Assessing the Impact of Time Spent in Custody and Mortality on the Estimation of Recidivism

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Abstract

This article reports on findings from a methodological study which investigated the impact of two potentially biasing factors – time spent in custody and mortality – on the estimation of recidivism. Using survival analysis techniques to derive estimates of re-offending, the study compared adjusted and unadjusted recidivism rates and assessed how rates vary for different offender populations and over different follow-up periods. In contrast to many previous studies, the research found that adjusting for time spent in custody and mortality makes little difference to the two-year recidivism rates of large offender populations. However, for certain offender groups and over shorter follow-up periods, the under-estimation of recidivism is more marked. The study concludes that current methods of estimating population-level recidivism rates are adequate and do not require wholesale re-calibration to account for either factor.

The task of measuring recidivism and identifying recidivist offenders has been of increasing interest to criminal justice policy makers and practitioners. This is evidenced by an accumulation of Australian literature in the area (Payne 2007) and recent national developments, such as the AIC Recidivism Roundtable (2005) and the inclusion of measures of recidivism in the National Information Development Plan (NIDP) for crime and justice (ABS 2005). Most recidivism research has focussed either on the exploration of recidivism or on program evaluation. More recently, recidivism research has found application in the area of risk assessment and prediction modelling (see e.g. Maller 2002).

Definitional and methodological problems associated with recidivism research have been acknowledged since the earliest days of criminal career research (Maltz 1984; Blumstein et al. 1986). Problems have tended to fall into three areas of concern: data availability and data quality; choice of follow-up times; and determining appropriateness of measures and models (Maltz 1984). Debates on choice or appropriateness of various follow-up times (e.g. whether to measure recidivism after six months, 12 months or two years) have invariably included discussion about 'exposure time' or 'available street time', that is, the time that an offender is assumed to be free to commit crimes. Estimates of re-offending that do not take exposure or 'available street time' into account assume that a person is completely free during the

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follow-up period to commit crime. This may not be the case, however, especially when offenders are known to spend portions of time in custody. Failure to adjust for time spent in custody (TSIC; sometimes referred to as 'non-street time') will likely lead to an under-estimation of re-offending, and a corresponding over-estimation of the rate of desistance, by virtue of having over-estimated exposure time. This has implications when assessing the effectiveness of criminal justice interventions. For example, if one wishes to know the impact of a particular sentencing decision on recidivism, then one would get an upward bias if time spent in custody was ignored, as this assumes the offender is on the straight and narrow when s/he may, in fact, be locked up. Similarly, estimates of the impact of the sentence will be upwards biased if one ignores mortality, since this assumes the offender is well behaved when that person may be deceased.

'Non-street time' can also be affected by factors other than time spent in custody. For example, hospitalizations and/or temporary or permanent relocation outside a jurisdiction can reduce the time and opportunity to commit crime. Time spent in hospitals and/or psychiatric units may be especially important when considering offenders with mental disorders, as there is evidence of considerable overlap between mental health service use and contact with the criminal justice system (Jablensky et al. 2004). Using Western Australian data (WA), Jablensky and colleagues (2004) linked mental health data to police arrest records and showed that people with a mental illness experience higher arrest rates than the general population. Interestingly, in that study, it was technically possible to adjust for both time spent in custody *and* time spent in hospital (as, for each individual, detailed, event-level data of each arrest and each hospitalization was available); however, it is more generally the case that these details are not known or not easily obtained by researchers and consequently the effects of 'non-street time' can not be measured.

Controlling for Exposure Time or Time Spent in Custody (TSIC)

Although it is acknowledged that the construction of unbiased estimates of recidivism ideally requires an accurate account of 'exposure time', few studies have implemented controls to do this. Only a handful of studies in Australia have considered and adjusted for exposure time in analyses of re-offending (Payne 2005; e.g. Harding & Maller 1997). Payne (2005) took account of time spent in custody in an evaluation of outcomes of the North Queensland Drug Court pilot program. Estimates of the individual rate of offending (lambda) increased by 50% when exposure time was adjusted for time spent in custody (Payne 2005:49). In contrast, Harding and Maller (1997) found little effect on age-arrest profiles after adjusting for TSIC. Even after controlling for various offender types (such as violent offenders or those receiving relatively long prison sentences), they found that adjustments for TSIC produced an insignificant effect on arrest profiles. They speculated that this was either because the number of offenders in these groups was too small to observe an effect or because their prison and/or lock-up time accounted for too small a proportion of the total time involved in calculations.

Accounting for Death

The need for recidivism studies to take into account mortality has been accentuated by a growing body of research demonstrating significantly higher rates of mortality and morbidity amongst offender populations (Paanila et al. 1999; Putkonen 2001; Lattimore et

al. 1997; e.g. Harding-Pink & Fryc 1988; Laub & Vaillant 2000; Hobbs et al. 2006; Graham 2003; Biles et al. 1999). Failure to take into account the death of offenders has confounding effects on recidivism analyses. First, researchers will incorrectly classify individuals who have died as being offenders who have desisted from crime (so-called 'false desistors'). Second, their exposure time will incorrectly include the period between date of death and the end of the follow-up period. In all cases, this is likely to lead to an under-estimate of recidivism and a corresponding over-estimate of the rate of desistance.

Combined Effects of TSIC and Mortality

Few studies have explicitly assessed the *joint* effects of time spent in custody *and* mortality on exposure time. Only one study could be identified that investigated how these two factors influenced offending patterns (Eggleston et al. 2004). The study found that both mortality and exposure time alter offending trajectories, particularly those of high-frequency offenders.

Purpose of this Study

The primary aims of the study were to:

i) Derive accurate estimates of recidivism which take into account both the time spent in custody and the mortality of offenders.

ii) Compare the *adjusted* estimates derived in i) with *unadjusted* estimates that do not control for time in custody and/or mortality.

iii) Assess the size and nature of differences for various sub-groups of the offender population

iv) Consider the wider implication of these findings to Australian criminal justice policy, evaluation and research.

Method

Data

Data for the study were drawn from the Crime Research Centre's offender database (CRCOD). The database contains de-identified records from the administrative systems of the Western Australian criminal justice system (i.e., police apprehensions, juvenile cautions, police lock-ups, court records, prison and community correction records, and other juvenile justice records). The CRCOD contains complete, linked records of all persons apprehended (and charged) by police from 1984 onwards; all persons serving terms of imprisonment from 1975 onwards; all persons serving community corrections orders from 1984 onwards and all persons admitted into police lock-ups from 1979 to 2005.[1] The CRCOD also contains

[1] Police lock-ups are jails run by police. These are usually located in a police station and are used to detain persons in legal custody. People who have been arrested and charged account for the largest proportion of the lock-up population (82% in 2005); however, drunken detainees (4%), persons on remand (4%) and persons detained on warrants (9%) also spend time in police lock-ups (Loh et al 2007).

linkages to records of juveniles who have either been formally cautioned by police (from 1991 onwards) or diverted into conferencing arrangements (from 1995 onwards).

Data Linkage

The data in CRCOD are linked through the Integrated Numerical Offender Identification System (INOIS) which allocates a unique identification number to each offender, allowing both cross-sectional (inter-agency) and longitudinal tracking (Ferrante 1993). INOIS uses probabilistic data matching techniques to uniquely identify offenders. These techniques date back to the 1960s (Newcombe & Kennedy 1962; Fellegi & Sunter 1969) and have been used to facilitate an increasing number of health and medical research studies (Sibthorpe et al. 1995; Holman et al. 2008). A small but growing number of Australian criminal justice-based studies have also used probabilistic data linkage methods (Ferrante 2009).

As with most probabilistic data matching systems, INOIS tolerates variations in the values of key demographic variables in order to achieve optimum linkage. Variations in demographic data may arise from data processing errors and from the use of information from multiple sources. Variations also arise over time from name changes (e.g. women who marry) and from the use of aliases. Expert judgement is required in developing the linkage strategy, writing the matching rules and setting thresholds for acceptance or rejection of potential links. Some clerical review of doubtful links may also be required, particularly where the decision to accept or reject a given link relies on assessment of conflicting information drawn from several sources or from information collected over an extended period of time. The accuracy of matching results from INOIS has been reviewed on several occasions and linked offender records from CRCOD have been used in a range of criminological studies (Ferrante 2009).

Study Population

Only adult records from CRCOD were included in the study, as there was incomplete data in relation to time spent in juvenile detention facilities. The adult offender population was categorised into three groups so as to assess how the effects of TSIC and mortality might vary across different sections of the offender population. The three groups comprised:

a) EVER ARRESTED – the complete population of adults arrested in Western Australia for the first time since 1 April 1984 (no. of persons=258,077). For each individual, the full arrest history from first arrest to latest known arrest (to study cut-off at 31 December 2005) was assembled and used (no. of events=674,039).

b) EVER ORDERED - all offenders who had ever served an adult non-custodial order in WA from 1984 to 2005 (no. of persons=34,518; no. of events=231,328).

c) EVER IMPRISONED - all offenders who had ever been imprisoned as adults in WA from 1984 to 2005 (no. of persons=17,337; no. of events=167,583).

Recidivism Measurement and Analysis

Consistent with other studies of recidivism, our measure of recidivism was based on re-arrest and the estimation of recidivism was based on survival analysis techniques and the Kaplan-Meier Estimator (KME). Broadhurst and Loh (1995) first applied these methods and measures to the Western Australian offender population more than a decade ago. They estimated the probability of re-arrest to be 0.88 for Aboriginal males, 0.52 for non-

Aboriginal males, 0.85 for Aboriginal females and 0.36 for non-Aboriginal females. Taken as rates of re-offending, the figures suggest that 88% of Aboriginal male offenders, 52% of non-Aboriginal male offenders, 85% of Aboriginal female offenders and 36% of non-Aboriginal female offenders are likely to recidivate in the future.

Broadhurst and Loh (1995) had anticipated these strikingly high and differential recidivism rates, arguing that they reflect the high arrest and incarceration levels, and the gross level of Aboriginal over-representation, that have long been characteristic of the Western Australian criminal justice system. This is supported by evidence elsewhere. Annual reports on government services published by the Steering Committee for the Review of Government Services (SCRGS) consistently show Western Australia to have substantially higher rates of re-imprisonment and return to community corrections than other Australian jurisdictions (see e.g. SCRGS 2009 Tables C.2 and C.3). The same Reports also show exceptionally high rates of incarceration of the Indigenous population in Western Australia, as compared with the non-Indigenous population.

Given these known differentials, our study calculates recidivism rates for each of the four gender-race sub-groups within the offender population. Additionally, we estimate recidivism through the derivation of ultimate probabilities of re-arrest, as per Broadhurst and Loh (1995), as well as at various fixed follow-up times (e.g. at two and five years).

Calculation of Time Spent in Custody

Given the linked nature of data in the CRCOD, it was possible to determine, for each individual offender, any period of time between arrests that was spent in custody (prison time, as well as time spent in police lock-ups). These time periods were factored into recidivism calculations to produce adjusted estimates.

Adjusting for Death of Offenders

With the co-operation of the WA Department of Corrective Services, a large, cross-sectional cohort of offender data was extracted and linked to Registrar-General Death records. Ethical approval to undertake the linkage was obtained from both the University of Western Australia and the WA Department of Health. The linkage was effected by the Data Linkage Unit, Department of Health, using a best-practice protocol designed to ensure privacy protection (Kelman et al. 2002). The linkage follows the precedent set by earlier research studies which have used probabilistic processes to link offender records to health, mental health and related datasets (e.g. Jablensky et al. 2004; Hobbs et al. 2006).

Results

Accounting for TSIC

Table 1 describes the prevalence and magnitude of TSIC for each group. As the table shows, the prevalence of TSIC varies considerably between groups. Approximately 11% of all offenders in the EVER ARRESTED population had spent some time in custody during their criminal careers – either in an adult prison or in police custody (lock-ups).[2] Episodes of incarceration affected 8.4% of all arrests belonging to this offender population. In lay terms,

[2] Almost 50,000 persons were admitted to police lock-ups in WA in 2005. However, for the most part, stays in police lock-up are very short – just one or two days (Loh et al. 2007).

this means that, fewer than one in ten persons ever arrested by police spent any time in custody and, when they did, it was not very often – about once in every 12 arrests.

As Table 1 shows, the prevalence of TSIC is higher for the EVER ORDERED and EVER IMPRISONED populations. More than one-third (36.5%) of EVER ORDERED offenders spent some time in custody. Of their 231,328 arrest events, 13.7% 'contained' an TSIC component[3]. As one would expect, all of the EVER IMPRISONED population had spent some time in custody. Of the arrest events belonging to this group, almost one-quarter (24%) contained an TSIC component. Thus, on average, about one in every four arrests of individuals in the EVER IMPRISONED group was interspersed with a period of incarceration.

Table 1: Prevalence and Magnitude of TSIC, and Prevalence of Mortality, across Various Offender Sub-Populations

Offender Population	Prevalence of TSIC*		Magnitude of TSIC		Mortality
	% of persons	% of arrests	Mean days	NST as % of time b/n arrest events	% of persons
EVER ARRESTED: adult persons ever arrested by police					
MI	43.1%	17.3%	15.7	3.4%	n/n
MN	10.4%	7.0%	9.9	0.6%	n/n
FI	27.7%	13.3%	3.8	0.6%	n/n
FN	5.5%	4.7%	3.3	0.1%	n/n
Total	*11.3%*	*8.4%*	9.3	0.6%	n/n
EVER ORDERED: offenders with adult community-corrections history					
MI	68.1%	20.1%	19.8	7.1%	5.9%
MN	35.1%	12.1%	13.8	2.1%	4.3%
FI	54.5%	16.3%	6.0	1.7%	4.8%
FN	20.5%	9.1%	4.9	0.5%	3.5%
Total	*36.5%*	*13.7%*	13.2	2.2%	4.3%
EVER IMPRISONED: offenders who have spent time in adult prison					
MI	100.0%	25.5%	29.5	10.8%	5.8%
MN	100.0%	23.5%	45.7	7.7%	5.0%
FI	100.0%	24.5%	11.3	3.7%	7.9%
FN	100.0%	22.2%	27.4	4.7%	3.7%
Total	*100.0%*	*24.0%*	37.1	7.7%	5.1%

* TSIC comprises time spent in adult prisons and/or in police lock-ups

n/n = not known, as not all records of arrested persons were linked by the study

MI = Male Indigenous; MN = Male Non-Indigenous;

FI = Female Indigenous; FN = Female Non-Indigenous

[3] By using the term 'contained', we mean that the time between this arrest event and the next arrest event included a period of incarceration.

The magnitude of the impact of TSIC for each of the study sub-populations is also demonstrated in Table 1. As one progressively moves from the EVER ARRESTED to the EVER IMPRISONED population, the extent of the TSIC effect increases. The table also illustrates how TSIC varies *within* populations. For example, within the EVER ARRESTED population, Indigenous male offenders spend longer periods of time in custody (mean TSIC = 15.7 days) than the total population (mean TSIC = 9.3 days).

Accounting for Mortality

Table 1 shows that only a small proportion of offender records linked to death records, despite the population-level nature of the linkage process. Only 4.3% of individuals in the EVER ORDERED cohort and 5.1% of individuals in the EVER IMPRISONED cohort were identified as having died during the study period. A greater proportion of Indigenous offenders than non-Indigenous offenders were found to link to death records (e.g. compare 5.8% of Indigenous males to 5% of non-Indigenous males in EVER IMPRISONED population).

Recidivism Analysis – Effects of Mortality and TSIC

Recidivism estimates were computed at various follow-up times using the Kaplan-Meier estimator. Table 2 presents estimates computed at two years (KME2), as this is typical of the length of follow-up time used in criminal justice research. The estimates represent the probability or likelihood that an individual will be re-arrested with two years of an arrest. Estimates were computed for each of the study populations and for sub-groups within them (e.g. male Indigenous offenders). For each group, an adjusted KME2 was computed which took into account the combine effects of TSIC *and* mortality. This was then compared with an unadjusted KME2. Note that, initially, the impact of TSIC was assessed separately from the impact of mortality. However, little difference was observed when adjustments were made for mortality *only*. To some extent, the negligible effect of mortality was expected, as only a small fraction (4-5%) of offenders in the linkage cohorts actually died during the study period. Analysis over shorter follow up periods also failed to find any effects due to mortality *only*. In other words, adjusting for mortality *over and above* TSIC appeared to have little effect on recidivism estimation. Consequently, the two factors were combined.

Estimates for the EVER ARRESTED and EVER ORDERED groups were also computed but are not presented, as for these groups the difference between estimates was not found to be statistically significant.

Table 2 shows that the adjusted KME2 for Indigenous males in the EVER IMPRISONED population is 0.92. The KME2 estimate represents the probability that an Indigenous male who has ever been imprisoned will be re-arrested within two years of an arrest *net of mortality and time spent in custody*. Thus, for this group, the recidivism rate after adjusting for time in custody and mortality is 92% after two years. Without adjustment, the recidivism rate is 90% after two years. The difference between estimates, which represents the effect of adjusting for both factors, is therefore 2%. For non-Indigenous males, the difference between adjusted and unadjusted KME2 is also 0.02 (0.80-0.78) or 2%. For non-Indigenous females, the difference is 0.01 (0.08-0.79) or just 1%, while for Indigenous females, there is no difference in estimates (both at 0.88). As the results clearly show, for the EVER IMPRISONED group, the effect of adjusting for TSIC and mortality is negligible.

Table 2: Adjusted and Unadjusted Estimates of The Probability of Re-Offending Within Two Years*, for the EVER IMPRISONED Population, by Gender-Race and Other Offender Characteristics

EVER IMPRISONED POPULATION	*Male Indigenous*		*Male Non-Indigenous*		*Female Indigenous*		*Female Non-Indigenous*	
	Adj p	**Unadj p**	**Adj p**	**Unadj p**	**Adj p**	**Unadj p**	**Adj p**	**Unadj p**
Total population	0.92	0.90	0.80	0.78	0.88	0.88	0.80	0.79
Arrest progression								
@ arrest 1-4	0.82	0.81	0.69	0.68	0.74	0.74	0.67	0.66
@ arrest 5-10	0.88	0.87	0.79	0.78	0.84	0.84	0.80	0.80
@ arrest 11-20	0.92	0.90	0.85	0.83	0.91	0.90	0.88	0.87
@ arrest 21+	0.96	0.94	0.91	0.89	0.95	0.94	0.92	0.91
Offence (at prior arrest)								
Violence	0.90	0.87	0.71	0.66	0.89	0.88	0.75	0.73
Burglary/Theft	0.93	0.91	0.85	0.83	0.89	0.89	0.82	0.81
Good order	0.93	0.92	0.83	0.82	0.89	0.88	0.85	0.84
Traffic	0.89	0.88	0.77	0.76	0.83	0.83	0.74	0.73
Other	0.92	0.91	0.77	0.75	0.89	0.89	0.74	0.73
Age-groups								
18-19	0.95	0.94	0.90	0.89	0.92	0.91	0.85	0.85
20-24	0.92	0.91	0.83	0.81	0.90	0.89	0.83	0.82
25-30	0.90	0.88	0.77	0.75	0.87	0.87	0.81	0.80
30-34	0.87	0.85	0.72	0.70	0.85	0.85	0.78	0.78
35+	0.82	0.81	0.60	0.58	0.80	0.79	0.68	0.68

* Probabilities are estimated using the Kaplan-Meier Estimator at two years follow-up (KME2)
Adj p = KME2 adjusted for TSIC and mortality
Unadj p = KME2 without any adjustments for TSIC and mortality

Some slightly larger differences emerge when other characteristics of the EVER IMPRISONED group are considered. For example, when offence type is taken into account, the adjusted recidivism estimate for male non-Indigenous offenders arrested for violent offences is 0.71, but 0.66 if left unadjusted. The difference of 0.05 is the largest variation identified in Table 2 and represents an 'error rate' in recidivism estimation of 7%. In other words, the recidivism rate of violent non-Indigenous male offenders at two years is under-estimated by 7% when the effects of any bias caused by time spent in custody and mortality are ignored.

The 'error rates' for other sub-groups of the EVER IMPRISONED population are depicted in Figure 1. As the figure shows, error rates in recidivism estimation never rise beyond 2 or 3%, except for male non-Indigenous offenders who have been arrested for a violent offence. Thus we can conclude that, except for this group, *adjusting for TSIC and mortality appears to have little effect on the two-year recidivism rates of the EVER IMPRISONED population.*

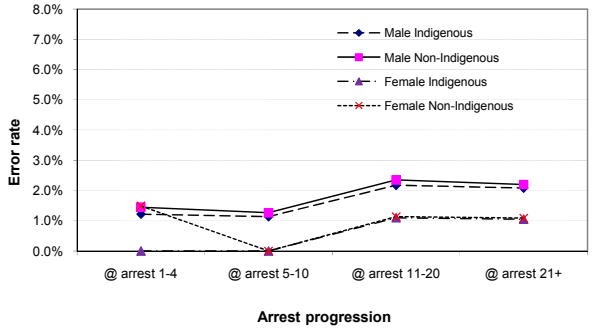
Probability of Re-Arrest within Different Timeframes

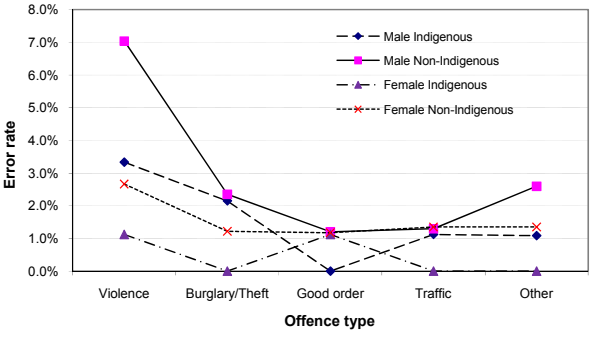
Recidivism estimates were also calculated at shorter follow-up times (from three months to a maximum of two years). Differences between adjusted and unadjusted estimates were found to vary with length of follow-up. Error rates (or, more meaningfully, the extent of *under-estimation* of recidivism) tended to peak at six months follow-up.

At this level of follow-up, the under-estimation of recidivism was 7.6% for Indigenous males, 3.7% for non-Indigenous males, 3.2% for Indigenous females and 3.5% for non-Indigenous females. As previously, under-estimation was found to be greatest for offenders with a significant arrest record (21+ arrests) and for offenders arrested for violent offences – see Figure 2. For the population of male Indigenous offenders arrested for violent offences, the error rate in recidivism estimation was 12.5%. For males offenders with a significant arrest record (21+ arrests), the error rate in recidivism estimation was 9%. Overall, it was found that as the length of follow-up increases, so the difference between adjusted and unadjusted recidivism rate diminishes.

At longer follow-up periods (beyond two years), there was no significant difference between adjusted and unadjusted recidivism estimates.

Figure 1: 'Error rate' or difference between adjusted and unadjusted two-year recidivism estimates, for the EVER IMPRISONED population, by various offender characteristics





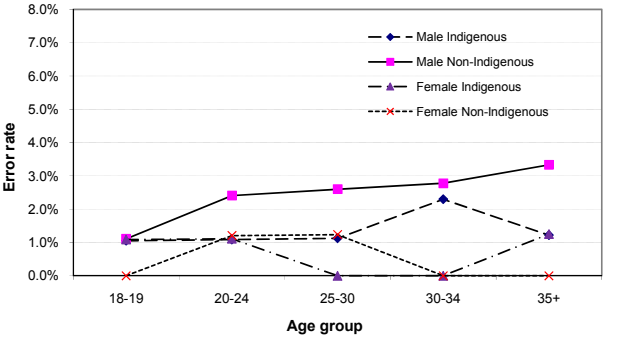
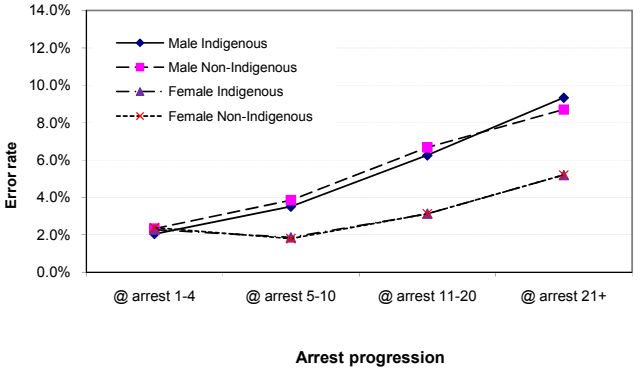
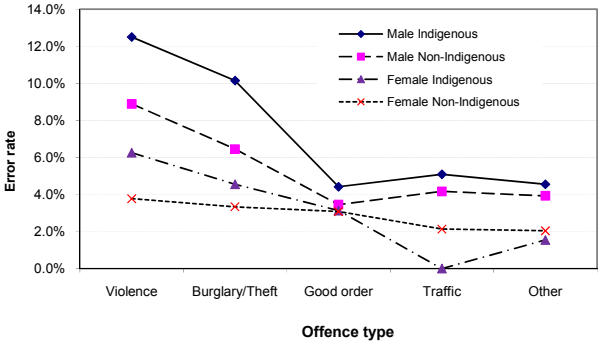
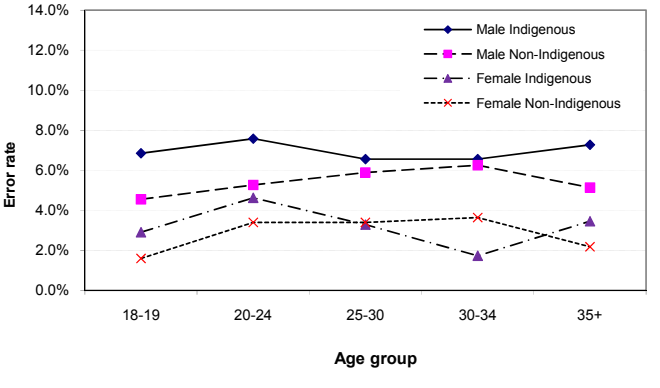


Figure 2: 'Error rate' or difference between adjusted and unadjusted six-month recidivism estimates, for the EVER IMPRISONED population, by various offender characteristics







Discussion

Using population-level data linked at the individual level, the study has systematically examined the effects of time spent in custody and mortality on the estimation of recidivism. In contrast to many previous studies, the study finds that adjusting for time spent in custody and mortality makes little difference to the two-year recidivism rates of large offender groups. This result was anticipated for the general offender population, as the group contains few offenders that have ever spent time in custody. The finding is consistent with that of Harding and Maller (1997) and, like those authors, we concur that this is because the total time spent in custody accounted for too small a proportion of the time being assessed to make an impact on estimates.

However, it was somewhat surprising to find that the recidivism rate of other offender populations, and in particular, the EVER IMPRISONED population, was only moderately affected by the influences of TSIC and mortality. The study anticipated that for a group with heavy involvement in the criminal justice system, with known and not insubstantial accruals of custodial time, and with elevated rates of injury and death, the effect of adjusting for TSIC and mortality might be significant. However, for this group, the 'error rate' in the estimation of recidivism was just 2 to 3%. The 'error rate' was marginally higher for certain sections of the EVER IMPRISONED population such as for non-Indigenous male offenders arrested for violent offence, where the recidivism rate was under-estimated by as much as 7%. Even so, the effects observed were somewhat modest and, again, can be attributed to two factors – the low prevalence and relatively small magnitude of time spent in custody by this offender group.

The study found that under-estimation of recidivism tended to increase over shorter follow-up periods. For Indigenous male offenders arrested for violent offences, the recidivism rate at six months was under-estimated by more than 12% if TSIC and mortality were not taken into account.

For researchers, practitioners and evaluators who work with certain segments of the offender population, the study's findings have relevance in that they provide evidence that without controlling for time spent in custody, recidivism estimates *for some groups* could be under-estimated by as much as 12%. While this may not seem a large figure *per se*, when applied in a practical setting or in an evaluation of the effectiveness of a program or intervention, it may mean the difference between action and inaction or between program success and failure. It would be prudent, therefore, for researchers and practitioners to consider making appropriate adjustments, *where relevant,* when estimating recidivism in future evaluations.

Overall, however, the small-sized effects of TSIC and mortality should provide reassurance that current methods of estimating *population-level* recidivism rates are adequate and do not require wholesale re-calibration in order to improve their accuracy. In short, TSIC and mortality have been shown to be important but not critical factors in the development of accurate and robust population-level models of re-offending.

Broader Policy Relevance

The study's finding that only modest adjustments to recidivism rates result from controlling for time spent in custody may provoke thinking about penal policy and the incapacitative effects of imprisonment. Given that adjustments for time spent in custody appear to have little or no effect on recidivism estimates, it is tempting to conclude that incapacitation may

be ineffective in reducing re-offending. However, such a conclusion would be premature. In reality, the modest effects observed have more to do with factors such as the low prevalence and small magnitude of TSIC than any limitations of penal policy. On this point, the results suggest that a potentially massive scale of increase in prevalence of imprisonment would need to be required if incapacitation were to be effective *at a population level*. While it was beyond the scope of the current project to follow this particular line of enquiry, there is clear potential for further research which might investigate and measure the incapacitation effects of incarceration.

In academic circles, a lot has been made of time spent in custody and its implications with respect to the estimation of recidivism and other criminal career dimensions. On the evidence presented here, it would appear as though those effects may be over-stated. At a population level, the under-estimation of rates does *not* appear to be large enough to warrant wholesale reconstruction of recidivism databases or an investment in linkages to better account for TSIC and mortality. This does not mean, though, that TSIC and mortality should be dismissed as important factors in the design and construction of models of re-offending, rather that they are important only some of the time and under certain circumstances. This study has been important in defining just those times and circumstances.

High Recidivism Rates in Western Australia

It is likely that some readers may find themselves more interested in the recidivism rates *per se* than in the bias issue which has been the focus of this article. The recidivism rates presented here may appear surprisingly high but are consistent with those estimated previously, based on the near same population in Western Australia (e.g. Broadhurst & Loh 1995). An important point to keep in mind is that, in both studies, the estimates are based on re-arrest and, as such, are likely to be higher than any rates based on re-conviction and/or re-imprisonment. Unfortunately, no comparable arrest-based recidivism estimates are available from other Australian jurisdictions. Consequently, it is difficult to assess whether (and to what extent) the findings from this study can be applied elsewhere. As discussed earlier, it is likely that recidivism rates estimated for Western Australia are higher than those found in most other Australia states, owing to the elevated levels of arrest and incarceration in the state, particularly with regards to the Indigenous population. This, in itself, may make a difference to the generalisability of findings and provides reasonable grounds for further research – either by way of replication studies in other locations or via studies that measure the effects of mortality and TSIC on alternative measures of recidivism (such as those based on reconviction).

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References

ABS 2005 *The National Information Development Plan for Crime and Justice Statistics (Cat No 4520.0)* Australian Bureau of Statistics Canberra

Biles D, Harding R & Walker J 1999 'The deaths of offenders serving community corrections orders' *Australian Institute of Criminology, Trends and Issues* vol no 107

Blumstein A, Cohen J, Roth J & Visher C 1986 *Criminal Careers and "Career Criminals"* National Academy Press Washington DC

Broadhurst R & Loh N 1995 'Re-arrest Probabilities for the 1984-1993 Apprehended Western Australian Population: A Survival Analysis' *Journal of Quantitative Criminology* vol 11 p 289

Eggleston E, Laub J & Sampson R 2004 'Methodological Sensitivities to Latent Class Analysis of Long-Term Criminal Trajectories' *Journal of Quantitative Criminology* vol 20 p 1

Fellegi I & Sunter A 1969 'A theory for record linkage' *Journal of the American Statistical Society* December

Ferrante A 1993 'Developing an offender-based tracking system: the Western Australia INOIS Project' *Australian and New Zealand Journal of Criminology* vol 26 p 232

Ferrante A 2009 'The Use of Data-Linkage Methods in Criminal Justice Research: A Commentary on Progress, Problems and Future Possibilities' *Current Issues in Criminal Justice* vol 20 p 378

Graham A 2003 'Post-prison mortality: unnatural death among people released from Victorian prisons between January 1990 and December 1999' *Australian and New Zealand Journal of Criminology* vol 36 p 99

Harding-Pink D & Fryc O 1988 'Risk of death after release from prison: a duty to warn' *British Medical Journal* vol 297 p 596

Harding R & Maller R 1997 'An Improved Methodology for Analyzing Age-Arrest Profiles: Application to a Western Australian Offender Population' *Journal of Quantitative Criminology* vol 13 p 349

Hobbs M, Krazlan K, Ridout S, Mai Q, Knuiman M & Chapman R 2006 'Mortality and morbidity in prisoners after release from prison in Western Australia: 1995-2003' *Australian Institute of Criminology, Research and Public Policy Series* vol no 71

Holman C, Bass A, Rosman D, Smith M, Semmens J, Glasson E, Brook E, Trutwein B, Rouse I, Watson C, Klerk Nd & Stanley F 2008 'A decade of data linkage in Western Australia: stategic design, applications and benefits of the WA data linkage system' *Australian Health Review* vol 32 p 766

Jablensky A, Morgan F, Morgan V, Valuri G & Ferrante A 2004 'Psychosis, crime and first onset of schizophrenia: a population-based study' *Schizophrenia Research* vol 67(Suppl. 1) p 9

Kelman C, Bass J & Holman D 2002 'Research use of linked health data: A best practice protocol' *Australian and New Zealand Journal of Public Health* vol 26 p 251

Lattimore P, Linster R & MacDonald JM 1997 'Risk of death among serious young offenders' *Journal of Research in Crime and Delinquency* vol 34 p 187

Laub J & Vaillant G 2000 'Delinquency and Mortality: A 50-year follow-up study of 1,000 delinquent and non-delinquent boys' *American Journal of Psychiatry* vol 157 p 96

Loh N, Maller M, Fernandez J, Ferrante A & Walsh M 2007 *Crime and Justice Statistics for Western Australia: 2005* Crime Research Centre University of Western Australia

Maller M 2002 'A Risk Assessment Model for Offender Management - The Adult Actuarial Risk Instrument (AARI)' ICCA (International Community Corrections Association) Conference, Boston, November 2002

Maltz MD 1984 *Recidivism* Originally published by Academic Press Inc Orlando Florida <www.uic.edu/depts/lib/forr/pdf/crimjust/recidivism.pdf>

Newcombe H & Kennedy J 1962 'Record Linkage: Making Maximum Use of the Discriminating Power of Identifying Information' *Communications of the ACM* vol 5

Paanila J, Hakola P & Tiihonen J 1999 'Mortality among habitually violent offenders' *Forensic Science International* vol 100 p 187

Payne J 2005 *Final report of the North Queensland Drug Court evaluation* Australian Institute of Criminology, Technical and background paper No 17

Payne J 2007 *Recidivism in Australia: findings and future research* Australian Institute of Criminology, Research and Public Policy Series No 80

Putkonen 2001 'Female homicide offenders have greatly increased mortality from unnatural deaths' *Forensic Science International* vol 119 p 221

SCRGS 2009 *Report on Government Services 2009* Steering Committee for the Review of Government Service Provision, Productivity Commission, Canberra

Sibthorpe B, Kliewer E & Smith L 1995 'Record linkage in Australian epidemiological research: Health benefits, privacy safeguards and future potential' *ANZ Journal of Public Health* vol 19 p 250