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Research Paper

Does diverting minor drug offenders reduce recidivism? Cannabis cautioning in Australia

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ABSTRACT

Aim: To see whether diversion of minor drug offenders from criminal prosecution reduces the risk of further offending.
Methods: We exploit the staged roll-out of a policy implemented in the State of New South Wales (Australia) in 2000, which gave police the discretion to formally caution rather than charge adults detected for use and/or possession of cannabis. We use the exogenous variation in the timing of the policy implementation as an instrument in a 2SLS (linear probability model) analysis to identify the effect of cannabis cautioning on risk of re-offending. A series of checks are carried out to test the robustness of the findings obtained via the linear probability model.
Results: Being given a cannabis caution rather than being prosecuted for cannabis possession reduces recidivism at 5 years by about 16 percentage points, on average. The effects are larger for those under the age of 30, those who have never previously been imprisoned, and those who have already had one caution.
Conclusions: The adoption of alternatives to prosecution for minor drug offences is more likely to enhance public safety rather than reduce it.

Introduction

Australia, along with many other countries prohibits the possession or use of many recreational drugs, including cannabis. This prohibition imposes significant costs on those convicted of using or possessing illicit drugs. They include reduced earnings and employment prospects in addition to any punishment they receive (Agan & Starr, 2017; Grogger, 1995). Depending on the country, they may also include limited access to housing, travel restrictions and loss of a driving license (Council of Europe, 2017). In recognition of these costs, a number of countries have elected to divert those convicted of minor drug offences away from the criminal justice system (Stevens, 2022). Police-led diversion now occupies a central position in police responses to people suspected of either simple possession or an offence related to their drug use (Bacon, 2023).

The classical justification for drug prohibition is that the risk of arrest acts as a deterrent to illicit drug use. An obvious question of interest to policy makers and the general public, therefore, is whether drug diversion programs increase or reduce the risk of further offending. In the study reported here, we evaluate the effect on re-offending (drug related and otherwise) of the New South Wales (NSW) cannabis cautioning scheme; one of the earliest and longest running drug diversion programs in Australia. Under this scheme, NSW police have the power to caution rather than charge an offender where he or she is found in possession of (or using) a small quantity of cannabis and where (a) the offender admits to having committed the offence and (b) the offender consents to being cautioned (Swain, 1999, p. 53–54). Before describing our study in more detail, we first briefly review relevant research on the effectiveness of police-led drug diversion programs in reducing reoffending.

Past research

Blais and her colleagues (2022) completed the most recent review of police-based drug diversion programs. They identified 14 studies

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examining the effect of these programs on recidivism but dismissed two of them on the grounds that they were methodologically inadequate (they lacked comparison groups and/or appropriate controls). On the basis that most of the remaining studies found evidence in favour of diversion (i.e., lower rates of reoffending) and that two of them had achieved a score of three or more on the Maryland Scientific Method Scale,[1] they concluded that drug diversion programs are effective in preventing criminal offending or future contacts with the justice system. A close look at the studies in question, however, raises some doubts about this conclusion, at least insofar as it applies to recidivism.

Measurement problems

One of the limitations of research cited in Blais et al. (2022) is that some of the studies cited in that review did not actually measure the impact of diversion on the recidivism of illicit drug users. Baker and Goh (2004) were concerned with whether the introduction of cannabis cautioning had resulted in a reduction in the total number of individuals charged with using or possessing cannabis. Hales et al. (2004) simply compared the number of court appearances for drug use and/or possession over a two-year period following the introduction of the Queensland Cannabis Diversion Scheme in a group that had been diverted, compared with a group that had not been diverted. Felix et al. (2017) examined the trend in police-recorded drug offences before and after Portugal decriminalised the use of illicit drugs. Hughes and Stevens (2010) examined self-reported drug use before and after drug decriminalisation in Portugal.

Design limitations

The establishment of a credible counterfactual lies at the heart of all research involving causal inference. In evaluating the effect of drug diversion schemes on recidivism, we seek to determine what the recidivism rate of a group that has been diverted would have been, had they not been diverted. The most common approach to solving this problem has been to match two groups on a range of relevant factors (controls),[2] one of which has been diverted and one of which has not. The groups are then compared in terms of recidivism. The strategy depends critically on the adequacy of the controls included in the study.

Kopak (2019) evaluated a pre-arrest diversion scheme for persons facing minor charges in Florida's Leon County. The research design involved a comparison of re-arrest outcomes for those who completed the program compared with those who did not. Re-arrest rates were found to be higher among program non-completers than among completers, but no adjustment was made for possible differences between program completers and program non-completers in factors that might have explained the higher rate of re-arrest in the former group. It is therefore impossible to determine whether the group difference in recidivism rates is due to treatment completion or pre-existing differences between treatment and comparison groups. Callister and Braatten's (2016) evaluation of the Eau Claire County Pre-Charge Diversion Program presents a similar problem. They created a control group by identifying all individuals that had equivalent charges to the treatment group, and which included only low risk first time offenders. While this is an improvement over the approach taken by Callister and Bratten (2016), it offers very limited assurance that the treatment and control groups had the same pre-intervention risk of reoffending. The same is true of diversion studies by Dole and Freeman (2018) and the New Mexico Sentencing Commission (2018) employed propensity score matching (PSM) to create a suitable control group. In those studies the treatment and comparison groups, however, were only matched on charge, not on other factors that might have influenced recidivism (e.g., prior criminal record, age and gender).

The studies by Cotti and Haley (2014), Shanahan et al. (2017) and Collins et al. (2017, 2019) all examined recidivism, and all made some attempt to create a credible control group. Cottee and Hayley (2014) matched treatment (n = 103) and control (n = 156) groups on age, gender, race and type of drug charge to evaluate the Winnebago Drug Misdemeanour Diversion Program (MDDP). The absence of any control for prior criminal record, a strong predictor of reoffending risk, raises doubts the value of their matching strategy. Two of their analyses involved comparisons between treatment completers and treatment non-completers. Such comparisons, as mentioned in the previous paragraph, are not a reliable basis for evaluating the effects of diversion. The third comparison involved an intention to treat (ITT) analysis. The treatment group, in other words, included offenders who had enrolled in treatment but had not necessarily completed it. This comparison revealed a 16 per cent lower rate of re-offending in the treatment group, however the difference that was not statistically significant.

Shanahan et al. (2017) evaluated the NSW Cannabis Cautioning Scheme using data drawn from a national on-line survey asking respondents about their cannabis use and whether they had ever been arrested or cautioned for cannabis use/possession. A total of 195 respondents reported being arrested for a cannabis possession/use offence and 355 who reported receiving a formal cannabis caution. After matching the treated group (those given a caution) with those in the control group on a range of characteristics (age, prior criminal conviction, cannabis consumption, employment status, self-reported criminal activity prior to detection, severity of dependence), Shanahan et al. (2017) found no statistically significant difference in cannabis use pre- and post-police intervention between the two groups. The study by Shanahan et al. (2017), is noteworthy for the number of recidivism-relevant controls included in the study.

The last two studies (Collins et al., 2017, 2019) both involve the Seattle Law Enforcement Assisted Diversion (LEAD) program, and both involve the same dataset. Because Collins et al. (2019) was concerned with program uptake and costs, we focus our attention on Collins et al. (2017). The study compared 203 treatment subjects, and 115 control subjects matched on age, gender, race, years on the program and total arrests prior to evaluation entry. Recidivism was measured by comparing the likelihood of re-arrest over the first six months and the first two-year periods starting from the date of referral. The study found that, compared to controls, LEAD participants had 60 % lower odds of re-arrest during the first six months following program entry as well as a 58 per cent lower odds of arrest over the two-year follow-up period.

There are a number of ways in which past research into the effect of police-led drug diversion programs on recidivism can be improved. The most obvious concerns design. Those who complete a drug treatment program are likely to differ in several ways other than having completed treatment) from those who fail to complete it (e.g., more motivated, fewer prior convictions). Propensity score matching solves this problem but only where it can be assumed that the allocation to treatment is random, conditional on the controls (Chen et al., 2022). This assumption is unlikely to be met in studies with limited controls, such as Dole and Freeman (2018). Accurate estimate of propensity scores in PSM also requires a large sample, a feature notably absent from the other PSM studies reviewed in the previous section.

We improve on past studies of drug diversion by adopting an

[1] Level 3: Measures of crime before and after the program, with a control group, but the groups are not necessarily equivalent. Level 4: Measures of crime before and after the program in multiple experimental and control units, with some control for confounding factors. Level 5: Random assignment of program and control conditions to units, which provides the strongest evidence for causality. See: Farrington et al. (2002).

[2] A factor is relevant insofar as it is correlated with the outcome being measured and offers a potential explanation for any observed difference between the two groups being compared.

instrumental variable (IV) quasi-experimental design.[3] The basic idea behind IV designs is to find a source of variation in the independent variable that has no causal effect on the outcome of interest, other than through the independent variable. More precisely, we seek a source of variation in key independent variable that is exogenous. Then, by construction, we avoid confounding from variables regardless of whether they are included as controls or not. In our case the variable we employ for this purpose (known as an instrument) is the variation between Local Area Commands (LACs) and police districts (PDs) in the speed with which they introduce cannabis cautioning. We argue (and later provide evidence showing) that this variation only affects re-offending through its influence on the likelihood of receiving a caution. The variation in the uptake of cannabis cautioning is shown in Fig. 1, which plots the cumulative number of cannabis cautions across the 58 different LACs each quarter between 2000 and 2020.

In later sections we report robustness checks to make sure the roll out of cannabis cautioning across LACs is unrelated to variation in crime or recidivism rates across those LACs. Before describing our study in more detail, however, it is important to understand how the NSW cannabis cautioning scheme operates.

NSW cannabis cautioning scheme

In NSW, police have the power to caution rather than charge an offender where he or she is found in possession of (or using) a small quantity of cannabis and where (a) the offender admits to having committed the offence (b) the offender consents to being cautioned and (c) the offender is referred to a drug education or drug referral service (Swain, 1999, p. 53–54). The NSW Cannabis Cautioning Scheme commenced as a 12-month state-wide trial on the third of April 2000. At the time of this study, police in NSW were organised in approximately 60[4] LACs or PDs, with each Local Area or District Commander responsible public safety in a defined geographic area and for implementation any directive issued by the Office of the NSW Police Commissioner. This includes implementation of the Cannabis Cautioning Scheme. Although Local and District Commanders were responsible for explaining the scheme to their officers, to our knowledge no explicit timetable was issued for implementation of the scheme. Nor were any guidelines issued concerning the number of cautions allowed to be issued by a given Local or District Command.

In the first month of the scheme 134 cannabis cautions were issued. The number of cannabis cautions issued rose to a peak of more than 600 a month in April 2014 but has since declined to around 200 a month. Under the cannabis cautioning scheme a person detected in possession of or using cannabis is eligible for a cannabis caution if:

- The cannabis is for personal use only.
- The person concerned is an adult.
- Their identity has been checked.
- They admit to the offence.
- They consent to a caution.
- They are not involved in any other criminal offence.
- They have no prior convictions for drug, violent or sexual offences.
- The amount involved is no more than 15 g of dried cannabis.
- There is sufficient evidence to prosecute the person.

Persons who have been convicted of a serious drug offence (e.g., supply or cultivate cannabis) are not eligible for a cannabis caution. If police decide to issue a cannabis caution to someone meeting these requirements, the person in question avoids a criminal conviction. Police, however, enjoy a significant degree of discretion in determining whether to caution a person found in possession of a small amount of cannabis or charge the person with a criminal offence.

Method

Design

In its simplest form, the relationship between recidivism ($Recid_c$) and receipt of a caution ($Caution_c$) can be described by the following linear equation:

$$Recid_c = \alpha + \beta Caution_c + u_c \quad (1)$$

where α is a base level of recidivism, β is a coefficient reflecting the effect of receiving a caution on recidivism and u_c is an error term. Our goal is to estimate the coefficient β. The fundamental challenge in estimating β is that there are likely to be systematic differences between those who receive a cannabis caution and individuals who are prosecuted for cannabis possession (i.e., the variable $Caution_c$ is endogenous). Failure to account for this would result in biased estimates of β.

We employ two lines of defence against this possibility. The first involves eliminating anyone from the sample who is not eligible for a cannabis caution. This leads us to remove anyone charged with a serious drug offence (e.g., supplying or trafficking drugs), a violent or sex offence, or a prior indictable offence or who has previously breached a court order; anyone who has already received two cannabis cautions, who pleads not guilty or is currently in custody and anyone under the age of 18. We also remove cases where key items of information are missing, such as missing LAC names (needed to construct our instrumental variable) or missing values of age, socioeconomic status and remoteness (important for our controls). This leaves us with a sample of 71,754 cases, (associated with 70,712 unique individuals), of which 53,011 are in the treatment group and 18,743 are in the control group. The second is the IV approach described earlier.

Data sources

Data for the study were sourced from the New South Wales (NSW) Bureau of Crime Statistics and Research re-offending database (ROD) (Hua & Fitzgerald, 2006) and the NSW Department of Corrective Services offender integrated management system (OIMS). ROD contains comprehensive data on all persons proceeded against by police, whether that be by way of warning, caution, youth justice conference or criminal prosecution. The OIMS dataset contains data on dates or entry into and exit information about custody (entry and exit dates) for each individual whose record we extracted from ROD. For the purposes of the present study, we used ROD to obtain data on all individuals who had at least one caution or conviction for cannabis use between 2000 and 2020 (and only for those individuals). We used OIMS to obtain the dates of entry and exit from prison, if any. Individuals in the ROD extract who have never been to prison will not appear in the OIMS database.

We merge both databases by using a unique identification number (mspdi) for each person in either dataset. After dealing with our sample restrictions, we obtain a database of 71,754 cases (associated with 70,712 unique individuals) related to cannabis offences, of which 53,011 led to a caution (*treatment group*) and 18,743 did not (*control group*). We construct our main dependant variable, recidivism, from the two data sets.

Variables

Outcome

We define recidivism as any reconviction within five years free time of being cautioned or prosecuted for a cannabis possession offence, regardless of the type of new offence. The term ‘free time’ in this context

[3] Widding-Havneraas and Zachrisson (2022) provide a very accessible introduction to this design in the context of health research.

[4] Two commands are not included in this analysis because they perform specialist duties (e.g. the aerial or maritime surveillance.

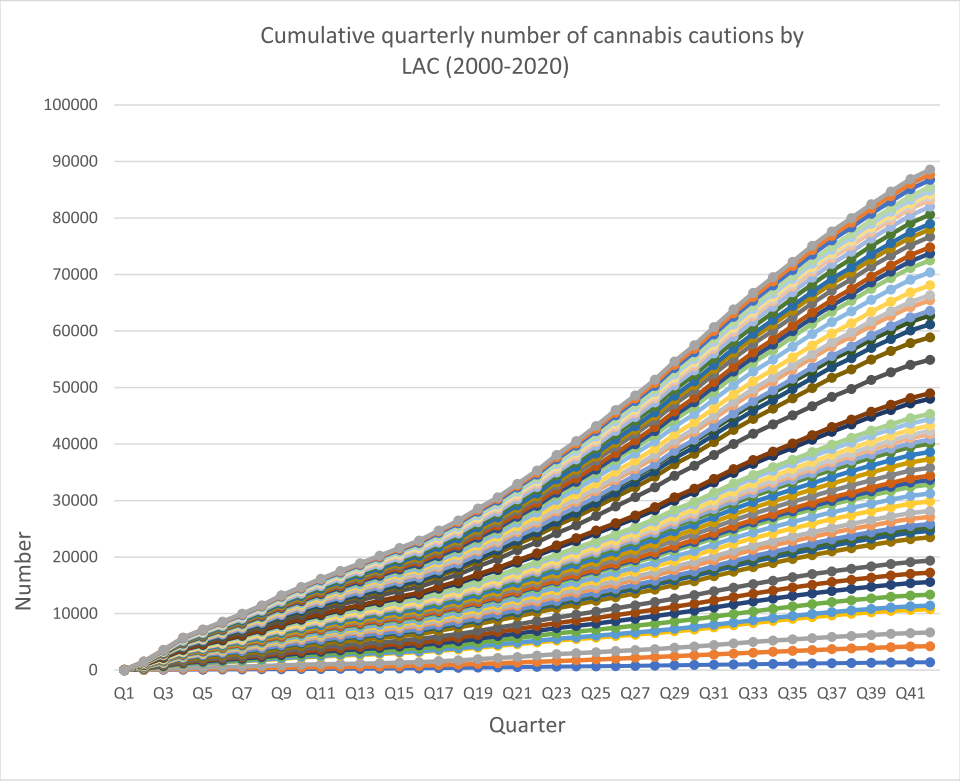

Fig. 1. Cumulative quarterly number of cannabis cautions by LAC (2000–2020).

refers to time out of custody. On occasion, we focus on specific types of new offences (drug-related or cannabis-related). Although our standard measures of recidivism is any new offence within five years of being cautioned or prosecuted, we sometimes focus on recidivism after 1 or 2 years to give a proper short-term estimation of the effect of cautions on recidivism.

To obtain our instrument, note first that the number of cautions issued by an individual LAC is partly a function of the size of its criminal caseload. We therefore begin by dividing the total number of cautions granted by a LAC by the total number of cannabis possession cases recorded by that LAC. We then make an adjustment to avoid including the current case in the construction of the instrument. For each case c processed at LAC p in our database, we first calculate the number of previous cautions, p(A), and the total number of previous cases processed, p(B). The first number is then divided by the second (p(A)/p(B)) to obtain the ratio of cautions granted in LAC p to the total number of cases processed before case c occurred. This gives us our instrumental variable, which hereafter we refer to as *ShareCaution*.[5]

Controls

Our controls include gender, age, Indigenous status, socioeconomic status (measured by SEIFA) (Australian Bureau of Statistics, 2025), remoteness (measured by ARIA) (Australian Bureau of Statistics, 2025), whether the individual has had a case while juvenile (<18), the number of times the person has been cautioned or prosecuted for cannabis use/possession previously, the number of proven concurrent offences at the time of the arrest, the number of previous arrests, and whether the person has previously been imprisoned.

[5] This IV is very similar to one of those used by Di Tella and Schargrodsky (2004) and by Henneguelle, Monnery and Kensey (2016) to estimate the effect of electronic monitoring on recidivism.

Analysis

To estimate the effect of a cannabis caution on the risk of recidivism we construct a two-equation model in which the probability of receiving a caution and the probability of reoffending are estimated jointly:

$$Caution^{*}_{c,p} = \alpha_0 + \alpha_1 ShareCaution_{c,p} + X_c\beta + e_{c,p} \quad (2)$$

$$Recid^{*}_{c,p} = \beta_0 + \beta_1 Caution_c + X_c\beta + \varepsilon_{c,p} \quad (3)$$

where the vector $\boldsymbol{X}$ is the same in both equations and includes the controls listed above. By estimating a recursive bivariate probit model of Eqs. (2) and (3) (using maximum likelihood regression) we explicitly control for the correlation (ρ) between the two error terms. This correlation captures the influence of any factor that influences both selection into treatment and the effect of treatment on recidivism. As a check on the results of the bivariate probit analysis we also use two-stage least squares (2SLS) estimation with Eq. (2) as the first stage.

Results

Sample description

Table 1 reports descriptive statistics for the full sample, for treated individuals who got a caution and for control individuals who did not get any caution.

The two groups differ significantly in a wide range of areas (such as gender, age or socioeconomic status measured by the SEIFA index). In terms of recidivism within 5 years, the two groups also differ dramatically: only 3.6 % of ex-cautioned offenders are charged again compared with 32.3 % of ex-non cautioned offenders, which yields a gap of 29 percentage points. If we look at recidivism within 1 year, 1.0 % of the treatment group is charged again compared with 9.3 % of the control group, which yields a smaller gap of nearly 8 percentage points. These differences highlight the importance of avoiding crude comparisons of

Table 1
Sample description.

Variables	Mean			Diff.	Range
	Full	Caution	No caution		
Male (%)	81.3	81.8	79.7	***	[0,1]
Age of offence (years)	28.8	27	34	***	[18, 88]
	(10.7)	(9.5)	(12.3)		
Had a case while juvenile (%)	5.4	5.2	5.9	***	[0,1]
Aboriginal (%)	2.6	1.9	4.7	***	[0,1]
Socio-economic index (SEIFA)					
First quartile (%)	22.9	21.1	27.8	***	[0,1]
Second quartile (%)	23.8	21.4	30.4	***	[0,1]
Third quartile (%)	26.7	27.4	24.7	***	[0,1]
Fourth quartile (%)	26.7	30.1	17.1	***	[0,1]
Remoteness Index					
Inner regional (%)	19.8	16.2	29.9	***	
Major cities (%)	74.5	79.5	60.6	***	
Outer regional (%)	5.2	4	8.7	***	
Remote (%)	0.5	0.4	0.8	***	
Time until next offence (if any, days)	1988	2053	1803	***	[0, 7937]
	(1862)	(1913)	(1695)		
Has been incarcerated before (%)	5.1	4	8.3	***	[0,1]
Has committed principal offences before (%)	20.3	17.2	29	***	[0,1]
Number of known previous cases	0.5 (1.1)	0.4 (1.0)	0.8 (1.5)	***	[0, 56]
Year of first committed offence					
In the 1990s (%)	0.7	0.4	1.3	***	[0,1]
In the 2000s (%)	44	41.7	50.8	***	[0,1]
In the 2010s (%)	55.3	57.9	47.8	***	[0,1]
Number of concurrent offences					
0 (%)	0.1	0	0.4	***	[0,1]
1 (%)	83.8	98	43.4	***	[0,1]
2 ()	10.4	2	34.4	***	[0,1]
3 or more (%)	5.7	0	21.9	***	[0,1]
Type of penalty					
Bond (%)	6	0	23.2	***	[0,1]
Conditional Release (%)	0.7	0	2.8	***	[0,1]
Conviction (%)	1	0	3.7	***	[0,1]
Fine (%)	14.2	0	54.3	***	[0,1]
No penalty (%)	3.8	0	14.7	***	[0,1]
Others (%)	0.2	0	0.8	***	[0,1]
Suspended sentence (%)	0.1	0	0.4	***	[0,1]
Caution (%)	73.9	100	0	***	[0,1]
Recidivism before 1 year (%)	3.3	1	9.3	***	[0,1]
Recidivism before 5 years (%)	12.6	3.6	32.3	***	[0,1]
Type of next offence (if any)					
Act of violence (%)	9.7	10.9	7.7	***	[0,1]
Breach of sentences (%)	3.3	3	3.9	***	[0,1]
Drugs (%)	41.3	38.5	46.5	***	[0,1]
Others (%)	4.3	4	4.7	***	[0,1]
Property (%)	9.8	9.5	10.5	***	[0,1]
Traffic (%)	29.3	32.9	22.8	***	[0,1]
Weapons (%)	2.2	1.2	4	***	[0,1]
N	71.754	53.011	18.743		

recidivism rates between those receiving and those not receiving a cannabis caution. The IV results we present next avoid this by comparing outcomes for people who would have received a cannabis caution (or been prosecuted) had they been dealt with by a different LAC or PD.

Instrumental variable estimates

To account for potential selection based on un-observables, we turn to our two-equation model with an IV. In Table 2, column 1 reports our benchmark probit estimate when cautions are considered exogenous. In column 2, we present the results of our recursive bivariate probit model using maximum likelihood estimation with one instrument. In column 3, we present the results of the OLS regression. In column four we present the results of the 2SLS regression. The outcome in each case is the estimated probability of recidivism after 5 years. The effects of our covariates on recidivism can be found in Appendix Table A4.

Table 2
Caution and recidivism: causal estimates.[7]

	Probit	**Bivariate Probit with IV**	**OLS**	**2SLS**
	1	2	3	4
Y1 = Recidivism: Caution	−0.0691***	−0.1618***	−0.0555***	−0.1744***
	(0.0051)	(0.011)	(0.0063)	(0.0497)
Y2 First stage equation)		0.4500***		0.5228***
ρ (correlation coefficient)		0.38		
Weak instrument test: *p*-value				<2e-16

Note. Robust standard errors clustered at the LAC level and at year of case finalisation are in parentheses. Values for probit and biprobit estimates are average marginal effects from maximum likelihood regressions. All regressions control for demographics and judicial backgrounds. 2SLS = two-stage least squares; IV = instrumental variable; OLS = ordinary least squares. The dependent variable is recidivism after 5 years. $N = 33.988$ (37.866 observations are deleted due to missingness since follow-up time lower than 5 years). *** $p < .001$, ** $p < .01$, * $p < .05$ + $p < 0.1$.

The bi-variate probit model analysis shows that β (−0.1618) is large, negative and significant. This indicates that receiving a cannabis caution instead of being prosecuted reduces recidivism after 5 years by 16 percentage points. When we estimate the same model using 2SLS regression (column 4), the estimated causal effect of caution is somewhat larger (a reduction in reoffending risk of 17 percentage points) but also less precise. In both cases (bivariate probit with IV or 2SLS with IV), the first stage equation shows a strong and highly significant relationship between our instrumental variable (*ShareCaution*) and the treatment variable (Caution). This provides assurance that our instrument is highly relevant. Prima facie, cautioning a person found in possession of or using a small quantity of cannabis rather than prosecuting them, reduces the risk of reoffending by about 16 percentage points

Heterogeneous treatment effects

We now explore the heterogeneity of treatment effects. To do so, we first estimate separate regressions of our bivariate probit model (as in

Table 3
Heterogeneity of effects.

	Yes	**No**
Younger than 30	−0.1315***	−0.2117***
	(0.0096)	(0.0185)
N	26.544	17.875
Has been to prison before	0.069	−0.1649***
	(0.0817)	(0.0108)
N	10.736	33.683
Has already had one caution	−0.7885***	−0.1607***
	(0.1054)	(0.0106)
N	10.589	33.83

Note. Robust standard errors clustered at the police station level and at year of cases finalisation are in parentheses. Values are average marginal effects from bivariate probit models using maximum likelihood estimation. All regressions include the full set of control variables. *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < 0.1$.

Table 3) on subsamples of treated offenders using possibly relevant mediating factors. The results are shown in Table 4.

The estimated effect of a cannabis caution on reoffending risk is larger among offenders aged under 30, those who have never previously been imprisoned and those who have already had one caution. Table 4 examines the effect of a cannabis caution on the overall risk of reoffending, the risk of re-arrest for another drug possession offence, and the risk of re-offending for another cannabis use/possession offence.

Receiving a cannabis caution reduces the risk of reoffending overall, as well as for a drug possession effect and, more specifically a cannabis possession offence. The estimated effects are still important and very significant: receiving a cannabis caution does help to reduce reoffending involving drug offences.

Robustness checks

As noted earlier, our identification strategy hinges on the assumption that access to a caution varies exogenously across LACs and over time; and is not related to LAC characteristics that affect recidivism. To test this assumption, we calculate a 'Caution Propensity Index' for each LAC by dividing the total number of cautions granted by the LAC by the total number of cannabis possession cases dealt with by that LAC. LACs are then divided into *Low, Moderate* and *High* LACs in terms of the Caution Propensity Index. This gives us 15 'low' LACs, 28 'moderate' and 15 'high' LACs.[6] We then regress the probability of recidivism reoffending against our controls plus a variable indicating whether the LAC was in the Low, Medium or High cautioning group. Appendix Table 1 presents the results.

There is no evidence that the differential use of cautions is related to differences in the probability of recidivism, either in the raw data or after controlling for a rich set of individual characteristics (to ensure that comparisons were not skewed by differences in offenders' composition across LACs). However, as a further test, we consider the possibility that local crime rates affect the willingness of an LAC to issue a cannabis caution. To test this hypothesis, we gathered monthly LAC reported crime data from 1995 to 2001 (to include the beginning of the cautioning scheme). We then compared recorded crime levels in our three groups of LACs (high, moderate, low). There are no significant differences in crime levels between LAC groups, either before, or at the point where cannabis cautioning was introduced (see Appendix Table 2). The disparities between groups of LACs in the use of cautions do not seem to be associated with levels of recorded crime.

Table 4
Cannabis cautions and recidivism by reoffence type.

	Bi-probit with IV	2SLS with IV
Re-offending (any)	−0.1618***	−0.1744***
	(0.011)	(0.0497)
Re-offending (any drug possession)	−0.1300***	−0.0566+
	(0.0097)	(0.0292)
Re-offending (cannabis possession)	−0.0905***	−0.0256*
	(0.0148)	(0.0107)

Note. Robust standard errors clustered at the police station level and at year of cases finalisation are in parentheses. Values for bi-probit are average marginal effects from bivariate probit models using maximum likelihood estimation. 2SLS = two-stage least squares; IV = instrumental variable. The dependent variable is recidivism after 5 years. All regressions include the full set of control variables. $N = 33.988$. *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < 0.1$.

Discussion

The present study provides some of the strongest evidence to date that diverting individuals detected in possession of small quantities of illicit drugs reduces the risk of reoffending, rather than increasing it. The beneficial effects of cannabis cautioning in our study are large, significant and not limited to future cannabis or drug re-offending. They are also consistent with the results of Shanahan et al. (2017) and other earlier studies of the effect of drug diversion.

Our preferred model indicates a 17-percentage point reduction in the risk of re-offending, relative to those found in possession of cannabis who were prosecuted, convicted, and sentenced. The effectiveness of cannabis cautions is not equal across all groups. The beneficial effects are more pronounced among older offenders, perhaps because many of those in the older age groups have families, jobs and children and who have much more to lose by further contact with the criminal justice system than younger offenders without such ties. They are less pronounced among those who have been previously imprisoned, perhaps because having a criminal record makes it harder to obtain legitimate employment (Lenton & Heale, 2000).

Although our focus was on the benefits of diverting minor drug offenders from court, our results are consistent with studies examining those benefits for other groups of offenders. Petrosino et al. (2010) conducted a Campbell Collaboration review of 29 studies of juvenile justice diversion that used random or quasi-random methods of assignment to conditions, and concluded that juvenile justice system processing increases delinquency, regardless of whether the latter was measured in terms of prevalence, incidence, severity, and self-report. Wilson, Brennan and Olaghere (2018) reviewed research on police-led diversion for low-risk youth with limited or no prior involvement in the juvenile justice system. The 31 studies (67 effect size estimates) included in their review all used experimental or quasi-experimental methods. The general pattern of results suggested that risk of reoffending was significantly lower among those diverted than among those prosecuted. Similar results have been reported for adults by Mueller-Smith and Schnepel (2021) and Agan, Doleac and Harvey (2023).

As with all studies, ours has a number of limitations. To begin with, we rely on officially recorded offending as our measure of recidivism. It is obvious that officially recorded offending captures only a fraction of the total volume of offending that occurs. We implicitly assume, that there is no bias in the likelihood of being detected as between those prosecuted and those given a cannabis caution. Our conclusions hinge critically on our assumption that variation across LACs and PDs in the likelihood of a cannabis caution is not driven by any difference between them in rates of re-arrest or crime. We provide evidence of this, but our evidence rests on the assumption that recorded crime and re-offending rates are a tolerably faithful reflection across time and space of underlying trends and differences in crime and reoffending. The available evidence, limited though it is, supports this assumption (Chilvers & Doak, 2000; Payne, 2007).

If prosecuting those who use cannabis makes them more likely to reoffend than diverting them from prosecution, there would seem little justification for retaining possession of a small quantity of cannabis use for personal use as a criminal offence. It might be argued in defence of prosecution that prohibition acts as a general deterrent even if it does not function as a specific deterrent. The available evidence, however, provides little support for the claim that the threat of criminal prosecution for possession of an illegal drug acts as a general deterrent to such use (Donnelly et al., 2009; Hughes & Stevens, 2010; Single, 1989). Studies that report an increase in the prevalence of cannabis use

[6] Appendix Tables A1 to A3 list the LACs in the low, medium and high cautioning groups.

[7] As we will discuss further in next sections, we could be concerned about unobserved LAC-level trends that are correlated with their use of cannabis cautions and with recidivism outcomes. As a first approach to this question, it should be noted that the inclusion of fixed effects by LAC does not change the size and significance of the obtained coefficients, neither in column 2 (bivariate probit with IV), nor in column 4 (2SLS with IV). Indeed, the obtained coefficients are respectively −0.1593*** (0.0110) and −0.2106*** (0.0513). We will return to this question in our robustness checks.

following decriminalisation, generally only find small effects (Williams, 2004). If decriminalisation of cannabis use is viewed by policy makers is a bridge too far for policy makers, it would seem prudent to at least divert those caught with small quantities of cannabis for personal use away from the court system.

Conclusion

The conventional justification for criminal prosecution of illicit drug users is that it acts as a general deterrent to illicit drug use and reduces the risk that those caught in possession of or using an illicit drug will be more likely to desist from drug use. As we need earlier, reliance on prosecution has a number of consequences not conductive to future law-abiding behaviour, including reduced earnings and employment prospects. In recognition of these costs, a number of countries have elected to divert those convicted of minor drug offences away from the criminal justice system (Stevens, 2022). The current study shows that the adoption of alternatives to prosecution for minor drug offences is more likely to enhance public safety rather than reduce it.

Ethics approval

The authors declare that the work reported herein did not require ethics approval because it did not involve animal or human participation.

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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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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.drugpo.2025.105008.

References

Agan, A., & Starr, S. (2017). The effect of criminal records on access to employment. *American Economic Review: Papers and Proceedings, 107*(5), 560–564. https://www.aeaweb.org/articles?id=10.1257/aer.p20171003.

Agan, A., Doleac, J. L., & Harvey, A. (2023). Misdemeanour prosecution. *The Quarterly Journal of Economics, 138*(3), 1453–1505. https://doi.org/10.1093/qje/qjad005

Australian Bureau of Statistics (2025). Remoteness areas. Australian statistical geography standard (ASGS) edition 3. https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/remoteness-structure/remoteness-areas.

Bacon, M. (2023). From criminalisation to harm reduction? The forms and functions of police drug diversion in England and Wales. *Policing and Society, 34*(3), 105–123. https://doi.org/10.1080/10439463.2023.2267729

Baker, J., & Goh, D. (2004). *The cannabis cautioning scheme three years on: An implementation and outcome evaluation*. Sydney, Australia: New South Wales Bureau of Crime Statistics and Research.

Blais, E., Brisson, J., Gagnon, F., & Lemay, S. (2022). Diverting people who use drugs from the criminal justice system: A systematic review of police-based diversion measures. *International Journal of Drug Policy, 105*, 103–697. https://doi.org/10.1016/j.drugpo.2022.103697. ISSN 0955-3959.

Callister, S., Braaten, A. (2016). An evaluation of the Eau Claire County pre-charge diversion program as measured by three year recidivism rates.

Chen, J. W., Maldonado, D. R., Brooke, L., Kowalski, K. B., Miecznikowski, C. K., Gornbein, J. A., & Domb, B. G. (2022). Best practice guidelines for propensity score methods in medical research: Consideration on theory, implementation, and reporting. *Arthroscopy : The Journal of Arthroscopic & Related Surgery : Official Publication of the Arthroscopy Association of North America and the International Arthroscopy Association, 38*(2), 632–642. https://doi.org/10.1016/j.arthro.2021.06.037

Chilvers, M., & Doak, P. (2000). *Validation of NSW police crime statistics: A regional analysis*. Sydney: NSW Bureau of Crime Statistics and Research. https://bocsar.nsw.gov.au/documents/publications/general-series/r48.pdf.

Collins, S. E., Lonczak, H. S., & Clifasefi, S. L. (2017). Seattle's Law enforcement assisted Diversion (LEAD): Program effects on recidivism outcomes. *Evaluation and Program Planning, 64*, 4956. https://doi.org/10.1016/j.evalprogplan.2017.05.008

Collins, S. E., Lonczak, H. S., & Clifasefi, S. L. (2019). Seattle's law enforcement assisted diversion (LEAD): Program effects on criminal justice and legal system utilization and costs. *Journal of Experimental Criminology, 15*(2), Article 201211. https://doi.org/10.1007/s11292-019-09352-7

Cotti, C. D., & Haley, M. R. (2014). Estimating the effectiveness of a misdemeanor drug diversion program using propensity score matching and survival analyses. *The Social Science Journal, 51*(4), Article 638644. https://doi.org/10.1016/j.soscij.2014.07.007

Council of Europe (2017). Costs and unintended consequences of drug control policies. Report by the expert group on possible adverse effects and associated costs of drug control policies. https://rm.coe.int/costs-and-unitended-consequences-of-drug-control-policies/16807701a9.

Di Tella, R., & Schargrodsky, E. (2004). Criminal recidivism after prison and electronic monitoring. *Journal of Political Economy, 131*(1), 28–73. https://www.journals.uchicago.edu/doi/abs/10.1086/669786.

Dole, J., & Freeman, L. (2018). *Evaluation of Santa Fe's lead program: Criminal justice outcomes*. New Mexico Sentencing Commission.

Donnelly, N., Hall, W., & Christie, P. (2009). The effects of the Cannabis expiation notice system on the prevalence of cannabis use in South Australia: Evidence from the National drug strategy household surveys 1985–95. *Drug and Alcohol Review, 19*(3), 265–269. https://doi.org/10.1080/713659382

Farrington, D. P, Gottfredson, D. C., Sherman, L. W., & Welsh, B. C. (2002). The Maryland scientific methods scale. In D. P. Farrington, D. L. MacKenzie, L. W. Sherman, & B. C. Welsh (Eds.), *Evidence-based crime prevention* (pp. 27–35). Routledge. https://doi.org/10.4324/9780203166697.

Félix, S., Portugal, P., & Tavares, A.S. (2017). Going after the addiction, not the addicted: The impact of drug decriminalization in Portugal.

Grogger, J. (1995). The effect of arrests on the employment and earnings of young men. *The Quarterly Journal of Economics, 110*(1), 51–71. https://doi.org/10.2307/2118510

Hales, J., Mayne, M., Swan, A., Alberti, S., & Ritter, A. (2004). *Evaluation of Queensland illicit drug diversion initiative (QIDDI) police diversion program: Final report*. Queensland Health & Queensland Police Service.

Henneguelle, A., Monnery, B., & Kensey, A. (2016). Better at home than in prison? The effects of electronic monitoring on recidivism in France. *The Journal of Law and Economics, 59*(3). https://doi.org/10.1086/690005

Hua, J., & Fitzgerald, J. (2006). Crime and Justice Bulletin 95. *Matching court records to measure reoffending*. Sydney: NSW Bureau of Crime Statistics and Research. https://bocsar.nsw.gov.au/documents/publications/cjb/cbj01-100/cjb95.pdf.

Hughes, C. E., & Stevens, A. (2010). What can we learn from the Portuguese decriminalization of illicit drugs? *British Journal of Criminology, 50*(6), 999–1022. https://doi.org/10.1093/bjc/azq038

Kopak, A. M. (2019). An initial assessment of Leon County Florida's pre-arrest adult civil citation program. *Journal of Behavioral Health Services & Research, 46*, 177–186. https://doi.org/10.1007/s11414-018-9620-0

Lenton, S., & Heale, P. (2000). Arrest, court and social impacts of conviction for a Minor cannabis offense under strict prohibition. *Contemporary Drug Problems, 27*(4), 805–833. https://journals.sagepub.com/doi/pdf/10.1177/009145090002700405.

Mueller-Smith, M., & Schnepel, K. T. (2021). Diversion in the criminal justice system. *The Review of Economic Studies, 88*(2), 883–936. https://doi.org/10.1093/restud/rdaa030

Payne, J. (2007). Research and public policy series report No. 80. *Recidivism in Australia: Findings and future research*. Canberra: Australian Institute of Criminology. https://www.aic.gov.au/sites/default/files/2020-05/rpp080.pdf.

Petrosino, A., Turpin-Petrosino, C., & Guckenburg, S. (2010). Formal processing of juveniles: Effects on delinquency. *Campbell Systematic Reviews, 6*(1), 1–88. https://doi.org/10.4073/csr.2010.1

Shanahan, M., Hughes, C. E., McSweeney, T., & Griffin, B. A. (2017). Alternate policing strategies: Cost-effectiveness of cautioning for cannabis offences. *International Journal of Drug Policy, 41*, 140–147. https://doi.org/10.1016/j.drugpo.2016.12.012

Single, E. (1989). The impact of marijuana decriminalization: An update. *Journal of Public Health Policy, 10*, 456–466. https://link.springer.com/content/pdf/10.2307/3342518.pdf.

Stevens, A. (2022). New prospects for harm reduction in the UK? A commentary on the new UK drug strategy. *International Journal of Drug Policy, 109*. https://doi.org/10.1016/j.drugpo.2022.103844

Swain, M. (1999). Background Paper No. 3/99. *The New South Wales drug summit: Issues and outcomes*. Parliamentary Research Service. https://www.parliament.nsw.gov.

au/researchpapers/Documents/the-nsw-drug-summit-issues-and-outcomes/bg03-99.pdf.

Widding-Havneraas, T., & Zachrisson, H. D. (2022). A gentle introduction to instrumental variables. *Journal of Clinical Epidemiology, 149*, 203–205. https://doi.org/10.1016/j.jclinepi.2022.06.022

Williams, J. (2004). The effects of price and policy on marijuana use: What can be learned from the Australian experience? *Health Economics, 13*(2), 123–137. https://doi.org/10.1002/hec.796

Wilson, D. B., Brennan, I., & Olaghere, A. (2018). Police-initiated diversion for youth to prevent future delinquent behaviour: A systematic review. *Campbell Systematic Reviews, 14*(1), 1–88. https://doi.org/10.4073/csr.2018.5