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The effect of the Violent Offender Treatment Program (VOTP) on offender outcomes

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Aim: *To identify the impact of the Violent Offender Treatment Program (VOTP) on re-offending and return to custody outcomes at 24 months of free time post release.*

Method: *Data were obtained for all offenders referred to VOTP between 2007 and 2014 and released from prison, yielding a sample size of 587 referrals. Ordinary least squares and two-stage-least-squares (2SLS) linear probability models were used to estimate the differences between those who started the program and those who did not, on four outcome variables measured at 24 months free time post release: 1) re-offending with any offence; 2) re-offending with any offence or a return to custody; 3) re-offending with a violent offence; and 4) re-offending with a violent offence or a return to custody. Similar analyses were also undertaken comparing outcomes for offenders who completed VOTP with those who did not complete the program.*

Results: *Starting VOTP was associated with significantly lowered probability of general re-offending (by 9 percentage points), general re-offending or returning to custody (7 percentage points) at 24 months free time post release. Similar differences in the probability of general re-offending (9 percentage points) and general re-offending or returning to custody (7 percentage points) were found in relation to completing VOTP. We also find non-significant results for violent re-offending. The latter finding may be related to loss of statistical power due to sample attrition.*

Conclusion: *VOTP appears to be associated with lower rates of general re-offending and return to custody, however the estimates obtained are based on a simple regression approach and may not represent causal effects. Replication with more robust techniques and/or a larger sample size is recommended.*

Keywords: *violent offending, re-offending, instrumental variables, regression*

INTRODUCTION

The number of adults imprisoned in NSW has been steadily rising over the last three decades and in March 2018 amounted to 13,494 inmates (NSW Bureau of Crime Statistics and Research (BOCSAR), 2018). While growth in the State's prisoners appears to have slowed over the last 12 months, current forecasts based on trends in receptions and remand suggest that the upward trend in prisoner numbers is set to continue (BOCSAR, 2018). This unprecedented demand for beds resulted in the NSW Government committing $3.8 billion in 2016 to spend on correctional facilities over the subsequent four years in order to boost overall prison capacity across the State. It has also resulted in renewed focus on effective treatment programs that can be delivered within a custodial setting to reduce the rate at which offenders return to NSW prisons.

A large proportion of the adult prison population are violent offenders. In the 12 months to December 2017, the most serious charge for over half of all remanded and sentenced NSW inmates was for a violent offence (BOCSAR, 2018). Many of these offenders will commit another offence after being released from prison and will ultimately return to custody. Weatherburn and Ringland (2014) estimate that around one-third of violent inmates in NSW will commit a new proven offence after being released to parole supervision and one in 10 will be returned to custody for breaching their parole. Jones, Hua, Donnelly, McHutchison, and Heggie (2006) also found that violent offenders in NSW released to parole are quicker to reoffend than non-violent offenders, even after adjusting for other relevant covariates such as the number of prior prison episodes, length of current sentence and age. This does not however appear to be the case in the United States, where violent offenders were found to re-offend relatively more

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slowly than other offenders, with 71.6 per cent of violent offenders re-offending within 5 years of release, compared to 82.4 per cent of property offenders, 77.5 per cent of drug offenders and 74.1 per cent of public order offenders (Alper, Durose, & Markman, 2018); though it is worth noting that violent offenders were more likely than other types of offenders to be arrested for another violent offence.

Both Australian studies found little evidence of offence specialisation amongst violent offenders in NSW; a finding which is consistent with other work mapping violent criminal careers (see also Piquero, Jennings, & Barnes, 2012; Alper et al., 2018). In Weatherburn and Ringland's (2014) study, for example, just 9 per cent of the parolees who committed a violent offence went on to commit a new violent offence whilst on parole. However, there are specific offender subgroups who are at a much greater risk of violent recidivism. Violent re-offending was found to be more likely among younger offenders (particularly those aged less than 25), males, Indigenous offenders and those with a prior history of prison. Perhaps most striking was the importance of the Level of Service Inventory – Revised (LSI-R) in judging risk of violent re-offending. The LSI-R is a standardised risk assessment instrument (Andrews & Bonta, 1995) which is administered to most NSW prisoners soon after entry into custody which encompasses criminal history, substance use, attitudes, as well as social and personal factors. Weatherburn and Ringland (2014) estimated that a parolee who scores in the medium-high range on the LSI-R is more than twice as likely to commit a further violent offence compared with a parolee with the same demographic and prior criminal history characteristics who scores in the low/low-medium range.

The finding that violent offenders do not necessarily specialise also emerged from a more recent study of violent offenders which focused on the longer-term risk of re-offending. Wan and Weatherburn (2016) tracked 26,472 violent offenders over a 20-year period to identify factors influencing desistance and time to next violent re-offence. They found that nearly three-quarters of violent offenders will never commit a new violent offence but that some groups of offenders have a very high chance of engaging in further violent offending. For example, more than two-thirds of Indigenous offenders aged 17 years or under at the time of their index violent offence whose first contact with the criminal justice system occurred when they were 12 years or younger will be convicted of another violent offence after 20 years. The existence of particular groups where persistent repeat violent offenders is a problem indicates that there may be benefits from violence-specific therapeutic interventions delivered in custodial settings.

THE VIOLENT OFFENDER TREATMENT PROGRAM

The Violent Offender Treatment Program (VOTP) is a residential therapy program delivered by Corrective Services NSW (CSNSW) for male prisoners who have been sentenced to a non-parole period of at least 2 years for a violent offence. This 12-month program is delivered at Parklea Correctional Centre where inmates are accommodated in a 64-bed unit. VOTP is delivered within a modified therapeutic community by a multidisciplinary team consisting of psychologists, custodial staff and other offender services and programme staff (Ware, Cieplucha & Matsuo, 2011). Given there are a limited number of places on the program, priority is given to inmates who are at high-risk of re-offending (i.e. medium high/high LSI-R) and who have a prior history of violent offending in the community and/or within custody (see Box 1 for further details on VOTP eligibility and exclusion criteria)[1]. If an offender meets these eligibility criteria and is deemed suitable, further interviews and assessment are undertaken immediately before starting VOTP to confirm their suitability for the program (CSNSW, 2016).

VOTP involves an initial assessment and preparatory phase where offenders are interviewed to determine their readiness, motivation and other responsivity issues (e.g. mental health), and also undergo a battery of tests. Following this is a treatment

Box 1. Eligibility and suitability criteria for participation in VOTP

To be eligible participants must have:

- a current violent offence resulting in a non-parole period of at least 2 years
- a history of committing one or more violent offences or
- a history of committing violent offences in custodial settings
- sufficient time (of at least 12 months) remaining in total sentence to complete the VOTP treatment
- Medium High / High LSI-R

The following participants are considered suitable for VOTP:

- violent offenders assessed as having high levels of psychopathic tendencies (i.e. as measured by Psychopathy Checklist-Revised Screening Version (PCL-R/SV))
- violent offenders with domestic violence convictions
- violent offenders who have committed a sexual offence (except where there is significant risk of harm to the offender from other offenders)
- violent offenders appealing the severity of their sentence

The following criteria exclude offenders from the program:

- violent offenders who are appealing against their conviction
- violent offenders who have committed a serious violent offence against a child will be assessed on a case-by-case basis
- violent offenders who have been assessed as unable to successfully complete the program on the basis of psychiatric, cognitive or intellectual functioning or physical abilities

phase of between 9 and 12 months duration. During the treatment phase, offenders attend three 2-hour group sessions each week with up to 11 other VOTP participants. In these sessions, which are designed around cognitive behavioural therapy (CBT) principles, inmates are encouraged to work intensively on changing the thinking, attitudes and feelings that led to their offending behaviour, and to understand the factors surrounding their offending behaviour. After completing the program, VOTP graduates can be referred to the CSNSW VOTP Maintenance and Outreach program. This post-treatment program provides continuing support to VOTP graduates during their transition into the community or back into the general prison population. The number of VOTP maintenance sessions a participant can attend is determined on a case-by-case basis and is dependent upon the offender's need. Over the period 2007-2014, 794 offenders were referred to VOTP.

RELATED LITERATURE

Current literature seems to suggest that CBT approaches are broadly effective in reducing the risk of re-offending among general offender populations. Feucht and Holt (2016) conducted a meta-analysis of 50 CBT programs rated by CrimeSolutions.gov and found that as a whole 74.0 per cent of these programs were rated as 'effective' or 'promising'. Furthermore, 69.2 per cent of those which focus on crime and crime prevention were rated 'effective' or 'promising' and 71.4 per cent of CBT programs which focus on corrections and re-entry were rated as 'effective' or 'promising'. This corroborates the findings of a previous systematic review by Lipsey, Landenberger, and Wilson (2007) which indicated that the odds of not re-offending for offenders who underwent CBT was roughly 1.5 times the size of those in the control groups. They find the effect is likely to be even larger under a 'best practice' scenario which yielded an odds ratio of 2.86 (i.e. the odds of an offender who underwent CBT not re-offending is close to three times that of their counterparts in the control group).

Despite the large number of violent prisoners and their relatively high rate of return to custody, there is surprisingly little evidence from the treatment literature on what works to reduce future risk of offending for violent offenders. A meta-analysis by Polaschek and Collie (2004) found only nine evaluations of cognitive-behavioural interventions for prisoners with a violent history which met their criteria for rigor (matched or randomly allocated comparison group with recidivism outcomes). On the basis of these evaluations they concluded that most programs demonstrated some level of efficacy but firm conclusions about the most promising framework for violent interventions could not be drawn because of flawed evaluation methodologies (including small numbers) and variations or lack of detail on program logic, delivery and settings.

A later systematic review (Jolliffe & Farrington, 2007) reiterated the need for additional evaluative research and theory development in relation to rehabilitative programs for violent offenders but was optimistic about rehabilitative options. Joliffe and Farrington (2007) considered the effectiveness of a broad range of interventions for violent offenders; both corrections- and community-based. They concluded on the basis of 11 reports that interventions with violent offenders can impact both general and violent re-offending rates, with a difference in percentage reconvicted of between 8 to 11 per cent for general re-offending and 7-8 per cent for violent re-offending. Interventions addressing cognitive skills and anger control, and utilising role plays and relapse prevention techniques outperformed other types of interventions; as did programs of longer duration and higher intensity. This review found that larger effect sizes were more common among studies with poorer methodological quality, raising some doubts about the generalisability of the findings.

CSNSW has commissioned a number of evaluations of VOTP to determine its effectiveness. Most of these studies have examined differences before and after program participation in offender cognitions, emotional regulation and empathy, and have consistently shown that the goals of the treatment are being met, at least amongst those who complete the program (Abreu, 2007; Bryan & Day, 2006; Dunne, 2006; Kennedy, 2006; cited in Ware et al. 2011). Only one study to date has considered the impact of VOTP on recidivism rates. Roman (2005; cited in Ware et al. 2011) found that offenders who participated in the Violence Prevention Program (an earlier version of the VOTP program) recorded reconviction rates that were 17 per cent lower than non-participants. However, this difference was not statistically significant.

THE CURRENT STUDY

The current study is the first evaluation of the post release offending behaviour of prisoners who have participated in VOTP whilst in custody. It considers the impact of starting and completing VOTP on both general and violent offending, as well as returns to custody. The voluntary nature of VOTP precludes a simple comparison of post release re-offending rates of VOTP participants and non-participants, as these two groups are likely to differ on important factors that are related to re-offending risk (our outcome) but have not been measured. For example, violent offenders with greater motivation to change their behaviour may be more likely to participate in a voluntary therapeutic program and it may be this motivation rather than treatment which results in lower rates of reoffending. Conversely, extrinsic factors such as parole board decisions may be influencing inmates' decision to participate and, in this case, offenders who are at higher-risk of re-offending (and thereby more likely to be denied parole) may be the ones who are encouraged to engage with the program. In both these scenarios, our estimates of treatment effects would be biased (toward a treatment effect in the former; toward a null effect in the latter). This study therefore uses both single-equation regression and instrumental variables methods to determine whether VOTP is associated with a reduction in re-offending and returning to custody to guard against the potential effects of unobserved bias.

METHOD

DATA SOURCES

The data for this analysis were obtained from two distinct data sources:

1. The Offender Integrated Management System (OIMS) database maintained by CSNSW. This provides administrative data relating to inmate characteristics, custodial episodes (such as episode start and end dates) and referrals to / participation in custodial programs.
2. BOCSAR's Re-Offending Database (ROD), which links all finalised NSW criminal court appearances and all movements in and out of NSW custody for a given individual from January 1994 to the present (Hua & Fitzgerald, 2006). ROD data used in the current study include all court appearances finalised up to 31 December 2017.

Details on all offenders who were referred to VOTP between 2007 and 2014 were extracted from OIMS. Offenders who were referred to VOTP but were deemed ineligible at a later stage in the referral process and those with a missing referral date were excluded from the sample. In cases where there were multiple referrals for the same offender, the earliest referral date where the offender commenced the program was selected. This resulted in a total of 587 offenders who had been referred to VOTP during the 7-year study period and had been released from custody at the time of data extraction; 321 of these offenders were referred but did not start the program[2], 50 offenders started VOTP but did not complete, and 216 offenders started and completed the program.

The 587 VOTP referral records were then linked to ROD using the OIMS offender identification number (Master Index Number), the offender's name and date of birth. The custodial episode in which the VOTP referral occurred was identified in ROD using the index custodial episode start date recorded in the OIMS data. The data linkage successfully linked all offenders from OIMS with ROD records, and data on offender demographics, prior offending history and index custodial episode were extracted. The following section will describe the outcome variables of interest and the independent variables included in the statistical models.

Dependent variables

Four key outcome variables were measured in this analysis:

1. **Re-offending with any offence:** any new proven offence excluding breach offences unrelated to Apprehended Domestic Violence Orders (ADVOs) (ANZSOC categories 151, 152 or 153 where law part codes are not 1207, 62079, or 65020); [3]
2. **Re-offending with any offence or returning to custody:** any new proven offence excluding breach of justice procedure offences unrelated to ADVOs (ANZSOC categories 151, 152 or 153 where law part codes are not 1207, 62079, or 65020) or any new custodial episode;
3. **Re-offending with a violent offence:** any new proven violent offence (classified as one falling within the ANZSOC categories 011 (murder), 012 (attempted murder), 02 (acts intended to cause injury), 03 (sexual assault and related offences), 05 (abduction, harassment and other offences against the person), and 06 (robbery, extortion and related offences)); and
4. **Re-offending with a violent offence or returning to custody:** any new proven violent offence or any new custodial episode.

We consider new custodial entries along with re-offending because some breaches of parole may result in a return to custody even if they do not constitute criminal acts. As some offenders may return to prison without recording a new proven offence (e.g. breach of parole) or before recording a specific offence (e.g. violence) only time spent out of custody is counted in the 24 month follow-up period. If an offender did not reach a follow-up point, they were subsequently censored (i.e. not included in the relevant analyses of that outcome variable at that point regardless of whether they had re-offended prior to that point).

Independent variables

A large number of independent variables relating to offender demographics, index custodial episode and criminal offence history were included in the statistical models and are listed below. This list of variables was drawn from a similar evaluation of a CSNSW program undertaken by Halstead (2016).

1. **Offender socio-demographic characteristics:**
   a) Age (in years at release date from custody).
   b) Indigenous status (whether the offender identified as being of Aboriginal or Torres Strait Islander descent at any court appearance recorded in ROD).
   c) Postcode level of disadvantage (according to the Australian Bureau of Statistics (2011b) Socio-Economic Indices for Areas (SEIFA) Index of Relative Socio-economic Disadvantage (IRSD)).
   d) Postcode level of remoteness (according to the Australian Bureau of Statistics (2011c) Accessibility/ Remoteness Index of Australia (ARIA)).
2. **Characteristics of the index custodial episode:**
   a) Parole (whether the offender was released to court-ordered parole, to State Parole Authority (SPA) parole or at the completion of their sentence (i.e. released without any parole conditions)).
   b) The LSI-R. This is an official actuarial-based assessment tool administered in order to estimate an individual's risk of general recidivism (Andrews & Bonta, 1995; Watkins, 2011). It provides an aggregate risk score based on 54 items (where a higher score indicates a higher level of risk), through combining results over ten different domains: criminal history (10 items), education/ employment (10 items), financial (2 items), family/marital (4 items), accommodation (3 items), leisure/recreation

(2 items), companions (5 items), alcohol/drug problem (9 items), emotional/personal (5 items), attitudes/orientation (4 items). For each individual, all LSI-R assessments collected during the index custodial episode and 6 months prior to the index custodial episode were extracted from ROD. For each offender, the LSI-R score closest to release date was then selected for inclusion as control variables. LSI-R raw scores, and scores categorised into risk bands, were both considered for inclusion as control variables. The 'Low' risk band category is defined by a score of 0-13, 'Medium-Low' risk by a score of 14-23; 'Medium' risk by a score of 24-33; 'Medium-High' risk by a score of 34-40 and 'High' risk by a score of 41 or more.

3. **Offender criminal offence history[4]:**
   a) Age of first contact (age of the offender at the time of first recorded caution, youth justice conference or proven court appearance, including in the Children's Court).
   b) A set of variables to denote the number of finalised court appearances (including youth justice conferences) during the index custodial episode or within 5 years prior to the index custodial start date where one or more of the following type of offence was proven:
      i. property offence;
      ii. sex offence;
      iii. drug offence;
      iv. break and enter offence;
      v. breach of court order offence;
      vi. exceed the prescribed content of alcohol offence; or
      vii. driving offence.
   c) Prior violent offending. Number of finalised court appearances (including youth justice conferences) during the index custodial episode or within 10 years prior to the index custodial start date where one or more violent offence(s) was proven.
   d) Number of finalised court appearances (including youth justice conferences) during the index custodial episode or within 5 years prior to the index custodial start date where one or more of the following type(s) of penalty was received:
      i. full-time imprisonment including juvenile control orders;
      ii. periodic detention, Intensive Correction Order (ICO) or home detention;
      iii. suspended sentences;
      iv. supervised orders; and
      v. bonds.
   e) Number of finalised Children's Court appearances (including youth justice conferences) during the index custodial episode or within 5 years prior to the index custodial start date where one or more offences were proven.
   f) Number of finalised court appearances (including youth justice conferences) during the index custodial episode or within 10 years prior to the index custodial start date where one or more offences were proven.

Treatment and control group

For this analysis, the treatment and control groups were defined in two different ways.

1. Program commencement design - Offenders who commenced VOTP are the treatment group whether or not they have completed the program (VOTP starters) and offenders who have been referred to VOTP but have not commenced the program (VOTP non-starters) are the control group.
2. Program completion design - Offenders who have completed VOTP (VOTP completers) are defined as the treatment group and offenders who have not commenced and have commenced but not completed the program (VOTP non-starters and VOTP non-completers) are the control group. Here it is important to note that a large proportion (81%) of offenders who commenced VOTP completed the program.[5]

By doing both analyses, we can obtain some indication whether program completion is a necessary condition to achieve a reduction in recidivism risk. The estimation issues around both these designs, including the ability of our analyses to control for selection bias in both cases, are discussed further in the next section.

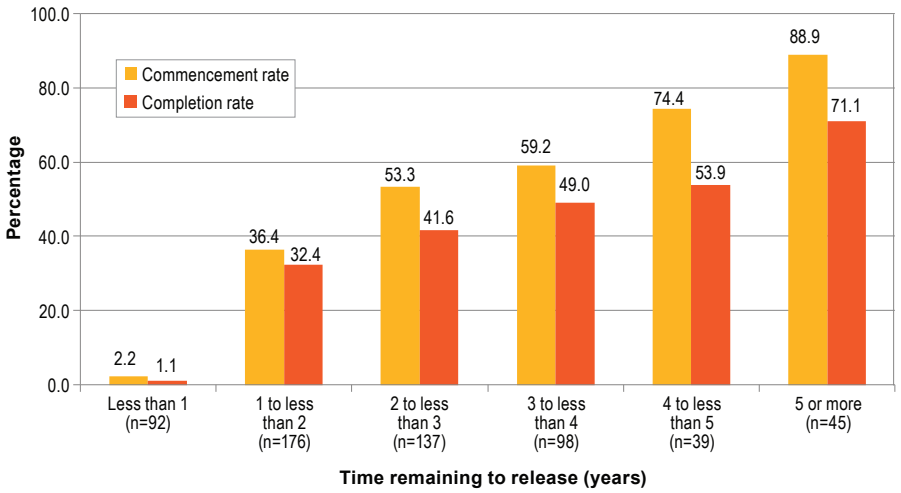
STATISTICAL ANALYSIS

As outlined in earlier sections, endogeneity is potentially an important issue for this evaluation because offenders are not randomly assigned to treatment conditions but voluntarily opt-in to the program, conditional on receiving a referral. Unobservable factors related to the risk of re-offending which are also correlated with treatment commencement/completion could therefore be present. In this case, fitting a simple regression model to the re-offending outcomes would be problematic because treatment status is correlated with the error term.

An instrumental variable approach can be used to deal with this problem. This method requires the identification of an exogenous factor, known as an instrumental variable (IV), that is correlated with selection into the treatment group but otherwise uncorrelated with the outcome (in this case re-offending risk). Statistical techniques can be used to 'exploit' variation in this instrument to give consistent estimates of the treatment effect in situations where there are concerns of selection bias.

One factor that could be potentially used as the IV is the timing of referral to VOTP during an offender's custodial episode. Offenders may be referred to VOTP at any point in their sentence although they would need 12 months or more time remaining on their sentence in order to complete the program. As the program is a 12-month residential program with limited beds, offenders

Figure 1. Commencement and completion rate of VOTP, by time remaining to release



who are referred with more time remaining on their sentence have more opportunities to start the program, while those who are referred with fewer than 12 months would be unlikely to start the program. Figure 1 indicates that offenders who have a longer period remaining on their sentence have higher rates of starting and completing VOTP.

For this to be used as a suitable IV, it must satisfy several assumptions (Imbens & Angrist, 1994). The major assumption is the exclusion restriction (that the IV affects the outcomes only through its effect on treatment and is otherwise uncorrelated to the outcome), however this is not testable. Instead, we can only put forward logical reasons why the IV is unlikely to violate the restriction. The timing of an offender's referral to VOTP is not determined by the offender and can occur at any point in their sentence and thus is unlikely to be correlated with most observable offender characteristics. However, the above measure (time remaining to release) could plausibly violate the exclusion restriction due to its correlation with sentence length, which may then be correlated with re-offending. Hence, the measure was residualised on sentence length and time fixed effects, yielding a measure of time available to complete the program independent of sentence length (hereafter this residualised measure will be referred to as the IV).

The next assumption is that the instrument is as good as randomly assigned. We tested this by regressing the IV on all our observed variables and time fixed effects, and then performing a joint *F*-test of the significance of the explanatory variables (Appendix Table A1). This test revealed that only one of the observed variables was correlated with the IV and more importantly, the joint *F*-test on all the explanatory variables was not statistically significant. The fact that most of our observed variables are uncorrelated with the IV reinforces our confidence that the exclusion restriction is likely to be satisfied. Next, in order to test for relevance (i.e. that the IV is predictive of treatment), we regressed each of the treatment variables (commencing VOTP and completing VOTP) on the IV, the control variables and time fixed effects. The coefficient on the IV was statistically significant and positive (Table A2). The strength of the IV is further validated in our full estimation results, where we show that the partial *F*-statistic on the first-stage regressions using this IV tend to exceed 10 (see Tables A3-A4), the rule of thumb set out in Bound, Jaeger, and Baker (1995). The last assumption is monotonicity or that the IV should affect every observation in the same direction (i.e. either increase or reduce their probability of treatment). This involves repeating the regressions used for the test of relevance on various subgroups within the sample. The results of these tests indicated that the IV monotonically increased the likelihood of starting and completing VOTP (Table A2). As these tests indicated that the residualised measure of days from referral to release was a suitable IV, we estimated two-stage-least-squares (2SLS) models of re-offending based on an estimated probability of starting and completing VOTP.[6]

One major shortcoming of IV methods is that they are relatively inefficient and therefore less capable of identifying significant treatment effects, if they exist, particularly where sample sizes and/or effects are small. In a study with a small sample such as ours, we are therefore concerned that the consistent estimates produced by IV analyses come at the cost of statistical power. Hence, we also estimated OLS (linear probability) models predicting the likelihood of re-offending related to starting and completing VOTP. The OLS and 2SLS estimates were then compared, first by interpreting the *p*-value of the *C*-statistic or endogeneity test, which determines whether the 2SLS estimates differ significantly to the OLS estimates (Baum, Schaffer, & Stillman 2003).[7] If this test was significant, the 2SLS results were considered preferable to the OLS results. If this test was not statistically significant, we considered the OLS results to be the preferred estimate due to the smaller standard errors obtained.

RESULTS

DESCRIPTIVE ANALYSIS

Table 1 presents the demographic characteristics of VOTP offenders by their commencement and completion status, and Table 2 presents descriptive statistics for the criminal history variables for the same offenders. The first two columns contrast the incidence of particular characteristics among those who started the program and those who did not start the program, while the third column reports *p*-values of a *chi*-squared test determining whether the differences between the groups was statistically significant. This is then repeated in the next three columns for those who completed the program and those who either did not start or did not complete the program.

The first three columns of Tables 1 and 2 compare offender demographics, index custodial episode characteristics and criminal offence history for VOTP-starters and VOTP non-starters. For the most part, offenders who started VOTP had very similar characteristics to those who were referred to but did not start the program. There were no significant differences in the Indigenous status, socioeconomic disadvantage, remoteness of area of residence or the risk of re-offending (as measured by the LSI-R) between the groups. Slightly fewer than half of offenders in both groups identified as Aboriginal or Torres Strait Islander, over three-quarters were less than 40 years old at the time of referral, approximately 60 per cent resided in major cities and nearly three-quarters were assessed at medium high – high on the LSI-R. Offenders also had extensive criminal histories with more than half of both groups recording 7 or more prior court appearances and roughly 40 per cent having four or more prior full-time prison sentences. Age and parole type was the only factor on which starters and non-starters differed on; there were more offenders aged 30 and under, and fewer of those aged 41 and over in the non-starter group and more tended to have been released by SPA. Similarly there were no major differences between the groups on the criminal history variables reported in Table 2, with the exception of the number of prior proven violent offences – nearly 40 per cent of those who started VOTP had 5 or more violent offences compared to only approximately 27 per cent among those who didn't start. This is possibly reflective of

Table 1. Descriptive statistics of demographic variables for VOTP offenders by commencement and completion status

Variables	VOTP not started (n=321)	VOTP started (n=266)	χ^2 *p*-value	VOTP not started or not completed (n=371)	VOTP completed (n=216)	χ^2 *p*-value
ATSI status			.782			.051
Non-ATSI	52.6%	51.5%		49.1%	57.4%	
ATSI	47.4%	48.5%		50.9%	42.6%	
Age group			.017			.009
30 and under	45.8%	34.2%		45.3%	32.4%	
31 – 40	34.6%	41.0%		34.5%	42.6%	
41 and over	19.6%	24.8%		20.2%	25.0%	
SEIFA quartile			.740			.666
Most disadvantaged	35.8%	32.7%		36.7%	30.6%	
Disadvantaged	31.2%	28.9%		29.1%	31.9%	
Advantaged	19.0%	22.9%		19.9%	22.2%	
Least advantaged	6.9%	7.1%		7.0%	6.9%	
Missing	7.2%	8.3%		7.3%	8.3%	
ARIA			.909			.227
Major cities	61.7%	59.8%		60.1%	62.0%	
Inner regional	14.0%	16.2%		13.7%	17.1%	
Outer regional/ Remote/ Very remote	16.5%	16.2%		18.6%	12.5%	
Missing	7.8%	7.9%		7.5%	8.3%	
LSI-R risk band			.646			.276
Low	19.6%	18.8%		20.5%	17.1%	
Medium-low	0.3%	0.0%		0.3%	0.0%	
Medium	18.7%	21.1%		18.3%	22.2%	
Medium-high	50.5%	48.1%		50.7%	47.2%	
High	4.0%	6.4%		3.8%	7.4%	
Missing	6.9%	5.6%		6.5%	6.0%	
Parole			.001			.002
None	65.7%	74.8%		68.2%	72.7%	
Court	16.5%	6.4%		15.4%	6.0%	
SPA	17.8%	18.8%		16.4%	21.3%	
Total	100.0%	100.0%		100.0%	100.0%	

Table 2. Descriptive statistics of criminal history variables for VOTP offenders by commencement and completion status

Factor	VOTP not started (n=321)	VOTP started (n=252)	χ^2 *p*-value	VOTP not started or not completed (n=371)	VOTP completed (n=216)	χ^2 *p*-value
Age group at first contact			.902			.305
14 and under	30.8%	29.3%		32.6%	25.9%	
15 – 19	37.4%	40.2%		36.4%	42.6%	
20 and over	29.9%	28.9%		29.1%	30.1%	
Missing	1.9%	1.5%		1.9%	1.4%	
Prior finalised court appearances and YJCs[a]			.263			.136
0 – 6	47.7%	42.9%		46.4%	44.0%	
7 – 11	35.5%	42.1%		35.8%	43.1%	
12 +	16.8%	15.0%		17.8%	13.0%	
Prior finalised Children's Court appearances and YJCs[b]			.233			.334
0	80.4%	76.3%		79.8%	76.4%	
1+	19.6%	23.7%		20.2%	23.6%	
Prior full-time prison sentence[b]			.204			.209
0 – 1	20.2%	15.4%		20.5%	13.9%	
2 – 3	37.7%	34.2%		34.2%	39.4%	
4 – 5	26.2%	30.8%		27.5%	29.6%	
6+	15.9%	19.5%		17.8%	17.1%	
Prior periodic detention, ICO or home detention[b]			.728			.896
0	96.9%	97.4%		97.0%	97.2%	
1+	3.1%	2.6%		3.0%	2.8%	
Prior suspended sentence[b]			.075			.159
0	75.1%	81.2%		76.0%	81.0%	
1+	24.9%	18.8%		24.0%	19.0%	
Prior bond[b]			.244			.283
0	52.3%	57.1%		52.8%	57.4%	
1+	47.7%	42.9%		47.2%	42.6%	
Prior supervised order[b]			.787			.875
0	63.9%	62.8%		63.6%	63.0%	
1+	36.1%	37.2%		36.4%	37.0%	
Prior proven violent offence[a]			.003			.233
0 – 2	40.8%	32.0%		38.3%	34.3%	
3 – 4	32.4%	28.2%		31.5%	28.7%	
5+	26.8%	39.8%		30.2%	37.0%	
Prior proven property offence[b]			.684			.196
0	31.5%	30.5%		31.8%	29.6%	
1 – 2	36.4%	39.8%		35.3%	42.6%	
3+	32.1%	29.7%		32.9%	27.8%	
Prior proven break and enter offence[b]			.984			.696
0	57.9%	57.9%		56.6%	60.2%	
1	22.4%	22.9%		23.5%	21.3%	
2+	19.6%	19.2%		19.9%	18.5%	
Prior proven sex offence[b]			.162			.102
0	98.1%	96.2%		98.1%	95.8%	
1+	1.9%	3.8%		1.9%	4.2%	
Prior proven drug offence[b]			.789			.764
0	65.1%	66.2%		66.0%	64.8%	
1+	34.9%	33.8%		34.0%	35.2%	
Prior proven exceed the prescribed content of alcohol offence[b]			.714			.331
0	87.9%	86.8%		88.4%	85.6%	
1+	12.1%	13.2%		11.6%	14.4%	
Prior driving offence[b]			.829			.862
0	57.0%	57.9%		57.7%	56.9%	
1+	43.0%	42.1%		42.3%	43.1%	
Prior proven breach of court order offence[b]			.999			.627
0	65.4%	65.4%		64.7%	66.7%	
1+	34.6%	34.6%		35.3%	33.3%	

[a] 10 years prior to the index custodial start date

[b] 5 years prior to the index custodial start date

the prioritisation of higher-need offenders or that they tended to be older and thus had more offences accumulated at the time of the study.

Columns 4-6 in Tables 1 and Table 2 compare descriptive statistics for VOTP completers with VOTP non-starters/non-completers. Similar to our first comparison, we find that these two violent offender groups are generally very similar on most demographic, index custodial episode and criminal history variables. The exceptions are age at release and release type. VOTP starters were older and were more likely to have been released to parole by SPA.

Table 3 presents the unadjusted re-offending rate for VOTP starters, VOTP non-starters, VOTP completers and VOTP non-completers/non-starters across different offence types at 24 months' free time post release. The first two rows of the table compare VOTP starters to non-starters, and show that relative to those who did not start, fewer of those who started VOTP re-offended with any offence (69.0% vs. 76.3%) and re-offended or returned to custody (57.7% vs. 67.8%). Smaller differences were observed in terms of re-offending with a violent offence (41.4% vs. 39.4%) and re-offending with a violent offence or returning to custody (67.2% vs. 63.3%). From the latter half of the table, which contrasts those who completed VOTP with those who did not start or complete the program, we observe lower rates of general re-offending (55.4% vs. 68.1%), re-offending or returning to custody (65.4% vs. 77.4%), re-offending with a violent offence (35.9% vs. 43.2%) and re-offending with a violent offence or returning to custody (60.2% vs. 68.4%). The differences between the groups on the violent re-offending outcomes appear larger than those observed when comparing those who started VOTP to those who did not.

MULTIVARIATE ANALYSES

This next section summarises estimates of the VOTP treatment effect using OLS and 2SLS models. Focusing on our parameter of primary interest, Table 4 shows the coefficients and standard

Table 3. Unadjusted rates of re-offending for VOTP offenders, by commencement and completion status, 24 months post release

Outcome	Reoffended with any offence		Reoffended or returned to custody		Reoffended with a violent offence		Reoffended with a violent offence or returned to custody	
Treatment group	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Started VOTP (n=266)	158	69.0	113	57.7	71	39.4	143	63.3
Did not start VOTP (n=321)	229	76.3	185	67.8	99	41.4	201	67.2
Completed VOTP (n=216)	93	55.4	123	65.4	55	35.9	112	60.2
Did not start or did not complete VOTP (n=371)	205	68.1	264	77.4	115	43.2	232	68.4

Table 4. Comparison of OLS and 2SLS estimates of the effect of starting and completing VOTP on re-offending and returning to custody

Estimation	OLS		2SLS					
Comparison: Started VOTP vs. did not start VOTP	**Coeff.**	**Std. err.**	**Coeff.**	**Std. err.**	**Partial *F***	***C*-stat**	**Endog. test**	**N**
General re-offending	-0.09 *	0.04	-0.01	0.15	30.89	0.29	.588	452
General re-offending or returning to custody	-0.07 *	0.03	-0.15	0.13	34.64	0.46	.495	533
Violent re-offending	-0.07	0.05	-0.03	0.17	26.21	0.05	.829	400
Violent re-offending or returning to custody	-0.06	0.04	-0.16	0.13	35.33	0.68	.411	528
Comparison: Completing VOTP vs. not completing VOTP	**Coeff.**	**Std. err.**	**Coeff.**	**Std. err.**	**Partial *F***	***C*-stat**	**Endog. test**	**N**
General re-offending	-0.09 *	0.04	-0.01	0.19	19.20	0.19	.660	452
General re-offending or returning to custody	-0.07 *	0.04	-0.19	0.16	22.82	0.60	.437	533
Violent re-offending	-0.08	0.05	-0.04	0.22	15.98	0.04	.845	400
Violent re-offending or returning to custody	-0.04	0.04	-0.20	0.17	24.69	1.00	.317	528

*=p<.05; **=p<.01; ***p<.001

Coeff.=coefficient; Std. err.=Standard error; Partial *F*= partial *F*-statistic of the first stage regression; *C*-stat.=*C*-statistic; Endog. test=p-value of test of *C*-statistic, i.e. endogeneity test.

Control variables: Indigenous status, age, SEIFA Quartile, remoteness of area of residence, latest LSI-R prior to custodial entry and type of release, prior finalised court appearances, prior Children's Court appearances, prior full-time prison sentences, other types of detention, suspended sentences, prior bonds, supervised orders and prior violent, sex, property, break and enter, drug, exceed the prescribed content of alcohol, driving, breach and indictable offences.

errors estimated for the treatment group after adjusting for observed variables related to the offenders' demographic, index custodial episode and prior criminal offence characteristics. For the OLS results, we report the estimated coefficient, standard error and statistical significance. For the 2SLS results, we report the same figures along with the partial *F*-statistic, the *C*-statistic, and the associated endogeneity test. The *C*-statistic is a measure of the difference in the estimates produced by 2SLS and OLS, and the *p*-value indicates whether this difference is statistically significant. A *p*-value below 0.05 indicates that there is sufficient bias in a direction that endogeneity can be considered significant, and in those cases, the 2SLS estimates are preferred. Otherwise, OLS estimates produce smaller standard errors as they are more efficient, however their estimates cannot safely be considered to be causal as they do not attempt to adjust for unobserved differences between groups.

First, we examine the upper half of Table 4, which examines the effect of starting VOTP on the four outcomes of interest at 24 months' free time post release. 2SLS estimates show a slight reduction in general re-offending, but this is not statistically significant. The partial *F*-statistic exceeds 10 confirming that the instrument is not weak. However, the *p*-value associated with the endogeneity test is roughly .05, indicating that the estimate of the treatment effect using 2SLS did not differ significantly from the OLS estimates. Therefore we turn to the OLS estimates, which indicate that the program is associated with a statistically significant reduction in general re-offending of roughly 9 percentage points. The results are similar for re-offending or returning to custody, where OLS indicates that starting the program is associated with a reduction in risk of 7 percentage points. However, the null result for the 2SLS means that we cannot definitively say whether this is a causal finding. We do not observe any statistically significant estimates of starting VOTP on either violent re-offending or violent re-offending and returning to custody using OLS or 2SLS. In both cases, the *F*-statistic is larger than 10 and there is no evidence for endogeneity.

The lower half of Table 4 examines the estimates where the treatment variable of interest is completion of VOTP. The 2SLS estimates show a minor, non-significant reduction in the likelihood of re-offending with a general offence at 24 months' free time. The *F*-statistic exceeds 10, however no evidence for endogeneity is found as the *p*-value of the endogeneity test exceeds .05. The OLS estimates indicate that completion of VOTP is associated with a 9 percentage point reduction in the risk of re-offending at 24 months' free time post release. Similar results are found when examining re-offending with a general offence or returning to custody. The OLS estimate indicates that there is a 7 percentage point reduction in the likelihood of re-offending with a general offence or returning to custody associated with completion of VOTP. As in the previous case, these estimates are not definitively causal because no significant effects were evident from the 2SLS models. For the violent re-offending outcomes, no statistically significant estimates of program completion were obtained either through OLS or 2SLS methods. In relation to all the outcomes, we observe large standard errors associated with the 2SLS estimates, but little evidence that there is systematic selection bias causing differences in the estimates obtained.

DISCUSSION

VOTP is a high-intensity therapeutic program delivered to violent offenders which has been operating within NSW correctional centres in its current form since 2003. This is the first study to consider its impact on post release offending behaviour. The results suggest that VOTP is associated with a significant decrease in the likelihood that a violent offender will commit a new offence or return to custody within 24 months of release from prison. OLS models estimate that an offender who commences VOTP is on average, between 7 and 9 percentage points less likely to re-offend or return to custody within 24 months free time after release. We find similar results when comparing those who completed VOTP with those who did not complete the program. VOTP completion is associated with reductions in the risk of general re-offending and general re-offending or returning to custody. However, we cannot be certain that these effects are causal as no significant estimates were obtained using the more robust 2SLS which more adequately deals with problems of endogeneity. We find no significant associations between starting or completing VOTP and the probability of violent re-offending at 24 months free time post release.

These conclusions are based on a simple regression approach in which treatment status is considered exogenous to the outcome (e.g. re-offending). Unfortunately, the use of the relatively inefficient 2SLS approach in a small sample study vastly reduces the likelihood of significant treatment effects being found. The sheer magnitude of the standard errors in our 2SLS estimates suggest that there is a fairly large loss of efficiency moving from OLS to 2SLS. Given that our OLS analyses were already severely underpowered due to low sample sizes, the likelihood of 2SLS analyses detecting significant effects was low. These analyses therefore should be replicated with a larger sample or with more robust analyses (such as those based on randomised samples) to confirm that these estimated associations represent causal effects.

Another limitation of this analysis is the relatively short follow-up period in which re-offending was measured. Wan and Weatherburn (2016) have demonstrated that the violent re-offending rate at three years (which is longer than that used for our cohort) is only half what is observed at the 20-year mark, prompting the authors to conclude that any short-term evaluations be supplemented with longer term follow-ups in order to establish whether or not gains after 1 to 3 years are still evident 10 or more years on. Similar patterns are observed among violent offenders in the United States, where the 2-year re-arrest rate for a violent offence is 19.1 per cent, relative to 54.2 per cent for all offences, and dwarfed by the rate of violent re-offending at 9 years post release (43.4 per cent).

This study is also unable to examine the number of VOTP maintenance sessions a participant attended post release and whether this had any effect on their re-offending risk at 24 months, nor disentangle the effect of completing VOTP from the delivery of these additional sessions. As these maintenance sessions are provided based on need, any examination of this question should use a relatively robust research design that accounts for the differences in assignments to these sessions to ensure that unbiased estimates of their effects are obtained.

Setting these caveats to one side, on the whole the evidence presented here suggests that VOTP may be effective at reducing general re-offending and returns to custody. On average, starting the program is associated with a lower re-offending probability of 9 percentage points at 24 months free time following release. When including return to custody, we find that starting VOTP is associated with a 7 percentage point lower probability of re-offending or returning to custody at 24 months. Equivalent results were also found for completers.

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NOTES

1. Among the eligibility criteria for the program is that violent offenders who have committed particular sexual offences will be evaluated on a case-by-case basis. This is because those who have committed sexual offences against children may be at risk of harm from other offenders in a residential setting.
2. The reasons for non-commencement were: non-consent (73.5%), insufficient time remaining in custody to complete the program (22.1%), ineligibility or unsuitability (1.8%), safety concerns (0.6%), being waitlisted or starting or completing the program after the study period (1.9%).
3. ANZSOC codes are sourced from Australian Bureau of Statistics (Australian Bureau of Statistics, 2011a) while law codes are held and maintained by the Judicial Commission of NSW.
4. While criminal history is one of the domains in the LSI-R, it is an aggregate measure of 10 domains covering various aspects of risk. The detailed and specific criminal history variables in ROD provide more accurate and complete information of an offender's history of offending than the LSI-R.
5. Among those who started but did not complete the program, the average time taken to drop out of the program was roughly 135 days; however the standard deviation of this measure was relatively large.
6. In the case of binary outcomes, the discrete choice alternatives to these models (the single-equation probit and the bivariate probit models) are commonly preferred. However, we should note that an assumption of the bivariate probit model is that of joint homoskedasticity (Murphy 2007) which score tests indicated were violated. Hence, we used the OLS and 2SLS linear probability model approach which are not subject to the joint normality of errors assumption as we would be unable to compare logistic regression with its IV analogue.
7. One criticism of this test is that it does not apply in cases where there are heterogeneous treatment effects. To guard against this, we repeated the OLS analyses using a complier-weighted approach, where the OLS sample was re-weighted to the characteristics of cases which were sensitive to the IV, to check whether these results differed significantly from the unweighted case. This was found not to be the case and therefore the endogeneity test was used as described.

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APPENDIX: SUPPLEMENTARY TABLES

TESTS OF INSTRUMENTAL VARIABLE

Table A1 presents the "randomness" test of the selected instrumental variable, which seeks to determine that the value of the instrumental variable is largely unrelated to offenders' observed characteristics. The test is conducted as follows: an Ordinary Least Squares (OLS) regression of the IV on the full set of the observable variables, conditional on time fixed effects is conducted. Then the joint significance of the variables is tested using an *F*-test to determine whether they jointly explain the variation in the IV. As noted, only one variable appears to be significantly correlated with the residualised number of days between referral to VOTP and release, and the *p*-value of the joint *F*-test of the significance of these variables exceeds .05, indicating that referral is not significantly explained by these observable characteristics. We therefore conclude that our IV demonstrates a suitable level of quasi-randomness for use in our analyses.

We conduct two further tests of the instrumental variable: a test of relevance and a test of monotonicity. The test of relevance usually works as follows: the IV is included along with the control variables and relevant fixed effects in a single-equation model predicting treatment. If the IV is significant and the *F*-test statistic is relatively high, then we consider that the IV is relevant (i.e. sufficiently related to the treatment variable). The test of monotonicity is conducted in a similar way. Again, the IV and relevant control variables and fixed effects are included in a model predicting treatment, but repeated for particular subsamples. If the sign on the coefficient of the IV variable is consistent across subgroups, then we conclude that the IV is monotonic.

The results of these tests are presented in Table A2. The first row below the heading relates to the test of relevance. We observe that the coefficient of the IV on starting and completing VOTP is positive and highly significant. Re-estimating the same models on subgroups of our sample shows that the IV consistently increases the probability of starting VOTP. Where the relationship between the IV on starting and completing VOTP is negative, it is non-significant. Taken together, these results suggest that the IV monotonically increases the likelihood of starting VOTP and completing VOTP.

REGRESSION TABLES

Tables A3 and A4 present the estimated effect of starting VOTP for each of the four outcomes under different specifications of the OLS and 2SLS models. Note that the last row, where all sets of control variables have been included, are those reported in the body of this report. Table A5 reports estimates obtained when estimating the final OLS regression models using logistic regression. While the odds ratios cannot be compared directly to the coefficients obtained in the OLS regressions, estimations of the marginal effects (i.e. the percentage point reduction in risk of each outcome) of starting and completing VOTP from the logistic regression models was identical to those obtained through OLS.

Table A1. Test of randomness of instrumental variable

Variable		Coeff.	Std. err.	*p*-value
Indigenous (relative to non-Indigenous)		-33.87	40.71	.406
Age group (relative to 30 and under)	31-40	42.45	49.33	.390
	41 and over	58.12	57.09	.309
SEIFA Quartile (relative to most disadvantaged)	Disadvantaged	80.35	46.06	.082
	Advantaged	55.46	51.60	.283
	Least disadvantaged	2.55	78.06	.974
	Missing	135.13	267.87	.614
ARIA Remoteness of defendant's postcode (relative to major cities)	Inner regional	29.88	55.08	.588
	Outer regional/remote/very remote	30.44	55.54	.584
	Missing	-173.09	263.93	.512
LSI-R risk (relative to High)	Medium	96.10	61.58	.119
	Medium-low	1.38	51.11	.978
	Low	168.14	94.65	.076
	Missing	-18.93	87.94	.830
Parole prospects (relative to other)	Court	-94.49	58.94	.110
	SPA	-46.76	48.66	.337
Prior finalised court appearances and YJCs (relative to 0-6)[a]	7-11	-15.34	54.79	.780
	12+	69.90	80.90	.388
Prior finalised Children's Court appearances and YJCs (relative to 0)	1+	85.48	59.27	.150
Prior full-time prison sentence[b]	0-1	-7.61	63.25	.904
	2-3	40.31	79.34	.612
	4-5	-71.01	96.95	.464
Prior periodic detention, ICO or home detention (relative to no)[b]	Yes	-27.97	115.02	.808
Prior suspended sentence (relative to no)[b]	Yes	-65.22	53.98	.227
Prior bond (relative to 0)[b]	Yes	-60.59	54.65	.268
Prior supervised order (relative to no)[b]	Yes	74.32	57.35	.196
Prior proven violent offence (relative to 0-2)[a]	3-4	56.79	49.98	.256
	5+	87.72	60.17	.145
Prior proven sex offence (relative to no)[b]	Yes	-96.31	113.67	.397
Prior proven property offence (relative to 0)[b]	1-2	36.11	54.10	.505
	3+	-6.21	74.03	.933
Prior proven break and enter offence (relative to 0)[b]	1	42.56	53.76	.429
	2+	145.37	64.99	.026
Prior proven drug offence (relative to 0)[b]	Yes	21.33	41.20	.605
Prior proven PCA offence (relative to no)[b]	Yes	8.35	59.83	.889
Prior proven driving offence (relative to no)[b]	Yes	27.84	43.48	.522
Prior proven breach of court order offences (relative to 0)[b]	Yes	17.35	47.55	.715
Prior proven indictable offences (relative to 0-2)[b]	3-4	-17.00	64.31	.792
	5+	-84.49	83.68	.313
Constant		-143.25	86.62	.099
N		587		
F-statistic		1.02		
p-value of *F*-test		.430		

Coeff.=coefficient; Std. err.=Standard error.
*Coefficients have been multiplied by 365.25 (i.e. one year) for simplicity.
Person control variables: Indigenous status, Age, SEIFA Quartile, Remoteness of area of residence
Index custodial episode control variables: Latest LSI-R prior to custodial entry and type of release
Criminal history control variables: Prior finalised court appearances, prior Children's Court appearances, prior full-time prison sentences, other types of detention, suspended sentences, prior bonds, supervised orders and prior violent, sex, property, break and enter, drug, exceed the prescribed content of alcohol, driving, breach and indictable offences.
[a] 10 years prior to the index custodial start date
[b] 5 years prior to the index custodial start date

Table A2. Tests of relevance and monotonicity of instrumental variable

	Starting VOTP		Completing VOTP	
Group	**Coeff. of IV***	***p*-value**	**Coeff. of IV***	***p*-value**
Whole sample	0.12	.000	0.10	.000
Sub-group				
Non-Indigenous	0.11	.000	0.11	.000
Indigenous	0.13	.000	0.13	.000
Aged 18-30	0.10	.004	0.10	.007
Age 31-49	0.04	.282	0.04	.332
41 and above	0.13	.000	0.13	.007
High LSI-R	0.10	.001	0.10	.048
Medium-high LSI-R	0.14	.000	0.14	.013
Medium LSI-R	0.12	.010	0.12	.078
Not paroled (i.e. other release)	0.15	.091	0.15	.024
Court release	0.09	.000	0.09	.001
SPA release	0.06	.350	0.06	.788
Most disadvantaged SEIFA quartile	0.19	.001	0.19	.062
Disadvantaged SEIFA quartile	0.15	.091	0.15	.024
Advantaged SEIFA quartile	0.10	.060	0.10	.108
Missing SEIFA quartile	0.12	.014	0.12	.070
Resides in a major city	0.16	.000	0.16	.000
Resides in an inner regional area	0.10	.000	0.10	.000
Resides in an outer regional/remote/very remote area	0.03	.770	0.03	.211
Missing remoteness index of area	0.23	.000	0.23	.001
0 – 6 prior finalised court appearances and YJCs[a]	0.12	.000	0.12	.000
7 – 11 prior finalised court appearances and YJCs[a]	0.12	.000	0.12	.001
12 + prior finalised court appearances and YJCs[a]	-0.03	.720	-0.03	.294
0 prior finalised Children's Court appearances and YJCs	0.13	.000	0.13	.000
1+ prior finalised Children's Court appearances and YJCs	0.08	.092	0.08	.081
0 – 1 prior full-time prison sentence[b]	0.14	.001	0.14	.064
2 – 3 prior full-time prison sentence[b]	0.13	.000	0.13	.000
4 – 5 prior full-time prison sentence[b]	0.07	.103	0.07	.033
6+ prior full-time prison sentence[b]	0.07	.271	0.07	.442
0 prior periodic detention, ICO or home detention[b]	0.12	.000	0.12	.000
0 prior suspended sentences[b]	0.11	.000	0.11	.000
1+ prior suspended sentences[b]	0.12	.013	0.12	.026
0 prior bonds[b]	0.12	.000	0.12	.000
1+ prior bonds[b]	0.11	.000	0.11	.011
0 prior supervised orders[b]	0.12	.000	0.12	.000
1+ prior supervised orders[b]	0.10	.002	0.10	.012
0 – 2 prior proven violent offences[a]	0.13	.000	0.13	.000
3 – 4 prior proven violent offences[a]	0.07	.049	0.07	.129
5+ prior proven violent offences[a]	0.14	.000	0.14	.032
0 prior proven sex offences[b]	0.12	.000	0.12	.000
1+ prior proven property offences[b]	0.14	.000	0.14	.000
1-2 prior proven property offences[b]	0.13	.000	0.13	.000
3+ prior proven property offences[b]	0.10	.002	0.10	.041
0 prior proven break and enter offences[b]	0.13	.000	0.13	.000
1 prior proven break and enter offences[b]	0.07	.102	0.07	.783
2+ prior proven break and enter offences[b]	0.10	.024	0.10	.033
0 prior proven drug offences[b]	0.12	.000	0.12	.000
1+ prior proven drug offences[b]	0.08	.010	0.08	.043
0 prior exceed the prescribed content of alcohol offences[b]	0.12	.000	0.12	.000
1+ prior exceed the prescribed content of alcohol offences[b]	0.10	.166	0.10	.042
0 prior driving offences[b]	0.13	.000	0.13	.000
1+ prior driving offences[b]	0.08	.006	0.08	.018
0 prior breach offences[b]	0.12	.000	0.12	.000
1+ prior breach offences[b]	0.12	.000	0.12	.017
0-2 prior appearances with an indictable offence[b]	0.15	.000	0.15	.000
3-4 prior appearances with an indictable offence[b]	0.11	.003	0.11	.003
5+ prior appearances with an indictable offence[b]	0.10	.001	0.10	.019

Person control variables: Indigenous status, Age, SEIFA Quartile, Remoteness of area of residence
Index custodial episode control variables: Latest LSI-R prior to custodial entry and type of release
Criminal history control variables: Prior finalised court appearances, prior Children's Court appearances, prior full-time prison sentences, other types of detention, suspended sentences, prior bonds, supervised orders and prior violent, sex, property, break and enter, drug, exceed the prescribed content of alcohol, driving, breach and indictable offences.
All specifications included time fixed effects.
*Coefficients have been multiplied by 365.25 (i.e. one year) for simplicity. Coeff.=coefficient
[a] 10 years prior to the index custodial start date
[b] 5 years prior to the index custodial start date

Table A3. The effect of starting VOTP on all outcomes, all specifications

Comparison: Starting VOTP vs. not starting VOTP	OLS					2SLS							
Outcome: General re-offending	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.09	.041	0.05	452	1.22	-0.01	.962	0.16	39.91	0.32	.569	452	0.70
Controls: Person	-0.09	.037	0.04	452	4.37	-0.08	.588	0.15	37.34	0.00	.949	452	4.15
Controls: Person and index	-0.06	.125	0.04	452	6.45	0.04	.787	0.15	34.35	0.54	.464	452	6.27
Controls: Person, index and priors	-0.09	.039	0.04	452	4.10	-0.01	.948	0.15	30.89	0.29	.588	452	3.97
Outcome: General re-offending or returning to custody	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.06	.081	0.04	533	2.55	-0.12	.369	0.13	43.44	0.18	.669	533	2.31
Controls: Person	-0.07	.046	0.04	533	3.32	-0.17	.184	0.13	41.66	0.65	.419	533	3.16
Controls: Person and index	-0.05	.149	0.03	533	7.08	-0.09	.485	0.12	37.31	0.10	.748	533	7.00
Controls: Person, index and priors	-0.07	.047	0.03	533	4.36	-0.15	.233	0.13	34.64	0.46	.495	533	4.26
Outcome: Violent re-offending	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.05	.345	0.05	400	0.60	0.08	.683	0.19	31.97	0.49	.483	400	0.50
Controls: Person	-0.05	.320	0.05	400	4.38	-0.05	.778	0.18	29.71	0.00	.995	400	4.33
Controls: Person and index	-0.02	.596	0.05	400	5.51	0.02	.905	0.17	28.36	0.08	.783	400	5.48
Controls: Person, index and priors	-0.07	.176	0.05	400	3.63	-0.03	.862	0.17	26.21	0.05	.829	400	3.58
Outcome: Violent re-offending or returning to custody	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.05	.162	0.04	528	2.78	-0.14	.320	0.14	44.06	0.39	.531	528	2.66
Controls: Person	-0.06	.111	0.04	528	3.48	-0.20	.144	0.14	42.07	1.14	.285	528	3.37
Controls: Person and index	-0.04	.292	0.04	528	7.67	-0.11	.418	0.13	38.01	0.30	.586	528	7.60
Controls: Person, index and priors	-0.06	.106	0.04	528	4.88	-0.16	.218	0.13	35.33	0.68	.411	528	4.77

*=p<.05; **=p<.01; ***p<.001
Person control variables: Indigenous status, Age, SEIFA Quartile, Remoteness of area of residence
Index custodial episode control variables: Latest LSI-R prior to custodial entry and type of release
Criminal history control variables: Prior finalised court appearances, prior Children's Court appearances, prior full-time prison sentences, other types of detention, suspended sentences, prior bonds, supervised orders and prior violent, sex, property, break and enter, drug, exceed the prescribed content of alcohol, driving, breach and indictable offences.
All specifications included time fixed effects

Table A4. The effect of completing VOTP on all outcomes, all specifications

Comparison: Completing VOTP vs. not completing VOTP	OLS					2SLS							
Outcome: General re-offending	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.11	.023	0.05	452	1.35	-0.01	.962	0.19	26.88	0.27	.604	452	0.70
Controls: Person	-0.09	.051	0.04	452	4.33	-0.10	.588	0.19	24.41	0.01	.936	452	4.14
Controls: Person and index	-0.07	.103	0.04	452	6.47	0.05	.787	0.18	22.68	0.45	.504	452	6.25
Controls: Person, index and priors	-0.09	.029	0.04	452	4.11	-0.01	.948	0.19	19.20	0.19	.660	452	3.98
Outcome: General re-offending or returning to custody	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.07	.061	0.04	533	2.59	-0.14	.369	0.16	30.16	0.22	.637	533	2.31
Controls: Person	-0.06	.087	0.04	533	3.26	-0.21	.188	0.16	28.93	0.92	.338	533	3.11
Controls: Person and index	-0.05	.150	0.03	533	7.08	-0.10	.485	0.15	25.84	0.15	.702	533	6.99
Controls: Person, index and priors	-0.07	.050	0.04	533	4.36	-0.19	.235	0.16	22.82	0.60	.437	533	4.21
Outcome: Violent re-offending	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.08	.122	0.05	400	0.79	0.10	.684	0.23	21.32	0.62	.430	400	0.50
Controls: Person	-0.06	.204	0.05	400	4.42	-0.06	.778	0.23	18.71	0.00	.999	400	4.34
Controls: Person and index	-0.04	.361	0.05	400	5.54	0.03	.905	0.22	18.09	0.11	.741	400	5.47
Controls: Person, index and priors	-0.08	.102	0.05	400	3.65	-0.04	.862	0.22	15.98	0.04	.845	400	3.59
Outcome: Violent re-offending or returning to custody	Coeff.	p-val.	Std. err.	N	F	Coeff.	p-val.	Std. err.	Partial F	C-stat	Endog. test	N	F
Controls: None	-0.05	.211	0.04	528	2.74	-0.17	.322	0.17	31.84	0.51	.475	528	2.64
Controls: Person	-0.04	.316	0.04	528	3.40	-0.24	.149	0.17	30.87	1.61	.205	528	3.29
Controls: Person and index	-0.03	.486	0.04	528	7.64	-0.13	.420	0.16	27.86	0.44	.505	528	7.53
Controls: Person, index and priors	-0.04	.258	0.04	528	4.84	-0.20	.223	0.17	24.69	1.00	.317	528	4.67

*=p<.05; **=p<.01; ***p<.001
Person control variables: Indigenous status, Age, SEIFA Quartile, Remoteness of area of residence
Index custodial episode control variables: Latest LSI-R prior to custodial entry and type of release
Criminal history control variables: Prior finalised court appearances, prior Children's Court appearances, prior full-time prison sentences, other types of detention, suspended sentences, prior bonds, supervised orders and prior violent, sex, property, break and enter, drug, exceed the prescribed content of alcohol, driving, breach and indictable offences.
All specifications included time fixed effects

Table A5. Logistic regression estimates of starting and completing VOTP on all outcomes, all specifications

	Comparison: Starting VOTP vs. not starting VOTP				Comparison: Completing VOTP vs. not completing VOTP			
Outcome: General re-offending	**Odds ratio**	***p*-val.**	**Std. err.**	**N**	**Odds ratio**	***p*-val.**	**Std. err.**	**N**
Controls: None	0.65	.041	0.21	452	0.62	.023	0.21	452
Controls: Person	0.61	.033	0.23	452	0.63	.050	0.24	452
Controls: Person and index	0.66	.099	0.25	452	0.65	.094	0.26	452
Controls: Person, index and priors	0.56	.036	0.28	450	0.54	.030	0.29	450
Outcome: General re-offending or returning to custody	**Odds ratio**	***p*-val.**	**Std. err.**	**N**	**Odds ratio**	***p*-val.**	**Std. err.**	**N**
Controls: None	0.68	.080	0.22	513	0.66	.062	0.22	513
Controls: Person	0.63	.050	0.23	513	0.65	.073	0.24	513
Controls: Person and index	0.64	.097	0.27	513	0.62	.090	0.28	513
Controls: Person, index and priors	0.55	.046	0.30	513	0.53	.036	0.31	513
Outcome: Violent re-offending	**Odds ratio**	***p*-val.**	**Std. err.**	**N**	**Odds ratio**	***p*-val.**	**Std. err.**	**N**
Controls: None	0.82	.341	0.21	400	0.71	.119	0.22	400
Controls: Person	0.81	.352	0.23	400	0.75	.231	0.24	400
Controls: Person and index	0.86	.551	0.25	400	0.77	.312	0.26	400
Controls: Person, index and priors	0.71	.223	0.28	398	0.64	.125	0.29	398
Outcome: Violent re-offending or returning to custody	**Odds ratio**	***p*-val.**	**Std. err.**	**N**	**Odds ratio**	***p*-val.**	**Std. err.**	**N**
Controls: None	0.75	.159	0.20	508	0.77	.210	0.21	508
Controls: Person	0.71	.108	0.22	508	0.78	.261	0.22	508
Controls: Person and index	0.69	.141	0.25	508	0.75	.270	0.26	508
Controls: Person, index and priors	0.60	.070	0.28	508	0.67	.163	0.28	508

p-val.=*p*-value; Std.Err.=standard error.

Person control variables: Indigenous status, Age, SEIFA Quartile, Remoteness of area of residence
Index custodial episode control variables: Latest LSI-R prior to custodial entry and type of release
Criminal history control variables: Prior finalised court appearances, prior Children's Court appearances, prior full-time prison sentences, other types of detention, suspended sentences, prior bonds, supervised orders and prior violent, sex, property, break and enter, drug, exceed the prescribed content of alcohol, driving, breach and indictable offences.

All specifications included time fixed effects

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