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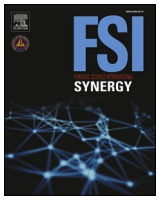

Vulnerability of individuals on mental health medications to drug facilitated sexual assaults

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ABSTRACT

Drink spiking in social settings is one of the most pervasive forms of drug-facilitated sexual assault (DFSA). There are no current data in Australia on the rates of drink spiking or their associated assaults. There is also little known about the prevalence of different substances involved and how the current substance use trends compare to sexual assault trends. To explore this, a recalculation of sexual assault trends to estimate substance related sexual assault was performed. Data about recent trends of mental health prescriptions and sexual assault were obtained from the Australian Institute of Health and Welfare (AIHW). The analysis of these datasets highlighted that females are the highest consumers of antidepressants and benzodiazepines. Results also indicated a statistically significant positive correlation between females and a higher incidence of sexual assault ($r = 0.996$, $p < .001$). This paper demonstrates that females are at most risk of drug-drug interactions (e.g., diazepam and ketamine) with their medications due to the higher rate of prescriptions amongst this population, and therefore more vulnerable to both opportunistic and proactive DFSA. While these findings are preliminary and not causal, they highlight trends in need of further study.

1. Introduction

Drug-facilitated sexual assault (DFSA) occurs when an individual is incapacitated by a substance to a point where they are unable to consent to a sexual act and are then assaulted in a sexual manner [1–4]. Drug-facilitated sexual assault can be classified as proactive, where the assailant introduces a substance to the individual who is assaulted; or opportunistic, where the assaulted individual voluntarily ingested the incapacitating substance [4]. Voluntary ingestion of a substance does not alter the fact that the assault is a drug-facilitated sexual assault.

In Australia, sexual assault laws are governed by state or territory laws, not federal law, therefore the definitions and consequences for DFSA can differ between jurisdictions [5]. In Western Australia, indecent and/or sexual assault, causing harm to a person (including an impairment of the senses) and intoxication by deception are all illegal [6]. This makes all aspects of DFSA illegal regardless of whether the incapacitating substance was voluntarily ingested [6].

Most substances used in DFSA are central nervous system (CNS) depressants such as gamma-hydroxybutyrate (GHB), gamma-butyrolactone (GBL), 1,4-butanediol (1,4-BD), ketamine, benzodiazepines, opioids, scopolamine, and even extra alcohol [7–9]. Ingestion of different CNS depressants at incapacitating doses presents with similar symptoms [10]. Common symptoms include drowsiness, euphoria, loss of consciousness, memory loss, loss of muscle control, anxiety, confusion, disinhibition, slurred speech, and derealisation [10].

Stimulants such as methamphetamine and cocaine have also been present in some incidents of DFSA and may be used due to the sexual excitation they can induce [10,11]. Ingestion of CNS stimulants can also leave a person vulnerable to DFSA as they can lower inhibition, increase euphoria and cause an increase of excitation of sexuality [11]. This increases the likelihood that an individual will not be in a mental state where they can soundly give consent [11]. Therefore, whether a substance is a stimulant or a depressant, its ability to cognitively and perhaps physically incapacitate or render a person incapable of understanding their situation or choices could classify it as a spiking agent.

Many illicit and licit substances are metabolised in a way that may cause drug-drug interactions with alcohol and spiking agents [12]. Therefore, the effect of the spiking agent may either be exacerbated or inhibited by another substance an individual has voluntarily consumed, such as personal medication [12]. In a similar manner the spiking agent

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may cause exacerbation/inhibition of the other substance potentially causing toxicity or lack of therapeutic effect [12].

Gathering evidence for DFSA cases is challenging [13]. Many substances used in DFSA are fast acting with short half-lives and eliminated rapidly [13]. This limits the time window in which a substance can be detected in blood and/or urine samples [13]. If an individual experienced amnesiac effects from the substance they ingested then by the time they have realised what has happened it may be too late to detect certain drugs in their biological samples [13].

Other factors that may influence detection include the metabolites into which some substances break down to in the body, which may complicate the interpretation of results [14]. For example diazepam's metabolites include temazepam and oxazepam, which may be interpreted as the individual having consumed three different benzodiazepines [14].

Standard drug analysis in some forensic laboratories may not include some spiking substances such as GHB, GBL and 1,4-BD, as they require more sensitive and specific equipment than some laboratories are equipped with [4,13]. In such scenarios the analysis for these drugs must be specifically requested if the case is indicating these may have been used [4,13]. This can lead to false negatives and some substances being missed [4].

A United States (US) study on 1000 cases between 2015 and 2016 detected alcohol, cannabinoids, and amphetamines as the most prevalent substances in DFSA [9]. A Netherlands study evaluated 135 cases between 2004 and 2006 and detected alcohol, paracetamol, cocaine, ibuprofen, and benzodiazepines as the most prevalent substances in DFSA [15]. In Australia, it is currently unclear what role substances play in DFSA. Prior to 2010 no study comprehensively evaluated the prevalence of substances in DFSA. The most recent study published in Victoria in 2019, was on data collected 13 years ago (from 2011 to 2013). In this study, 204 DFSA cases were evaluated, revealing the most prevalent substances were alcohol, benzodiazepines, and stimulants such as amphetamines and cocaine [4].

The limited and now dated studies do not provide a contemporary picture of drug facilitated sexual assaults. Furthermore, drug trends can change quickly over time with the introduction of new synthetic drugs often being created [14]. It is therefore crucial that these trends are updated regularly so that there is a full picture of the current substances being used so that laboratories can create protocols for their detection.

Both the Netherlands and Victorian studies found a high prevalence of benzodiazepines in DFSA cases. These are typically prescribed for mental health conditions, and specifically anxiety-related disorders and thus may represent a typology of DFSA victims. There may be numerous reasons that a person may be the target of sexual assault. Research by Stewart, Swanek and Forth [16] identified that perceived vulnerability of the individual played a large role in the likelihood of victimisation. This study found that when a person displays submissive nonverbal behaviour, reduced assertiveness and increased emotionality, they are more likely to be a target of sexual assault [16]. Significantly, anxiety was identified as one such state of increased emotionality [16]. Linked with the high prevalence of benzodiazepines in DFSA victims it appears that individuals receiving pharmaceutical treatment for anxiety and associated mental health conditions represent a vulnerable population targeted in these sexual assaults. Studies have also identified that revictimisation rates of sexual assault victims are higher than other crime types [16]. This may be exacerbated by the effects of sexual assault including a negative impact on mental health further highlighting the vulnerability and targeting of these individuals [17,18].

Whilst the research by Stewart, Swanek and Forth [16] identified that individuals who have mental health conditions such as anxiety and depression may already display submissive behaviour patterns that increase the likelihood of victimisation, what is not considered in studies such as this are the side effects of mental health medications, particularly those that affect levels of consciousness and cognitive processes, that may further increase vulnerability to sexual assault particularly when consumed with alcohol.

1.1. Present study

It has been observed that a significant proportion of DFSA involved individuals with a history of mental health conditions [4]. Anti-depressants and other drugs used to treat mental health conditions have the potential to interact with alcohol and drink spiking agents, with these drug-drug interactions potentially exacerbating deleterious effects, increasing vulnerability of victims and further enabling drug-facilitated crimes [12]. Therefore, the aim of this study was the analysis of recent and current use trends of mental health medications and the determination of any correlation with DFSA trends in Australia.

2. Methods

The study was granted Murdoch Universityethics approval (number 2023/110) for dataset collection and analysis.

2.1. Datasets

The datasets used in this study were made available by the Australian Institute of Health and Welfare (AIHW). They included, the rate of Australian prescriptions related to mental health medications in their entirety, and anti-depressants and benzodiazepines specifically. Datasets (from AIHW) for the rates of sexual assaults were also obtained for comparison with medication trends.

These datasets were downloaded as Microsoft Excel spreadsheets, and the variables chosen for analysis were.

- Standardised rates of prescriptions dispensed (both subsidised and non-subsidised).
- Prescription rates of female versus male for both types of medication (i.e. anti-depressants and benzodiazepines).
- Rates of sexual assault by sex and compared to substance related sexual assault.

2.2. Sexual assault data

The reviewed sexual assault datasets were not sufficiently detailed to determine the proportion of sexual assaults that were substance-related. To do this, a number of informed assumptions had to be made. In 2016, a Personal Safety Survey (PSS) conducted by the Australian Bureau of Statistics (ABS) sought to determine the nature and extent of Australian individuals' experiences of violence, including sexual violence that comprises both sexual assault and sexual threat [19,20]. Of the female respondents that reported being victims of sexual assault perpetrated by a male, 50 % were of the belief that, based on their experience, the consumption of alcohol or another substance contributed to the sexual assault, with either the respondent, perpetrator or both being under the influence of a substance [19,20]. A further study by the Australian Institute of Criminology (AIC) in 2017/2018, conducted as part of the Drug Use Monitoring in Australia (DUMA) Program, interviewed 125 males detained for the offence of sexual assault [20]. Of these 125.

- Ten detainees (8.0 %) believed their drug use contributed to the offence. However, 21 detainees (17 %) tested positive to one or more selected drugs.
- Thirty-five detainees (28 %) believed alcohol contributed to the offence.
- Five detainees (4.0 %) believed both drugs and alcohol contributed.

Considering the proportion of detainees that tested positive to the presence of drugs in combination with those that believed alcohol contributed to the offence, it is evident that for 45 % of detainees the use of substances may have played a role in perpetrating the sexual assault

[20]. A figure of 49 % may be used if it is assumed that the 4 % of detainees that believed both drugs and alcohol contributed were not counted in the previous data.

Therefore, from the ABS and AIC surveys, a conclusion was surmised that 50 % of the reported sexual assault cases were substance related.

A Pearson's correlation was performed, using Jamovi (Jamovi Organisation, v2.4.8) [21], on female, male, substance related and total sexual assault trends between 2013 and 2021. All assumptions were met for the correlation.

3. Results

3.1. Mental health prescriptions

Overall, mental health prescription trends show that antidepressants are by far the most frequently dispensed mental health medication. This is illustrated in Fig. 1. The rise in prescriptions dispensed since the 2013/14 financial year with a sharper rise since the 2019/20 financial year. Psychostimulants also had a sharp increase from the 2020/21 financial year. Anxiolytics, hypnotics, and sedatives have been on a steady decline over the 9 years, while antipsychotics have remained steady.

Antidepressants were dispensed at a far higher rate than any other mental health prescription. At a dispensing rate of 1269 prescriptions per 1000 people in the population, it is clear some individuals are taking more than one type of antidepressant within a given year, although not necessarily at the same time. The second highest dispensed mental health medication class was antipsychotics at a rate of 168 prescriptions per 1000 people, followed by anxiolytics at a rate of 118 prescriptions per 1000 people.

Antidepressant dispensing trends by sex are presented in Fig. 2, demonstrating that the highest users of antidepressants were females by roughly double the rate of males. Trends across both sexes have been on a comparable increase since the 2013/14 financial year. The most recent rates of use in the 2021/22 financial year show females having 1619 antidepressant scripts filled per 1000 females and males having 900 per 1000 males, with the total for the population at 1269 per 1000.

The dispensing trends for different benzodiazepines as well as the combination of all benzodiazepines are shown in Fig. 3, demonstrating that the quantity of benzodiazepines being dispensed is decreasing. The most frequently dispensed benzodiazepines were diazepam, at a rate of 9340 prescriptions per 100,000 people in 2020/21, which has remained at a steady rate of dispensing. Temazepam which has been decreasing steadily was dispensed at a rate of 6493 per 100,000 people in 2020/21. Flunitrazepam, which is well known for being a spiking agent is the second least dispensed benzodiazepine.

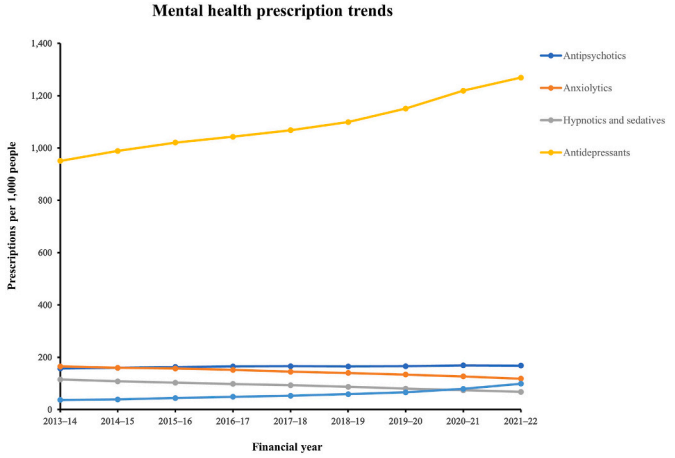

Fig. 1. Rates of mental health medications dispensed in Australia, per 1000 people, by financial year from 2013/14 to 2021/22.

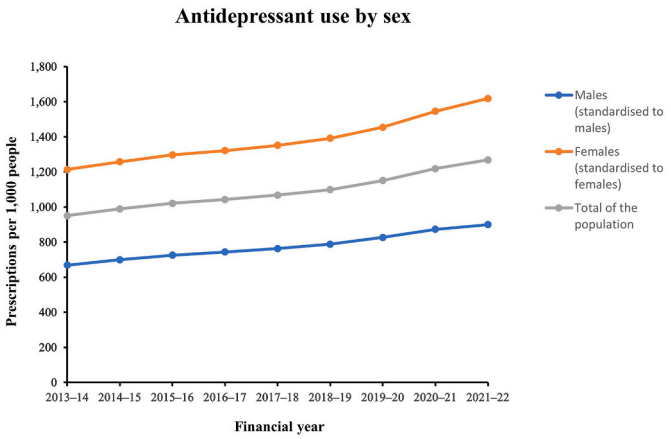

Fig. 2. Antidepressant trends in Australia by sex per 1000 of the relevant population group. Female prescriptions are standardised to females and male prescriptions are standardised to males. Total prescriptions are standardised to the total population. Data reported by financial year from 2013/14 to 2021/22.

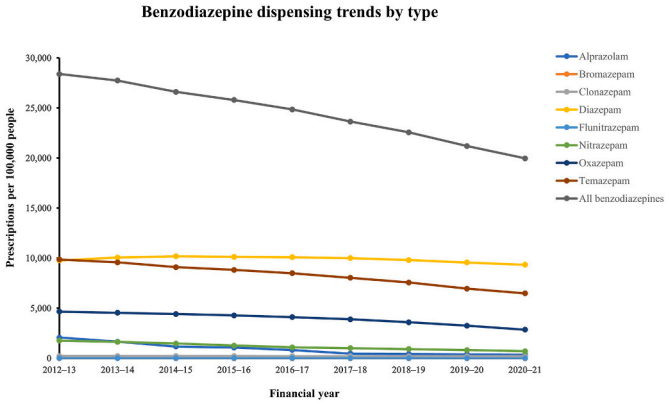

Fig. 3. Benzodiazepine dispensing trends in Australia, per 100,000 people from the 2012/13 financial year to 2020/21. Each type of benzodiazepine is shown to highlight the individual dispensing trends.

It should be noted that the dataset for benzodiazepines is on a different timeline to the mental health prescriptions solely due to data availability.

Benzodiazepine use by sex is presented in Fig. 4, demonstrating that both male and female use is declining around the same rate and therefore total benzodiazepine use is also declining at a comparable rate. In 2020/21, benzodiazepines were used by females at a rate of 23,961 prescriptions per 100,000 and males at a rate of 15,910 prescriptions per 100,000.

3.2. Sexual assault trends

Sexual assault trends between 2013 and 2021 are shown in Fig. 5. Male and female sexual assault is compared with the total rate of sexual assaults as well as the calculated[1] rate of substance related sexual assault. There is a sharp rise in female sexual assaults from 2020 to 2021. There is also a statistical correlation between the rate of female sexual assaults and total sexual assaults.

The most recent rates of assault in 2021 were 205.4 per 100,000 females and males at a rate of 4.4 per 100,000 males. The total sexual assault rate in 2021 was 120.9 per 100,000 of the population. With the

[1] 50 % multiplier determined from the AIHW survey (ABS and AIC) information described in the methods section.

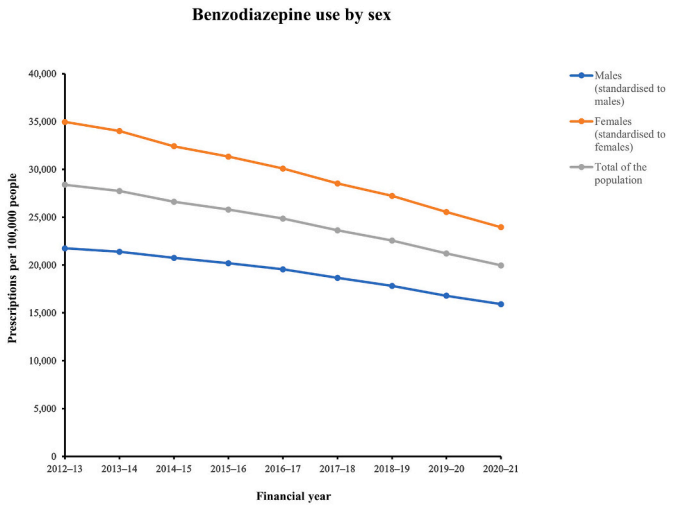

Fig. 4. Benzodiazepine prescriptions dispensed in Australia, per 100,000 of the relevant population group. Female prescription numbers are standardised to the female population and male prescription numbers are standardised to the male population. Data were reported by financial year from the 2012/13 to 2020/21.

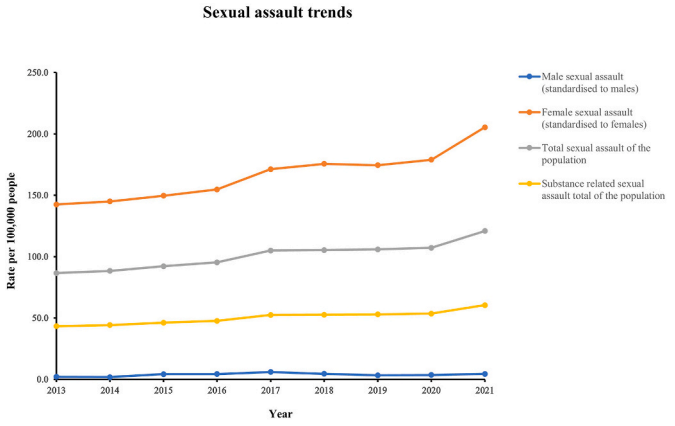

Fig. 5. Sexual assault trends in Australia, per 100,000 of the relevant population group. Sexual assaults on females are standardised to the female population, and sexual assaults on males are standardised to the male population. Substance related sexual assault is a recalculated value from total sexual assault using the assumption that substances, including alcohol, contribute to 50 % of assaults.

surmised assumption that alcohol and drugs contribute to 50 % of sexual assaults, the drug related sexual assault rate would have been 60.45 per 100,000 people in the population.

The statistical analysis of the sexual assault trends presented in Fig. 5 is summarised in Table 1 and uses a Pearson's correlation. The matrix shows that the most significant correlation is between female sexual assault and total and drug related sexual assault with r = 0.996 and p-value ≤0.001. The upper and lower confidence intervals (CI) were 95 %. Male sexual assault data did not have a significant correlation with sexual assault trends or substance related sexual assault.

4. Discussion

The purpose of this study was to analyse recent and current substance use trends as well as documented drug taking and DFSA to highlight correlated trends in Australia. Using the surmised assumption that substances contribute to 50 % of total sexual assaults [20], the changing substance trends between 2012 and 2021 were hypothesised to positively correlate with changing rates of sexual assault over that time. Our results support this hypothesis, indicating that there was a positive correlation between substance related sexual assault, females, and total sexual assault.

Table 1
Matrix for Pearson's correlation of male and female sexual assault (SA) rates per year compared to total, and substance related sexual assault.

Correlation Matrix					
		Male sexual assault	Female sexual assault	Total sexual assault	Substance related sexual assault
Male sexual assault	Pearson's r	–			
	df	–			
	p-value	–			
	95 % CI Upper	–			
	95 % CI Lower	–			
	N	–			
Female sexual assault	Pearson's r	0.5	–		
	df	7	–		
	p-value	0.17	–		
	95 % CI Upper	0.874	–		
	95 % CI Lower	−0.245	–		
	N	9	–		
Total sexual assault	Pearson's r	0.559	0.996[a]	–	
	df	7	7	–	
	p-value	0.118	<0.001	–	
	95 % CI Upper	0.892	0.999	–	
	95 % CI Lower	−0.167	0.981	–	
	N	9	9	–	
Substance related sexual assault	Pearson's r	0.559	0.996[a]	1[a]	–
	df	7	7	7	–
	p-value	0.118	<0.001	<0.001	–
	95 % CI Upper	0.892	0.999	1	–
	95 % CI Lower	−0.167	0.981	1	–
	N	9	9	9	–

Note. *p < .05, **p < .01.
[a] p < .001.

4.1. Mental health medications

Antidepressants were dispensed at a far higher rate than any other mental health prescription from 2013/14 to 2021/22. This class of medication was also the prominent mental health medication showing an increasing trend. The sharp rise in psychostimulants dispensed prescriptions during 2020 demonstrates how substance use trends can change quickly in a short space of time.

Antipsychotics, which remained at a steady rate of dispensing, include medication such as olanzapine and quetiapine which already have drowsy side effects of their own. These can then have additive effects with any CNS depressants used in drink spiking [10,22]. Given the normalised routine of drinking socially, this may increase the potential of DFSA as victims are unable to perceive the risk and their vulnerability [8].

Anxiolytics, which were on a decreasing trend for dispensed prescriptions, include many CNS depressants, such as the benzodiazepines. As illustrated in Fig. 3 the two most commonly dispensed benzodiazepines were diazepam and temazepam. Benzodiazepines are also used as drink spiking agents due to their fast-acting nature [10]. Many

benzodiazepines are also eliminated quickly from the body, making them difficult to detect in blood and urine samples. For example diazepam is a long-acting benzodiazepine with a 0.5–2 h time to peak effect and a 20–80 h half-life [10], temazepam is a short acting benzodiazepine with a 1.2–1.6 h time to peak effect and a 3.5–18.4 h half-life [10]. The decreasing rates at which benzodiazepines are dispensed is important as they are a concern in DFSA, and this could show that a trend towards a different spiking agent may be occurring.

The findings indicated that the highest consumers of antidepressants and benzodiazepines were female. This highlights how females are more susceptible to drug-drug interactions with their prescription antidepressants and benzodiazepines. Due to the higher risk of drug interactions, females are also at a higher risk of both proactive and opportunistic DFSA.

4.2. Sexual assault trends

The findings highlighted the far higher rate of females who were sexually assaulted compared to males. The female rate had a high correlation with sexual assault and substance related sexual assault. While the substance related sexual assault is based on a surmised assumption, the correlation does agree with literature where female complainants represent the majority of DFSA.

The significance of potential drug interactions between mental health medication and alcohol/drink spiking agents is important as a high proportion of those at risk of DFSA have a mental health history [23]. Those with a mental health history may be more likely to partake in risky behaviour such as consuming more alcohol than the recommended amount [23]. There is also the possibility that some people are not aware of the interactions between their medication and alcohol and/or illicit substances. This puts people with a mental health history at a higher risk of DFSA and a greater injury to their mental health as a result [23].

The combined findings from the datasets highlight that females take more mental health medication than males and as a result are at a higher risk of DFSA. Regarding DFSA in Australia, the move towards fewer benzodiazepines and more antidepressants and psychostimulants will mean that different toxicology results will start to show. The interpretation of the results will be vital in investigating DFSA both currently and in the future.

4.3. Implications on the criminal justice system and associated stakeholders

Previous research has identified that perceived vulnerability of the individual plays a large role in the likelihood of victimisation [16]. Behaviours such as submissive nonverbal behaviour, reduced assertiveness and increased emotionality, such as depression and anxiety, are more likely to increase one's vulnerability to sexual assault [16]. This research has also shown that compared to other crimes victims of sexual assault have an increased rate of revictimisation [16].

It is noteworthy that research has shown that increasing counts of revictimisation lead to a decreasing rate of success in court, since it has been demonstrated that greater blame is placed on the victim of repeat victimisation when compared to victims of a one-off sexual assault [24,25]. There is a general pattern of thought that these victims should have "learnt their lesson" from their previous experience and therefore avoid situations that put them at risk [24].

Mental health medications such as benzodiazepines and antidepressants are commonly detected in victims of sexual assault [4,15]. The presence of these medications may further exacerbate flawed blame attribution, most notably if it occurs in the judicial context by the trier-of-fact (jury or judge) in a court case [26]. It is already evident that victims of sexual revictimisation are unlikely to have their cases progress through to prosecution due to their testimony being less likely to be believed than those reporting their first case of assault [24]. It has also been suggested that police investigators may not proceed with investigating a repeat sexual assault due to a disbelief in the truthfulness of the allegation [24]. Such biases may be exacerbated if an investigation reveals prior drug use for pre-existing medical/mental health conditions. Research should be focussed on establishing whether this would affect a juror's decision-making process, influence police to investigate allegations, and compel a prosecutor to bring charges commensurate with the evidence at hand. In this context the authors agree with the findings of Lilley et al.: "Greater researcher access to the decision-making process of genuine trial jurors will allow for more reliable and conclusive testing of the extent to which such factors have any negative impact upon juror fairness and impartiality" [27].

4.4. Limitations

An important unknown to be aware of, is how different people interact with the substances that are used. People metabolise different substances at different rates dependant on their biology. There is also very little known around if there is a threshold limit for different substances to determine if a person has been spiked. For example, a person may use an opioid as a regular medication and there is a therapeutic dose for that. However, a blood or urine test may reveal a result that would suggest that a person has far more than a therapeutic dose in their system and so they may have been spiked with the same class of medication. The presence of alcohol further confounds the interpretation.

The data analysis applied in this study for substance related sexual assault was derived from two studies based on the opinion of a DFSA affected sample population. The first study was the PSS which gathered opinions from victims of DFSA. The second study was from the DUMA program which gathered data from detainees [20]. The studies were not based on real data from toxicology analysis of a population sample of sexual assaults and therefore should not be inferred as an accurate picture.

4.5. Future research

The current research in Australia suggests that important trends, and subsequent awareness-raising initiatives may be gained from existing datasets. Future research should seek to further explore these data and develop other approaches to understanding individuals' awareness of drug-drug interactions, and the effects of such interactions.

One means of improving the data would be participation of the police force/SARC by providing anonymised data to fill in the gap between what is self-reported and what is being detected giving a more accurate picture. Furthermore, changing trends in mental health medication as well as illicit substance use is important to be aware of. Investigators need to be aware of the current substance trends, so they know what to look for as well as what toxicology results mean when they receive them. Also, toxicology analyses can continue to evolve and have testing standards develop as fast as the trends move, particularly with the fast-moving nature of designer benzodiazepines.

The potential for drug-drug interactions as well as differing metabolic rates between individuals provides potential for further investigation into quantifying the amount of prescription medications detected in samples. The amount of substance ingested at the time is crucial into how that substance affects an individual and how incapacitated they may become.

In future, there may also be an increase in the detection of substances such as cannabinoids, MDMA and psilocybin with the approval of prescriptions for these in Australia. With more people using such substances for therapeutic use, the likelihood of drug-drug interactions with alcohol and drink spiking substances will likely also rise. It will be important to track the use of these and how often they are detected in DFSA and drink spiking analysis.

5. Conclusion

The analysis of the mental health prescription dispensing, including benzodiazepines, has provided insight into the societal use trends of these medications. The data highlight that between 2013/14 to 2021/22 benzodiazepine prescription rates were falling, whereas antidepressant use was rising. This study has further demonstrated that women are being prescribed mental health medication at a greater rate than men. It would be expected therefore, in situations of drink spiking women may be more susceptible to proactive and opportunistic DFSA. Further research is required to explore the trends seen here to perhaps increase awareness of drug-drug interactions and provide investigators with more context to toxicology results.

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CRediT authorship contribution statement

Marie Lynam: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **David Keatley:** Writing – review & editing, Supervision, Methodology. **Garth Maker:** Writing – review & editing, Supervision, Methodology. **John Coumbaros:** Writing – review & editing, Supervision, Project administration, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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