



## Does *CREDIT* reduce the risk of re-offending?

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**Aim:** To determine whether being referred to the Court Referral of Eligible Defendants into Treatment (*CREDIT*) pilot program reduces re-offending.

**Method:** Using propensity score matching, adult defendants referred to the *CREDIT* program, who had their matter finalised in court by 30 June 2011, were matched to control defendants on a large number of socio-demographic, index offence and prior offence characteristics. Intention-to-treat analyses were conducted separately for the two *CREDIT* pilot sites of Tamworth ( $n = 261$ ) and Burwood ( $n = 159$ ). Re-offending was measured until 30 June 2012.

**Results:** No significant differences were found between defendants referred to *CREDIT* and their matched controls in the proportion re-offending within 12 months, the number of court re-appearances within 12 months or the time to the first proven re-offence.

**Conclusion:** These results suggest that defendants referred to the *CREDIT* program are as likely to re-offend as defendants who are dealt with through the normal court process. However, these results may reflect the very small number of defendants referred to the program over the study period, the short follow-up period involved and the inability to match treatment and control defendants on key variables related to offending (e.g. drug use, mental health issues).

**Keywords:** re-offending, court-based intervention, propensity score matching, intention-to-treat, hazard ratio

### INTRODUCTION

The NSW Court Referral of Eligible Defendants into Treatment (*CREDIT*) is a local court based program that assists adult defendants who are motivated to address the underlying causes of their offending behaviour. It is a two-year pilot program that began operation on 24 August 2009 in one metropolitan local court (Burwood) and one non-metropolitan local court (Tamworth). *CREDIT* has two objectives:

1. to reduce re-offending by encouraging and assisting defendants appearing at local courts to engage in education, treatment or rehabilitation programs and by assisting them to receive social welfare support; and
2. to contribute to the quality of decision-making in the local court by helping ensure that information on defendants' needs and rehabilitation efforts are put before the court.

Trimboli (2012) provides a detailed description of the context in which *CREDIT* was developed and evidence for the types of interventions that effectively reduce re-offending, so this information is not repeated here. In the following paragraphs, the operation of the *CREDIT* program is briefly described.

*CREDIT* incorporates elements of problem-solving justice interventions<sup>1</sup> which are guided by the principles of therapeutic jurisprudence.<sup>2</sup> The *CREDIT* program was influenced by, and has similarities to, two Victorian programs: the Neighbourhood Justice Centre and the Court Intervention Services Program (CISP). A central objective of each of these programs is to reduce re-offending by providing short-term, individualised case management, as well as support and treatment referrals, to defendants who have multiple and complex needs. These programs match the intensity of the intervention to the defendants' needs and their level of re-offending risk.

In NSW, adult defendants are eligible for the *CREDIT* program if they have an identifiable problem related to their offending behaviour (e.g. substance abuse, other addictions, mental health problems, unstable housing, poor employment history). They must be motivated to address the problems related to their offending behaviour and reside within areas where they can participate in treatment and other services. A defendant is not eligible for the program if he/she is on a Department of Corrective Services supervision order, on remand, has been convicted of a sex offence in the previous five years or is

currently before the court for a sex offence. Defendants can be referred to the CREDIT program before entering a plea. These referrals can be made by magistrates, solicitors, police officers, staff of other court-based programs or by the defendant. After a plea has been entered by the defendant, he/she can only be referred to the program by a magistrate.

Following a detailed assessment of the factors which may be contributing to their offending behaviour, the defendant and CREDIT case worker prepare and agree upon an intervention plan. The case worker then refers the defendant to appropriate services that are equipped to deal with issues such as mental health, addiction, disabilities, accommodation, employment, financial management, education and relationships. While defendants are on the program, CREDIT staff provide them with ongoing support and supervision. The intensity and frequency of intervention is matched to the defendants' needs and level of re-offending risk. For defendants with a low risk of re-offending and who require basic case management and support, the program lasts up to two months. For defendants who are considered at medium risk of re-offending and who require complex case management and support, the program lasts up to four months. For defendants who are considered at high risk of re-offending and who require intensive case management and support, the program lasts up to six months.

Participation in the CREDIT program formally ends when the defendant is sentenced by a magistrate, however, a defendant may choose to withdraw from the program at any time. A defendant can also be terminated from the program if he/she re-offends while on the program and this results in bail being refused or if he/she fails to complete aspects of the intervention plan.

Trimboli (2012) found that, over the two years of the program's operation, most defendants who were referred for some form of support or treatment were accepted by the service providers. For example, in each of the two pilot sites, more than 90 per cent of the defendants referred to mental health services and alcohol treatment programs were accepted by those services. Trimboli (2012) also found very high levels of satisfaction among both stakeholders and program participants who were interviewed. All but one participant (n = 121) reported being either satisfied or very satisfied with their own progress on the program. All but one participant would recommend the program to others in a situation similar to their own. Almost all participants reported positive changes in their lives as a result of being on the program. These changes included improved physical or mental health, a more positive outlook, improved relationships, increased confidence, achieving positive outcomes, dealing with issues, recognising the consequences of their actions, becoming more responsible individuals, managing problems or situations more constructively, becoming aware of the services or the resources available, and having new options opened as a result of being on the program.

Stakeholders reported that positive features of the pilot program included its high level of case management; broad eligibility criteria; co-ordinated, multi-faceted and flexible nature; the visible support it enjoys from magistrates; and the in-depth

information provided by staff about clients. This last feature of the pilot program facilitated more accurate submissions on sentence. Both stakeholders and program participants identified CREDIT staff as one of the best aspects of the program. Comments were made about staff dedication, professionalism, flexibility, their ability to engage with both program participants and stakeholders, and their availability to both participants and stakeholders. Most stakeholders reported excellent working relationships with CREDIT staff and some reported lighter workloads as a result of the program. Court-related stakeholders, particularly magistrates, believed that the timely, high-quality reports prepared by CREDIT program staff contributed to effective decision-making and sentencing by magistrates.

Stakeholders recommended that the pilot program be extended state-wide. However, they also suggested some improvements to the program, including an enhancement of relevant services, programs and transport options in the catchment areas; clarification of the relationship between CREDIT and other court-based programs; the development of a model to provide ongoing case management of clients with multiple needs following their exit from the CREDIT program in order to maintain the progress achieved; and adequate resourcing of the program.

While the first evaluation of the CREDIT program (Trimboli, 2012) described the key operating characteristics of the program and the satisfaction of participants and stakeholders with the operation of the program, the current bulletin examines the effectiveness of the program in reducing the risk of re-offending. This is a key objective of the program and it is consistent with the NSW Government's goal 'to reduce juvenile and adult re-offending by 5% by 2016' (NSW Government, 2011, p. 35).

## THE CURRENT STUDY

The aim of the current study was to determine whether the CREDIT pilot program reduces re-offending. In an evaluation such as this, it is necessary to ensure that individuals who receive the treatment (i.e. referral to CREDIT) are compared to an equivalent group of individuals who did not receive the treatment. If there are systematic differences between the two groups, then we cannot be confident that any observed differences in re-offending risk can be attributed to the treatment. This problem is known as 'selection bias'. The best method for dealing with selection bias in evaluation research is to randomly assign individuals to treatment and control groups. However, random allocation rarely occurs in criminal justice interventions.

In the absence of random allocation, researchers must use other non-experimental methods to address issues of selection bias when estimating the impact of a treatment program. The method used in the current study is propensity score matching (PSM). This method has been successfully applied in other evaluations of criminal justice interventions (see, for example, Jones, 2009; Lulham, Weatherburn, & Bartels, 2009; Smith & Weatherburn, 2012). In PSM, individuals in the treatment group are matched with individuals in a control group who are identical in all observable respects except for the fact that

they did not receive the treatment. Matching is conducted on the basis of a propensity score. The propensity score is the conditional probability of receiving the treatment based on a set of observed covariates. PSM does not attempt to match on all of the covariates individually. Instead, the propensity score is a composite score which summarises the information required to balance the distribution of the covariates (Rosenbaum & Rubin, 1984). As Rubin (2001, p. 171) notes, *'if (the) treatment and control groups have the same distribution of propensity scores, they have the same distribution of all observed covariates, just like in a randomised experiment'*. It is important to note that two groups matched on observable characteristics using PSM may still differ in terms of unobserved characteristics. We return to this point in the discussion.

The analysis undertaken in the current study was an intention-to-treat (ITT) analysis. This analysis compares a control group of defendants to all eligible defendants who were referred to the CREDIT program irrespective of whether or not they entered or completed the program. ITT analyses are preferable to as-treated analyses because they minimise problems of selection bias associated with only measuring re-offending among those defendants who actually started or completed the program of interest. The ITT analysis used in the current study was adopted because it *'generally gives a conservative estimate of the treatment effect compared with what would be expected if there was full compliance ... ITT essentially tests a treatment policy or strategy, and avoids overoptimistic estimates of the efficacy of an intervention resulting from the removal of non-compliers'* (Heritier, Gebiski, & Keech, 2003, p. 1).

## METHOD

### DATA SOURCES

The data for the current study were drawn from two sources:

1. the CREDIT database, which provides information regarding the defendants who were referred to the CREDIT program in each of the two pilot sites (Burwood and Tamworth). This database was tailor-made for the program and is maintained by the program staff; and
2. the Re-Offending Database (ROD), which links all finalised criminal court appearances (in the Children's, Local, District and Supreme courts of NSW) and all movements in and out of custody by the same individual in NSW from January 1994 to the present. This database was developed and is maintained by the NSW Bureau of Crime Statistics and Research (Hua & Fitzgerald, 2006). ROD contains demographic information for each offender (e.g. age, gender, Indigenous status), as well as offence-specific information (e.g. offence type, counts of offence, charge outcome, penalty imposed) and information on offenders' prior criminal history. ROD data used in the current study related to all court appearances finalised up to 30 September 2012.

Defendants included in the CREDIT database were linked to ROD records using the following person identifiers: name,

date of birth and Criminal Names Index (CNI). The index court appearance (i.e. the court appearance for which the defendant was referred to CREDIT) was then identified for each individual by matching the police H number from the CREDIT database with the police H number recorded on ROD. The CREDIT database contained 1,136 referrals to CREDIT in total (up until December 2012). Of these, 21 (1.8%) could not be matched in ROD. There were 173 (15.2%) referrals which could be matched in ROD but the index court appearance of these defendants could not be identified either because the index matter had not been finalised yet, or the index appearance could not be identified using the H number.

### SAMPLE

#### Treatment group

The treatment group comprised all defendants who were referred to the CREDIT program, had their index matter finalised between 24 August 2009 and 30 June 2011, and could be matched to a court appearance in ROD.<sup>3</sup> Any defendants who did not meet the eligibility criteria for the CREDIT program were excluded from the treatment group; that is, any defendants who were under the supervision of the Department of Corrective Services, were refused bail by the magistrate, had a current sex offence charge(s), had a sex offence conviction(s) in the prior five years, or had been given an 'immediate response' for a crisis situation by the CREDIT program staff were excluded.

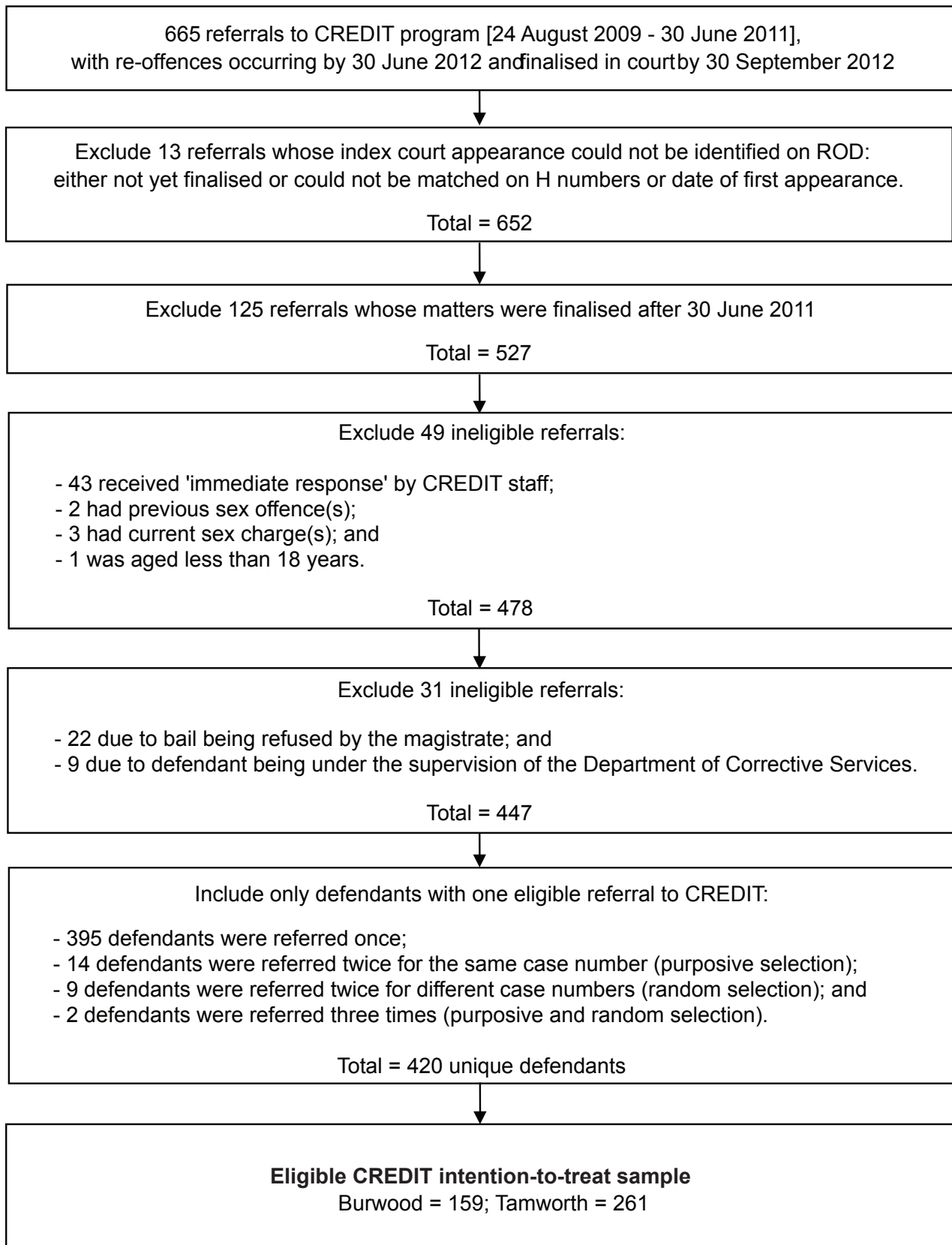
Only one eligible referral to CREDIT per defendant was included in the treatment group. If a defendant was referred to the program on more than one occasion, one referral record was selected at random and re-offending data for this referral was extracted. Figure 1 shows the number of eligible defendants in the treatment group after the application of the program's eligibility criteria and the removal of multiple referral records. As seen here, the final treatment group consisted of 420 unique defendants. Of these, 159 defendants were referred to the Burwood CREDIT office and 261 defendants were referred to the Tamworth CREDIT office.

#### Control group

As will be discussed in greater detail in the Results section, defendants referred to the CREDIT program in the two pilot sites were found to differ on key demographic, index offence and prior offence characteristics. As a result, separate analyses were conducted for the two sites using separate control groups identified in ROD. In addition to having the same program exclusion criteria as the defendants referred to CREDIT, control groups were selected using the following criteria:

1. defendants referred to CREDIT in Burwood were compared with defendants who had a finalised court appearance between 24 August 2009 and 30 June 2011 in one of nine local courts in the western Sydney area (i.e. Balmain, Bankstown, Blacktown, Fairfield, Liverpool, Mount Druitt, Newtown, Parramatta and Penrith); and

**Figure 1. Intention-to-treat CREDIT sample: Number of defendants in the treatment sample by study exclusion criteria**





- defendants referred to CREDIT in Tamworth were compared with defendants who had a finalised court appearance between 24 August 2009 and 30 June 2011 in one of 45 local courts from the outer-region locations of NSW (as defined by ARIA).<sup>4</sup> These courts included Armidale, Coffs Harbour, Cootamundra, Dubbo, Grafton, Inverell, Kempsey, Lismore, Mullumbimby, Narrabri, Parkes, Tumut, Wagga Wagga, Wellington and Young.

## VARIABLES

### Dependent Variables

Re-offending was defined in the current study as any proven offence committed after the index court appearance that resulted in a finalised court appearance. The cut-off date for measuring re-offending was 30 September 2012. This ensured that all defendants included in the treatment and the control groups had a minimum 12-month follow-up period (ending 30 June 2012) plus a three-month lag period for any re-offences to be finalised in court and included in ROD.

### Explanatory variables

A number of variables relating to the defendants' demographic characteristics, as well as characteristics of their index offence and prior offending were considered for inclusion in the propensity score and re-offending models.

#### 1. Demographic characteristics

- gender
- age (in years)
- Indigenous status: whether the defendant identified as being of Aboriginal or Torres Strait Islander descent, or both, at any appearance recorded on ROD
- postcode level of disadvantage: defendants were assigned to one of four 'Socio-Economic Indexes for Areas' (SEIFA) quartiles based on the postcode of their residential address at the time of the index court appearance (see Australian Bureau of Statistics, 2008, for further explanation of SEIFA).<sup>5</sup>

#### 2. Index offence characteristics

- principal offence type: the type of principal offence<sup>6</sup> at the index court appearance, at the ANZSOC Division, Sub-division and Group levels (Australian Bureau of Statistics, 2011)
- concurrent offences: the number of proven concurrent offences, including the principal offence, at the index court appearance
- finalisation date: in order to ensure that matched CREDIT and control defendants had similar follow-up periods, the finalisation dates were divided into quarters, for each pilot site.

#### 3. Prior offence characteristics

- prior court finalisations: the total number of finalised court appearances where one or more offences were proven in the five years prior to the index court appearance
- prior juvenile offences: the total number of court appearances in the Children's Court or at a Youth Justice Conference where one or more offences were proven in the five years prior to the index court appearance
- prior prison: whether the defendant was given a full-time prison sentence in the five years prior to the index court appearance.

## STATISTICAL ANALYSIS

### Propensity score matching

Propensity score matching (PSM) was conducted using the PSMATCH2 module in STATA, and all analyses were undertaken separately for the Tamworth and Burwood CREDIT referral groups. The PSM process involved several steps. Firstly, all the explanatory variables described above (and any relevant interactions) were regressed against a dichotomous variable indicating whether or not the individual was referred to CREDIT. Logistic regression techniques were used for this purpose. Defendants referred to CREDIT were then matched with individuals from the control group using one-to-one nearest neighbour matching, without replacement, and a calliper of 0.01 for Tamworth CREDIT and 0.02 for Burwood CREDIT.<sup>7</sup> This meant that each defendant referred to CREDIT was matched with the participant in the control group with the closest propensity score, provided the score was within 0.01 (or 0.02) units, and was then removed from the matching process. After matching, the CREDIT referral and control groups were compared on each of the explanatory variables used to predict the propensity score to assess whether there were any systematic differences across the two groups. Rosenbaum and Rubin's (1985) standardised bias (SB) was used here. An SB with an absolute value of less than 20 was considered optimal (Apel & Sweeten, 2010) and indicated good balance across the CREDIT referral groups and the control groups for the variable of interest.

### Re-offending analyses

Where covariate balance could be demonstrated after matching individuals in the treatment and control groups, risk of re-offending was compared. Three re-offending outcomes were examined:

- any re-offending within 12 months of index finalisation date:** whether there was a proven offence committed 12 months after the finalisation date of the index court appearance (and finalised within 15 months). This dichotomous re-offending outcome was modelled using binary logistic regression and individual effects were expressed using an odds ratio (OR).

- **number of court appearances within 12 months of index finalisation date:** the number of court appearances that resulted in a conviction after the finalisation date of the index court appearance (and finalised within 15 months). This re-offending outcome was modelled using negative binomial regression and individual effects were expressed using an incidence rate ratio (IRR).
- **time to re-offend from index court finalisation date:** the number of days (excluding time spent in custody) from the finalisation date of the index court appearance until the first proven re-offence. Where there was no proven re-offence, the number of days (excluding any time spent in custody) from the finalisation date of the index court appearance until 30 June 2012 was counted. Cox proportional hazards regression was used for this analysis because of the time dependant nature of the outcome variable and because it can successfully deal with censored cases. Individual effects were expressed from the Cox regression models using a hazard ratio (HR).

A statistically significant odds ratio which is greater than one in value means that re-offending is more likely to occur among the CREDIT group compared with the control group while a statistically significant OR which is less than one means that re-offending is less likely to occur. A similar principle applies when interpreting the magnitude of a statistically significant incidence rate ratio and a statistically significant hazard ratio. These three analyses were conducted with and without adjustment for other explanatory variables and, in all analyses, robust standard errors were calculated using the VCE(cluster) option in STATA to deal with the matched nature of these data. Individual effects from each regression model were also presented with a 95 per cent Confidence Interval (CI).

## RESULTS

### CREDIT SAMPLE CHARACTERISTICS

Table 1 shows the number of defendants referred to CREDIT who had their index matter finalised by 30 June 2011. These data are broken down by whether the defendant started the program and whether they completed the program. In total, 420 defendants were referred to the CREDIT program during the study period: 159 defendants from Burwood Local Court and 261 defendants from Tamworth and Quirindi Local Courts.

**Table 1: Involvement in CREDIT program for index matters finalised by 30 June 2011**

CREDIT pilot site	Number referred to CREDIT	Number started CREDIT	Number completed CREDIT
Burwood	159	132	77
Tamworth	261	202	123
Total	420	334	200

Of the 420 defendants referred to CREDIT, 334 (79.5%) started the program, 21 (5.0%) did not start the program as they believed that they did not have any issues which needed to be addressed, 14 (3.3%) withheld consent to participate and 50 (11.9%) did not start the program for other reasons (e.g. not presenting to the CREDIT office for an assessment). Among the 334 defendants who started the CREDIT program, 74 were terminated (17.6% of those who were referred), 36 withdrew (8.6% of those who were referred) and 200 (47.6% of those who were referred) completed the program.

Table 2 describes the 420 eligible defendants referred to each of the two CREDIT pilot sites in terms of their socio-demographic, index offence and prior offending characteristics.

As Table 2 shows, of the 420 eligible defendants referred to the CREDIT program, nearly two-thirds were referred to the Tamworth pilot site, three-quarters were male, nearly one-third identified as Indigenous or Torres Strait Islander, nearly 90 per cent were aged between 18 and 44 years and three-quarters lived in areas with high levels of disadvantage (as measured by SEIFA). Most CREDIT referrals had an extensive criminal history. Nearly three-quarters of the defendants referred to CREDIT had at least one proven court appearance in the previous five years and one in five had served a full-time prison sentence in the previous five years. With regard to the index court appearance, nearly three-quarters of the defendants referred to CREDIT were appearing for more than one offence, almost one-third had a violent offence intended to cause injury (defined as any offence under ANZSOC Division 02) as their principal offence, 17 per cent had a traffic offence as their principal offence and over one-third received a good behaviour bond as their principal penalty.

There were, however, a number of significant differences in the characteristics of the defendants referred to CREDIT across the two pilot sites. In the Tamworth site, 79 per cent of the defendants were males compared with 69 per cent in the Burwood site ( $\chi^2_1 = 5.0, p = .024$ ). Just over 45 per cent of the defendants referred at the Tamworth site were Indigenous compared with 11 per cent of those referred at the Burwood site ( $\chi^2_2 = 65.4, p < .001$ ). Around 44 per cent of the defendants referred at Burwood were from areas with the highest or second highest level of disadvantage compared with 94 per cent of those referred at Tamworth ( $\chi^2_4 = 224.4, p < .001$ ). Just over 23 per cent of the defendants referred at Burwood had had five or more court appearances in the previous five years compared with 13 per cent of those referred at Tamworth ( $\chi^2_3 = 9.5, p = .024$ ).

Of those defendants referred to the Burwood CREDIT office, 44 per cent had four or more concurrent offences compared with 31 per cent of defendants referred to the Tamworth CREDIT office ( $\chi^2_2 = 7.3, p = .026$ ). Theft offences were the principal offence for a higher percentage of the Burwood CREDIT referrals compared with the Tamworth CREDIT referrals (16.4% vs. 5.4%, respectively;  $\chi^2_1 = 13.8, p < .001$ ); this was also the case for illicit drugs as the principal offence (7.6% vs. 3.1%, respectively;  $\chi^2_1 = 4.4, p = .036$ ) and for public order offences as the principal offence (9.4% vs. 3.8%, respectively;  $\chi^2_1 = 5.6, p = .019$ ). Conversely, traffic and vehicle regulatory offences

**Table 2. Eligible CREDIT defendants by pilot site: demographic, index offence and prior offence characteristics (n = 420)**

	Burwood		Tamworth		TOTAL	
	N	% of total	N	% of total	N	% of total
<b>Referrals to CREDIT</b>	159	37.9	261	62.1	420	100.0
<b>Demographic characteristics</b>						
Gender						
Female	49	30.8	55	21.1	104	24.8
Male	110	69.2	206	78.9	316	75.2
<b>Indigenous status</b>						
Non-Indigenous	141	88.7	130	49.8	271	64.5
Indigenous	17	10.7	118	45.2	135	32.1
Unknown	1	0.6	13	5.0	14	3.3
<b>Age at time of CREDIT assessment (years)</b>						
Mean = 32.4; SD = 10.9; Inter Quartile Range (23, 39)						
18 – 24	47	29.6	82	31.4	129	30.7
25 – 34	42	26.4	73	28.0	115	27.4
35 – 44	46	28.9	81	31.0	127	30.2
45 – 54	15	9.4	19	7.3	34	8.1
55+	9	5.7	6	2.3	15	3.6
<b>SEIFA disadvantage score</b>						
Highest level of disadvantage	51	32.1	32	12.3	83	19.8
Second highest level of disadvantage	19	11.9	213	81.6	232	55.2
Second lowest level of disadvantage	40	25.2	9	3.4	49	11.7
Lowest level of disadvantage	47	29.6	0	0.0	47	11.2
Unknown	2	1.3	7	2.7	9	2.1
<b>Prior offence characteristics</b>						
<b>Prison in previous 5 years?</b>						
No	120	75.5	217	83.1	337	80.2
Yes	39	24.5	44	16.9	83	19.8
<b>Children's Court or YJC in previous 5 years?</b>						
No	151	95.0	235	90.0	386	91.9
Yes	8	5.0	26	10.0	34	8.1
<b>Number of proven court appearances in previous 5 years</b>						
0	39	24.5	69	26.4	108	25.7
1	28	17.6	66	25.3	94	22.4
2 - 4	55	34.6	93	35.6	148	35.2
5+	37	23.3	33	12.6	70	16.7
<b>Index offence characteristics</b>						
<b>Principal offence at index court appearance (ANZSOC, 2011)</b>						
Acts intended to cause injury (Division 02)	43	27.0	86	33.0	129	30.7
Theft (Division 08)	26	16.4	14	5.4	40	9.5
Illicit drug offences (Division 10)	12	7.5	8	3.1	20	4.8
Public order offences (Division 13)	15	9.4	10	3.8	25	6.0
Traffic and vehicle regulatory offences (Division 14)	12	7.5	58	22.2	70	16.7
Offences against justice procedures (Division 15)	24	15.1	45	17.2	69	16.4
Other offences	27	17.0	40	15.3	67	16.0

**Table 2. Eligible CREDIT defendants by pilot site: demographic, index offence and prior offence characteristics (n = 420) - continued**

	Burwood		Tamworth		TOTAL	
	N	% of total	N	% of total	N	% of total
<b>Number of concurrent offences</b>						
1	41	25.8	74	28.4	115	27.4
2 - 3	48	30.2	105	40.2	153	36.4
4+	70	44.0	82	31.4	152	36.2
<b>Type of penalty for principal offence</b>						
Imprisonment	18	11.3	43	16.5	61	14.5
Periodic detention	0	-	4	1.5	4	1.0
Intensive Correction Order	2	1.3	3	1.1	5	1.2
Suspended sentence with supervision	13	8.2	22	8.4	35	8.3
Suspended sentence without supervision	13	8.2	10	3.8	23	5.5
Community service order	5	3.1	26	10.0	31	7.4
Bond with supervision	25	15.7	40	15.3	65	15.5
Bond without supervision	46	28.9	35	13.4	81	19.3
Fine	8	5.0	36	13.8	44	10.5
Bond without conviction	14	8.8	12	4.6	26	6.2
Nominal sentence, no conviction recorded, no action taken	5	3.1	6	2.3	11	2.6
Principal offence not proven, no penalty	10	6.3	24	9.2	34	8.1

were the principal offence types for a higher percentage of the Tamworth referrals compared with the Burwood referrals (22.2% vs. 7.6%, respectively;  $\chi^2_1 = 15.4, p < .001$ ). A higher percentage of defendants referred to the Burwood CREDIT office received a bond without supervision as their principal penalty compared with those referred to the Tamworth office (28.9% vs. 13.4%, respectively;  $\chi^2_1 = 15.3, p < .001$ ).

Prior offending, previous custodial sanctions and Indigenous status are all factors that have been shown to be predictive of re-offending (e.g. Bales & Piquero, 2012; Jones, Hua, Donnelly, McHutchinson, & Heggie, 2006; Lulham, Weatherburn, & Bartels, 2009; Smith & Jones, 2008). Given that defendants referred to the Burwood CREDIT office differed significantly from those referred to the Tamworth office on prior offending and Indigenous status, the propensity score matching and subsequent re-offending analyses were undertaken separately for the two CREDIT pilot sites. The need for separate analyses was further supported by the finding that theft and illicit drug offences were higher among defendants referred to the Burwood CREDIT office.

Analysing any re-offending committed by *all* defendants who were referred to CREDIT (i.e. 'intention-to-treat' analyses) reduced the potential for selection bias which could have resulted if the re-offending analyses were restricted to those defendants who either commenced or completed the program. While this is not shown in Table 2, among the defendants referred to CREDIT in Tamworth, it was found that males were *less* likely to commence CREDIT,<sup>8</sup> while Indigenous defendants<sup>9</sup> and those with more concurrent index offences<sup>10</sup> were *more* likely to commence CREDIT. Among the defendants referred at Burwood, those with more proven court appearances in the

previous five years were more likely to commence CREDIT,<sup>11</sup> as were those with more concurrent index offences.<sup>12</sup>

In terms of completing the program, defendants referred at Tamworth were *less* likely to complete CREDIT if they had more proven court appearances in the previous five years,<sup>13</sup> had been to prison in the previous five years<sup>14</sup> or were male.<sup>15</sup> By contrast, defendants referred at Burwood were *more* likely to complete the program if their principal index offence was for offences against justice procedures.<sup>16</sup>

### Tamworth CREDIT pilot site: Re-offending

#### Propensity score matching

The sample of 261 defendants from the Tamworth and Quirindi Local Courts who were referred to CREDIT were compared with 5,000 randomly selected defendants from 45 local courts in the outer regional area of NSW where CREDIT was not available. Logistic regression models were applied to this sub-group to identify variables predictive of being referred to CREDIT. The final logistic regression model using the unmatched samples (n = 5,261) significantly predicted being referred to the CREDIT pilot program (Likelihood Ratio (LR)  $\chi^2_{30} = 366.6, p < .001$ ). On the basis of this model, 255 defendants referred to the CREDIT program were matched with 255 defendants from the control courts using their estimated propensity scores (or predicted probabilities). This was done using one-to-one matching with a caliper of 0.01. Only six defendants could not be matched with a defendant in the control group based on these criteria. The adequacy of this matching approach in balancing the two groups on the measured covariates was then assessed using the standardised bias (SB).



Figure 2 (and Appendix Table A1) shows the SB values for the matched and unmatched samples. Before matching, 14 of the 30 variables examined had an SB absolute value greater than 20. These were: age (45-54 years), Indigenous (yes), Indigenous (unknown), highest level of disadvantage (SEIFA quartile 1), second highest level of disadvantage (SEIFA quartile 2), two to three concurrent offences, four or more concurrent offences, 'against justice procedures' index offences, 'PCA' index offences, two to four proven offences during the previous five years, five or more proven offences during the previous five years, having been in prison during the previous five years, the interaction between having been in prison during the previous five years and having four or more concurrent offences and the finalisation date (1<sup>st</sup> quarter). This suggests that there were large differences between the Tamworth CREDIT referral group and the control group on these measured covariates before matching on propensity scores. Figure 2 also shows that, after matching occurred (n = 510), the SB had greatly improved across most variables. After matching, only two variables had an SB greater than |10| ('illicit drugs' index offences and the interaction between 2-3 concurrent offences and having been in prison during the previous five years) and none had an SB greater than |20|. The propensity score model using the matched CREDIT sample did not significantly predict whether or not someone was referred to CREDIT (Pseudo R<sup>2</sup> = 0.012; LR  $\chi^2_{30}$  = 8.5, p > .999); this further indicates that the treatment and control groups were adequately balanced on the measured covariates.

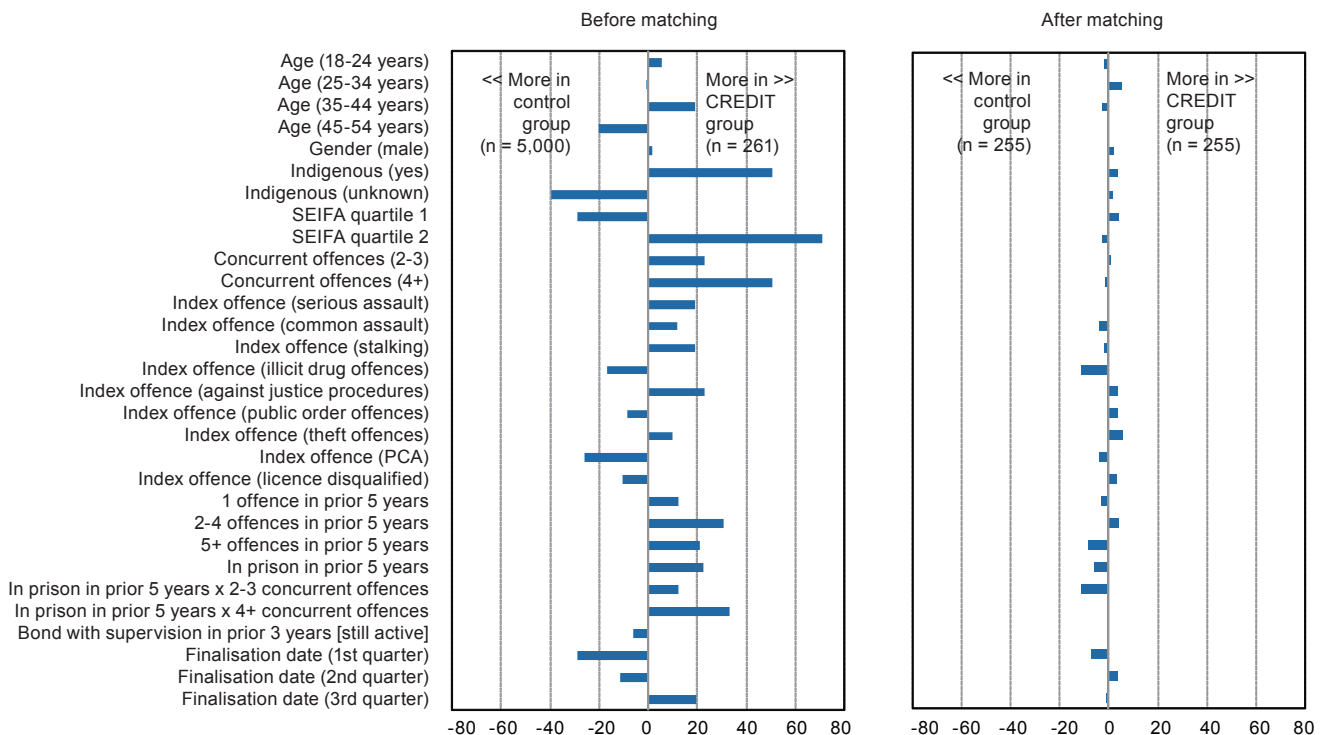
**Re-offending outcomes**

Table 3 shows the number and percentage of defendants referred to the Tamworth CREDIT pilot site and their matched controls who re-offended within 12 months of the index court appearance. Table 3 also shows the rate of re-offending within

**Table 3. Re-offending outcomes for the matched Tamworth CREDIT and control groups**

Re-offending outcome	Matched sample (n=510)	
	Tamworth CREDIT group	Control group
<b>Re-offended within 12 months of index finalisation date</b>		
<i>Per cent</i>	<b>17.3</b>	<b>19.6</b>
<i>95% CI</i>	(13.1, 22.4)	(15.2, 24.9)
<b>Number of court re-appearances within 12 months of index finalisation date</b>		
<i>Mean</i>	<b>0.22</b>	<b>0.23</b>
<i>95% CI</i>	(0.16, 0.28)	(0.17, 0.29)
<b>Number of days for 20% of each group to re-offend after index finalisation date</b>		
<i>Free days</i>	<b>302</b>	<b>279</b>
<i>95% CI</i>	(205, 476)	(153, 366)

**Figure 2. Standardised bias (SB) levels for each variable for the Tamworth CREDIT unmatched and matched samples**



12 months of the index court appearance for the matched sample and the number of days until 20 per cent of the CREDIT and control groups had recorded a new offence.

Table 4 shows the treatment effect estimates (that is, the effect of being referred to the Tamworth CREDIT pilot program) on re-offending outcomes for the matched analyses.

Amongst those defendants who were referred to Tamworth CREDIT, 17.3 per cent had re-offended in the 12 months after the finalisation date of their index offence. This compared with 19.6 per cent of the matched control group who had re-offended during the same period (Table 3). As shown in Table 4, this difference between the matched Tamworth CREDIT and control groups was not statistically significant at the 0.05 level (OR = 0.85, 95% CI (0.56, 1.31),  $p = .468$ ). This lack of effect was evident even after adjusting for other covariates (OR = 0.85, 95% CI (0.52, 1.39),  $p = .519$ ).

The mean number of proven court re-appearances within 12 months of finalisation was 0.22 for the Tamworth CREDIT group and 0.23 for the control group (Table 3). The results of the negative binomial regression shown in Table 4 indicates that this difference between the two groups in the rate of re-offending was also not statistically significant. This was true regardless of whether or not other covariates were adjusted for (unadjusted IRR = 0.95, 95% CI (0.65, 1.39),  $p = .788$ ; adjusted IRR = 1.00, 95% CI (0.70, 1.44),  $p = .997$ ).

**Table 4. Unadjusted and adjusted differences in re-offending outcomes for the Tamworth CREDIT group versus the control group**

Re-offending outcome	Matched sample (n=510)	
	Unadjusted	Adjusted
<b>Re-offended within 12 months of index finalisation date</b>		
<i>Odds Ratio (95% CI)<sup>a</sup></i>	<b>0.85</b> (0.56, 1.31)	<b>0.85</b> (0.52, 1.39)
<i>p-value</i>	.468	.519
<b>Number of re-appearances within 12 months of finalisation date</b>		
<i>Incidence Rate Ratio (95% CI)<sup>b</sup></i>	<b>0.95</b> (0.65, 1.39)	<b>1.00</b> (0.70, 1.44)
<i>p-value</i>	.788	.997
<b>Number of days to first re-offence for persons who re-offended</b>		
<i>Hazard Ratio (95% CI)<sup>c</sup></i>	<b>0.85</b> (0.62, 1.15)	<b>0.83</b> (0.60, 1.15)
<i>p-value</i>	.291	.274

<sup>a</sup> Adjusted for Indigenous status, concurrent charges and proven court appearances in the previous five years.  
<sup>b</sup> Adjusted for an index prison sentence, Indigenous status and proven court appearances in the previous five years.  
<sup>c</sup> Adjusted for Indigenous status, 'public order' index offences, proven court appearances in the previous five years and prison sentence in the previous five years. Five offenders were excluded from the Cox regression analysis because they had no 'free' days during the follow-up period.

As shown in Table 3, it took 302 days after the finalisation date of their index court appearance for 20 per cent of the Tamworth CREDIT group to commit their first new offence. By comparison, it took 279 days after the finalisation date of their index court appearance for 20 per cent of the control group to commit their first new offence. However, again this difference between the two groups in re-offending was not statistically significant. Table 4 shows the hazard ratios estimated from the Cox regression analyses. As seen here, both the unadjusted (HR = 0.85; 95% CI (0.62, 1.15),  $p = .291$ ) and adjusted (HR = 0.83; 95% CI (0.60, 1.15),  $p = .274$ ) hazard ratios were not significant at the 0.05 level, which indicates that the probability of re-offending at any given point in time was the same for the defendants referred to the Tamworth CREDIT program and their matched controls.

**Burwood CREDIT pilot site: Re-offending**

**Propensity score matching**

The sample of 159 defendants from Burwood Local Court who were referred to CREDIT were compared with 5,000 randomly selected defendants from nine local courts in the western suburbs of Sydney where CREDIT was not available. Logistic regression models were applied to this sub-group to identify variables predictive of being referred to CREDIT. The final logistic regression model using the unmatched samples (n = 5,159) significantly predicted being referred to the CREDIT pilot program (LR  $\chi^2_{27} = 345.0$ ,  $p < .001$ ). On the basis of this model, 152 defendants referred to the CREDIT program were matched with 152 defendants from the control courts using their estimated propensity scores (or predicted probabilities). This was done using one-to-one matching with a caliper of 0.02. Only seven defendants could not be matched with a defendant in the control group based on these criteria. The adequacy of this matching approach in balancing the two groups on the measured covariates used in the propensity score was then assessed using the standardised bias (SB).

Figure 3 (and Appendix Table A2) shows the SB values for the matched and unmatched samples. Before matching, 16 of the 27 variables examined had an SB absolute value of more than 20. These were: gender (male), highest level of disadvantage (SEIFA quartile 1), lowest level of disadvantage (SEIFA quartile 4), four or more concurrent offences, 'serious assault' index offences, 'deal or traffic in illicit drugs' index offences, 'public order' index offences, 'theft' index offences, 'PCA' index offences, 'licence disqualification' index offences, two to four proven offences during the previous five years, five or more proven offences during the previous five years, having been in prison in the previous five years, the interaction between 'serious assault' index offences and having four or more concurrent offences, the interaction between 'theft' index offences and having four or more concurrent offences, and the finalisation date (1<sup>st</sup> quarter). This suggests that there were large differences between the Burwood CREDIT and control groups on the measured covariates before matching on propensity scores.

Figure 3. Standardised bias (SB) levels for each variable for the Burwood CREDIT unmatched and matched samples

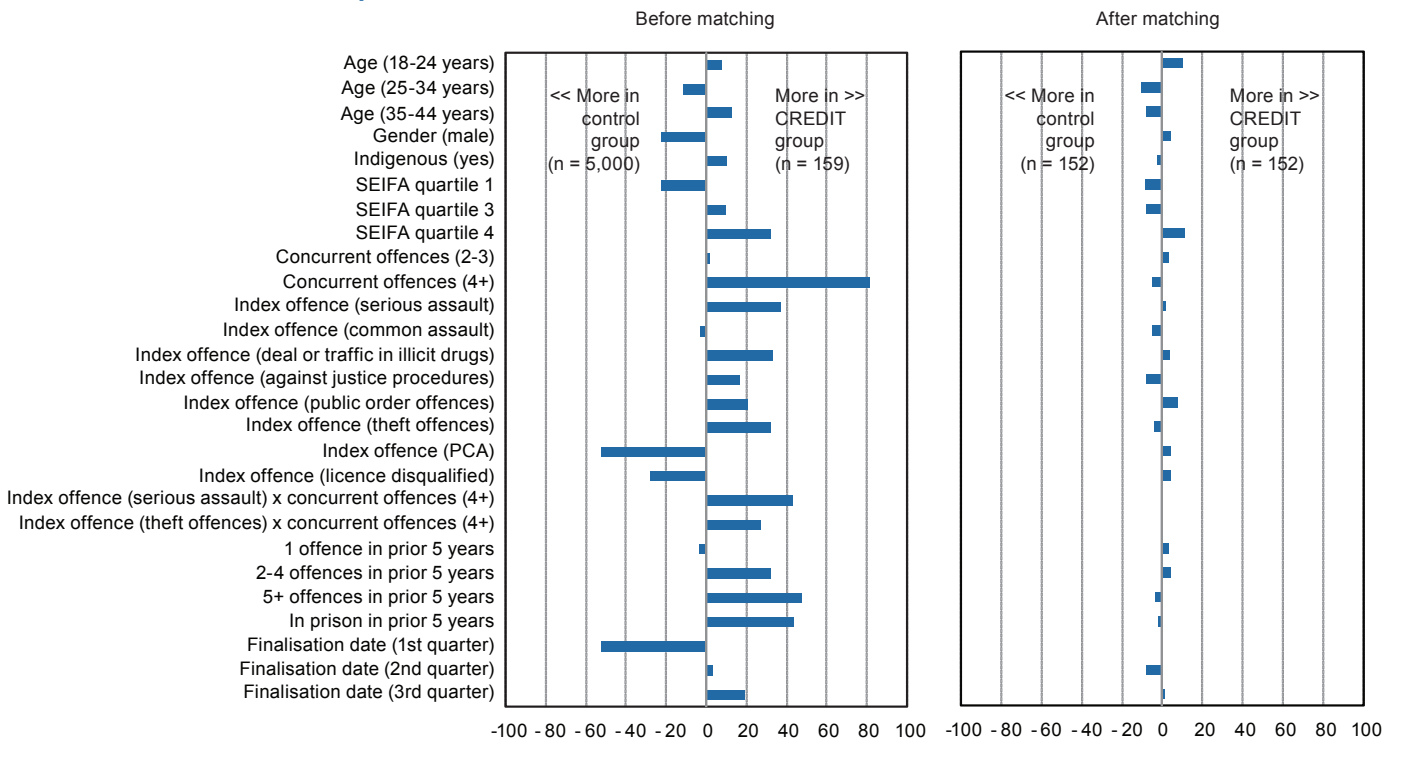


Figure 3 also shows that, after matching (n=304), the SB had greatly improved across most variables. After matching, only three variables had an SB greater than |10| (age 18-24 years, age 25-34 years and SEIFA quartile 4) and none had an SB greater than |20|. The propensity score model using the matched CREDIT sample did not significantly predict whether or not someone was referred to CREDIT (Pseudo R<sup>2</sup> = 0.017; LR  $\chi^2_{27} = 7.34, p > .999$ ); this further indicates that the treatment and control groups were adequately balanced on the measured covariates.

**Re-offending outcomes**

Table 5 shows the number and percentage of defendants referred to the Burwood CREDIT pilot site and their matched controls who re-offended within 12 months of the index court appearance. Table 5 also shows the rate of re-offending within 12 months of the index court appearance for the matched sample and the number of days until 20 per cent of the CREDIT and their matched controls had recorded a new offence.

Table 6 shows the treatment effect estimates (that is, the effect of being referred to the CREDIT pilot program in Burwood) on re-offending outcomes for the matched analyses.

As Table 5 shows, amongst those defendants who were referred to Burwood CREDIT, 28.3 per cent had re-offended in the 12 months after the finalisation date of their index offence. This compared with 25 per cent of the matched control group who had re-offended during the same 12-month period. While this

Table 5. Re-offending outcomes for the matched Burwood CREDIT and control groups

Re-offending outcome	Matched sample (n=304)	
	Burwood CREDIT group	Control group
<b>Re-offended within 12 months of index finalisation date</b>		
<i>Per cent</i>	<b>28.3</b>	<b>25.0</b>
<i>95% CI</i>	(21.7, 35.9)	(18.8, 32.4)
<b>Number of court re-appearances within 12 months of index finalisation date</b>		
<i>Mean</i>	<b>0.51</b>	<b>0.36</b>
<i>95% CI</i>	(0.34, 0.68)	(0.23, 0.48)
<b>Number of days for 20% of each group to re-offend after index finalisation date</b>		
<i>Free days</i>	<b>184</b>	<b>171</b>
<i>95% CI</i>	(88, 271)	(116, 241)

appears to indicate that a higher percentage of the Burwood CREDIT group re-offended within 12 months, Table 6 shows that this difference in the percentage re-offending was not statistically significant (OR = 1.18, 95% CI (0.70, 2.00), p = .530). This lack of an effect remained even after adjusting for other covariates (OR = 1.11, 95% CI (0.63, 1.93), p = .723).

The mean number of proven court re-appearances within 12 months of finalisation was 0.51 for the Burwood CREDIT group and 0.36 for the control group (Table 5). While the number of proven court appearances within 12 months appears to be higher for the Burwood CREDIT group, the results of the unadjusted negative binomial regression analysis in Table 6 show that this difference was not statistically significant (IRR = 1.44, 95% CI (0.91, 2.28),  $p = .115$ ). This lack of an effect remained after covariate adjustment (IRR = 1.37, 95% CI (0.89, 2.12),  $p = .152$ ).

As shown in Table 5, it took 184 days after the finalisation date of their index court appearance for 20 per cent of the Burwood CREDIT group to commit their first new offence. By comparison, it took 171 days for 20 per cent of the control group to commit their first new offence. Cox regression analyses found no significant differences between the two groups in time to re-offend. As seen in Table 6, both the unadjusted (HR = 1.02, 95% CI (0.72, 1.45),  $p = .919$ ) and adjusted (HR = 0.90, 95% CI (0.62, 1.31),  $p = .594$ ) hazard ratios were not significant at the 0.05 level, which indicates that the probability of re-offending at any given point in time was the same for the defendants referred to the Burwood CREDIT program and their matched controls.

**Table 6. Unadjusted and adjusted differences in re-offending outcomes for the Burwood CREDIT group versus the control group**

Re-offending outcome	Matched sample (n=304)	
	Unadjusted	Adjusted
<b>Re-offended within 12 months of index finalisation date</b>		
<i>Odds Ratio (95% CI)<sup>a</sup></i>	<b>1.18</b> (0.70, 2.00)	<b>1.11</b> (0.63, 1.93)
<i>p-value</i>	.530	.723
<b>Number of re-appearances within 12 months of finalisation date</b>		
<i>Incidence Rate Ratio (95% CI)<sup>b</sup></i>	<b>1.44</b> (0.91, 2.28)	<b>1.37</b> (0.89, 2.12)
<i>p-value</i>	.115	.152
<b>Number of days to first re-offence for persons who re-offended</b>		
<i>Hazard Ratio (95% CI)<sup>c</sup></i>	<b>1.02</b> (0.72, 1.45)	<b>0.90</b> (0.62, 1.31)
<i>p-value</i>	.919	.594

<sup>a</sup> Adjusted for proven court appearances in the previous five years and 'public order' index offences.

<sup>b</sup> Adjusted for proven court appearances in the previous five years, prison sentence in the previous five years, gender and 'dealing in illicit drugs' index offences.

<sup>c</sup> Adjusted for 'public order' index offences, proven court appearances in the previous five years and prison sentence in the previous five years. Two offenders were excluded from the Cox regression analysis because they had no 'free' days during the follow-up period.

## DISCUSSION

One of the key objectives of the CREDIT program is to reduce re-offending by effectively treating the causes of a person's criminal behaviour. The current results provide no evidence that the CREDIT program achieves this aim. At both Tamworth and Burwood pilot sites, there were no statistically significant differences in the proportion of defendants referred to the CREDIT program who were re-convicted when compared with a matched group who had been dealt with through the normal court process. There were also no significant differences between the CREDIT referral group and their matched controls in the number of reconvictions or the time to the first new offence.

Taken on their own, the results of these analyses suggest that being referred to the CREDIT program is no more effective than court in reducing re-offending rates. This finding seems to be somewhat at odds with the earlier evaluation of the CREDIT program undertaken by the Bureau in 2011. In this study, Trimboli (2012) found that the vast majority of defendants interviewed reported positive personal changes in their lives as a result of being on the program. These changes included improvements in the defendant's own health and well-being, as well as improvements in other areas such as life skills and interpersonal relationships. While these interviews were restricted to defendants who had completed the program (rather than all defendants who were referred), key stakeholders involved with CREDIT identified similar positive outcomes for those participating in the program. Most key stakeholders interviewed stated that, in general, the CREDIT program had a beneficial impact on defendants' lives and on the defendants' partners, children and other family members.

It would be reasonable to expect that these improvements in the quality of life for defendants would impact on offending behaviour and, at least for those who completed the program, bring about reduced re-offending rates amongst this cohort. Indeed, several of the key stakeholders held this view, suggesting that, in their experience, the program had resulted in defendants turning up to court much less frequently (unpublished data). However, the findings from the current study are consistent with other research on 'what works' in community corrections. Other studies conducted in the US, which have evaluated outpatient drug treatment programs, suggest that simply referring an offender and/or managing them in the community is not an effective method for reducing recidivism (see MacKenzie, 2000, for a review). MacKenzie (2002) suggests that the varying quality and quantity of the treatment provided in these types of programs may be one of the reasons why researchers have failed to detect any changes in rates of re-offending. It is worth noting in this context that, while the acceptance rate of CREDIT referrals was quite high (79.5% of those referred), less than half of all persons referred actually completed the program. Among the 334 defendants who started CREDIT, 74 were terminated (17.6% of those referred) and 36 withdrew (8.6% of those referred). Although it was necessary to include these individuals in the evaluation (to avoid selection bias), their inclusion would



have weakened our capacity to detect a treatment effect among those who did complete the program.

There are several important limitations of the methodology used in the current study which also deserve mention. The most important is the problem of omitted variable bias. Although defendants in the CREDIT group were matched with controls on a large number of covariates, including demographic, offence-specific and prior offending characteristics, it is still possible that there is one or more unmeasured factors that influence both treatment allocation and re-offending which have not been accounted for in the propensity score models. The most obvious information missing from the analyses (because it is not available on ROD) was information on defendants' drug and alcohol use. Drug and alcohol use is one of the key determinants of entry into the CREDIT program and is a factor that has been shown to be a good predictor of re-offending (e.g. Chilvers & Weatherburn, 2003; Hall, 1996; Ringland, 2011). Had we been able to adequately match the treatment and control groups on this key covariate, it is possible that a significant difference between the CREDIT and control groups in re-offending may have been detected. This fact underscores the need for routine assessment of all defendants in criminal proceedings for drug and alcohol problems.

Secondly, the small number of defendants included in the treatment groups, particularly in the Burwood pilot site, reduced the statistical power of the analysis to detect any differences between the two groups. Only 420 defendants referred to CREDIT had an adequate follow-up period in which to measure re-offending and could therefore be included in the analysis. Furthermore, defendants referred to each pilot site differed on key socio-demographic characteristics, index offence characteristics and prior offending characteristics which meant that the re-offending data had to be analysed separately for the Burwood and Tamworth pilot sites. This further reduced the sample size of the treatment groups (159 and 261, respectively) and, consequently, the ability to detect a statistically significant difference in re-offending rates, if such a difference existed. Repeating the analysis with a larger cohort of CREDIT defendants would provide stronger evidence as to the effectiveness of the CREDIT program in reducing re-offending.

Finally, the current study used proven court appearances as a proxy measure of re-offending. This re-offending outcome is frequently used in criminal justice evaluations, however, it may not detect small changes in rates of re-offending. Proven court appearances do not capture information on re-offences which do not come to the attention of law enforcement agencies. Re-offences which are not proceeded against or are informally dealt with by police are also excluded. Therefore, large differences between the CREDIT and control groups in actual re-offending rates would be needed before a significant difference in re-appearance rates could be detected. Furthermore, even for new offences which do proceed to court, there is a substantial lag between the time the offence is committed and when that matter is finalised in court. In the local court, the median time

taken for this to occur is three months; but it is only after 12 months of being charged that 90 per cent of offences are finalised in court (unpublished data). This means that, for most of the CREDIT cohort, court data on re-offending within 12 months would not be complete until three years after they entered the program.

The NSW Bureau of Crime Statistics and Research is currently investigating whether re-arrest provides a more sensitive and more timely measure of re-offending than reconviction. In light of this and the above-mentioned study limitations, consideration should be given to extending the CREDIT program so that further research on its efficacy can be undertaken using a larger sample of defendants, stronger controls and a more sensitive and timely re-offending measure. Consideration should also be given to further research on the reasons behind the high drop-out rate of CREDIT referrals.

## ACKNOWLEDGEMENTS

Thanks are due to the CREDIT program staff in both pilot sites and staff at the Crime Prevention Division for the accuracy of the CREDIT database. Thanks are also due to several staff at the Bureau of Crime Statistics and Research: Mai Ho, Tracy Painting and Mark Ramsay for the data linkage; Steve Moffatt, Clare Ringland, Nadine Smith, Lucy Snowball and Yinny Wai-Yin Wan for statistical advice, particularly regarding propensity score matching; Craig Jones for both statistical advice and assistance in designing the evaluation plan; Don Weatherburn for comments on an earlier version of this bulletin; and Florence Sin for desk-top publishing. The comments made by the two external reviewers are also appreciated.

## NOTES

1. Problem-solving justice interventions '*[focus] on defendants ... whose underlying medical and social problems (e.g. homelessness, mental illness, substance abuse) have contributed to recurring contacts with the justice system. The approach seeks to reduce recidivism and improve outcomes for individuals, families, and communities using methods that involve ongoing judicial leadership; the integration of treatment and/or social services with judicial case processing; close monitoring of and immediate response to behavior; multidisciplinary involvement; and collaboration with community-based and government organizations*' (Casey, Rottman, & Bromage, 2007, p. 4).
2. Therapeutic jurisprudence is '*the study of the role of the law as a therapeutic agent ... [focusing] on the law's impact on emotional life and on psychological well-being*' (Wexler & Winick, 1996, p. xvii).
3. The 665 referrals include two where the referral record was dated after 30 June 2011. Nevertheless, they were included as these records contained H number information for index appearances which had been finalised by 30 June 2011.

4. ARIA or 'Accessibility/Remoteness Index of Australia' measures remoteness based on the physical road distance between populated localities and different categories of service centres. The Index has five categories, ranging from 'major cities of Australia' (and thus relatively unrestricted accessibility to a wide range of goods, services and opportunities for social interaction) to 'very remote Australia' (and thus very little accessibility to goods, services and opportunities for social interaction, Australian Bureau of Statistics, 2003). The remoteness scores exclude any consideration of socio-economic status, rurality and population size.
5. SEIFA or 'Socio-Economic Indexes for Areas' provide summary measures of different aspects of the socio-economic conditions of people living in a geographic area (Australian Bureau of Statistics, 2008). Data on education, housing, income and employment which are collected in the Census of Population and Housing are utilised 'to produce index scores that rank areas based on their relative socio-economic advantage and disadvantage' (Wise & Mathews, 2011, p. 2). The quartiles are: lowest quartile (the highest level of disadvantage); second quartile (second highest level of disadvantage); third quartile (second lowest level of disadvantage); and highest quartile (the lowest level of disadvantage).
6. See NSW Bureau of Crime Statistics and Research (2011, p. 136), for a definition of 'principal offence'.
7. A calliper of 0.01 was used for the Tamworth CREDIT PSM analyses because the number of referrals was comparatively larger ( $n = 261$ ). Because the number of referrals to Burwood CREDIT was much smaller ( $n = 159$ ), using a more liberal definition of a calliper (0.02) produced more stable matches using PSM. A calliper of 0.02 is still a fairly strict calliper.
8. 74.3% vs. 89.1% ( $\chi^2_1 = 5.4, p = .020$ ).
9. 85.6% vs. 70.6% ( $\chi^2_1 = 8.3, p = .004$ ).
10. 70.3% (1 concurrent offence) vs. 76.2% (2-3 concurrent offences) vs. 85.4% (4+ concurrent offences) (Linear trend  $\chi^2_1 = 5.1, p = .024$ ).
11. OR = 1.21 (LR  $\chi^2_1 = 5.2, p = .023$ ).
12. 75.6% (1 concurrent offence) vs. 77.1% (2-3 concurrent offences) vs. 91.4% (4+ concurrent offences) ( $\chi^2_2 = 6.3, p = .043$ ).
13. OR = 0.88 ( $\chi^2_1 = 4.8, p = .028$ ).
14. 31.8% vs. 50.2% ( $\chi^2_1 = 5.0, p = .026$ ).
15. 42.7% vs. 63.6% ( $\chi^2_1 = 7.6, p = .006$ ).
16. 66.7% vs. 45.2% (LR  $\chi^2_1 = 3.8, p = .051$ ).

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APPENDIX

**Table A1. Standardised bias (SB) before (n = 5,261) and after (n = 510) matching the Tamworth intention-to-treat CREDIT group to the control group**

Variable	Standardised bias	
	Unmatched (n=5,261)	Matched (n=510)
<b>Demographic characteristics</b>		
Age (18 - 24 years)	5.7	-1.7
Age (25 - 34 years)	-0.7	5.2
Age (35 - 44 years)	19.3	-2.7
Age (45 - 54 years)	-20.2	0.0
Gender (male)	1.9	1.9
Indigenous (yes)	50.6	3.4
Indigenous (unknown)	-39.5	1.3
SEIFA quartile 1	-29.0	4.1
SEIFA quartile 2	70.7	-2.6
<b>Index offence characteristics</b>		
Concurrent offences (2 - 3)	23.2	0.8
Concurrent offences (4+)	50.7	-1.0
Index offence (serious assault)	19.1	0.0
Index offence (common assault)	11.7	-4.0
Index offence (stalking)	19.3	-1.7
Index offence (illicit drug offences)	-16.8	-11.0
Index offence (against justice procedures)	23.0	3.5
Index offence (public order offences)	-8.7	3.7
Index offence (theft offences)	9.8	5.8
Index offence (PCA)	-25.7	-3.9
Index offence (licence disqualified)	-10.3	3.2
<b>Prior offence characteristics</b>		
1 offence in prior 5 years	12.2	-2.8
2 - 4 offences in prior 5 years	30.8	3.8
5+ offences in prior 5 years	21.1	-8.0
In prison in prior 5 years	22.3	-5.8
In prison in prior 5 years x concurrent offences (2 - 3)	12.1	-11.0
In prison in prior 5 years x concurrent offences (4+)	33.2	0.0
Bond with supervision in prior 3 years (still active)	-6.1	0.0
Finalisation date (1st quarter)	-28.8	-6.9
Finalisation date (2nd quarter)	-11.5	3.7
Finalisation date (3rd quarter)	19.7	-0.9

**Table A2. Standardised bias (SB) before (n = 5,159) and after (n = 304) matching the Burwood intention-to-treat CREDIT group to the control group**

Variable	Standardised bias	
	Unmatched (n=5,159)	Matched (n=304)
<b>Demographic characteristics</b>		
Age (18 - 24 years)	7.8	10.3
Age (25 - 34 years)	-11.6	-10.1
Age (35 - 44 years)	12.1	-7.5
Gender (male)	-22.4	4.5
Indigenous (yes)	9.9	-2.3
SEIFA quartile 1	-22.1	-8.2
SEIFA quartile 3	9.4	-7.8
SEIFA quartile 4	32.0	11.1
<b>Index offence characteristics</b>		
Concurrent offences (2 - 3)	1.2	2.9
Concurrent offences (4+)	81.5	-4.8
Index offence (serious assault)	36.6	2.0
Index offence (common assault)	-2.6	-4.9
Index offence (deal or traffic in illicit drugs)	33.3	3.7
Index offence (against justice procedures)	16.9	-8.0
Index offence (public order offences)	20.1	7.8
Index offence (theft offences)	32.0	-4.2
Index offence (PCA)	-52.4	4.5
Index offence (licence disqualified)	-28.1	4.6
Index offence (serious assault) x concurrent offences (4+)	43.1	0.0
Index offence (theft offences) x concurrent offences (4+)	26.8	0.0
<b>Prior offence characteristics</b>		
1 offence in prior 5 years	-3.5	3.4
2 - 4 offences in prior 5 years	31.8	4.5
5+ offences in prior 5 years	47.1	-3.8
In prison in prior 5 years	43.8	-1.8
Finalisation date (1st quarter)	-52.2	0.0
Finalisation date (2nd quarter)	3.1	-7.5
Finalisation date (3rd quarter)	19.4	1.5