CRIME
AND JUSTICE
STATISTICS

BUREAU BRIEF

Trends in drug driving charges, roadside drug testing and drug use in NSW, 2008-2023

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AIM

To examine trends in drug driving charges, roadside drug testing, and population drug use in New South Wales (NSW) between 2008 and 2023.

METHOD

Data on drug driving proceedings and roadside drug testing were obtained from the NSW Police Force. Focusing on the period between 2008 and 2023, we describe trends in the number of drug driving charges laid by police, as well as changes in the volume of roadside drug tests undertaken by police and the detection rate over time. We also examine the profile of drivers who are proceeded against after testing positive and any differences in key characteristics over time. Finally, to support the interpretation of these results, we assess changes in drug use from two population drug use monitoring systems and consider associated trends in self-reported drug driving behaviours.

RESULTS

Between 2008 and 2023, the number of drug driving charges rose from an average of 102 per quarter in 2008 to 3,296 in 2023. This significant growth in charges followed the announcement of two expansions of the NSW Mobile Drug Testing (MDT) program, which resulted in a rapid increase in testing volumes from around 20,000 to 156,000 tests per year in 2008 and 2019 respectively. While the MDT expansions aimed to increase police capacity to detect and deter drug driving behaviours, we found a weak relationship between total testing volumes and subsequent detection rates, with the average detection rate varying between 2% and 18%. This suggests that the number of drug driving charges over this 15-year period was not simply a function of the number of tests conducted, but also related to when, where, and for whom tests were used. When we compared drug driving offenders charged in 2019 with those charged in 2023, we found that the 2023 cohort were more likely to be older, test positive for methamphetamine, reside in regional areas and have a prior drug driving charge. During the period we study, population-level drug use has remained relatively consistent. Meanwhile, the self-reported prevalence of drug driving has decreased at a steady rate, with this downward trend commencing prior to the start of the MDT program in NSW.

CONCLUSION

Sequential expansions of the MDT program have led to a considerable increase in the number of offenders charged with drug driving offences in NSW between 2008 and 2023. Recent growth in the roadside drug test detection rate and subsequent charges may be driven by police targeting of repeat drug driving offenders, and motorists who offend in regional areas.

KEYWORDS

Drug driving Mobile drug testing MDT Driving

Drugs and drug courts Driving offences

INTRODUCTION

Drug use and drug driving are highly prevalent in Australia and are associated with significant social costs. In 2023, 3.9 million (or 18% of) Australians aged 14 and over reported using an illicit drug in the previous 12 months, with cannabis and cocaine being the most frequent drugs used (Australian Institute of Health and Welfare, 2024). Recent surveys suggest that up to 40% of people who regularly use illicit drugs self-report drug driving (Hasan et al., 2023; Sutherland et al., 2021). Beyond the fact that it is illegal for Australian motorists to drive with the presence of certain illicit drugs in their system[1], this is concerning as the use of illicit drugs is known to impair cognitive and motor skills required for safe driving (Ortiz-Peregrina et al., 2021; Simmons et al., 2022; Stough et al., 2012) and is a contributing factor in up to 30% of road fatalities in Australia (Centre for Accident Research & Road Safety, 2017). Whetton et al. (2016, 2020) estimate that road crashes attributed to cannabis and methamphetamine cost Australians around $480.6m and $125.2m, respectively, each year.[2]

The bedrock of the NSW Police Force's response to drug driving is the Mobile Drug Testing (MDT) program. MDT was legislated in 2006 and introduced in NSW in 2007 along with a new suite of offences for driving a motor vehicle with a prescribed illicit drug present in a driver's system.[3] These changes improved the ability of the NSW Police Force to identify and proceed against drug driving offenders, as previously they could only charge an offender with driving under the influence of a drug based on a subjective assessment of the driver's level of intoxication. Similar to Random Breath Testing (RBT), it was anticipated that the high visibility of roadside drug testing would increase the perceived risk of detection amongst drug drivers thereby reducing drug driving behaviours. The MDT program in NSW is now one of the largest roadside drug testing programs in Australia, representing a quarter of all roadside drug tests undertaken nationwide.[4]

The operation of the Mobile Drug Testing program in NSW

The MDT program works by testing for the presence of illicit drugs in a driver's system at select roadside locations (which can be conducted alongside RBT stationary operations) and during NSW Police Force patrols. Drivers required by police to submit to a MDT are first asked for their licence, and to complete a breath test for alcohol. Following this, they are asked to submit to one or more oral fluid tests. A driver must comply with a request by police to submit to an oral fluid test. Failing to do so may constitute an offence.

MDT tests for the presence of four drugs in a driver's saliva, including cocaine, 3,4-methylenedioxymethylamphetamine (also known as MDMA), delta-9-tetrahydrocannabinol (also known as THC), and methylamphetamine (also known as speed) (*Road Transport Act 2013 (*NSW)). Figure 1 summarises the testing process at the time this research was undertaken, and the approximate times required to receive results. In the first stage of saliva testing, all drivers are provided the Securetec DrugWipe sample collector to be dragged across the tongue. Results from this screening test are usually available within 3 minutes. If negative, no further action is taken. If positive, drivers may be arrested for the purposes of providing an oral fluid sample and escorted to a roadside testing van or bus, or back to a police station. The second saliva sample is analysed using the Draeger DrugTest 5000. The results from this second test are available within 20 minutes.[5] All saliva samples collected following an initial positive test are sent to a laboratory for further testing, regardless of the outcome of the second test. Drivers who obtain a negative second test result are released pending results from the laboratory testing. Those

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1   Specifically, all Australian states and territories have roadside drug testing laws which employ a zero-tolerance threshold (where it is an offence for a driver to have any amount of a number of illicit drugs detected in their system). See Moxham-Hall and Hughes (2020) for a comparison of roadside drug testing laws across Australian states and territories.

2   See Whetton et al. (2016, 2020). This includes costs attributable to hospital separations, compensation payments for injuries and property damage, among other costs.
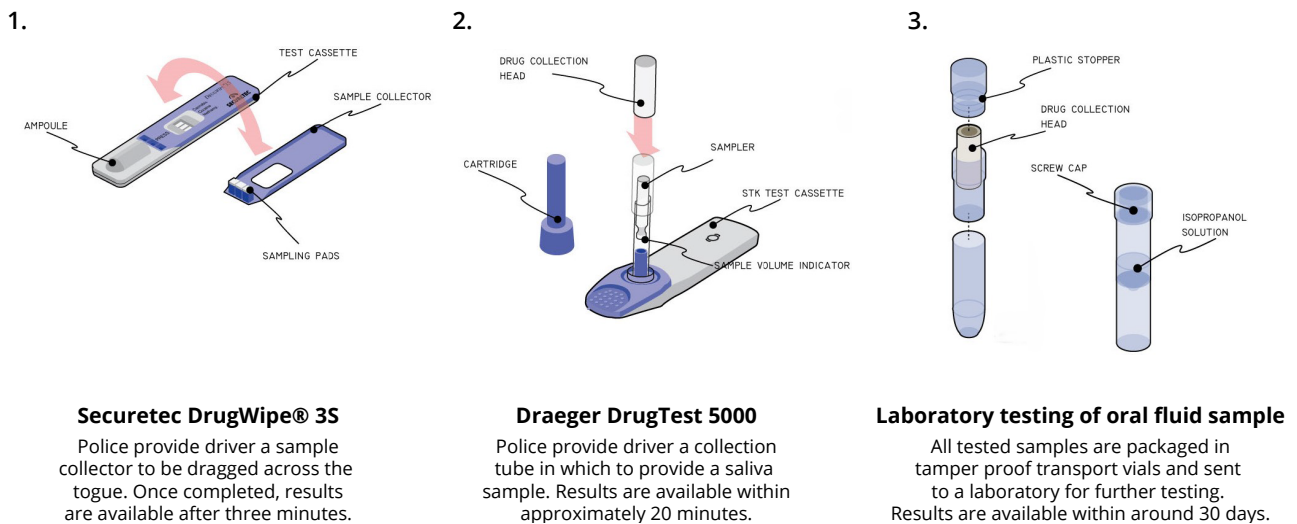
3   Legislative changes under the *Road Legislation Amendment (Drug Testing) Act 2006* (NSW) made it an offence to drive a motor vehicle with an illicit drug present in a driver's oral fluid, blood, or urine.

4   For an overview of roadside drug testing in other Australian jurisdictions, see Bureau of Infrastructure and Transport Research Economics (BITRE; 2023).

5   A database entry into the NSW Police Force Computerised Operational Policing System database is required to be completed as soon as possible for any incidents where the driver is subject to a secondary test using the Draeger DrugTest 5000 (NSW Police Force, 2018).

who obtain a positive second test result are issued a prohibition notice and prohibited from driving for a period of 24 hours. If samples are confirmed as positive by laboratory testing,[6] police take legal action against the driver either by way of a penalty notice or a court attendance notice. Penalties imposed on drivers increase in severity according to whether the offender has previously been proceeded against for drug driving (NSW Government, 2021).[7]

Figure 1. Summary of MDT program saliva testing devices and process employed by the NSW Police Force

1.

Securetec DrugWipe® 3S
Police provide driver a sample collector to be dragged across the togue. Once completed, results are available after three minutes.

2.

Draeger DrugTest 5000
Police provide driver a collection tube in which to provide a saliva sample. Results are available within approximately 20 minutes.

3.

Laboratory testing of oral fluid sample
All tested samples are packaged in tamper proof transport vials and sent to a laboratory for further testing. Results are available within around 30 days.

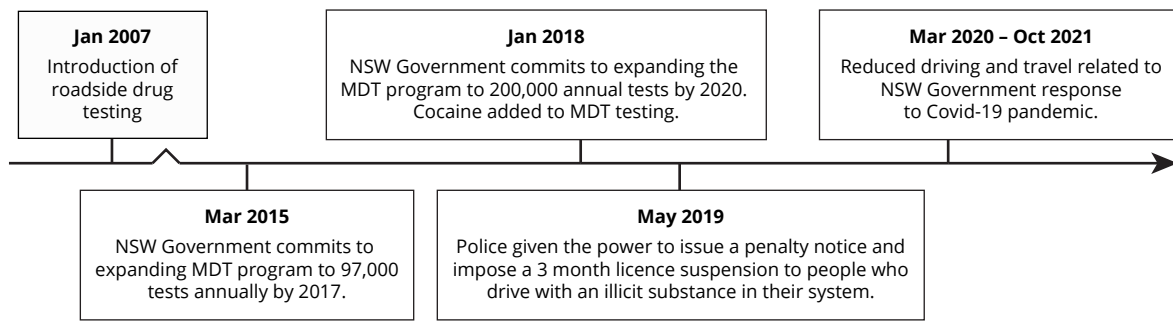Note. Information and images adapted from NSW Police Force (2018).

Legislative changes and expansion of the Mobile Drug Testing program in NSW

Figure 2 details a timeline of major events and reforms to the MDT program. Since its introduction in 2007, the scale and scope of MDT operations have expanded considerably. Two MDT expansions were implemented in response to concerns that both the use of illicit drugs and their presence in traffic crashes and fatalities were unacceptably high (Gair, 2015; Singhal, 2020). The first expansion was announced in March 2015, where the NSW Government committed to triple testing numbers to around 100,000 a year by 2017 (NSW Legislative Council, 2018a). The second expansion of MDT was announced by the NSW Government as part of the Road Safety Plan 2021 in January 2018, with the intention to double the number of roadside tests to 200,000 by 2020 (Parliament of NSW, 2022). This coincided with a suite of drink and drug driving reforms including two legislative amendments related to drug driving. The first enabled roadside drug testing for cocaine in early 2018 (McKeith, 2018), while the other granted police the power to issue a penalty notice and impose a three-month licence suspension to first time drug driving offenders in May 2019 (Centre for Road Safety, 2022). Although the MDT program planned to administer 200,000 tests a year by 2020, this was hampered by COVID-19 and the associated government response. Of note, the NSW police temporarily stopped conducting stationary MDT in March 2020 (Cormack & Power, 2020).

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6   While roadside oral fluid testing equipment is used to help triage drivers subjected to MDT, it does not provide evidentiary standard analysis required for a prosecution.
7   For first time offenders, police have the option to issue a penalty notice fine of $603 and impose a 3-month licence suspension. The maximum court-imposed fine for a first offence is $2,200 and licence disqualification can range from 3-6 months. For subsequent offenders, the maximum court imposed fine is $3,300 and the minimum licence disqualification is 6 months, whilst the maximum disqualification is unlimited.

Figure 2. Timelines of major events and reforms for the MDT program, 2007 - 2023

Jan 2007	**Jan 2018**	**Mar 2020 – Oct 2021**
Introduction of roadside drug testing	NSW Government commits to expanding the MDT program to 200,000 annual tests by 2020. Cocaine added to MDT testing.	Reduced driving and travel related to NSW Government response to Covid-19 pandemic.

Mar 2015	**May 2019**
NSW Government commits to expanding MDT program to 97,000 tests annually by 2017.	Police given the power to issue a penalty notice and impose a 3 month licence suspension to people who drive with an illicit substance in their system.

Australian research on roadside drug testing

The development of the MDT program was inspired by the success of high-visibility, high-volume roadside RBT programs that have been in operation in Australia since the mid-1970s (National Drug Driving Working Group, 2018). Oral fluid testing was adopted for MDT because it could be easily deployed roadside, required minimal training, and was similar to the familiar RBT process. This enabled a level of mass screening which could not be achieved via a blood sample testing, an approach which is more time consuming and invasive than oral fluid testing (National Drug Driving Working Group, 2018). NSW policymakers have continued to support the expansions of the MDT program on the basis that it deters risky drug driving behaviours and improves road safety[8] via two mechanisms. The first is general deterrence, whereby high-visibility enforcement discourages offending by increasing the actual or perceived risk of apprehension. The second is specific deterrence, whereby the apprehension and punishment of an individual for a drug driving offence aims to discourage them from committing further offences.

Despite broad support for the program, Australian evidence regarding the deterrent effects of MDT and similar programs is limited and provides mixed results. Newstead et al. (2020) evaluated the impact of a 2015 expansion of roadside drug testing in Victoria using police data on testing and crashes, along with Victorian coronial data from 2004 to 2018. Using logistic regression, the authors found that additional testing and increases in the detection rate were associated with reductions in the presence of THC and methamphetamine in the systems of motorists injured in road crashes.[9] While these results are promising, the study does not control for several important factors related to drug-related road crashes, such as underlying trends in drug driving, drug use, driver characteristics, speeding, fatigue, distraction, or use of a seatbelt. Considering these limitations, it is unclear whether these unobserved confounders have led to an overestimation (or underestimation) of the program's expansion.

The largest Australia-wide study comes from Horyniak et al. (2017), who examined trends in self-reported drug-driving among 5,053 regular drug users across Australia between 2007 and 2013, including 643 drug users from NSW. The authors report that in the six years following the introduction of MDT, drug driving decreased among people who inject drugs (from 83% to 74%) and among regular psychostimulant users (from 72% to 56%). The authors attribute this decrease to a general deterrent effect in the population. Additionally, the study found no evidence of a relationship between experiences with roadside drug testing and the prevalence of drug-driving, implying that testing may not have a specific deterrent effect. Yet, several methodological problems limit the interpretation of Horyniak et al.'s (2017) results. Most importantly, as the study was unable to examine population trends in the prevalence of drug driving prior

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8   For instance, when announcing the 2015 expansion of MDT, the then-Roads Minister Duncan Gay stated, "Our message is quite simple, if you use drugs and drive, our mobile drug testing program will identify you, putting your licence, livelihood and family at great risk" (Gair, 2015).

9   Specifically, the study estimated that an additional 1000 preliminary oral fluid tests was associated with a significant decrease in the proportion of vehicle controllers detected with THC in their system who are seriously injured (Odds Ratio [OR] =0.962, p <0.0001), or fatally injured (OR = 0.958, p = 0.047) in a road crash. Additionally, each percentage point increase in the detection rate of drug tests was associated with a decrease in the proportion of vehicle controllers detected with meth in their system and fatally injured in road crashes (OR = 0.79, p = 0.007).

to the introduction of roadside drug testing, it is unclear whether observed decreases are attributable to a longer-term trend rather than roadside drug testing. General deterrence findings are also likely confounded by the study's repeated cross-sectional design which compares small and separate samples of drug users over time who may differ in their drug use behaviours.

The absence of a specific deterrent effect was similarly identified by Hasan et al. (2023), who found no association between random drug testing and self-reported drug driving in their survey of 1,541 drug and non-drug drivers in QLD, NSW, and Victoria. The study also found that drug drivers were significantly more likely to report using a range of strategies to avoid police detection. In contrast, in a study of 803 Queensland regular drug users, Mills et al. (2022) found that repeated exposure to roadside drug testing had a positive, albeit small, effect on drivers' perceived certainty of apprehension and future intentions to drug drive. However, as these two studies rely on small non-random samples of motorists who are disproportionately young adults and male, their results may not extrapolate to the general population of NSW.

Beyond the question of whether roadside drug testing deters drug driving, the operation of Australian roadside drug testing regimes has come under scrutiny from academics and commentators. For instance, Quilter and McNamara (2017) argue that the practice of detecting for any presence of drugs (known as a zero-tolerance approach) results in over-criminalisation and shifts liability away from impairment to prior use. The authors point out that this is also at odds with the policing of drink driving, where evidence-based blood alcohol content threshold levels serve as proxies for impairment. Others have suggested that it is not practical or necessary to establish drug driving thresholds for several reasons (Prichard et al., 2010). Firstly, the potency of drugs is more variable than alcohol (partly due to their inconsistent purity) and thresholds may appear to condone certain thresholds of illicit drug use. Secondly, multiple cut-off levels for separate illicit drugs could be confusing to motorists. Finally, any attempt to establish impairment thresholds for drug driving would require criteria for impairment in cases of poly-drug use.[10]

A further criticism regarding the fairness of the zero-tolerance approach is related to the accuracy of testing equipment and methods used in Australian roadside drug testing. One consideration is that the ability of testing equipment to detect the presence of a drug depends on the drug type being tested. Significant focus has been placed on the accuracy of cannabis detection rates in roadside drug testing. Possibly the most robust of this work is Arkell et al. (2019), who conducted a randomised double-blind control trial which evaluated the accuracy of the two roadside testing devices used in NSW to detect drug driving. When analysing 210 oral fluid samples, the authors found that although the devices were effective in detecting recent cannabis use, there were a high number of both false positives and false negatives.[11] However, penalties (barring driving prohibition) are not applied until laboratory testing of oral fluid samples, which confirms 97% of positive roadside readings (NSW Legislative Council, 2018b). Even still, there are concerns that oral fluid is not well-suited for confirmatory testing, particularly given a lack of evidence that trace concentrations of illicit drugs in blood or oral fluid are associated with impairment or increased collision risk (Wolff et al., 2013, Robertson et al., 2022). The implications of the zero-tolerance approach are significant given the penalties involved, particularly in regional areas where drug convictions are disproportionately high.[12] Ricketts (2018) remarks that regional drivers subjected to licence suspension following drug driving offences have fewer alternatives to driving (such as public transport networks) than their counterparts in metropolitan areas.

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10 This is significant, as research shows that most drug users are poly-drug users (Darke & Hall, 1995; Darke, et al., 2007).
11 In particular, 5% of Securetec DrugWipe 5s test results recorded positives and 16% were false negatives, while 10% of Drager DrugTest 5000 tests were false positives and 9% recorded false negatives.
12 For example, in 2017, the rate of drug driving convictions in the Richmond-Tweed region was five times the state average (Ramsey & Fitzgerald, 2017).

The current study

The approach to policing drug driving in NSW and the scale of the MDT program has changed significantly between 2008 and 2023. However, there is currently little publicly available information on the outcomes of the MDT program in NSW and the number and characteristics of offenders who are proceeded against as a result of testing. This study aims to remedy this by addressing the following research questions:

1. What are the trends in drug driving charges in NSW?

2. What are the trends in the use of MDT by the NSW Police Force, and what is the average detection rate?

3. Who is being charged with drug driving offences, and has the profile of drug driving offenders changed over time?

4. To what extent are recent trends in drug driving offending driven by changes in drug use/drug driving behaviours?

METHOD

Data

To examine the use of MDT in NSW and the characteristics of persons proceeded against, we draw on three sources of administrative data:

1. **Drug test volumes**: A publicly available extract from the Bureau of Infrastructure and Transport Research Economics (BITRE), detailing the annual number of mobile drug tests conducted by NSW Police between 2008 and 2022. Testing volumes for 2023 were obtained directly from the NSW Police Force Traffic & Highway Patrol Command. Additionally, the aggregate annual counts of positive tests were obtained from the NSW Police Force Statistical Services Team.

2. **Drug driving incidents:** An extract from the NSW Police Force Computerised Operational Policing System (COPS) database containing all criminal incidents where a person of interest (POI) was proceeded against for a drug driving presence offence[13] between 2008 and 2023. This included details on proceeding dates, concurrent offences, incident locations, offence types, drug test results, and the type of drug involved in the incident.[14] The extract also contains sociodemographic characteristics of offenders at the time of the incident, including their age, Aboriginality, gender, and measures of socioeconomic disadvantage and remoteness associated with their residential address.

3. **Prior offending:** An extract drawn from the BOCSAR Reoffending Database (ROD). The ROD contains a record of all police cautions, youth justice conferences, and court appearances finalised in NSW between 1994 and 2023, including offence characteristics, court outcomes, and custodial episodes. These records were linked with the above COPS extract to examine the offending history of persons proceeded against for drug driving.

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13 There are two types of drug driving offences in NSW: 1) presence offences designed to deter the use of illicit drugs that feature in NSW fatal crashes, largely detected through MDT and 2) driving under the influence (DUI) offences which are detected via behavioural impairment and/or through blood and urine testing if police have a reasonable suspicion that a driver is under the influence of drugs. This paper is only focused on presence offences, which make up the vast majority of drug driving offences. Specifically, we exclude 6% of total drug driving incidents which were unable to be linked to a NSW Police Force recorded drug test. Several explanations exist for the presence of a drug driving charge without a drug test recorded by the NSW Police. These charges may be attributed to DUI offences, non-fatal crashes that require police drug testing outside the MDT program, or small-scale errors in data collection by the NSW Police Force.

14 While the MDT program tests for the presence of four illicit drugs, the categories recorded in NSW Police data do not use the same naming convention as Road Transport Act. We report drug types as recorded by the NSW Police. As such the term cannabis is used in place of THC, amphetamine in place of methylamphetamine, ecstasy in place of MDMA.

To provide context to the interpretation of the MDT operational data, we draw on two additional sources of information which can be used to infer trends in aggregate drug use and drug driving behaviours. These include:

1. **Self-reported drug use and drug driving behaviour:** Self-reported estimates of the prevalence of drug use and drug driving behaviour from a large representative longitudinal survey, the National Drug Strategy Household Survey (NDSHS).[15] Specifically, we report the estimated proportion of the NSW population over the age of 14 who reported using illicit drugs in the 12 months prior to the survey, from eight waves of the survey conducted between 2001 and 2022/23. This includes disaggregation by drug types targeted by the MDT program (Cannabis, Ecstasy, Cocaine, Methylamphetamine). Similar information on drug driving behaviours is available at the national level. For Australians who report regularly using illicit drugs, we present estimates of the prevalence of driving under the influence of illicit drugs in the previous 12 months.

2. **Wastewater monitoring:** Levels of drug consumption in the NSW population implied by the presence of illicit drugs in wastewater, estimated by the National Wastewater Drug Monitoring Program.[16] Estimates are presented by region (metropolitan or regional) from the beginning of the monitoring program in August 2016 until December 2023. We draw on longitudinal data disaggregated by drug type, focusing on those drugs which are included in the MDT program (Cannabis, Ecstasy, Cocaine, Methylamphetamine). Wastewater treatment testing takes the form of a repeated cross-section of different catchment sites. As a result, underlying catchment sites may not remain consistent between testing periods. While this approach allows for an understanding of longer-term drug use trends in the population, care is advised in interpreting the results of single testing periods. Wastewater testing in each period may be unduly influenced by the sites where testing is being carried out and may not be representative of the wider population of drug users or drug drivers.

Statistical analysis

We begin by focusing on trends in drug driving offending and the operation of the MDT program in NSW. Specifically, we examine changes in the frequency of drug driving offences, drug testing, self-reported drug driving behaviours, and drug use over time by plotting quarterly and yearly trends from 2008 to 2023.[17]

To describe how the composition of drug driving offenders has changed over time, we compute descriptive statistics that compare sociodemographic characteristics of drug driving offenders proceeded against in 2019 and 2023. First, we investigate how changes in testing and the proportion of positive tests coincide with changes in offender characteristics at a more granular level. We then focus on trends in the proportion of drug driving offenders by prior offending behaviours.

Finally, to support the interpretation of these results, we draw upon three sources of information describing trends in drug driving and drug use in the population.

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15 Readers interested in the survey are directed to Australian Institute of Health and Welfare (2024).
16 For further information on wastewater testing, see Australian Criminal Intelligence Commission (2024).
17 Although the program began in 2007, routinely collated data detailing the number of drug tests conducted by NSW Police is only available from 2008. Interested readers are directed to Ramsey and Fitzgerald (2017) for discussion of earlier operation of the MDT program. Yearly trends were plotted in cases when quarterly data were not available.

RESULTS

Drug-driving incidents in NSW

Figure 3 presents the quarterly number of drug driving incidents where legal action was taken by NSW police between 2008 and 2023. In the early stages of roadside drug testing, from 2008 to 2015, the total number of legal actions for drug driving offences remained below 400 per quarter. After the first expansion of MDT was announced in 2015, the number of drug driving offences grew to roughly 1,800 incidents per quarter in 2015, then stabilised to around 2,000 incidents per quarter between 2016 and 2018. Following the announcement of the 2018 MDT expansion and the introduction of infringement notices for first time drug driving offenders in 2019, quarterly drug driving offences continued to grow to an average of 2,950 per quarter by mid-2023 (reflecting a 48% increase from 2016-2018 levels).

Figure 3. Quarterly number of legal actions for drug driving, NSW, 2008–2023
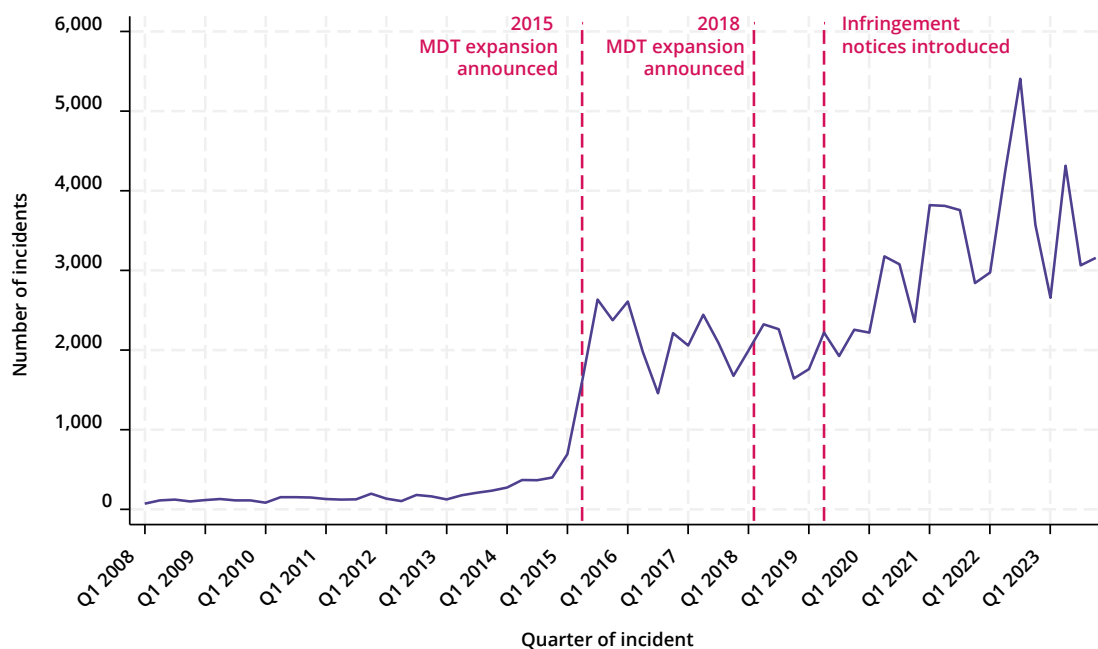
Note. Counts refer to the number of incidents where legal action was taken by police after drug testing. Horizontal axis labels reflect the first quarter of each year. Dashed lines reflect important policy or program changes.

Figure 4 breaks down the number of drug driving incidents in NSW by the drug type detected. After the first MDT expansion was announced in 2015, drug driving incidents increased sharply for all drug types, but cannabis and methamphetamine were the most common drugs detected. Most notably, from 2008-2014, quarterly cannabis offences grew from an average of 98 in 2008-2014 to a quarterly mean of 1,137 between 2015-2017 (1060% increase), while offences involving amphetamines grew from 98 per quarter in 2008-2014 to 1,287 per quarter during 2015-2017 (1213% increase). In the same period, ecstasy saw a more muted increase in absolute terms, rising from an average of 19 incidents to around 98 per quarter (415% increase). Following the announcement of the 2018 expansion and the introduction of penalty notices for first time drug driving offenders in 2019, the average number of quarterly drug driving offences again increased across most drug types. In particular, between 2018-2023, cannabis related offences grew to an average of 1,706 per quarter (50% increase), amphetamine related offences rose to roughly 1,666 per quarter (29% increase) and offences related to ecstasy increased to a mean of 125 per quarter (28% increase). This also coincided with a legislative change that allowed for cocaine to be tested under the MDT program, which saw the number of cocaine related offences to rise from zero to an average of 302 post-2018.

Figure 4. Quarterly number of drug driving legal actions by drug type identified, NSW, 2008–2023
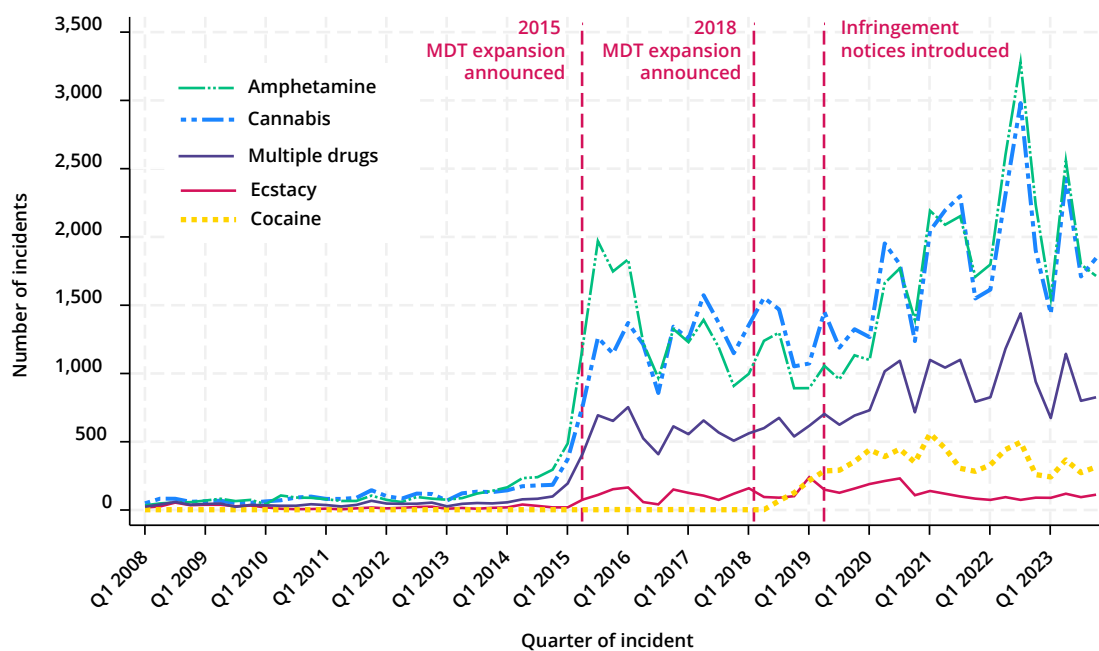
Note. Counts refer to the number of incidents where a specific drug type was identified in lab testing of oral fluid and legal action was taken by police after drug testing. Horizontal axis labels reflect the first quarter of each year. Drug type identification categories are not mutually exclusive. Testing for cocaine was introduced in 2018.

Figure 5 shows quarterly trends in the method of legal proceeding for drug driving incidents. Note that prior to the introduction of penalty notices for first time offenders in 2019, a court attendance notice was the only type of legal action available to police. This means that by construction, the total number of drug driving incidents where legal action was taken (the dotted line) is equal to the number of incidents proceeded against by way of a court attendance notice (the blue line) up until 2019. As detailed in Figure 5, there was a significant upward trend in court attendance notices issued for drug driving from 2015 to 2019, spiking as high as 2,633 incidents per quarter in 2015 and then stabilising to an average of around 2,000 incidents per quarter. After the 2019 introduction of penalty notices, the total number of drug driving offences continued to rise, peaking at around 5,400 incidents in quarter three of 2022. This was driven by both a significant growth in infringement notices, rising from zero to a high of nearly 1,700 incidents per quarter, coupled with a contemporaneous rise in court attendance notices.

Figure 5. Quarterly number of drug driving incidents by method of proceeding, NSW, 2008–2023
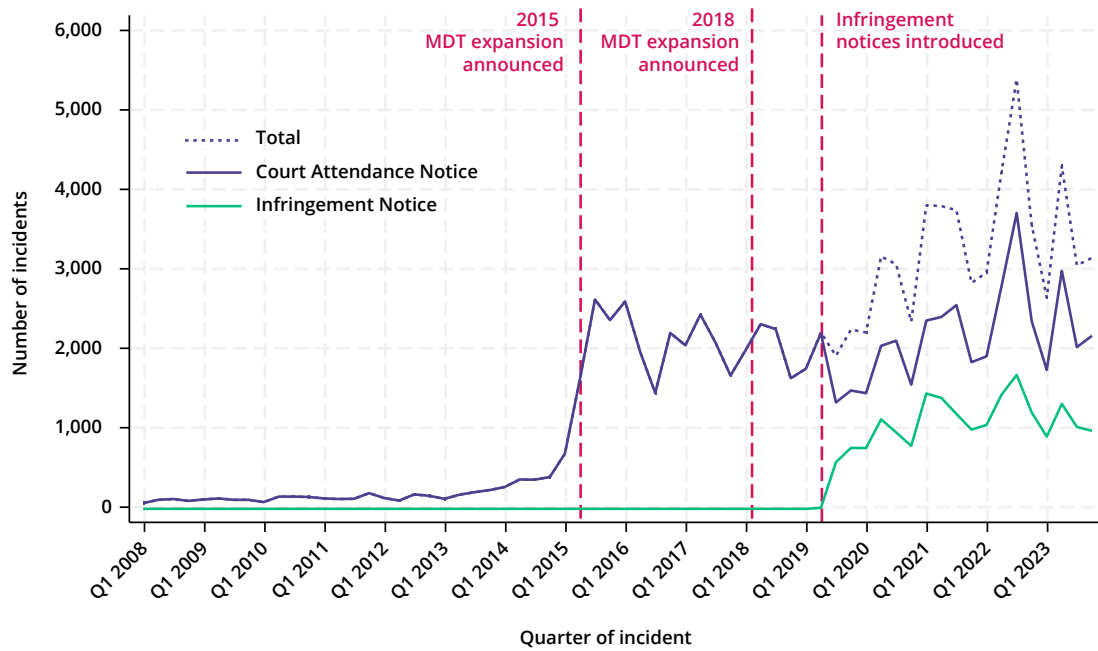
Note. Counts refer to the number of incidents where legal action was taken by police after drug testing. Horizontal axis labels reflect the first quarter of each year. Methods of proceeding are mutually exclusive. Infringement notice penalties were introduced as a method of proceeding in 2019. Dashed lines reflect important policy or program changes.

Overall, these data show substantial growth in the number of drug driving incidents proceeded against by NSW police since the first expansion of the MDT program in 2015. This is largely due to a significant increase in the volume of drug driving offenders detected with cannabis or amphetamines in their system, although the introduction of cocaine testing in 2018 further augmented this upward trend. The rise in drug driving incidents post 2018 also coincided with the 2018 MDT expansion and the introduction of infringement notices for first time drug driving offenders. However, the extent to which infringement notices contributed to the rise in total drug driving incidents post-2019 is unclear, as we cannot disentangle the impact of this policy change from the 2018 expansion announcement.[18] In the following sections we investigate the extent to which the rapid increase observed in drug driving incidents over the last decade is due to changes in roadside testing numbers, increases in detection rates, police enforcement practices and/or underlying illicit drug use.

## Mobile Drug Testing by the NSW Police Force

To begin, we examine changes in the number of roadside drug tests administered annually by the NSW Police Force, along with trends in the number of positive tests and the average detection rate (i.e., the percentage of all tests administered that return a positive result). We present this information in Figure 6.

Between 2008 and 2013, the annual number of roadside drug tests remained relatively low, growing from around 20,000 in 2008 to nearly 35,000 in 2013. Across this period, around 4,000 tests recorded a positive reading in total, resulting in a detection rate of between 2–3%. In 2014, the number of tests grew modestly to around 39,000, but there was a significantly higher number of positive tests recorded (n=2,090). This caused the detection rate to double from the previous year, to over 5%. During the first MDT expansion between 2015-2018, the number of tests rose steadily by around 24,000 additional tests each year, reaching around 62,000 in 2015 and then nearly 116,000 in 2018. At the same time, around 9,000 drug tests per year returned a positive result. This equates to a sharp increase in the average detection rate to nearly 15% in 2015, which then reduced to around 8% by 2018.

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18 In particular, the trend in drug driving incidents proceeded against by way of a court attendance notice post-2019 does not represent a counterfactual level of total drug driving incidents if infringement notices were not introduced. Consequently, we cannot infer the contribution of the introduction of infringement notices to the total volume of drug driving incidents post-2019 from the trends presented in Figure 5.

During the second MDT expansion, which was announced in 2018, the number of drug tests increased by around 43% to approximately 166,000 in 2019. Meanwhile, the average detection rate dropped to nearly 6%. Although the planned expansion of test numbers was set to reach 200,000 by 2020, this was impacted by COVID-19 and the associated government response. Test numbers reduced by around 22% year-on-year to 2021, where the NSW Police Force conducted approximately 95,000 tests, and recorded its highest detection rate at nearly 18%. By 2023, test numbers rose rapidly to around 156,000, while the detection rate declined to 2015-2016 levels at around 11%.

Figure 6. Annual number of drug tests and average detection rate of roadside drug testing, NSW, 2008–2023
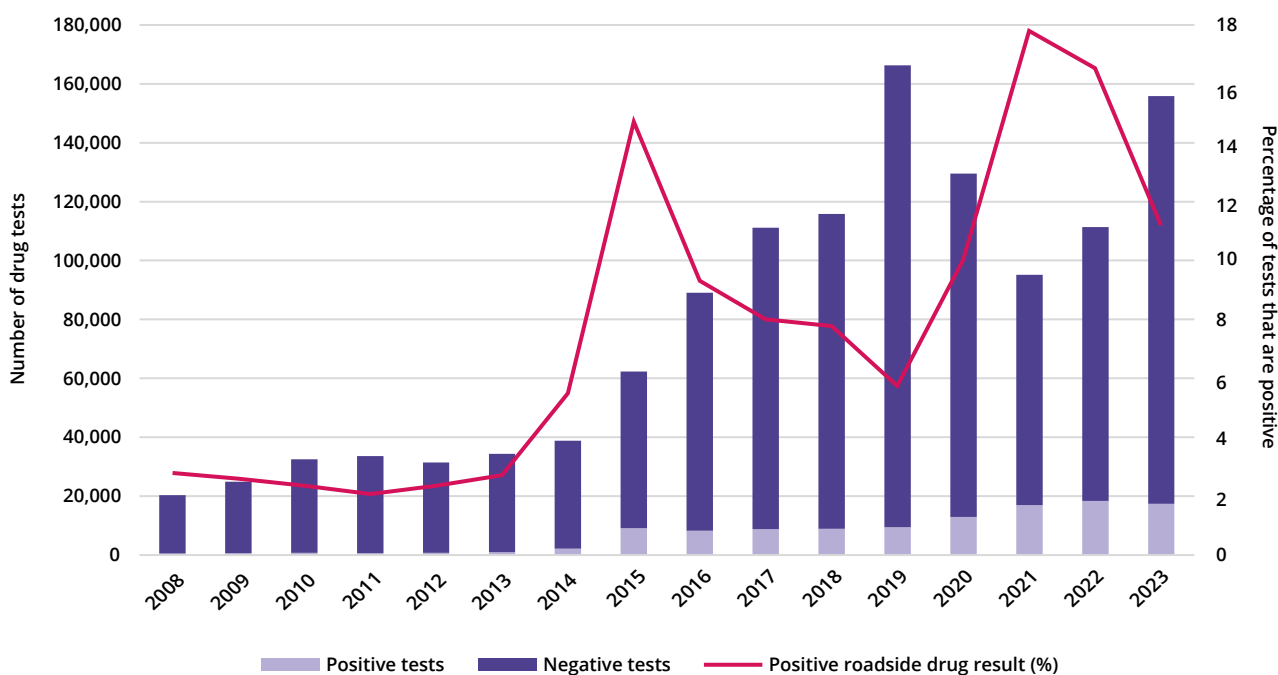
Note. Total number of drug tests refers to the number of occurrences where MDT testing took place, rather than the individual number of unique tests. Positive tests include those where the first stage of testing (using the Securetec DrugWipe) indicated a positive result. Information is compiled from BITRE (2023) and the NSW Police Force.

Overall, these trends suggest that the growth in drug driving incidents between 2015 and 2023, as illustrated in Figure 3, coincides with a significant increase in the total number of roadside drug tests conducted and the number which returned a positive result. However, these data also suggest that the correlation between drug detection rates and the overall volume of tests administered is not consistently positive.[19]

Characteristics of offenders charged with drug driving offences

In the previous section we saw a significant increase in the number of roadside drug tests since the first MDT expansion was announced in 2015. However, we also observed significant variation in the average detection rate (i.e., % of tests returning a positive result) in the years following the expansion. While this may reflect trends in the incidence of drug driving behaviours, given the significant year-to-year variation a more likely explanation is that police enforcement practices have changed over this period.

To investigate this possibility, we compare characteristics of drug driving offenders charged in 2019 with those charged in 2023. Table 1 summarises the average sociodemographic and criminogenic characteristics of each of these offender cohorts. We chose 2019 as the reference year as it represented a peak in overall testing and a local trough in the percentage of positive drug tests (see Figure 4). This choice of year also mitigates the influence of COVID-19 and the associated government response on our

19 We investigate this further by calculating the correlation coefficient between the total number of tests and the proportion of positive tests, which was equal to 0.56 between 2008-2023, 0.45 between 2008-2014, -0.96 between 2015-2017 and -0.73 between 2018-2023.

results. In 2019, the majority (68%) of drug driving offenders were aged 18-39, 77% were male and 11% identified as an Aboriginal person. Further, 58% of offenders belonged to the lowest two Socio-Economic Indices for Areas (SEIFA)[20] quartiles, most offenders (53%) lived in major cities and around one third (31%) were from inner regional areas. For the 2019 cohort of drug driving offenders, 76% were charged with a drug driving offence for the first time, while the drug type identified was most likely to be cannabis (62%), followed by methamphetamine (49%). Offenders were most likely to be charged in the Central Metropolitan, Northern and Southern Metropolitan policing areas, with around 20% of all drug driving offenders charged in each respective area. Additionally, around 56% of offenders charged in 2019 had a prior proven court appearance, 39% had a prior drug offence and 82% had a prior driving offence.[21]

Relative to drug driving offenders in 2019, drug driving offenders proceeded against in 2023 were 6 percentage points (p.p.) less likely to be aged between 18-29 and 5 p.p. more likely to live in an inner regional area. The remaining sociodemographic characteristics were very similar between groups (namely gender, Aboriginality and SEIFA quartile). However, there were group differences in terms of index offence characteristics. Specifically, drug driving offenders in 2023 were 13 p.p. more likely to have committed a repeat drug driving offence, 5 p.p. less likely to be drug tested at a truck stop and 8 p.p. more likely to have a concurrent offence, relative to their counterparts in 2019. The type of drug detected in offenders' systems also changed considerably between 2019 and 2023. Offenders tested in 2023 were 8 p.p. more likely to be detected with methamphetamine in their system. Detection rates of cannabis, ecstasy and cocaine each reduced by 5 p.p., respectively, while there was a 6 p.p. fall in the rate of detection for multiple drugs. Offenders proceeded against in 2023 were 2 p.p. more likely to be tested in the Northwest Metropolitan, Northern, and Western policing regions than those in 2019, respectively. Conversely, compared to those proceeded against in 2019, offenders proceeded against in 2023 were less likely to have been tested in the Central Metropolitan (2 p.p.) and Southwest Metropolitan (4 p.p.) policing regions. Finally, when comparing prior offending behaviours between these two groups, drug driving offenders in 2023 were 2 p.p. more likely to have a prior proven court appearance, had similar observable rates of prior drug offending, were 2 p.p. less likely to have a prior driving offence, and had a similar history of prior sentenced custodial episodes. Taken together this suggests that in 2023, police were more likely to encounter and subsequently charge motorists who reside in regional areas, use methamphetamine, are older, and are repeat drug driving offenders when compared to 2019.

Table 1. Average differences in the sociodemographic and criminogenic characteristics of offenders proceeded against for drug driving, NSW, 2019 and 2023

		Year of drug driving offence		
		2019 (N=8,157)	2023 (N=13,185)	Difference (N=21,342)
Panel A: Sociodemographic characteristics				
Age at offence (%)	11-17	1	1	0*
	18-29	38	32	-6***
	30-39	30	30	0
	40-54	24	28	3***
	55+	4	7	3***
Gender (%)	Male	77	76	-2***
	Female	23	24	2***
Aboriginality (%)	Aboriginal	11	14	3***
	Non-Aboriginal	86	85	-2***
	Unknown	2	1	-1***

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20 The SEIFA is The Australian Bureau of Statistics' Index of Relative Social Disadvantage associated with an offender's residential postcode (see ABS, 2016).
21 This includes offences proceeded against by way of an infringement notice.

Table 1. Average differences in the sociodemographic and criminogenic characteristics of offenders proceeded against for drug driving, NSW, 2019 and 2023 (....continued)

		Year of drug driving offence		
		2019 (N=8,157)	2023 (N=13,185)	Difference (N=21,342)
Socioeconomic disadvantage (%)	Q1 (most disadvantaged)	29	31	2***
	Q2	29	28	-1
	Q3	23	22	0
	Q4 (least disadvantaged)	12	11	-1**
	Missing	7	7	0
Remoteness (%)	Major cities	53	49	-3***
	Inner regional	31	36	5***
	Outer regional	9	10	1*
	Remote or very remote	1	1	-1***
	Missing	6	5	-1***
Panel B: Index offence characteristics				
Index drug offence type (%)	First drug driving offence	76	63	-13***
	Repeat drug driving offence	24	37	13***
Drug test at truck stop (%)	No	79	85	6***
	Yes	20	15	-5***
	Missing	1	1	-1***
Concurrent offences (%)	0	74	66	-8***
	1	17	21	4***
	2+	9	13	3***
Concurrent drug offences (%)	0	93	92	-1***
	1	5	6	1**
	2+	2	2	0*
Concurrent driving offences (%)	0	80	73	-8***
	1	15	20	5***
	2+	5	8	3***
Drug type identified^ (%)	Cannabis	62	56	-5***
	Methamphetamine	49	58	8***
	Ecstasy	8	3	-5***
	Cocaine	14	9	-5***
	Multiple drugs	32	26	-6***
Policing region (%)	Central Metro	20	18	-2***
	Northwest Metro	7	9	2***
	Northern	23	24	2***
	Southwest Metro	13	9	-4***
	Southern	22	24	1**
	Western	14	16	2***
Panel C: Offending within prior five years				
Prior proven court appearance (%)	0	44	46	2***
	1	18	14	-5***
	2+	38	40	3***
Prior drug offences (%)	0	61	61	0
	1	21	21	-1
	2+	18	18	0
Prior driving offences (%)	0	18	20	2***
	1	18	19	2***
	2+	64	61	-4***
Prior sentenced custodial episodes (%)	0	89	90	0
	1+	11	10	0

Note. Counts refer to the number of incidents where legal action was taken by police after drug testing. Values are reported in proportions and refer to the annual number of incidents proceeded against after drug testing by the NSW Police Force. Stars indicate statistical significance at a variety of conventional thresholds of statistical significance: * – 10%, ** – 5%, *** – 1%. ^ - Drug type identification categories are based on oral fluid lab testing and are not mutually exclusive. Proportions may not sum to one due to rounding.

The relatively high proportion of repeat offenders amongst drug drivers charged in recent years is further illustrated by Figure 7. Figure 7 shows trends in the total number of drug driving incidents recorded by police, broken down by whether the offence was a first-time or a repeat drug driving offence. As expected, considering the low volume of testing under MDT prior to 2015, almost all drug driving incidents involved first-time offenders in 2008. The percentage of first-time drug driving offences remained very high up until 2015, with over 95% of all drug driving incidents involving a first-time drug driving offender. Following both expansions of MDT (announced in 2015 and 2018), the percentage of first-time offences gradually decreased, along with a corresponding increase in repeat drug driving offences. By mid-2023, close to 42% of drug driving incidents involved repeat drug driving offenders. We would expect that as more motorists are exposed to MDT, the proportion of first-time drug driving offenders would decrease. However, as the scale of MDT is small relative to the number of motorists,[22] this large reduction in the proportion of first-time drug driving offenders may reflect police enforcement practices.

Figure 7. **Proportion of quarterly drug driving incidents by whether a first time or repeat drug driving offence, NSW, 2008–2023**
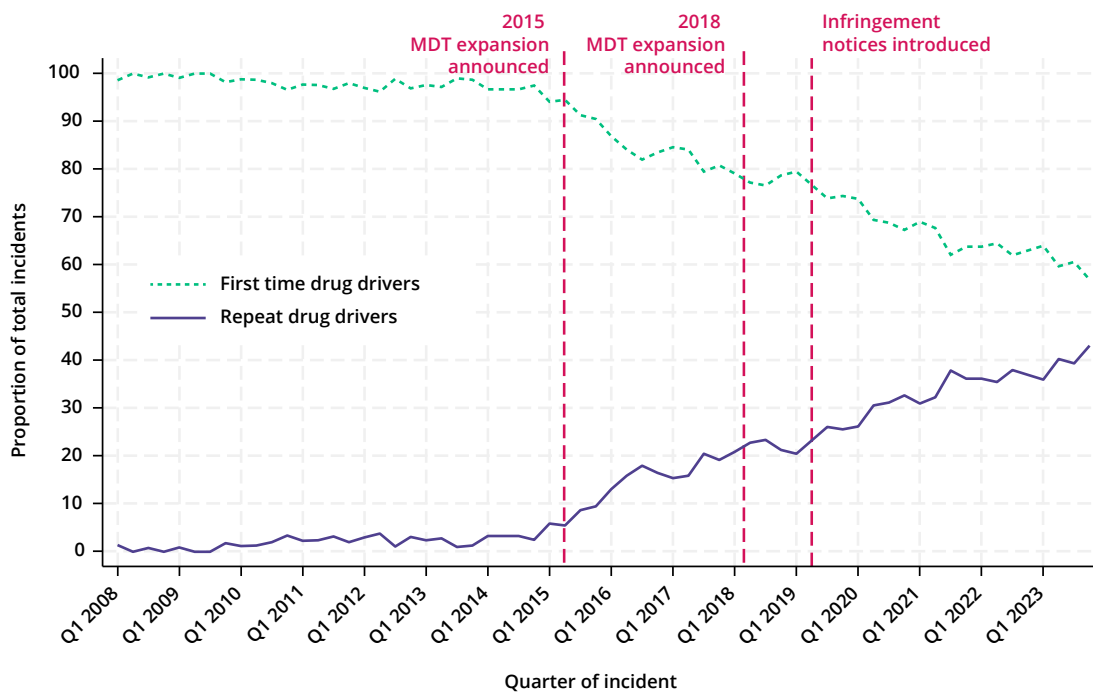
Note. Data in this figure refer to drug driving charges where legal action was taken by police after drug testing offences. Specifically, it refers to the proportion of these charges that were recorded as first time and subsequent offences in each quarter. Horizontal axis labels reflect the first quarter of each year. Dashed lines reflect important policy or program changes.

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22   For instance, in 2016, there were over 5,000,000 driver licences registered in NSW (BITRE, 2017), while around 90,000 mobile drug tests were conducted.

Population drug driving and drug use trends

In this section we consider the extent to which the strong upward trend in illicit drug driving incidents in NSW since 2015 is driven by an increase in the use of illicit drugs and/or the incidence of driving under the influence of illicit drugs. Specifically, we examine trends in population illicit drug use from both the NDSHS and NSW wastewater drug detection data, and trends in self-reported drug driving from the NDSHS.

In Figure 8, we plot the proportion of people in NSW who self-report having used an illicit drug in the last 12 months, broken down by drug type. From 2001 to 2013, the trend in self-reported use of any illicit drug was relatively stable at around 14%. Cannabis and ecstasy use also remained fairly consistent over this period, at around 10% and 3% respectively. Meanwhile, methamphetamine use fell from roughly 3% to 2% and cocaine use rose slightly from around 2% to 3%. From the announcement of the first MDT announcement in 2015 until 2023, the use of ecstasy remained somewhat stable at around 2%, whereas self-reported cannabis and cocaine use rose from 10% to 11% and 3% to 5% respectively. At the same time, methamphetamine use continued to decline from 2% to nearly 1%. Self-reported use of any drug also grew slightly over this period from almost 15% to 17%, driven by increases in cocaine and cannabis use.[23]

Figure 8. **Proportion of population who self-report having used an illicit substance in the prior 12 months, by type of substance and survey year, NSW, National Drug Strategy Household Survey**
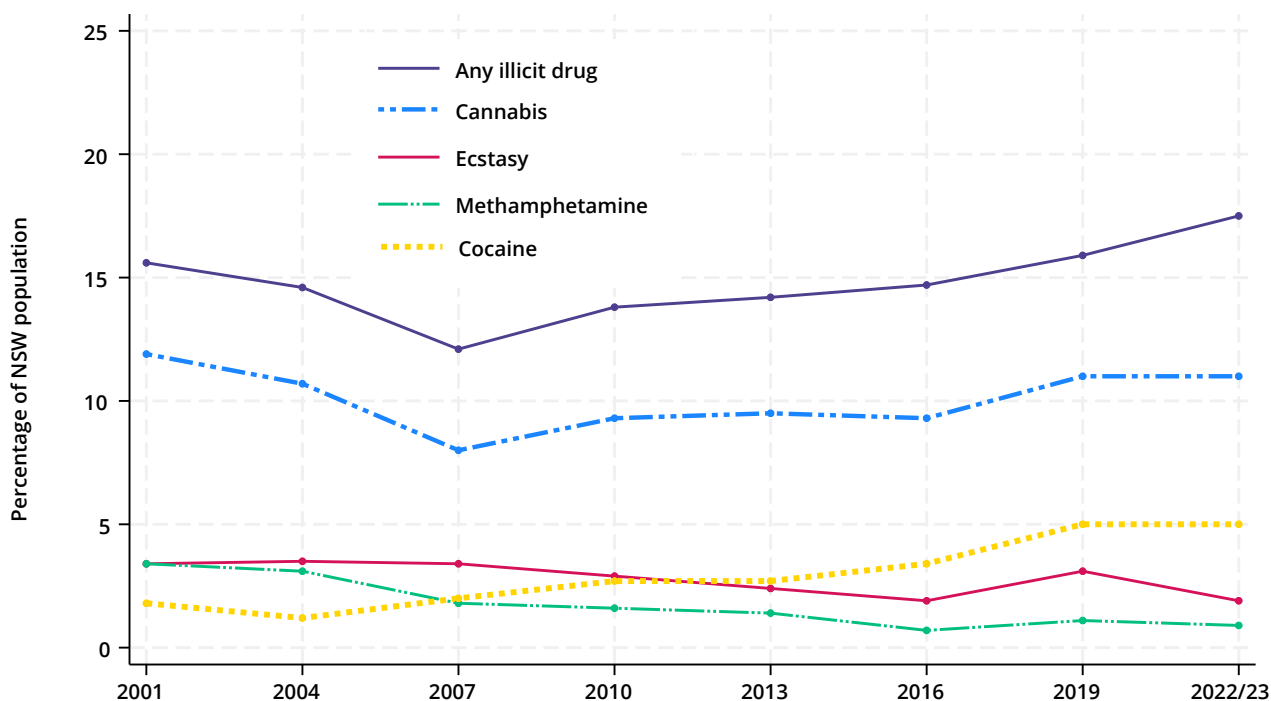

Note. Population proportions refer to people aged over 14 years at the time of the survey. Drug category for amphetamines was changed in the 2022/23 wave of the survey and may not be comparable with earlier years. Prevalence estimates for methamphetamine use capture use for non-medical purposes. Prior to 2004, the drug category for ecstasy additionally included substances known as "designer drugs".

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23 While Figure 8 shows trends in self-reported drug use over time, not all differences are statistically significant between years. Comparing 2015 and 2023, only cocaine and methamphetamine exhibited statistically significant differences.

Figure 9 shows trends in drugs detected in NSW wastewater, an alternative proxy for drug use. Note that these trends may be influenced by the sampling methodology employed, where different wastewater treatment plants are sampled in each data collection. Regardless, according to wastewater readings, the estimated quantity of drugs consumed per person in NSW has been relatively consistent across all drug types since sampling began (in 2018 for cannabis, and 2016 for the remaining drug types) until 2023. Cannabis use remained relatively constant in NSW metropolitan regions at around 500 milligrams per 1,000 people per day and grew slightly in regional areas to roughly 1,800 milligrams per 1,000 people per day in 2023. At the same time, methylamphetamine, MDMA and cocaine remained stable between 2016 and 2023 at roughly 1,000, 250 and 750 milligrams per 1,000 people per day, respectively, across regional and metropolitan areas. One exception is regional use of methylamphetamine which saw sustained increases between 2018 to 2019, and 2022 to mid-2023.

Figure 9. **Drug use implied by recorded concentration in wastewater testing by region, drug type and quarter of sampling, NSW, 2016–2023, National Wastewater Drug Monitoring Program**
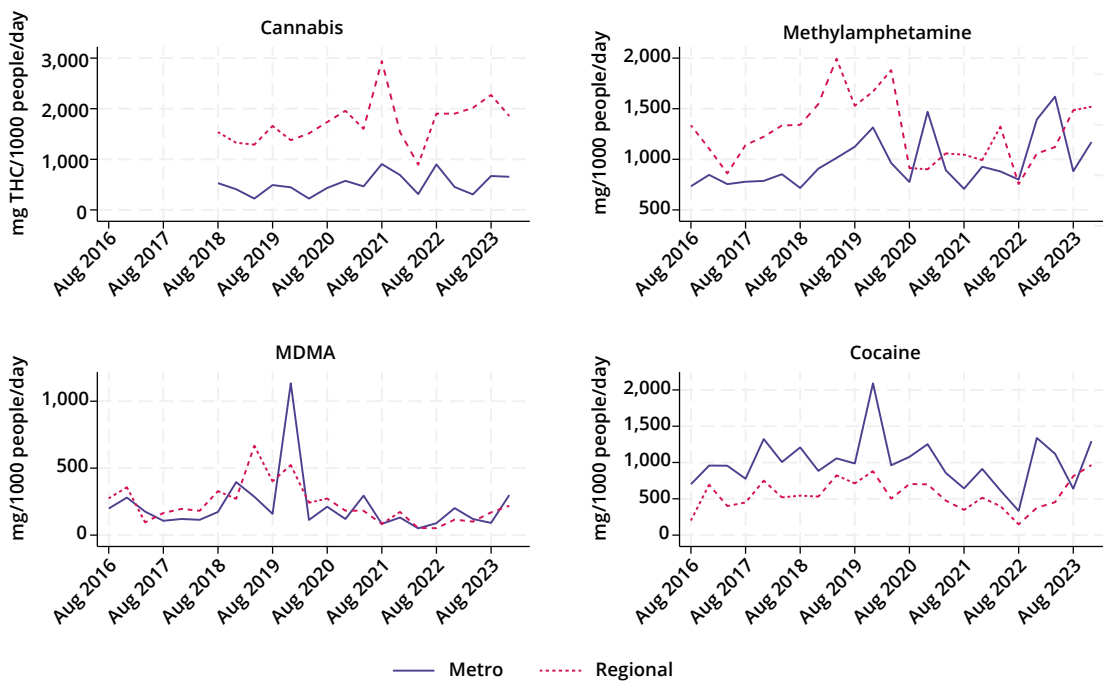
Together, the data shown in Figures 8 and 9 suggest that illicit drug use in NSW has remained relatively stable between 2015 and 2023, with the possible exception of cocaine and cannabis for which use has increased slightly. However, during this period, the growth in the use of illicit drugs has been much slower than the growth in both the number of drug driving charges and positive drug tests. This suggests that increased drug use alone cannot explain the rise in drug driving charges since 2015.

Finally, Figure 10 shows trends in the percentage of recent drug users in Australia who self-reported driving under the influence of an illicit substance in the last 12 months, drawn from eight waves of national NDSHS data. Note that a breakdown of self-reported drug driving by state is not readily available. In 2001, roughly 25% of drug users reported drug driving in the prior year. This decreased to around 23% by 2004. After the introduction of MDT in NSW in 2007, the proportion of drug users who reported drug driving continued to decline at a rate similar to the pre-MDT period. Specifically, the proportion of drug users who reported drug driving decreased to roughly 21% by 2007 and continued to decline to just over 16% by 2013. During the two MDT expansions which took place from 2015-2023, self-reported drug driving rates fell more slowly from 15% in 2016 to 14% in the most recent 2022/3 wave of the NDSHS. While these are national data, MDT programs in other Australian jurisdictions were expanded around the same time as NSW.[24] These data suggest that roadside drug testing in Australia over the last decade has coincided with a small decline in self-reported rates of drug driving. However, it is unclear whether this decline is related to testing, is influenced by other policy levers such as education and advertising campaigns (see for example Higgins-Whitton, 2016), or is simply a continuation of a pre-existing downward trend.

Figure 10. **Proportion of recent drug drivers who self-reported driving under the influence of an illicit substance in the prior 12 months by year of survey, Australia, National Drug Strategy Household Survey**
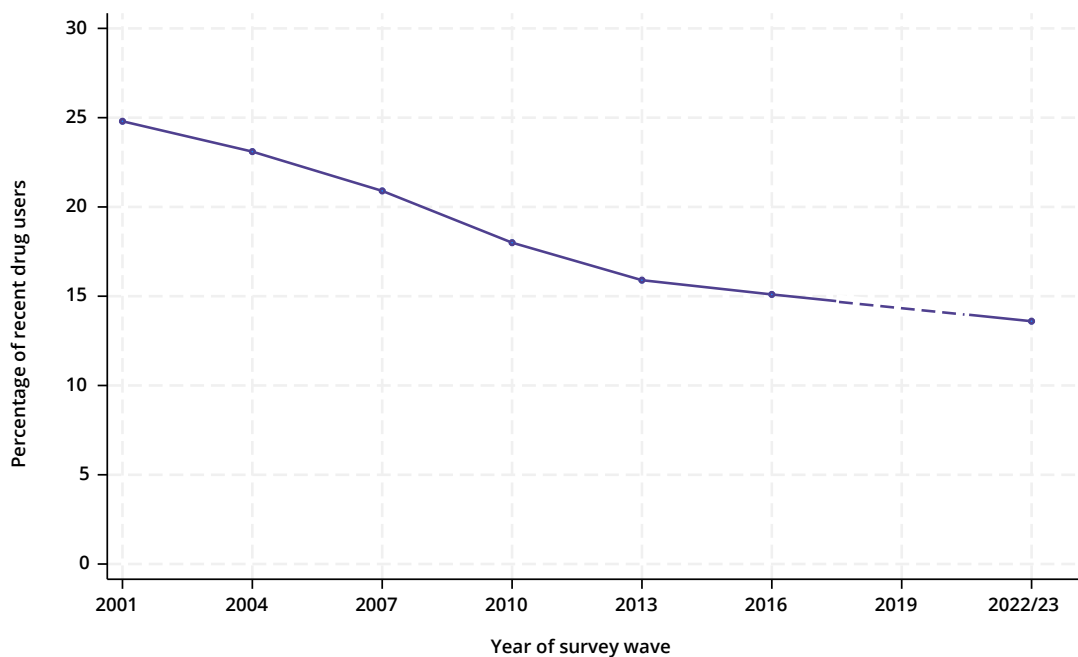
Note. Drug driving prevalence estimates were withheld from the 2019 release of the NDSHS due to small numbers, confidentiality, or other concerns about the quality of the data. Data is aggregated at a national level in line with public reporting from the NDSHS.

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24   See BITRE (2023) for information on roadside drug testing conducted in states other than NSW.

SUMMARY

Since the introduction of MDT in NSW, the number of people proceeded against by the NSW police for drug driving offences has grown significantly. In 2008, 102 people were proceeded against for drug driving each quarter, on average. By 2023, this number had risen around 32 times to an average of 3,296 people per quarter. In this study we investigated why drug driving charges have increased so rapidly over the last 15 years by examining the scale of the MDT program, changes in the characteristics of offenders charged with drug driving and trends in self-reported drug use and drug driving behaviours. We find that the significant growth in charges followed announcements of two expansions of the MDT program. Expansions of the program increased testing volumes from around 20,000 to 156,000 tests per year and positive tests from around 500 to 18,000 per year. While the MDT expansions aimed to increase police capacity to detect and deter drug driving behaviours, we found only a weak and inconsistent relationship between total testing volumes and subsequent detection rates. Specifically, testing volumes were positively correlated with drug driving charges between 2008 and 2014, and negatively correlated between 2015 and 2023. Further, between 2008 and 2023, the average detection rate varied between 2% and 18%. This suggests that the number of drug driving charges over this 15-year period was not simply a function of the number of drug tests conducted.

There are two potential explanations for the divergence between testing volumes and detection rates. Firstly, it is plausible that shifts in detection rates are an artefact of changes in police practices relating to how and when drug driving offenders are located and tested. This is pertinent to the operation of the MDT program, which may be highly concentrated to a specific area, event, time of day, or person rather than randomly delivered to motorists. While the RBT and MDT programs are often compared, there is an important distinction in how each program operates. The RBT program targets people randomly, with up to 6 million tests per year and average detection rates below 1% (BITRE, 2023). MDT is a significantly smaller program with much higher detection rates (up to 18%). If police have changed their approach to identifying and/or proceeding against drug driving offenders using the MDT program, it would have ramifications for the types of offenders being identified in testing and the proportion of positive tests. Secondly, it is possible that trends in drug use and/or drug driving prevalence have changed in the population over time. For example, if illicit drug use or the prevalence of drug driving is increasing in the population, we might expect to observe a higher proportion of people who test positive for illicit drugs while driving, even if police enforcement practices have not changed.

To investigate changes in police practice, we examined observable differences over time in the sociodemographic and criminogenic characteristics of those charged with a drug driving offence. We focused on differences in the cohort of offenders proceeded against in 2019 (when the program was in peak operation, but detection rates were somewhat low) to those in 2023 (when testing numbers were similar, but the detection rate was high). Compared to 2019, we found that drug drivers charged by police in 2023 were more likely to test positive for methamphetamine, to be older and to have no concurrent offences. There were also small, but statistically significant, differences across police regions, with an increase in the proportion of drivers coming from regional areas. The most notable difference between the two cohorts is their prior drug driving history. By 2023, 37% of all those charged with drug driving were repeat offenders. This compares to just 24% of those charged in 2019. To some degree this result is expected. With continued operation and increased testing, the pool of people who have been tested for the first time would decrease, necessitating an increase in the number of repeat drug drivers. However, considering MDT's small scale relative to the total number of motorists, this more likely reflects police targeting of high-risk times and locations rather than simply an increase in exposure to the program.[25] One notable change which coincided with the growth in drug driving charges was the introduction of infringement notices for first time drug driving offenders in 2019. While it is possible that this policy change has contributed to the growth in drug driving charges, concurrent influences such as program

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25 Firstly, the MDT program operates on a relatively small scale, delivering around 166,000 tests per year in peak operation. Secondly, the number of tests delivered each year has not grown linearly. Taken together, it is unlikely that the linear increase in proportion of repeat offenders identified is solely reflective of the increase in the underlying population who have been previously tested.

expansions and changes to testing related to the Government's COVID-19 response prevent a direct attribution of this growth in charges to the introduction of penalty notices.

In examining the second explanation for the divergence in testing volumes and detection, we considered whether population drug use and/or drug driving trends have changed. Wastewater testing and longitudinal survey data indicate that population drug use in NSW remained relatively constant between 2015-2023, and that cannabis was, by far, the most common drug consumed. Further, self-reported drug driving appears to have been declining since 2001 (before MDT was even in effect), with the slowest decline occurring in the periods where MDT was expanded in NSW. These data reinforce the notion that the observed increase in the number of people proceeded against for drug driving is primarily driven by changes to policing practices rather than changes in the prevalence of illicit drug use and/or drug driving behaviours.

An important consideration is whether current policing practices in NSW impact the effectiveness of the MDT program to deter drug driving behaviours, either through general or specific deterrence mechanisms. Our observation that a large and growing number and proportion of drug driving offenders continue to be proceeded against for a reoffence implies that the program may not have a strong specific deterrent effect. This aligns with prior work examining roadside drug testing in three Australian states (including NSW), which suggests that current testing regimes fail to elicit a specific deterrent effect and that drivers successfully engage in behaviours to avoid detection (Hasan et al., 2023). In considering the possibility that the program may have a general deterrent effect, we observe no consistent relationship between MDT testing volumes and self-reported measures of drug driving. Though the number of tests being delivered has expanded and contracted significantly between 2008 and 2023, self-reported drug driving in Australia declined somewhat linearly with the slowest decline occurring in the periods where MDT was expanded in NSW. Importantly, as this trend in self-reported drug driving began in 2001 (before MDT was in effect) it is possible that the decline in drug driving behaviours is simply the continuation of a pre-existing trend.

A major consideration regarding the ability of the MDT program to elicit a general deterrence effect is the small scale on which it operates, as this may limit the actual and perceived risk of apprehension amongst drug driving offenders. Although the program has expanded considerably since its inception in 2007, at its operational peak it delivered only 166,000 tests. This volume of testing is small given that there are more than 6 million registered drivers in NSW. A limiting factor in scaling up the MDT program to a level equivalent to the RBT program has been the significant cost of purchasing and administering tests (see National Drug Driving Working Group, 2018). Without a substantial reduction in testing costs, it is unclear whether the program could be expanded to the scale necessary to facilitate a general deterrent effect. Acknowledging this limitation, policymakers should consider alternative approaches to influence drug driving behaviors, such as education or advertising campaigns (Higgins-Whitton, 2016).

Our study is not without limitations. Firstly, while we plot trends in roadside drug testing, characteristics of offenders, and the prevalence of underlying drug use and drug driving, we do not estimate causal relationships between these variables. There could be unobservable time confounders which exert an influence on the variables we study at around the same time as recent MDT expansions. This would influence the degree to which recent growth in drug driving charges can be explained by changes in police targeting. Additionally, in examining drug driving behaviours in the population we are only able to observe the proportion of drug users who drug drive rather than the frequency of drug driving among this group. We are also limited to observing this behaviour in the Australian (rather than NSW-specific) population. This may have implications for understanding the relationship between MDT expansions, police enforcement, and drug driving behaviours in NSW. To date, most studies on the deterrent effect of roadside drug testing programs make use of small, non-random datasets on self-reported drug driving and drug use behaviours. This may not be representative of the broader population of NSW. Further rigorous evaluation is therefore necessary to determine the impact of the MDT program on drug driving behaviours in NSW. Similar to research on the efficacy of RBT, this should involve large-scale representative surveys to understand people's experiences with MDT and how their perceived risk of apprehension influences their driving habits (for example, see Owens & Boorman, 2011).

ACKNOWLEDGEMENTS

REFERENCES

Arkell, T. R., Kevin, R. C., Stuart, J., Lintzeris, N., Haber, P. S., Ramaekers, J. G., & McGregor, I. S. (2019). Detection of Δ^9 THC in oral fluid following vaporized cannabis with varied cannabidiol (CBD) content: An evaluation of two point-of-collection testing devices. *Drug Testing and Analysis, 11*(10), 1486-1497. https://doi.org/10.1002/dta.2687.

Australian Bureau of Statistics (2016). *Socio-Economic Indexes for Areas (SEIFA) 2016* (cat. no. 2033.0.55.001). Retrieved from the Australian Bureau of Statistics website at: https://www.abs.gov.au/ausstats/abs@.nsf/mf/2033.0.55.001.

Australian Criminal Intelligence Commission. (2024). *National wastewater drug monitoring program: Report 22*. Retrieved from the Australian Criminal Intelligence Commission website at: https://www.acic.gov.au/sites/default/files/2024-07/National%20Wastewater%20Drug%20Monitoring%20Program%20%E2%80%93%20Report%2022_0.pdf.

Australian Institute of Health and Welfare (AIHW). (2024). *Illicit Drug Use.* Retrieved from the AIHW website at: https://www.aihw.gov.au/reports/illicit-use-of-drugs/illicit-drug-use#How-common.

Bureau of Infrastructure and Transport Research Economics (BITRE). (2017). *Drivers Licenses in Australia.* Retrieved from the website at: https://www.bitre.gov.au/sites/default/files/is_084.pdf.

Bureau of Infrastructure and Transport Economics (BITRE). (2023). *Road Safety Enforcement Data Dashboard.* Retrieved from the BITRE website at: https://www.bitre.gov.au/publications/2023/road-safety-enforcement-data.

Centre for Accident Research & Road Safety. (2017). *Fact sheet: drug driving.* Retrieved from the National Road Safety Partnership Program website at: https://cdn-nrspp-s3-aus.s3.ap-southeast-2.amazonaws.com/wp-content/uploads/sites/4/2017/03/21124015/drug_driving_fs-1.pdf.

Centre for Road Safety. (2022). *NSW Drink and Drug Driving Reforms: Monitoring report 4.* Retrieved from the Transport for NSW website at: https://roadsafety.transport.nsw.gov.au/downloads/drink-drug-driving-reforms-monitoring4.pdf.

Cormack, L., & Power, J. (2020). *Stopping roadside breath-testing in response to COVID-19 will lead to road deaths, experts say.* Retrieved from The Sydney Morning Herald website at: https://www.smh.com.au/national/nsw/stopping-roadside-breath-testing-in-response-to-covid-19-will-lead-to-road-deaths-experts-say-20200317-p54aus.html.

Darke, S., & Hall, W. (1995). Levels and correlates of polydrug use among heroin users and regular methamphetamine users. *Drug and Alcohol Dependence, 39*(3), 231-235. https://doi.org/10.1016/0376-8716(95)01171-9.

Darke, S., Ross, J., & Teesson, M. (2007). The Australian Treatment Outcome Study (ATOS): What have we learnt about treatment for heroin dependence? *Drug and Alcohol Review, 26*(1), 49-54. https://doi.org/10.1080/09595230601036986.

Gair, K. (2015). *NSW Police launch blitz to catch out drug-drivers*. Retrieved from The Sydney Morning Herald website at: https://www.smh.com.au/national/nsw/nsw-police-launch-blitz-to-catch-out-drugdrivers-20151201-glcism.html.

Harrison, W., Newman, S., Baldock, M., & McLean, J. (2003). *Drink driving enforcement—Issues in developing best practice* (Trends and Issues in Criminal and Criminal Justice No. 472). Retrieved from the Australian Institute of Criminology website at: https://www.aic.gov.au/sites/default/files/2020-05/tandi472.pdf.

Hasan, R., Watson, B., Haworth, N., & Oviedo-Trespalacios, O. (2023). What contributes to drug driving? An exploratory investigation into the influence of problematic substance use, roadside testing and alternative transport options. *Accident Analysis & Prevention, 184*(1), 1-19. https://doi.org/10.1016/j.aap.2023.106990.

Higgins-Whitton, L., Fernandes, R., Hillard, E., Walker, E., Gallagher, T., Douglas, N., & Arnold, M. (2016). 'MDT–Mobile Drug Testing': Using research to develop the first drug driving public education campaign in NSW. In *Australasian Road Safety Conference, 2016, Canberra, ACT, Australia*. Accessed from the Australasian College of Road Safety website at: https://archive.acrs.org.au/files/papers/arsc/2016/Higgins-Whitton%2000200%20EA.pdf

Horyniak, D., Dietze, P., Lenton, S., Alati, R., Bruno, R., Matthews, A., Breen, C., & Burns, L. (2017). Trends in reports of driving following illicit drug consumption among regular drug users in Australia, 2007–2013: Has random roadside drug testing had a deterrent effect? *Accident Analysis & Prevention, 104*(1), 146-155. https://doi.org/10.1016/j.aap.2017.05.008.

McKeith, S. (2018). *Concerned about roadside cocaine testing? Here's what you need to know*. Retrieved from the Australian Broadcasting Corporation website at: https://www.abc.net.au/triplej/programs/hack/roadside-cocaine-testing/9357280.

Mills, L., Freeman, J., Parkes, A., & Davey, J. (2022). Do they need to be tested to be deterred? Exploring the impact of exposure to roadside drug testing on drug driving, *Journal of Safety Research, 80*(1), 362-370. https://doi.org/10.1016/j.jsr.2021.12.017.

New South Wales, *Parliamentary Debates*, Legislative Assembly, 6 March 2018 (Melinda Pavey – Minister for Roads, Maritime & Freight) https://www.parliament.nsw.gov.au/Hansard/Pages/HansardResult.aspx#/docid/HANSARD-1323879322-100745.

NSW Government. (2021). *Drink and Drug Driving Penalties.* Retrieved from the NSW Government website at: https://www.nsw.gov.au/driving-boating-and-transport/demerits-penalties-and-offences/offences/alcohol-and-drug-offences/drink-and-drug-driving-penalties.

Moxham-Hall, V., & Hughes, C. (2020). *Drug driving laws in Australia: What are they and why do they matter?* (No. DPMP Bulletin No. 29). University of New South Wales Social Policy Research Centre. Retrieved from the University of New South Wales website at: https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/DPMP_Bulletin_29.pdf.

National Drug Driving Working Group. (2018). Australia's second generational approach to roadside drug testing. Retrieved from the Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts website at: https://www.infrastructure.gov.au/sites/default/files/migrated/roads/safety/publications/2018/pdf/second_gen_approach_roadside_drug_testing.pdf.

Newstead, S., Cameron, M., Thompson, L., & Clark, B. (2020). Evaluation of the roadside drug testing expansion and roadside alcohol testing enforcement programs in Victoria. Monash University Accident Research Centre. Retrieved from the Monash University website at: https://www.monash.edu/__data/assets/pdf_file/0008/2564441/Evaluation-of-the-RDT-Program-and-RBT-in-Victoria-MUARC-Report-355_Updates.pdf.

NSW Police Force. (2018). *Standard Operating Procedures for Random Oral Fluid Testing.* Retrieved from the NSW Police Force website at: https://www.police.nsw.gov.au/__data/assets/pdf_file/0020/612704/4761_information_for_the_disclosure_log.pdf.

Ortiz-Peregrina, S., Oviedo-Trespalacios, O., Ortiz, C., & Anera, R. G. (2021). Self-regulation of driving behavior under the influence of cannabis: the role of driving complexity and driver vision. *Human Factors, 65*(7), 1506-1524. https://doi.org/10.1177/00187208211047799.

Owens, P., & Boorman, M. (2011). *Evaluating the deterrent effect of random breath testing (RBT) and random drug testing (RDT) – The driver's perspective: research findings* (National Drug Law Enforcement Research Fund Monograph No. 41). Retrieved from the Australian Institute of Criminology website at: https://www.aic.gov.au/sites/default/files/2020-05/monograph41.pdf.

Parliament of NSW. (2022). *Responses to post-hearing questions - Road Transport Amendment (Medicinal Cannabis Exemptions from Offences) Bill 2021.* Retrieved from the Parliament of NSW website at: https://www.parliament.nsw.gov.au/lcdocs/other/17485/AQON%20-%20NSW%20Government%20-%20received%2022%20July%202022.pdf.

Prichard, J., Matthews, A., Bruno, R., Rayment, K., & Cockburn, H. (2010). Detouring civil liberties? Drug-driving laws in Australia, *Griffith Law Review, 19*(2), 330–349. https://doi.org/10.1080/10383441.2010.10854679.

Quilter, J., & McNamara, L. (2017). 'Zero tolerance' drug driving laws in Australia: A gap between rationale and form? *International Journal for Crime, Justice and Social Democracy 6*(3), 47-71. https://doi.org/10.5204/ijcjsd.v6i3.416.

Ramsey, S., & Fitzgerald, J. (2017). *Recent Trends in Arrests for Drug Driving* (Bureau Brief No. 125). Retrieved from the NSW Bureau of Crime Statistics and Research website: https://www.bocsar.nsw.gov.au/Publications/BB/Report-2017-Recent-Trends-in-Arrests-for-Drug-Driving-BB125.pdf.

Ricketts, A. (2018). Roadside drug testing: Incoherent policy or uncertainty by design? *Alternative Law Journal, 43*(1), 30–34. https://doi.org/10.1177/1037969X17748178.

Robertson, M. B., Li, A., Yuan, Y., Jiang, A., Gjerde, H., Staples, J. A., & Brubacher, J. R. (2022). Correlation between oral fluid and blood THC concentration: a systematic review and discussion of policy implications. *Accident Analysis & Prevention*, *173*, 106694. https://doi.org/10.1016/j.aap.2022.106694

Simmons, S. M., Caird, J. K., Sterzer, F., & Asbridge, M. (2022). The effects of cannabis and alcohol on driving performance and driver behaviour: a systematic review and meta-analysis, *Addiction, 117*(7), 1843-1856. https://doi.org/10.1111/add.15770.

Singhal, P. (2020). *NSW Police increases roadside drug testing.* Retrieved from The Sydney Morning Herald website: https://www.smh.com.au/national/nsw/nsw-police-increases-roadside-drug-testing-20200910-p55uha.html.

Stough, C., Downey, L. A., King, R., Papafotiou, K., Swann, P., & Ogden, E. (2012). The acute effects of 3, 4-methylenedioxymethamphetamine and methamphetamine on driving: a simulator study. *Accident Analysis & Prevention, 45*(1), 493-497. https://doi.org/10.1016/j.aap.2011.08.017.

Sutherland, R., Uporova, J., Chandrasena, U., Price, O., Karlsson, A., Gibbs, D., Swanton, R., Bruno, R., Dietze, P., Lenton, S., Salom, C., Daly, C., Thomas, N., Juckel, J., Agramunt, S., Wilson, Y., Woods, E., Moon, C., Degenhardt, L., Farrell M., & Peacock, A. (2021). Australian drug trends 2021: Key findings from the National Illicit Drug Reporting System (IDRS) interviews. Accessed from the National Drug and Alcohol Research Centre website at: https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/National%20IDRS%20Interview%20Report%202021_17.01.23.pdf.

Transport for NSW. (2024). *Drugs & Drug Driving.* Retrieved from the Transport for NSW website at: https://www.transport.nsw.gov.au/roadsafety/topics-tips/drugs#Mobile_drug_testing

Whetton, S., Shanahan, M., Cartwright, K., Duraisingam, V., Ferrante, A., Gray, D., Kaye, S., Kostadinov, V., McKetin, R., Pidd, K., Roche, A., Tait, R. J., & Allsop, S. (2016). *The social costs of methamphetamine in Australia 2013/14*. Retrieved from the National Drug Research Institute website at: https://ndri.curtin.edu.au/ndri/media/documents/publications/T246.pdf.

Whetton, S., Tait, R. J., Chrzanowska, A., Donnelly, N., McEntee, A., Mukhtar, A., Zahra, E., Campbell, G., Degenhardt, L., Dey, T., Abdul Halim, S., Hall, W., Makate, M., Norman, R., Peacock, A., Roche, A., & Allsop, S. (2020). *Quantifying the social costs of cannabis use to Australia in 2015/16*. Retrieved from the National Drug Research Institute website at: https://ndri.curtin.edu.au/ndri/media/documents/publications/T287.pdf.

Wolff, K., Brimblecombe, R., Forfar, J. C., Forrest, A. R., Gilvarry, E., Johnston, A., Morgan, J., Osselton, M. D., Read, L., & Taylor, D. (2013). *Driving under the influence of drugs. Report from the Expert Panel on Drug Driving.* Retrieved from the UK Publishing Service website at: https://assets.publishing.service.gov.uk/media/5a7a560d40f0b66a2fc019bc/drug-driving-expert-panel-report.pdf.