group they were asked to answer in reference to their usage at the Pre-recall time point: 'In the one month before you were recalled did you feel your alcohol was out of control?' For those in the Discharged group they were asked about their current use: 'Do you currently ever feel your use of alcohol is out of control?' Participants then had the following response options: 'never or almost never', 'sometimes', 'often' or 'always or nearly always'. Answers are weighted 0-3 respectively, scores are summed to provide an overall score of dependency with a maximum score of 15. The SDS was used for the four main drug types: alcohol, cannabis, synthetic cannabis and crack. Clinical cut offs exist for some substances, for example, a score of greater than or equal to 4 is indicative of clinical dependency on cannabis.

Self-efficacy.

Self-efficacy in relation to drug use was measured using the Drug-Taking Confidence Questionnaire, Brief Form (DTCQ-B; Sklar & Turner, 1999) which

assesses confidence about resisting substance use in specific situations. This is a short 8 item scale that has been shown to be reliable and valid from a sample of clients seeking treatment for addictions (Sklar & Turner, 1999). It asks participants to imagine themselves in a range of situations, such as feeling angry at the way things turned out or wanting to celebrate with a friend, and to then rate their confidence in resisting drugs and/or alcohol in that situation, as a percentage between 0% and 100%. A mean percentage is then calculated from the items to provide a global self-efficacy score, with a maximum score of 100%.

Premorbid functioning.

Premorbid verbal intelligence was indexed using the Spot-the-Word test (STW; Baddeley, Emslie, & Nimmo-Smith, 1993). It is a lexical decision task that correlates with premorbid verbal IQ measures such as the NART, however, it is a less anxiety-producing measure which is important for people with low educational attainment. The participant is required to select the real word from each of 60 letter-string pairs of items comprising one word and one non-word, a nonsense made-up word made to look like a real word (e.g. slank – chariot, sterile-palth, byzantine-chloriant). The sum of correctly identified words constitutes a score denoting premorbid IQ with a maximum score of 60.

This has been shown to be a reliable and valid measure of verbal intelligence in a sample of students (Baddeley et al., 1993). Studies have shown that performance on the STW is not affected by age or gender, though higher educational level does improve scores (Baddeley et al., 1993; Saxton et al., 2001; Yuspeh & Vanderploeg, 2000). It is also relatively stable following neurological impairment (Yuspeh & Vanderploeg, 2000).

Psychological well-being factors.

Psychotic symptomatology.

The Schizotypal Personality Questionnaire-Brief (SPQ-B): a brief screening instrument for schizotypal personality disorder (Raine & Benishay, 1995) was used to assess for levels of schizotypy in the sample, as a proxy for psychotic-type experiences. This is 22-item self-report measure requiring participants to indicate 'yes' or 'no' to how much a range of statements applies to them. The measure has three subscales: cognitive-perceptual, e.g. 'have you ever had the sense that some person or force is around you even though you cannot see anyone?'; interpersonal e.g. 'I feel I have to be on guard, even with my friends'; and disorganised, e.g. 'I sometimes use words in unusual ways'. The 'yes' answers are summed to provide a total scale score, with a maximum score of 22, and the three subscale scores.

The measure has been shown to be reliable, with an internal consistency of 0.76 (Raine & Benishay, 1995).

Depression.

Depression symptoms were measured using the Beck Depression Inventory (BDI-II, Beck, Steer & Brown, 1996) a 21-item self-report measure of severity of symptoms of depression over the past two weeks. It requires participants to pick out a statement from a selection of four that applies to their experience of a range of depression symptoms including pessimism, loss of hope for the future and suicidal thoughts. For example, 'choose one of I do not feel sad; I feel sad much of the time; I am sad all of the time; I am so sad or unhappy that I can't stand it'. The statements are weighted 0-3 and the scores are summed to give a total, with a maximum possible score of 63. Scores above 14 represent clinically significant symptoms, with scores greater than 29 indicating severe difficulties.

The BDI has been shown to be valid and reliable in psychiatric and non-psychiatric populations, with an internal consistency of 0.87 (Beck, Steer, & Carbin, 1988). It has recently been validated with psychiatric inpatients as a measure of depression symptomatology (Subica et al., 2014).

Anxiety.

Anxiety symptoms were measured using the Beck Anxiety Inventory (BAI, Beck, Epstein, Brown & Steer, 1988) a 21-item measure self-report measure of general anxiety over the past two weeks. It asks responders to rate the frequency of experience of a range of anxiety symptoms such as numbness or tingling, feeling scared and panic. They can respond with 'not at all', 'mildly, it did not bother me much', 'moderately, it was very unpleasant, but I could stand it' or 'severely, I could barely stand it'. The responses are weighted 0-3 respectively and scores are summed to give a total scale score of anxiety symptomatology, with a maximum score of 63. Scores above 10 indicate clinical significance, with scores greater than 30 representing severe difficulties.

The BAI has been shown to be reliable for a sample of psychiatric outpatients with a Cronbach's α of 0.92 (Beck et al., 1988).

Well-Being.

The World Health Organisation (WHO) Wellbeing Index is a self-report measure of positive mental health. It consists of five items that are rated on a six-point scale from 'All of the time' to 'At no time'. The participant is requested to rate their agreement over the previous two weeks, for example of having 'felt cheerful and in good spirits'. Responses are weighted 0 – 5, and scores are then summed, with a maximum score of 25, and higher scores indicate a more positive rating of wellbeing.

It has been shown to have good internal consistency (Cronbach's $\alpha = 0.91$; Löwe et al., 2004). It has been shown to be useful and valid as a measure of treatment response and outcomes in a psychiatric population (Newnham, Hooke, & Page, 2010).

Recall factors.

Participants in the Recalled group were asked to report in their own words their reasons for being recalled. They were also asked to select reasons from a list including, alcohol, drugs, mental health and housing issues and say whether 'yes', 'maybe' or 'no' as to whether this may have played a role in their recall/ in potential recall, the Recalled and Discharged groups respectively. They were then asked to rank what they think to be the most influential reasons linked to being recalled.

Case Note Reviews

These were conducted to gather demographic and historical information including age, ethnicity, diagnoses, index offence and substance use history across different time points. This included, when detailed in the notes, biological measures of drug use from mouth swabs and urine screens. Information was gathered from electronic progress notes, Multi-Disciplinary Team reports, risk assessments and information from courts by the two researchers (HA and MR).

Procedure

Initial contact and arrangements.

The study was initially discussed at the User Involvement Group at the hospital site, it was then piloted with three service users who provided feedback on acceptability and made suggestions for adaptations.

Following identification by clinicians of potential participants, individuals were contacted to discuss the study, to go through the information sheet and answer

any questions they had. Data collection took place either on the ward or in the hostel where participants were residing, always in a separate, private room to ensure confidentiality was maintained. These were conducted at times suitable for the participants as to not disrupt their engagement with therapeutic activities. Handovers from ward or hostel staff were always taken prior to starting to ensure it was deemed clinically appropriate to meet with them. Payment was provided following completion of the data collection, and staff were consulted to ensure this was done in line with any care plans.

Testing session.

Participants were first guided through the information sheet (Appendix 2), which they had received in advance. As it has been noted that the accuracy of information provided by offenders depends to some extent on their trust of the interviewers and their impression of whether it will be kept confidential (Hodgins, 2001), confidentiality and the distinction between the research team and the service provider were emphasised. This was to encourage participants to be as honest as possible. However, the usual limitations of confidentiality were explained, in the case of risk to self or another. Participants completed a consent form (Appendix 5) to ensure they fully understood what was involved and how the data would be processed.

The interview was then carried out, including the completion of the measures described above, and this lasted approximately 90 minutes. Participants were given the option of completing the measures independently or having the research administer them where appropriate. This was aimed to reduce the cognitive burden placed on participants as it is known substance use, psychiatric illness and medication can cause difficulties with memory, abstract thinking, attention and concentration (Braff, 1993; Carey, 2002). Substance use questions were spread throughout the interviews to

minimise the potential for inducing cravings. Participants were given a short break in the middle of the testing session if they requested one.

Case note review.

Following the interview, data was also collected from the electronic records, as described above. This took place at one of the hospital sites.

Data Analysis

Statistical Package for Social Sciences (SPSS Version 25) was used to perform all analyses. Main outcome variables were inspected for normality and transformed where possible to allow parametric tests to be carried out. Group differences were analysed using independent sample *t*-tests for continuous variables and χ^2 -tests for categorical variables.

To assess change of substance use in the community over time, a new variable was created, see Table 1 for details. The variables Index Offence and Post-Discharge refer to the same time point for both groups. The Community variable captures the most recent period of time spent in the community, with the aim of comparing drug use in the community in those who went onto be recalled with those who remain on discharge. As such, for the Recalled group this variable refers to the one month prior to recall (Pre-recall as shown in Figure 2) and for the Discharged group this variable refers to the one month prior to study participation (Current as shown in Figure 2). As the data collected were categorical and repeated measures analyses were needed, a combination of Friedman's and χ^2 tests were used. There was no appropriate alternative to a mixed ANOVA due to the categorical nature of the data and the small sample size, therefore interaction effects were not determined.

Table 1

Description of variables created for analyses of substance use in the community over time

Variable	Description of time point	
	Discharged and Recalled groups	
Index Offence	The one month before the offence for which they are currently detained or on conditional release for.	
Post-Discharge	The one month after the most recent discharge.	
	Discharged group	Recalled group
Community	The past one month	The one month prior to the most recent recall

Results

Participants

Thirty-one participants were seen, 19 who had been recalled and 12 who had been never recalled, (see Figure 1 for a breakdown). One participant from the Recalled group was excluded following data collection as he was not under Section 37/41. Of the thirty eligible participants, all were male, with a mean (SD) age of 40.9 (8.9) years (range from 28 to 58). There was no significant group differences in age (see Table 2 for details). The majority of both groups were ethnically Asian or Black and few had educational qualifications above GCSEs. All participants had a diagnosis of a psychotic illness recorded in their case notes, with 30% (n=9) having a co-morbid diagnosis of personality disorder, see Table 2.

Table 2

Sample characteristics

	<u>Total</u> <u>(n=30)</u> <i>Mean</i> <i>(SD)</i>	<u>Recalled</u> <u>(n=18)</u> <i>Mean</i> <i>(SD)</i>	<u>Discharged</u> <u>(n=12)</u> <i>Mean</i> <i>(SD)</i>	<u>P-value</u>
Age at assessment	40.90 (8.90)	40.00 (8.57)	42.25 (9.60)	0.507 ^a
Education	<i>n</i> <i>(%)</i>	<i>n</i> <i>(%)</i>	<i>n</i> <i>(%)</i>	N too small
No qualifications	16 (53.3)	10 (55.6)	6 (50.0)	
GCSE	9 (30.0)	5 (27.8)	4 (33.3)	
A-Level	2 (6.7)	1 (5.6)	1 (8.3)	
University/Post-graduate	3 (10.0)	2 (10.1)	1 (8.3)	
Ethnicity				N too small
White British and/or other White	5 (16.7)	1 (5.6)	4 (33.3)	
Asian/Asian British	11 (36.7)	6 (33.3)	5 (41.7)	
Black African/Caribbean/Black British	12 (40.0)	3 (16.7)	9 (75.0)	
Other: Middle-Eastern/and or East Asian	2 (6.7%)	2 (10.1%)	0.0 (0.0%)	
Diagnosis				N too small
Psychotic and personality disorder	9 (30.0)	3 (16.7)	6 (50.0)	
Psychotic disorder only	21 (70.0)	15 (83.3)	6 (50.0)	

^a Group differences compared with an independent samples *t*-test

Offending History

The mean (SD) age at index offence was 28.7 (7.8) years, ranging from 19 to 48 years. There was no significant difference in age at index offence between the two groups (see Table 3). The most common type of offence was assault, including actual bodily harm and grievous bodily harm, followed by murder or attempted murder and other offences, including robbery, damage to property and possession of a weapon.

Table 3

Offending history

	<u>Total</u> (n=30)	<u>Recalled</u> (n=18)	<u>Discharged</u> (n=12)	<u>P-value</u>
	<i>Mean</i> (<i>SD</i>)	<i>Mean</i> (<i>SD</i>)	<i>Mean</i> (<i>SD</i>)	
Age at IO	28.70 (7.79)	27.17 (7.24)	31.00 (8.33)	0.192 ^a
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Index Offence type				N too small
Assault	11 (36.7)	6 (33.3)	5 (41.7)	
Arson	2 (6.7)	1 (5.6)	1 (8.3)	
Other offences ^c	7 (23.3)	5 (27.8)	2 (16.7)	
Murder/attempted murder/manslaughter	7 (23.3)	4 (22.2)	3 (25.0)	
Sexual violence	3 (10.0)	2 (10.1)	1 (8.3)	

^a Group differences compared with an independent samples t-test

^b Group differences compared with a χ^2 test

^c Includes robbery, damage to property and possession of a weapon.

Substance Use in the community: across three time points (Index Offence, Post-Discharge and Community)

Index Offence.

At the Index Offence time point, 56.7% of the sample reported using alcohol, 56.7% cannabis, 6.7% synthetic cannabis and 30% crack. Where possible χ^2 -tests were carried out and no significant differences were found between the two groups in use of alcohol, cannabis or crack at this time point, see Table 4.

Table 4

Prevalence of alcohol and other substance use at the Index Offence time point

<u>Substance</u>	<u>Total</u> (n=30)	<u>Recalled</u> (n=18)	<u>Discharged</u> (n=12)	<u>P-value</u>
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Alcohol	17 (56.7)	12 (66.7)	5 (41.7)	0.176 ^a
Cannabis	17 (56.7)	10 (55.6)	7 (58.3)	0.880 ^a
Synthetic cannabis	2 (6.7)	2 (11.1)	0 (0.0)	N too small
Crack	9 (30.0)	7 (38.9)	2 (16.7)	0.249 ^b

^aGroup differences compared with a χ^2 test

^bGroup differences compared with a Fisher's Exact test

Post-Discharge.

At the Post-Discharge time point, a third of the sample reported using alcohol, 23.3% cannabis, 6.7% synthetic cannabis and 10% crack. Where possible, χ^2 -tests were carried out and no significant difference was found in alcohol use between the two groups. The number of people using cannabis at this time point was significantly higher in the Recalled than the Discharged group, ($\chi^2(1) = 6.09, p = 0.024$, see Table 5 for details).

Table 5

Prevalence of alcohol and other substance use at the Post-Discharge time point

<u>Substance</u>	<u>Total</u> (n=30)	<u>Recalled</u> (n=18)	<u>Discharged</u> (n=12)	<u>P-value</u>
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Alcohol	10 (33.3)	8 (44.4)	2 (16.7)	0.235 ^a
Cannabis	7 (23.3)	7 (38.9)	0 (0.0)	*0.024^b
Synthetic cannabis	2 (6.7)	2 (11.1)	0 (0.0)	N too small
Crack	3 (10.0)	3 (16.7)	0 (0.0)	N too small

^aGroup differences compared with a χ^2 test

^bGroup differences compared with a Fisher's Exact test

*Significant at $p < 0.05$

Community.

At the Community time point, 43.3% of the sample were using alcohol, 26.7% cannabis, 6.7% synthetic cannabis and 16.7% crack. Where possible, χ^2 -tests were carried out and no significant difference in alcohol use was found between the two groups. As for Post-Discharge, cannabis use was significantly higher in the Recalled compared to the Discharged group at this time point ($\chi^2(1) = 7.27, p = 0.010$, see Table 6).

Table 6

Prevalence of alcohol and other substance use at the Community time point

<u>Substance</u>	<u>Total</u> (n=30)	<u>Recalled</u> (n=18)	<u>Discharged</u> (n=12)	<u>P-value</u>
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Alcohol	13 (43.3)	9 (50.0)	4 (33.3)	0.367 ^a
Cannabis	8 (26.7)	8 (44.4)	0 (0.0)	*0.010^b
Synthetic cannabis	3 (10.0)	3 (16.7)	0 (0.0)	N too small
Crack	5 (16.7)	4 (22.2)	1 (8.3)	N too small

^aGroup differences compared with a χ^2 test

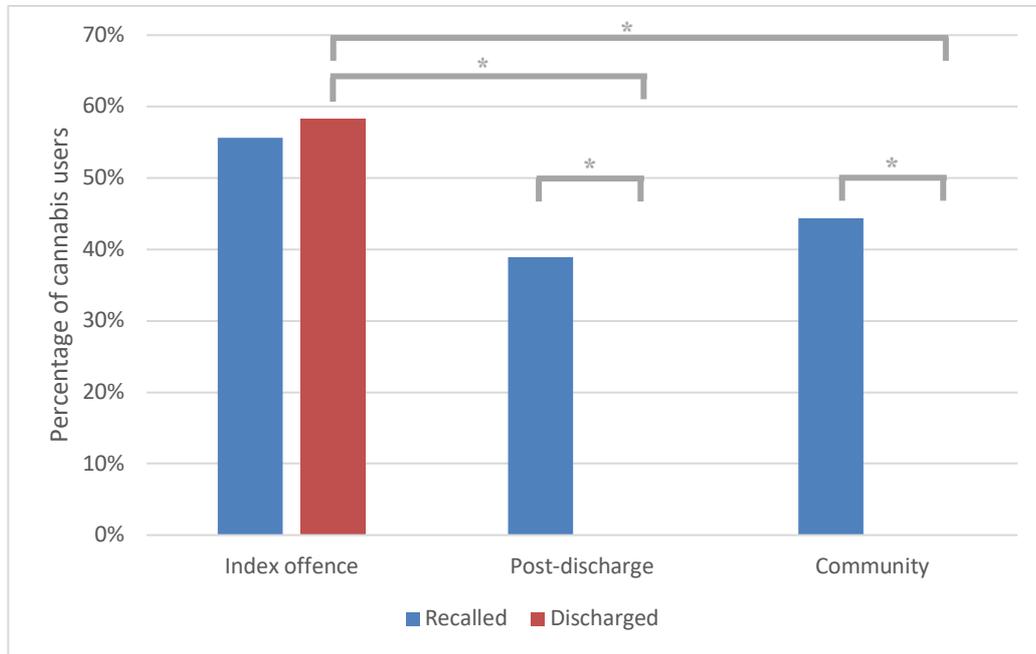
^bGroup differences compared with a Fisher's Exact test

*Significant at $p < 0.05$

In order to assess change in drug use over the three time points a series of repeated measures Friedman tests were carried out for alcohol and cannabis use in each group separately. Analyses were not carried out for synthetic cannabis or crack due to the small numbers of users in our sample. No significant differences in alcohol or cannabis use was found across the three time points in the Recalled group. Analysis of the Discharged group showed a statistically significant difference in cannabis use over the three time points, $\chi^2(2) = 12.00, p = 0.001$. There was no significant difference for any other drug type.

To investigate the significant difference across time in the Discharged group, post hoc analyses of Wilcoxon signed-rank tests were conducted, with a Bonferroni correction applied, resulting in a significance level set at $p < 0.017$. There was a significant reduction in cannabis use between Index Offence and both Post-Discharge ($Z = -2.65, p = 0.008$) and Current use ($Z = -2.65, p = 0.008$). There was no significant difference between use Post-Discharge and Community use ($Z = -0.00, p = 1.00$).

Figure 3 shows the change in the percentage of cannabis users across the three time points and between the two groups.



* Indicates statistical significance, $p < 0.05$

Figure 3

Percentage of participants in each group reporting using cannabis at each of the three time points.

Frequency of substance use across time.

Frequency data were collected, see Appendix 6 for full results. Due to the small numbers, no statistical analyses were carried out on this data. Participants who were using alcohol or substances were asked about the amounts they used on a typical day. Mean amounts of typical use on a day is shown for each drug Appendix 7.

Other substance use.

Table 7 shows a breakdown of certain substances ever used in their lifetime by the sample and across groups.

Table 7

Prevalence of lifetime use and lifetime regular use of ketamine, opiates, hallucinogens, stimulants and unprescribed medication

<u>Substance</u>	<u>Lifetime use</u>			<u>Lifetime Regular Used</u>		
	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Ketamine	4 (13.3)	3 (16.7)	1 (8.3)	1 (3.3)	1 (5.6)	0 (0.0)
Opiates	13 (43.3)	10 (55.6)	3 (25.0)	2 (6.7)	1 (5.6)	1 (8.3)
Hallucinogens	7 (23.3)	5 (27.8)	2 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)
Stimulants	15 (50.0)	13 (72.2)	2 (16.7)	4 (13.3)	4 (22.2)	0 (0.0)
Prescription medication (unprescribed)	3 (10.0)	2 (11.1)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)

Poly-substance use.

The data were examined to determine the prevalence of poly-substance use, focusing on the illicit drugs, therefore alcohol was not included in this analysis. At Index Offence, four participants were using two substances, cannabis and one other of synthetic cannabis and crack and one participant was using all three. Post-Discharge four participants were using multiple drugs, again all using cannabis, with one using synthetic cannabis, two using crack and one using both. For Community use four participants were using multiple drugs. All were using cannabis at this time point, with two also using synthetic cannabis and two using crack. Due to the small number of polydrug users it was not possible to compare between the Recalled and Discharged groups.

Substance use in hospital.

Self-report.

Participants were asked about their use of substances when previously admitted to a secure forensic unit, prior to the most recent discharge (Hospital time point, see Figure 1). Cannabis was the most commonly used substance, with 30.0% of the sample having used whilst in Hospital. Due to the small sample sizes statistical analyses were not conducted.

Table 8

Prevalence of self-reported drug use whilst in a secure unit (Hospital time point)

<u>Substance</u>	<u>Total</u> <u>(n=30)</u>	<u>Recalled (n=18)</u>	<u>Discharged (n=12)</u>
	<i>n</i> <i>(%)</i>	<i>n</i> <i>(%)</i>	<i>n</i> <i>(%)</i>
Alcohol	5 (16.7)	4 (22.2)	1 (8.3)
Cannabis	9 (30.0)	7 (38.9)	2 (16.7)
Synthetic cannabis	0 (0.0)	0 (0.0)	0 (0.0)
Crack	2 (6.7)	2 (11.1)	0 (0.0)

Case notes.

From the case notes it was found that 43.3% had a record of a positive urine drug screening (UDS) at this time, see Table 9 for details. The Recalled group were significantly more likely to have a positive screening than the Discharged group, $\chi^2(1) = 6.84, p = 0.009$. Drug screens were positive for cannabis (n=10), amphetamines (n=2) and opiates (n=1).

Table 9

Prevalence of recorded positive and negative urine drug screen or mouth swab test results whilst in hospital (Hospital time point)

<u>Substance</u>	<u>Total</u> (n=30)	<u>Recalled</u> (n=18)	<u>Discharged</u> (n=12)	<u>P-value</u>
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Positive drug screen	13 (43.3)	11 (61.1)	2 (16.7)	*0.009 ^a
Negative drug screen	12 (40.0)	4 (22.2)	8 (66.7)	
No record	5 (16.7)	3 (16.7)	2 (16.7)	

^aGroup differences compared with a χ^2 test

*Significant at $p < 0.05$

Self-efficacy and drug dependency.

Differences between the two groups on current self-efficacy in drug use, as measured by the DTC-Q, were assessed. Data was positively skewed and therefore did not meet the parametric assumptions, transformation was attempted but did not improve this. Hence, a non-parametric Mann Whitney U was carried out to compare scores across the two groups and no significant difference was found, see Table 10.

The Severity of Dependence scale was used to assess dependence of the four main drug types based on use at the Community time point. Two out of the 13 alcohol users (15%), three out of the 8 cannabis users (38%) were found to be clinically dependent according to the clinical cut off of ≥ 3 and ≥ 4 respectively.

Based on previous findings, that in the Recalled group there was persistent use of cannabis over time, subgroup analyses of the participants who continued to use cannabis, were conducted to explore this further. Comparisons of the cannabis users Post-Discharge (n=7) and at Pre-recall (n=8) to non-users were carried out. Three out of the eight (37.5%) cannabis users at Pre-recall were dependent on cannabis,

according to the Severity of Dependence Scale (score ≥ 4). Independent samples *t*-tests and a Mann Whitney U where data were not normally distributed, were carried out to compare scores on BDI, BAI, SPQ-B and DTCQ-8. Those using cannabis (n = 7) and not using cannabis (n = 11) Post-discharge did not differ significantly on any factors. Those using cannabis (n=8) at the time point of Pre-recall scored significantly lower on the DTCQ-8 (M=58.0, SD=34.1) compared to those not using cannabis (n=10) at that time (M=94.3, SD=7.0), ($U = 16.0, p = 0.030$), suggesting lower self-efficacy over substance use. There were no significant differences on any other measures. Due to the small sample size, low power and risk of Type I error these results must be interpreted with caution.

Table 10

Self-efficacy and drug dependency scores across groups

<u>Outcome</u>	<u>Total</u>	<u>Recalled</u>	<u>Discharged</u>	<u>P-value</u>
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	
DTC-Q¹ (n=30)	82.45 (25.21)	78.15 (29.14)	88.91 (16.96)	0.260 ^a
SDS² alcohol (n=13)	1.38 (3.12)	1.78 (3.70)	0.5 (1.0)	N too small
SDS² cannabis (n=8)	3.86 (3.76)	3.86 (3.76)		n/a
SDS² synthetic cannabis (n=3)	5.00 (7.81)	5.00 (7.81)		n/a
SDS² crack (n=3)	3.20 (2.17)	2.50 (1.73)	6.0 (-)	N too small

¹Drug taking confidence questionnaire

² Severity of Dependence Scale

^aGroup differences compared with a Mann Whitney U

Number of Days spent Discharged in the community

The number of days spent discharged in the community was compared across the two groups. The data were not normally distributed, so a logarithmic

transformation was carried out which reduced skewness to a normal distribution (according to the Shapiro-Wilk test) and removed the outliers.

An independent samples *t*-test showed significant group differences in the number of days spent in the community, $t(28) = 2.62, p = 0.014$. The Discharged group spent significantly more days in the community ($M = 820.5, SD = 734.6, 95\% CI = 353.7, 1287.3$) than the recalled group ($M = 347.0, SD = 304.6, 95\% CI = 195.5, 498.5$).

Comparison of users and non-users.

The number of days spent discharged in the community was compared across drug use at the different time points. Where group sizes allowed, *t*-tests were carried out, using the transformed variable of days spent in the community, to assess if there were any significant differences between users and non-users. See Table 11 for details.

Table 11

Average number of days spent in the community between users and non-users at different time points

	Substance Use							
	Alcohol use	No alcohol use	Cannabis use	No cannabis use	Synthetic cannabis use	No synthetic cannabis use	Crack use	No crack use
Index Offence								
Sample size	17	13	17	13	2	28	9	21
Mean (SD) days in the community	512.0 (585.1)	568.3 ^a (549.9)	466.1 (550.7)	628.4 ^a (583.2)	152.0 (135.8)	564.9 (570.7)	272.8 (188.0)	649.4 ^a (630.6)
Post-Discharge								
Sample size	10	20	7	23	2	28	3	27
Mean (SD) days in the community	236.9 (177.4)	**686.2 ^a (628.3)	147.0 (111.0)	***654.9 ^a (590.5)	58.0 (2.8)	570.6 (565.6)	122.6 (100.0)	582.4 (573.1)
Community								
Sample size	13	17	8	23	3	27	5	25
Mean (SD) days in the community	486.1 (532.4)	574.9 ^a (595.3)	227.4 (246.0)	630.4 ^a (610.4)	121.3 (109.7)	582.5 (572.8)	242.8 (60.5)	595.1 (598.5)

**Significant at $p < 0.01$

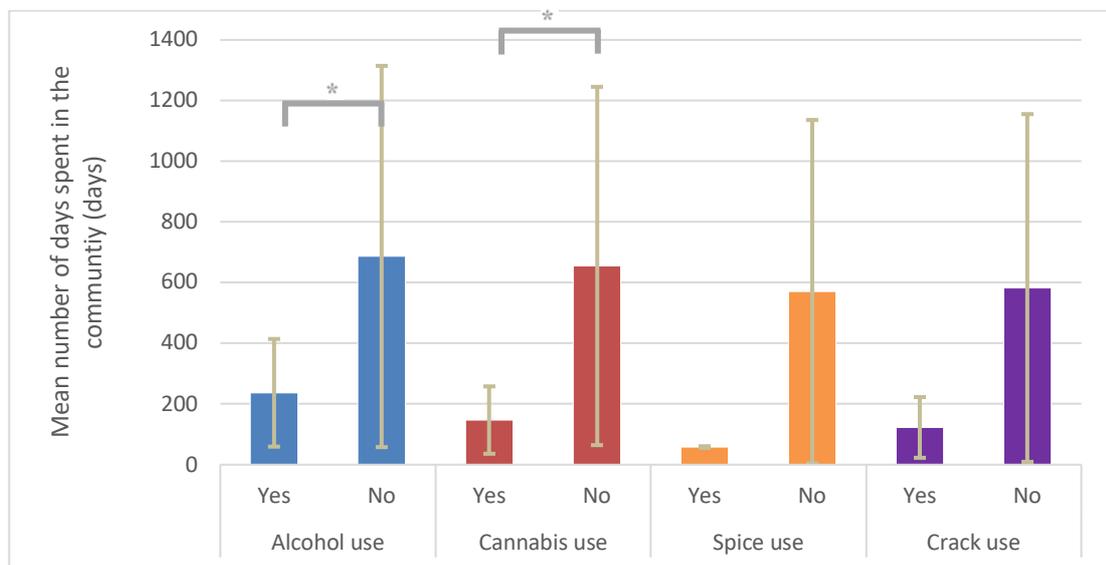
***Significant at $p < 0.001$

^a Group differences compared with an independent samples *t*-test

Those using alcohol, cannabis and crack at the Index Offence time point did not significantly differ in the number of days spent in the community, compared to those who were not using.

Those using alcohol at the Post-Discharge time point spent significantly fewer days in the community than those not using alcohol, $t(28) = 3.18, p = 0.004$. Those using cannabis in the same period spent significantly fewer days in the community than those who did not use, $t(28) = 4.34, p < 0.001$. Analyses could not be run for synthetic cannabis and crack due to the small and unequal group sizes. However, a similar trend is observed from their means, shown in Figure 4.

Those using alcohol, cannabis and crack at the Community time point did not significantly differ in the number of days spent in the community, compared to those who were not using.



* Indicates statistical significance at $p < 0.05$

Error bars represent standard deviation

Figure 4

Average number of days spent in the community across users and non-users at the Post-Discharge time point

Psychological Measures

Table 12 presents a summary of the outcomes from the psychological measures. Data were checked for normality and to ensure parametric assumptions were met. For both the BDI and BAI data, the Shapiro-Wilk test was significant suggesting it did not meet normality, from observation the data were negatively skewed, and the BAI had multiple outliers. Therefore, square root and logarithmic transformation for the BDI and BAI respectively was completed. This reduced the skewness to a normal distribution and removed the outliers. Differences between the two groups were tested using independent sample *t*-tests, (see Table 12).

There were no statistically significant differences between the two groups on any of the psychological measures. There was a non-significant trend towards a higher WHO quality of life scores in the Discharged group ($M = 15.28$, $SD = 4.56$) than the Recalled group ($M = 15.28$, $SD = 5.21$), $t(28) = 1.83$, $p = 0.078$.

Table 12

Outcomes from psychological measures

<u>Psychological Outcome</u>	<u>Total</u> (n=30)	<u>Recalled</u> (n=18)	<u>Discharged</u> (n=12)	<u>P-value</u>
	<i>Mean</i> (<i>SD</i>)	<i>Mean</i> (<i>SD</i>)	<i>Mean</i> (<i>SD</i>)	
Beck Depression Inventory	12.57 (9.22)	11.78 (7.11)	13.75 (11.98)	0.833 ^a
Beck Anxiety Inventory	8.63 (9.99)	7.56 (7.86)	10.25 (12.76)	0.753 ^a
Schizotypal Personality Questionnaire - Brief total score	6.13 (4.87)	5.78 (4.14)	6.67 (5.96)	0.633 ^a
Cognitive-Perceptual subscale	1.77 (2.08)	1.89 (2.19)	1.58 (1.98)	0.701 ^a
Interpersonal subscale	2.97 (2.20)	2.5 (1.79)	3.67 (2.64)	0.159 ^a
Disorganised Subscale	1.13 (1.50)	0.94 (1.21)	1.42 (1.88)	0.409 ^a
Spot the Word Test¹	42.82 (6.55)	42.44 (6.14)	43.33 (7.30)	0.727 ^a
WHO Quality of Life	16.63 (5.16)	15.28 (5.21)	18.67 (4.56)	0.078 ^a

¹ n=28 due to missing data

^a Group differences compared with an independent samples t-test

The clinical cut off for the BDI found 43% (n=13, Recalled=10, Discharged=3) of the sample scored in the clinical range (≥ 14) for depression symptomatology. Thirty percent (n=9, Recalled=6, Discharged=3) scored in the clinical range (≥ 10) for anxiety symptoms. The prevalence of clinical cases was compared between the two groups using a χ^2 test and there were no significant differences. One participant was in the severe range for depression, and one in the severe range for anxiety.

Reasons for Recall

The mean number of recalls in the Recalled group was 2 (SD=1.46, range 1 – 6). Participants reported reasons for being recalled in the Recalled group; and potential risk factors for recall in the Discharged group. One participant from the Discharged group refused to answer these questions. Due to the small sample size statistical analyses were not carried out on this data. Overall, the most common reasons reported for recall were drugs (69%), mental health (69%), violence/fighting/reoffending (45%) and alcohol (28%). The Recalled group also rated money (39%), family (28%), employment (28%) and housing (22%) as reasons associated with recall. The Discharged group did not associate these factors with potential recall.

Participants then ranked which they thought was the most important factor linked to recall. Results are shown in Figure 5. Drugs was most frequently ranked as number one, then violence or fighting and then mental health. This was similar in the Recalled group, however, for the Discharged group, Mental Health was not ranked first as frequently.

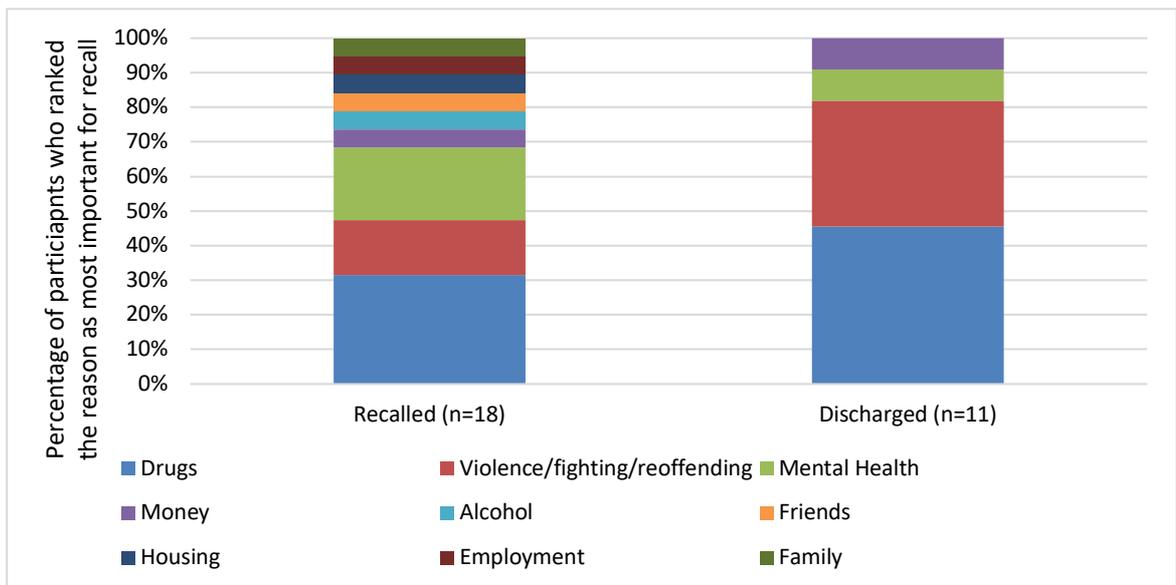


Figure 5

Reasons ranked as most important for recall

Case note reviews revealed that the most common reason to recorded by clinicians for recall was mental health (50.0%) then violence or reoffending (37.5%) and then drugs (25.0%).

Discussion

Overview

For the current study we compared the nature and extent of substance use between a sample of formally recalled patients to a group of patients who remain on conditional discharge in the community, having never been recalled. The findings suggest that there were no differences in use of alcohol, cannabis, synthetic cannabis or crack, at the time of index offence between the two groups of patients. However, in the period immediately after discharge, cannabis use was significantly more prevalent in those who had subsequently been recalled compared to those who remain on discharge.

Those who had been recalled were also significantly more likely to be using cannabis in the community at the time they were recalled, compared to the current use in the community of those who remain on discharge. It appears that those who had not been recalled stopped using cannabis (no participant who remained on discharge reported any cannabis use at either time point following discharge), whereas cannabis use remained constant over time for those who had been recalled. Relatedly, those who reported using cannabis and alcohol in the period immediately after discharge went on to spend fewer days in the community, compared to those who reported no use at this time.

Previously, there has been mixed findings about the association of ‘substance use’, as a general category with adverse outcomes such as re-conviction, reoffending

and recall to hospital (Bjorkly et al., 2010; Fazel et al., 2016; Manguno-Mire et al., 2014; and Riordan et al., 2006). This is the first study of its kind to evidence a link between specific substances, cannabis and alcohol, and recall to hospital for Forensic patients. The results suggest that use of these specific substances, by men engaged with an inner-city Forensic service, are associated with poorer outcomes.

There were no differences between the two groups on the psychological measures taken. Reasons for recall were recorded, with drugs, mental health and violence/fighting/reoffending being rated most frequently by participants and clinicians.

Demographic and Psychological Outcomes

All 31 participants had a diagnosis of a psychotic illness, with approximately a third having a co-morbid diagnosis of personality disorder. The most common index offences included assault, murder, attempted murder and manslaughter. The majority of the sample came from minority ethnic backgrounds and few were in education above GCSE level. There were no differences between those who were recalled and those who remained on conditional discharge in age, ethnicity, educational level, age at offence and type of offence. In addition, no differences were found in depression, anxiety, psychotic symptomatology and pre-morbid IQ. There was a trend for poorer quality of life in the patients who had been recalled compared to those who remained conditionally discharged. This may well reflect the fact that the majority of those who had been recalled were detained in hospital at the time of the study and therefore had limited freedom or access to activities and family life.

Cannabis Use

The results of this study suggest that cannabis use in particular is associated with being recalled to hospital. Previous research linking drug use to outcomes in forensic patients has relied on crude measures of substance use, relying on a broad category of ‘substance use’ in general (rather than identifying specific substances; Bjorkly et al., 2010; Hayes et al., 2014; Manguno-Mire et al., 2014), though sometimes distinguishing between alcohol and drugs (Coid et al., 2007; Riordan et al., 2006; Scott et al., 2004).

Our findings suggest that cannabis use is higher in the community (both immediately following discharge and at the time of recall) in patients who are later recalled compared to those who remain on conditional discharge. In addition, those who remained discharged showed significant reductions in their cannabis use between the time of their index offence and the month following their discharge, and between the index offence and their current use in the community. There was no significant change in use of alcohol for this group. The recalled participants did not show a reduction in alcohol or cannabis use across time.

Our findings suggest a different pattern in cannabis use across time by the two groups. Where the individuals who remain discharged reported stopping using cannabis following the index offence, those who were recalled report continued use.

Notably, those using cannabis immediately post-discharge also ended up spending fewer days in the community than those who were not using cannabis. Cannabis users spent on average 5 months in the community, whilst non-users spent 1 year 9 months in the community. This suggests cannabis is a key substance linked to having conditional discharge revoked sooner.

These findings are in contrast to previous research looking at outcomes in discharged forensic patients. Substance use when discharged was not associated with conditional release status in the USA (Manguno-Mire et al., 2014), lifetime substance use, but not post-discharge substance use was associated with reoffending in Norway (Bjorkly et al., 2010) and substance use did not significantly predict recall status in the UK (Riordan et al., 2006). One previous study did find that a diagnosis of substance use disorder was associated with greater risk of readmission to psychiatric hospital (Fazel et al., 2016). However, no previous studies have looked specifically at certain substances, and use of broader categories may have lacked the sensitivity to notice an association with cannabis use.

From the current study, it is not possible to infer a causal relationship, as there may be confounding factors not accounted for here. For example, it may reflect the potential association of cannabis use with psychotic relapse, as is known to be a risk in vulnerable populations (Schoeler et al., 2016). Clinicians' records on case notes most often cite 'deterioration in mental state' as the reason for recall. This suggests that there may be a mediating effect of mental health on the relationship between cannabis use and recall. While we found no group differences in current mental health, we did not have measures of mental health status at the point of recall, so were unfortunately not able to test this potential relationship. Rates of dependency on cannabis were low in the current sample, suggesting the association observed is not linked to an issue with addiction.

Cannabis use is also highlighted with greater numbers of recalled patients having positive urine drug screens when in hospital prior to the most recent discharge compared to those who were never recalled. These were often positive for cannabis use. Interestingly, rates of poly-substance use in this sample were not particularly high

(13%) compared to estimates of around 50% (Hakansson et al., 2011) of those in the criminal justice system. At the same time, it is notable that all the poly-substance users were using cannabis as well as other drugs.

A subgroup analysis of the participants who had been recalled found that those who used cannabis at the time of their recall had significantly lower scores in self-efficacy relating to controlling substance use than those who did not use cannabis at recall. This suggests poorer control over and greater difficulty resisting substance use for this subgroup. Self-efficacy has been shown to be an important predictor of substance use treatment outcomes (Kadden & Litt, 2011), and therefore lower scores in this subgroup may be indicative of patterns of use that are harder to treat.

Alcohol

Alcohol was also indicated as a key substance associated with worse outcomes for participants. Those using alcohol immediately after discharge spent on average eight months in the community, compared to non-users who spent on average one year ten months in the community. This suggests alcohol is associated with recall to hospital. Previous research, which has distinguished alcohol use from other drugs, has found alcohol to be associated with reconviction (Coid et al., 2007; Scott et al., 2004), but not recall to hospital (Riordan et al., 2004). Therefore, this is a key finding suggesting alcohol may play a role in recall to hospital. Alcohol was not once recorded as a reason for recall on the case notes, which suggests clinicians do not view it as an independent risk factor separate to substance use that is worth recording.

Participants' Views of Reasons to be Recalled

Previous research, which has relied on reviews of case notes, has highlighted substance use, non-compliance with medication, violence/reoffending and relapse in

mental health as reasons for revoking conditional discharge (Hayes et al., 2014). Similar to findings from this study, participants rated drug use, mental health and violence most frequently as a key factor and this was the case in both groups. A quarter of the sample reported alcohol as a factor linked to recall, which previous research had not distinguished from general substance use. One participant spoke about drugs being linked to his recall, however emphasised that he felt this was not fair:

“I have been recalled when I use drugs as it breaks my conditions. There is blanket rule for everyone, putting everyone on the same track.”

One previous study interviewed patients who had been recalled to a secure setting who suffered dual diagnosis to determine their explanations for discharge (Chiringa, Robinson & Clancy, 2014). They determined two categories of explanation, justice/fairness and treatment and care. These included factors such as unfair perceptions from clinicians about levels of risk, being treated as a criminal, lack of awareness about conditions of discharge, poor standard of care, being under surveillance rather than supported, lacking independence and poor communication. During the interviews, in the current study many participants spoke of feeling their recall had not been justified and disagreeing with their clinical teams’ views, the following is a quote from one of the participants:

“Cannabis is my drug of choice to socialise, my clinical team think it makes me unwell.”

Approximately forty percent participants who had been recalled also rated money as a factor linked to recall. This is in line with Manguno-Mire et al., (2014), who found that financial security, as measured by access to disability benefits in the USA, improved outcomes for conditionally discharged patients. It may also be that money issues are associated with substance use for some of these participants, as

discharged patients have limited access to employment and financial issues can arise when money is required for drugs. For those in the sample who had been recalled, clinicians recording in the case notes of the reasons for this most frequently cited mental health, violence or reoffending and drug use. However, other factors such as alcohol, money, family, employment, housing and friendship issues which were highlighted as important factors by the recalled group were not mentioned in the case notes. The following is a quote from one of the participants illustrated the interaction of factors associated with recall:

“...isolated, no friends, no family, I use cannabis to pass the time. After being locked up for such a long time you feel lonely in the community. You need something to pick you up, friends and family have moved on. Something to cheer you up, take the weight of your shoulders.”

Strengths and Limitations

This study has a number of strengths. It is the first of its kind to examine substance use in detail, across type and time, in association with readmission to hospital in a forensic setting. The reliance on two sources of information, self-report and case note reviews, reduced information bias. Despite the shortcomings of relying on self-reported information for substance use across time, this provided participants’ own perception of the situation for the first time. Case notes alone are not a reliable indicator of presence of drug use, due to variation in reporting by clinicians and at different stages of treatment.

When designing the study, it was unclear whether the two groups defined would be expected to be distinct, as some of those on conditional discharge may go on to be recalled in the future, and therefore the two sample populations may in fact be

overlapping. An alternative comparison group of individuals who go on to receive ‘absolute’ discharge would have been preferable, however as these people are no longer engaged with services they become harder to locate and recruit.

The analysis revealed that those who remain conditionally discharged had spent significantly longer in the community (over two years on average at the point of participation) than those who had been recalled prior to being readmitted (just under a year on average). This suggests that participants who remain on discharge represent a distinct group of patients who are managing conditional discharge successfully, and therefore are a valid comparison group to those who were subsequently recalled. In addition, lack of variation in demographic characteristics further suggests the two groups provide a well-matched comparison.

The study also had a number of shortcomings and the findings must be interpreted within the limitations this sets. The figures of potential participants provided by the service was lower than expected, hence the scope for recruitment was limited. Predominantly, due to issues mobilising staff teams to discuss the research with participants we had a response rate of 29%. The study sample was smaller than planned and therefore the study was underpowered.

The necessary sample size to detect an effect, as calculated from the power analysis ($n=56$), was not met, with the groups being significantly smaller than required. We therefore, could not assess for any association of synthetic cannabis and crack use with recall, and this represents a problem with statistical power. An association of these substances with recall may be evident with a larger sample. In addition, low power also increases risk of finding a significant result which does not reflect a ‘true effect’, due to having a low positive predictive value (Button et al., 2013). The current discourse about a ‘replication crisis’ in psychological research (Maxwell & Howard

2015), highlights the predominance of positive findings which are not reproducible in later research, suggesting a failure to capture ‘true effects’. Given the low power of the current study, and the novelty of the research methods, the significant findings must be interpreted with this in mind. Future research employing similar methods with larger samples would be helpful to corroborate these findings.

Given the exploratory nature of the study a high number of analyses were run, twenty-six in total. This further introduces increased risk of Type I error due to multiple testing. If a Bonferroni correction had been employed this would have meant an alpha value of 0.002, would have been used as the critical value for significance. With this in mind, the significant findings, presented here should be interpreted with caution.

The bespoke measure created for assessing frequency of substance use at different time-points was designed as a simpler alternative to existing measures to reduce the cognitive and time demands placed on participants. However, the use of set categorical response options limited the statistics that could be used on the data. Assigning the categories arbitrary numbers was not appropriate as any comparison of means would be meaningless. This meant that this information was not analysable. Future research, employing a continuous measure would be appropriate for determining if there is a change in frequency of use at different points of engagement.

Selection bias is another potential limiting factor of the study, with those consenting perhaps more likely to be substance users and therefore more interested in taking part. In particular, for the participants who remained on discharge, there were difficulties locating individuals in the community. Therefore, recruitment relied heavily on advertisement through the Substance Use Support Service groups, which

will likely have meant those seen were more likely to have histories of problematic substance use.

Due to the limited number of women engaged with the service, which is reflective of the psychiatric forensic population more generally, they were excluded from taking part. Those engaged with the learning disability section of the forensic service were also excluded based on the cognitive demands of the measures. Our findings therefore cannot be extended to these subgroups of the forensic population.

Reliance on self-reported information of historical substance use introduces recall bias, with the accuracy or completeness of the recollections retrieved likely to introduce error of over or under-estimation. In addition, memory specificity and coherence may have varied at particular time points. The month post-discharge may have been a more distinct period and one of 'wellness', compared to the period prior to the index offence and prior to recall where there may be less clarity due to increased likelihood of stress, psychotic symptoms and traumatic events. Furthermore, some drugs, such as cannabis and alcohol, impair episodic memory so may negatively influence the accuracy of self-report. Efforts were taken to minimise these effects, through use of orientating questions such as is done in the Time Life Follow-Back method, which is considered to give highly valid estimates of substance use (Hjorthøj, Hjorthøj, & Nordentoft, 2012).

Despite the best efforts of the research team to distinguish themselves from the service and emphasise the confidentiality of information, participants may have been wary about disclosing the full extent of their substance use, in particular current usage, for risk of it impacting their care. This is particularly of note for those in the community, as disclosing of substance use may be admitting to breaching conditions of their discharge and increasing their risk of being recalled. Given that use of

substances was reduced in this specific group in the study the findings must be interpreted with caution.

Future research

Future research should continue with more detailed analysis of substance use, assessing types of drugs used and frequency of use over time. This would improve our understanding of the nature of particular substance use and patterns of use on outcomes for forensic patients. Studies should aim to recruit larger samples to improve power and endeavour to access participants from a range of sources to reduce selection bias. In particular, more detailed analysis of substance use from larger samples would improve our understanding of the impact of specific substances (e.g. synthetic cannabis or crack) on recall to hospital. In addition, research including females and those with a diagnosis of a learning disability will progress our understanding of substance use specifically in those subsections of the forensic population. Longitudinal studies, following individuals pre and post discharge would prove useful in further understanding the links between substance use and recall.

Clinical Implications

This study highlights the prevalence of alcohol and other drug use in the forensic population. It is apparent that patients view substance use (alongside other issues) as a risk factor for being recalled. Our findings imply that alcohol and cannabis may play a role in precipitating readmission into hospital. However, there is an apparent lack of attention paid to use of alcohol by clinicians and it would prove useful for this to be acknowledged independently of other substances. Clinically, an awareness of problematic use of these substances, in particular when individuals are conditionally discharged, might help reduce the risk of being recalled.

Conclusions

This research builds on previous findings, that substance use is associated with poorer outcomes for forensic patients. In particular, it has shown that cannabis use is more prevalent in those who are subsequently recalled to hospital and both cannabis and alcohol use are associated a shorter time spent in the community post-discharge. Together these findings suggest that cannabis and alcohol use may be important factors for outcomes following conditional discharge, in particular precipitating conditional discharge revocation. Given this understanding, future research exploring this relationship further would prove useful in informing clinical practice to reduce the risk of readmission into hospital.

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Part 3: Critical Appraisal

Introduction

The task of formulating, designing and conducting a major research project has been a complex and fulfilling process. Through this journey I have gained an insight into the challenges of undertaking research in a clinical setting and the richness of information that can be gathered in these environments.

In the following critical appraisal, I will discuss my reasons for choosing the research questions, and then offer some critical reflections regarding designing measures, the ethical approval process and difficulties with recruitment. Finally, I will conclude with some personal reflections on the research process, focusing on power, beyond statistics.

Choosing the research topic

Prior to training I worked in an inpatient acute setting and frequently observed the cycle of discharge, drug use, relapse and readmission. In my role as an Assistant Psychologist I set up a drop in with the local community drug service on the ward in an attempt to improve the access to support that patients had when they were discharged and ease the transition into the community. From this experience I was aware of the difficulty between the promotion of abstinence by services and patients desire to make choices, even if these may be unwise, and express their personal freedom.

When I heard about the project investigating substance use and its role in recall to hospital in a forensic population it sparked my interest based on my previous experience. I was also keen to build on the skills I had gained as a Research Assistant in data collection in a clinical environment. In early discussions about the project I felt

both excited and daunted about the opportunity to shape and formulate the research myself.

Designing Measures

Set with the task of capturing substance use over time I looked over some of the existing measures. The Time Line Follow Back (Fals-Stewart, O'Farrell, Freitas, MacFarlane & Rutigiano, 2000) method appeared to be the most reliable and relevant for my study. Given the known difficulties that substance use, psychiatric illness and medication can cause with memory, abstract thinking, attention and concentration (Braf, 1993; Carey, 200), I was concerned about the demands that completing a TLFB for many different time periods, the length of time it would take, and the likely unreliability of the information gathered. I quickly realised I would need to design a simpler measure for my study, minimising the cognitive demand placed on the participants. We decided on a more straightforward, 'yes' or 'no' to certain drug types and then a measure of frequency of use in a month period, with set categories and orientation questions to aid recall. It was felt that categories of frequency, with an accompanied visual scale would be most appropriate to reduce the reliance on participants thinking of a specific figure for frequency they could give a near estimation. I felt that any change in use, or lack of it, over time was the key aspect we wanted to capture.

In practice, this worked well, the visual scale helped participants select their usage and the categories felt useful. Unfortunately, when it came to conducting the analyses the reliance on categorical information limited the statistics that could be used on the data. Assigning the categories arbitrary numbers was not appropriate as any comparison of means would be meaningless. I felt frustrated at the limited options I

had, and ultimately the data was not possible to analyse. It was disappointing that the richness of this information was lost. This highlighted to me the tension between designing a measure that is practical and suitable for participants and the boundaries of statistical testing. With hindsight, I would have been more creative when designing the measure to allow for a continuous outcome that would be both appropriate and meaningful and could then go on to be analysed statistically

NHS Ethical Approval Process

Completing the NHS ethical approval process felt like a climbing Everest. The lack of clarity about the different stages of the process left me overwhelmed, with seemingly unending back and forth between seven different institutions. This was punctuated by periods of waiting patiently for responses that were expected to be a few days but often would be weeks.

The process involved: completing the Integrated Research Application System (IRAS) form in conjunction with my UCL and external supervisors, submitting to the Joint Research Office (JRO) at University College London Hospital, making copious revisions for the JRO, submission to the Health Research Authority, submission to the NHS Research Ethics Committee (REC), attending the REC meeting to defend the decisions I had made about the project, sending revisions to the REC committee, liaising with the NHS service Research and Development (which is held by a third sector company NOCLOR), having the NHS service lead giving approval and then finally receiving the go ahead to begin data collection. The process took in its entirety 12 months to complete.

Undertaking the process on my own was exhausting, finding endless questions that I barely understood and trying to search around for the correct person to provide

the answer. Every time the end was in sight the finishing line was pushed back, leaving me increasingly down-trodden. Brindley (2012) captures this experience in his qualitative study of the ethics process. Interviews with trainees revealed themes that resonated with my experience, including the overwhelming process, feeling pushed further and further down with time ticking away and going backwards and forwards with the process. Once I finally received 'favourable opinion' I started to believe it in itself should be worthy of being awarded a DClinPsy.

The Highs and Lows of Recruitment

Once the study began, it quickly became apparent that the initial numbers of recalled patients provided by the service were an over-estimation. We began with a list of 35 potential participants to recruit from for the Recalled group. I began to be concerned as my power calculation had specified 29 participants in each group and this meant I was aiming for about 83% response rate to recruitment, quite a task! For this group we had the advantage of most participants being in a fixed location, detained on a specific ward, at either the medium or low-secure site. As a result, there was usually a named Clinical Psychologist who could be approached to make initial contact. This system worked well, and finished data collection with 18 participants in this group, a reasonable 50% response rate.

Another key factor that supported our recruitment was our ability to provide remuneration to the participants for their involvement. We provided participants with £12 cash for taking part. During the REC meeting there was some concern expressed around the safety of providing known drug users with cash, and gift vouchers were suggested as an alternative. We argued that forensic patients should be treated as any other research participants and highlighted the limitations of providing gift vouchers

to people detained in hospital, we felt therefore cash should be deemed acceptable. Festinger et al., (2005) study has shown that payments, at least up to \$70, did not affect rates of drug use or perceptions of coercion in a sample of substance using clients involved in a research study. It felt very important that we defend the right to provide our participants with cash, especially given the limited options for earning money for this population, in particular for those who are in hospital.

Despite being able to pay our participants, as we began to recruit individuals in the community who had never been recalled, the difficulties increased considerably. We discovered, firstly, that although there were greater numbers of these participants, teams supporting them were more spread out. In addition, following a 're-structuring' of the community teams there was no longer a Clinical Psychologist linked to each team that could assist us. In fact, the equivalent of one full-time Clinical Psychologist, was now allocated to providing care to all discharged community patients, covering four locality teams. The Clinical Psychologists sharing this role were in the process of setting up the service provision and therefore were not engaged with patients to assist with recruitment. They did provide support in facilitating meetings with clinical community teams, however due to pressures in the teams this had limited success. Through Psychiatrists, Support Workers and the Substance Use Support Service groups we were able to recruit 12 discharged participants, however this was sadly only a 17% response rate. For the majority of potential participants, staff did not respond to our request to speak to individuals about the study. This highlights the different demands of the community setting compared to the hospital, with much larger caseloads and less service provision. As a result, this and the fewer than expected recalled patients, unfortunately meant an underpowered study.

Power: beyond statistics

It would be difficult to conduct a research project in a forensic setting and not be confronted by the issues of social and political power that are at play. Individuals are detained, for indeterminable periods, and when discharged are subject to strict, legally enforceable conditions. Certain decisions, such as for leave or discharge, are held at the level of the Secretary of State for Justice (Scott-Moncrieff, 2002). In addition, the overwhelming majority of the individuals I saw were from Black and Asian Minority Ethnic backgrounds and had on average little education, two additional factors highlighting systemic disadvantage. This left me wondering what social factors had contributed to the detention of these people.

I was shocked to read in the literature, on outcomes for forensic patients, statements implying increased risk of violence based on racial classifications such as African-Caribbean (Coid, Kahtan, Gault, & Jarman, 2000) or Black (Coid, Hickey, Kahtan, Zhang, & Yang, 2007). The ideas were posited with no critical view of these categories, as if they suggest an inherent psychological and biological difference from ‘Whiteness’ other than melanin levels. Coid et al., (2000, 2007) failed to consider the complexity of this issue and the potential reasons for such differences other than something inherent to the racial class. Racial bias in the criminal justice system has been documented widely (Fernando, Ndegwa, & Wilson, 2005), as well systemic racism in society, reflected in worse outcomes for those from ethnic minorities across the board (Cabinet Office, 2017). It has been noted that Black and White people are ‘seen differentially even if they exhibit the same behaviours’ (Loring & Powell, 1988), which has implications for how distress is understood and responded to within the field of mental health (Fernando, 2017). This is evidenced by lower rates of referrals to

talking therapies for Black service users as well as higher rates of being detained under the MHA, forcibly medicated, and admitted as forensic patients (Fernando, 2017)

I began to question what role the skin colour of the people I spoke to had in their predicament; on the opportunities that were afforded to them, the services that were accessible to them and the perception of them by others/professionals as ‘different’, ‘inferior’ or ‘dangerous’.

In the interviews, participants often spoke of feeling they were treated unfairly and since entering the forensic system having little control over important decisions in their lives, such as where to live, whether to work and whether or not to drink alcohol or use drugs. Individuals are oppressed by the system, they become “‘objects’ of others’ will rather than self-determining ‘subjects’” (Freire, 1970).

Entering into a research interview I was wary of how they would respond to what I was asking of them. I was, not only, connected to the institution that is the oppressor, I had to wear an NHS badge that signified this and carry an alarm and keys, both symbols of the power I held in relation to the participants. The research required individuals to disclose about alcohol and substance use, which not only may imply illegal behaviour (possession of illicit substances) but also may have been admitting to breaching of conditions of discharge or hospital rules. Both these things could have serious consequences for the participants, potential recall, revocation of leave or delay of discharge.

We attempted to clearly distinguish the research team from the service, however, for participants to disclose using substances they required faith in this distinction. Given the power the forensic system holds over its patients, I felt this was a big ask for our participants and was often surprised by the frankness and honesty of

those who did take part. However, for some, the level of distrust of professionals may have put them off taking part entirely. This may have been particularly an issue for those in the community who were told about the study through their psychiatrist, the very person who holds the power to recall them to hospital.

Alongside carrying out the research, my final year of training has included working clinically within a Liberation Psychology framework (Martin-Baro, 1994). This model encourages one to prioritise understanding the process of oppression in marginalised communities in order to address the socio-political structures within which they exist. It is concerned with reconstructing Psychology from the perspective of the ‘most marginalised or oppressed’ and doing this through engagement and solidarity with these groups (Martin-Baro, 1994). In a way I felt this subgroup of ‘recalled patients’ perhaps represented ‘the most marginalised’ of the forensic population.

I found that many participants used the research interview, between completing the measures, as an opportunity to tell their story and be heard, to provide their perspective on what has happened to them rather than what is recorded in their notes. It has been reported that forensic patients have found research being conducted in hospitals communicates that there are people who are motivated to help them and that they matter and are valuable human beings (Hillbrand, 2005). With this in mind I felt a conflict between the ‘scientific’ value of my research project and the importance of the stories I heard along the way from people who have little voice or power in society.

This reminded me of the shortcomings of statistics, which, whilst providing a broad view of patterns across populations, can negate the importance of the individual experience; and at worst also be dangerous, without a critical lens, as per Coid et al.,

(2000, 2007). Of course, the context of my project did not allow for a true dialogue (Martin-Baro, 1986) with the individuals that I met. However, it left me thinking about how their views on the system, how it functions and its problems, may be vital to our understanding of the outcomes we observe.

Conclusions

In summary, the research process was a challenging yet rewarding process. I developed new skills and gained insight into the early stages of the research process, formulating ideas and designing measures. It also led me to reflect on the process of doing research within a clinical setting and the limitations of collecting quantitative data. Carrying out this project within a forensic setting highlighted some of the wider socio-political forces that are embedded in the system and left me thinking of how and if research can consider, and even challenge, these.

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Appendices

Appendix 1: Ethical Approval Letter



Health Research Authority

London - London Bridge Research Ethics Committee

Skipton House
80 London Road
London
SE1 6LH

Telephone: 02071048308
Fax:

Please note: This is the favourable opinion of the REC only and does not allow you to start your study at NHS sites in England until you receive HRA Approval

04 July 2017

Professor Valerie Curran

Dear Professor Curran

Study title: The nature and prevalence of substance use in a forensic population and an evaluation of its role in recall to hospital.
REC reference: 17/LO/0867
Protocol number: 17/0060
IRAS project ID: 218085

Thank you for your letter responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to make a request to postpone publication, please contact hra.studyregistration@nhs.net outlining the reasons for your request.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for NHS permission for research is available in the Integrated Research Application System, www.hra.nhs.uk or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS sites

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Copies of advertisement materials for research participants [Poster]	1.0	05 January 2017
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Confirmation of Insurance]	1.0	21 March 2017
Interview schedules or topic guides for participants [Interview Schedule & Qols]	1.0	20 January 2017
IRAS Application Form [IRAS_Form_03052017]		03 May 2017
Participant consent form [Consent Form]	2.0	07 June 2017
Participant information sheet (PIS) [Participant Information Sheet]	2.0	07 June 2017
Participant information sheet (PIS) [Participant Information Sheet - tracked changes]	2.0	07 June 2017
Referee's report or other scientific critique report [Peer Review]	1.0	06 October 2016
Research protocol or project proposal [Protocol]	1.0	18 April 2017
Summary CV for Chief Investigator (CI) [CI CV]	1.0	01 January 2017
Summary CV for student [HA CV]	1.0	01 January 2017
Summary CV for student [GS CV]	1.0	01 January 2017
Summary CV for supervisor (student research) [CI CV]	1.0	01 January 2017
Summary CV for supervisor (student research) [CM CV]	1.0	22 February 2017

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "*After ethical review – guidance for researchers*" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:

<http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/>

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at <http://www.hra.nhs.uk/hra-training/>

17/LO/0867

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project.

Yours sincerely

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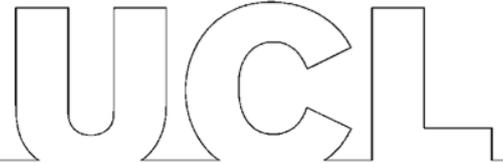
PP

**Professor David Bartlett
Chair**

Email: nrescommittee.london-londonbridge@nhs.net

Enclosures: "After ethical review – guidance for researchers" [\[SL-AR2\]](#)

Appendix 2: Participant Information Sheet



Information sheet for volunteers

The nature and prevalence of substance use in a forensic setting and an evaluation of its role in recall to hospital.

Version 2.0 June 7th 2017

You are invited to take part in research looking at how using drugs may be linked with being recalled to hospital.

Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information and discuss this with the researchers, your family, friends or clinical team if you want to. Please ask us if anything is not clear or if you want more information.

Why are we doing this research?

We want to find out how drug and alcohol use may be linked to being recalled to hospital. We will also look at social and psychological factors at different time points, as well as at your medical notes. The research will help us figure out how important drug and alcohol use is, and this can then help us to make better treatment available.

This study is part of a student research project that is part of a postgraduate qualification.

Why have I been chosen?

You have been chosen to take part because EITHER

- You are currently living in the community and have never been recalled
- OR
- you are currently in hospital after being recalled.

Do I have to take part?

No. It's completely up to you. If you decide to take part, you will be asked to sign a form to show you are happy to take part. But you can still change your mind at any time and stop taking part.

What do I need to do?

One of our research team will arrange to meet with you where you are living at the moment. She will ask if you have any questions about taking part. She will then ask you some questions and give you some questionnaires about your drug and alcohol use, your mood and lifestyle. This will last about one hour, maximum an hour and a half, but you can take breaks if you need to. Researchers will also look at your medical notes that are stored with

What will happen to the information I give?

The data collected will have any personal information removed and then shared with the research team at UCL. They will not be able to identify you from this. No information you

DOC CONTROL: Student Project, Participant Information Sheet, 218085, v2.0, 07/06/17,
Page 1 of 2

give will be shared with your clinical team, unless we are worried about your safety or the safety of someone else. The consent form that you sign will be stored securely in a locked filing cabinet at the [REDACTED]. This information will be kept securely for 5 years and then shredded.

How will my information be kept confidential?

Anything you tell us during this research will be confidential and only shared with the researchers. We will not pass on any information to anyone else, including the staff involved in your care. The only time we will share information is if you tell us that you or someone else might be in danger. Then we will need to talk to your clinical team.

What are the possible risks of taking part?

There is a chance of you having some cravings, but these won't last long. The questionnaires ask about some things which may make you feel sad or upset. If this you get cravings or feel upset, please let the researcher know so she can help you with it.

Are there any benefits?

There are no direct benefits from taking part. However, the study may help your awareness of any drug use, and the possible link to mental health issues and recall to hospital.

What will happen to the results?

The results will be written up as part of an educational course and will be sent to relevant research journals to be published. A short summary of the results will be sent to everyone who takes part.

Will I get paid?

We will pay you £8.00 an hour for taking part in the study. We think it will take about 1.5 hours so that would be £12.00 in total.

What if there is a problem or something goes wrong?

Any complaint about taking part in this study will be fully addressed. You can also contact the PALS (Patient Advice and Liaison Service) on 0800 783 4839 or by email [REDACTED]

Who is organising and funding the research?

The study is being organised by University College London (UCL) and East London NHS Foundation Trust. It is funded and sponsored by UCL. [A](#) NHS Research Ethics Committee has approved the study (IRAS ID: 218085)

Who can I talk to about it?

[REDACTED]

Contact email address and phone number [REDACTED]

Thank you for taking the time to read this information

Appendix 3: Example of Substance Use Measures

Think about the month before your admission to a secure unit or prison due to your current index offence. Can you remember when that was?

What time of year was it?

Thinking about that period in your life were you using:

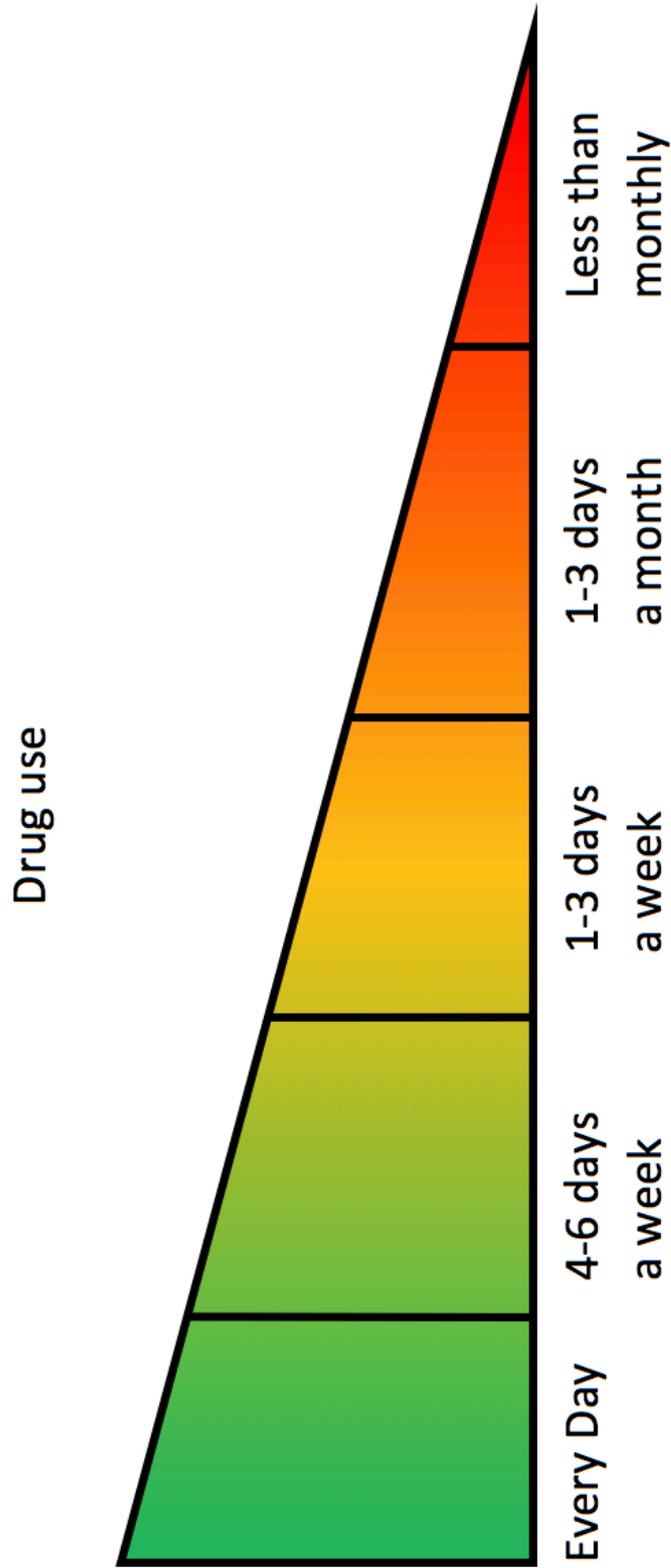
Alcohol?	Yes		No		
How often	Every day	4-6 days a week	1-3 days a week	1-3 days a month	Less than monthly
On a typical day on which you drank, about how much did you use?	<i>What type of drink (normal strength/ high strength beer, wine, vodka, cider etc.); the brand if possible, or the type of spirit; for beer/cider: how many pints/cans/bottles; for wine: how many glasses & what size glass (small= 125ml, medium= 175ml, large= 250ml); for spirits: how many measures (single= 25ml, double= 50ml), or if they are heavy drinkers they may give it in bottle size (50cl, 70cl, 1l etc.)</i>				

Cannabis?	Yes		No		
How often	Every day	4-6 days a week	1-3 days a week	1-3 days a month	Less than monthly
On a typical day on which you consumed cannabis, about how much did you use?	<i>Information on weight if possible</i>				

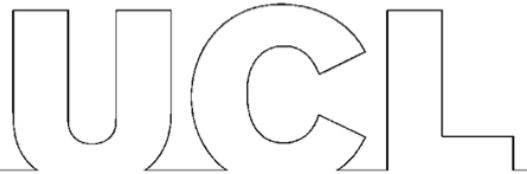
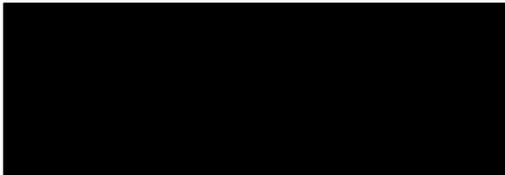
Spice/synthetic cannabinoids?	Yes		No		
How often	Every day	4-6 days a week	1-3 days a week	1-3 days a month	Less than monthly
On a typical day on which you consumed spice, about how much did you use?	<i>Information on weight if possible</i>				

Crack?	Yes		No		
How often	Every day	4-6 days a week	1-3 days a week	1-3 days a month	Less than monthly
On a typical day on which you consumed crack, about how much did you use?	<i>Information on weight if possible</i>				

Appendix 4: Visual Scale



Appendix 5: Participant Consent Form



IRAS: 218085

CLINICAL PSYCHOLOGY

Consent Form

Version 2.0 June 2017

The nature and prevalence of substance use in a forensic setting and an evaluation of its role in recall to hospital.

PARTICIPANT NUMBER:

Please put your initials on the dotted line if you AGREE:

INITIALS:

I have read and understand the information sheet for the study.

I have had the chance to ask questions and talk about the study.

I have had answers to all my questions.

I know that taking part is up to me.

I know that I can change my mind at any time and stop taking part without saying why.

If I stop taking part I know this won't affect my care.

I understand that things I tell the researchers will be kept confidential within the team.

I understand that things I tell the researchers will not be shared with my clinical team, unless there is a concern about my safety, or the safety of someone else.

I know that any information used will not be linked to my name or anything that shows it is me.

I agree for my medical notes to be looked at by the researchers at UCL, [redacted] and the regulatory bodies and know that any information taken from them won't have my name on it.

I agree to be contacted about future studies.

I agree to take part in the study.

Signed (participant) Date

Signed (researcher) Date

DOC CONTROL: Student Project, Consent Form, 218085, v2.0, 07/06/17, Page 1 of 1

Appendix 6: Frequency of use for Alcohol, Cannabis, Synthetic Cannabis and Crack across time.

Self-reported frequency of alcohol use across time, n (%)

<u>Frequency of alcohol use</u>	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)
Never	13 (43.3)	6 (33.3)	7 (58.3)	20 (66.7)	10 (55.6)	10 (83.3)	17 (56.7)	9 (50.0)	8 (66.7)
Less than monthly	3 (10.0)	1 (5.6)	2 (16.7)	4 (13.3)	3 (16.7)	1 (8.3)	2 (6.7)	1 (5.6)	1 (8.3)
1-3 days a month	2 (6.7)	1 (5.6)	1 (8.3)	1 (3.3)	1 (5.6)	0 (0.0)	3 (10.0)	2 (11.1)	1 (8.3)
1-3 days a week	7 (23.3)	6 (33.3)	1 (8.3)	2 (6.7)	1 (5.6)	1 (8.3)	5 (16.7)	4 (22.2)	1 (8.3)
4-6 days a week	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)	1 (3.3)	0 (0.0)	1 (8.3)
Every day	5 (16.7)	4 (22.2)	1 (8.3)	2 (6.7)	2 (11.1)	0 (0.0)	2 (6.7)	2 (11.1)	0 (0.0)

Self-reported frequency of cannabis use across time, n (%)

<u>Frequency of cannabis use</u>	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)
Never	13 (43.3)	8 (44.4)	5 (41.7)	23 (76.7)	11 (61.1)	12 (100.0)	22 (73.3)	10 (55.6)	12 (100.0)
Less than monthly	1 (3.3)	0 (0.0)	1 (8.3)	2 (6.7)	2 (11.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
1-3 days a month	1 (3.3)	0 (0.0)	1 (8.3)	1 (3.3)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
1-3 days a week	4 (13.3)	1 (5.6)	3 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (6.7)	2 (11.1)	0 (0.0)
4-6 days a week	4 (13.3)	4 (22.2)	0 (0.0)	2 (6.7)	2 (11.1)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)
Every day	7 (23.3)	5 (27.8)	2 (16.7)	2 (6.7)	2 (11.1)	0 (0.0)	5 (16.7)	5 (27.8)	0 (0.0)

Self-reported frequency of synthetic cannabis use across time, n (%)

<u>Frequency of synthetic cannabis use</u>	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)
Never	28 (93.3)	16 (88.9)	12 (100.0)	28 (93.3)	16 (88.9)	12 (100.0)	27 (90.0)	15 (83.3)	12 (100.0)
Less than monthly	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)
1-3 days a month	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
1-3 days a week	1 (3.3)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)
4-6 days a week	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)
Every day	1 (3.3)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Self-reported frequency of crack use across time, n (%)

<u>Frequency of crack use</u>	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)	Total (n=30)	Recalled (n=18)	Discharged (n=12)
Never	21 (70.0)	11 (61.1)	10 (83.3)	27 (90.0)	15 (83.3)	12 (100.0)	21 (70.0)	14 (77.8)	7
Less than monthly	1 (3.3)	0 (0.0)	1 (8.3)	1 (3.3)	1 (5.6)	0 (0.0)	2 (6.7)	1 (5.6)	1 (8.3)
1-3 days a month	1 (3.3)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)
1-3 days a week	2 (6.7)	2 (11.1)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)	1 (3.3)	1 (5.6)	0 (0.0)
4-6 days a week	1 (3.3)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (6.7)	2 (11.1)	0 (0.0)
Every day	4 (13.3)	3 (16.7)	1 (8.3)	1 (3.0)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Appendix 7: Average amounts of Alcohol, Cannabis, Synthetic Cannabis and Crack consumed on a typical day across time.

Average units of alcohol consumed on a typical day of use across time, mean (SD)

	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Total (n=17)	Recalled (n=12)	Discharged (n=5)	Total (n=10)	Recalled (n=8)	Discharged (n=2)	Total (n=13)	Recalled (n=9)	Discharged (n=4)
Alcohol	13.82	12.14	17.86	13.32	15.57	4.30	7.17	8.94	3.18
(units)	(12.77)	(11.71)	(15.6)	(9.51)	(3.23)	(0.70)	(5.06)	(4.90)	(2.75)

Mean amount of cannabis used on a typical day of use across time, mean (SD)

	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Total (n=17)	Recalled (n=10)	Discharged (n=7)	Total (n=7)	Recalled (n=7)	Discharged (n=0)	Total (n=8)	Recalled (n=8)	Discharged (n=0)
Cannabis	4.48	6.45	1.64	1.64	1.64	-	2.69	2.69	-
(g)	(11.27)	(14.63)	(1.37)	(0.96)	(0.36)		(1.41)	(1.41)	

Mean amount of synthetic cannabis used on a typical day of use across time, mean (SD)

	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Total (n=2)	Recalled (n=2)	Discharged (n=0)	Total (n=2)	Recalled (n=2)	Discharged (n=0)	Total (n=3)	Recalled (n=3)	Discharged (n=0)
Synthetic cannabis	1.82	1.82	-	2.25	2.25	-	1.71	1.71	-
(g)	(1.67)	(1.67)		(1.67)	(1.67)		(1.19)	(1.19)	

Mean amount of crack used on a typical day of use across time, mean (SD)

	<u>Index offence</u>			<u>Discharge</u>			<u>Most recent use in the community</u>		
	Recalled (n=7)	Discharged (n=2)	Total (n=9)	Recalled (n=0)	Discharged (n=3)	Total (n=3)	Recalled (n=5)	Discharged (n=1)	Total (n=6)
Crack	50.00	15.00	41.25	-	43.33	43.33	25.00	20.00	24.17
(£)	(31.6)	(7.07)	(31.37)		(25.17)	(25.17)	(15.00)	(n/a)	(13.57)

*Estimated cost, 1 rock = £10