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Using Criminal Career Data in Evaluation

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Abstract

Outcome measures, such as reconviction rates, are becoming increasingly useful in judging effectiveness of offender programmes. In England and Wales the Offenders Index and the Police National Computer are the major sources of criminal career information. Our approach to using data from these sources in evaluation work and performance monitoring will be described. This will be illustrated by results from national performance monitoring of the probation service and an example of how these data have been used in a research study. Steps we are now taking to improve data access for evaluators will be described.

Background

The Home Office has now adopted aims focused on *outcomes* rather than *outputs*. This reflects a growing emphasis on *evidence-based policy*. Meta-analytic reviews, that bring together results from many, mostly North American, studies, have appeared (e.g. Andrews et al (1990)). They point to particular types of structured programme being effective in reducing reoffending (see Vennard et al, 1997). These results have spurred work to develop new offender programmes run in England and Wales. An accreditation panel was established in 1999 to accredit both prison and probation offender programmes. The system of accreditation will be underpinned by the body of research evidence available on "what works" in reducing reoffending, and by results from evaluation of programmes seeking accreditation.

Government efforts to gauge the cost-effectiveness of the three-year £250 million Crime Reduction Programme also add to the demand for evaluation of new approaches being developed around the country. To this end, RDS has recruited many new research staff, and is awarding research contracts to academics and other external agencies.

One key measure of programme effectiveness is the reconviction rate. A major study by Lloyd et al (1994) discusses the difficulties in using reconviction information as an outcome measure. Reconviction is not the same as reoffending and can also be influenced by the local practice of the police and other CJS agencies in securing convictions. Factors such as clear-up rates, cautioning rates and the extent to which police will take no further action where a crime may have taken place will influence reconviction rates. Reconviction information is, nevertheless, very important in any credible assessment of programme effectiveness. It will also form an important element in monitoring of Home Office aims to reduce levels of repeat offending.

Sources of Data on Criminal Careers

Researchers in England and Wales are fortunate in having not one, but two, systems for accessing information on criminal careers of offenders. These are the Home Office Offenders Index (OI) and Phoenix (the Police National Computer - PNC).

Offenders Index

The OI is the main system used by the Criminal Careers Section of the Home Office's Research Development and Statistics Directorate (RDS). The Home Office Offenders Index (OI) holds criminal history data for offenders convicted in England and Wales for standard list offences since 1963. Standard list offences consist of all indictable offences and some of the more serious summary offences.

The OI was created purely for research and statistical analysis. Its sole purpose is to provide criminal history data on selected samples of offenders. At any time data held on the OI is 6 to 9 months in arrears. Advances over the last four years have tripled the capacity of the OI. RDS can now trace criminal career information relating to more than 200,000 offenders per year. This has allowed increases in the size of samples drawn for the Home Office's own performance monitoring and regular statistics. Kershaw (1999a) reports on recent results obtained from samples of prisoners released in 1994 and for those sentenced to other disposals. These technical advances have also increased RDS's capacity to provide data to external researchers.

Redevelopment of the OI during 2000 will offer further options to researchers. Data on cautions, and offence dates, (currently only available from the PNC - see below), will be added to the OI. Technical improvements should increase the capacity and speed of the system. Userfriendliness of the OI will also be improved, with the provision of spreadsheet-based aids to providing input files and receiving output files.

Police National Computer

Until 1998 it was a very laborious process to extract information from PNC. This was unfortunate as the PNC contains a wider range of data than the OI. From November 1995 onwards, police forces started to add information on police cautions as well as convictions. The coverage of offences is broader than for the OI as it covers all offences for which a custodial sentence is possible (standard list offences are listed in appendices 4 and 5 of Home Office, 1999) and information is recorded on co-offenders.

A significant advantage of PNC (over the OI) is that it records the date an offence actually took place. The OI only records the date the sentence or order was passed at court. Thus PNC permits more detailed examination of patterns of offending, including the timing of offences. Furthermore, when evaluating the effect of sentences and programmes it can identify 'pseudo-reconvictions' (Lloyd et al, 1994). Pseudo-reconvictions are reconvictions that occur early in a follow-up period but which relate to offences committed *before* the follow-up period. RDS have estimated that at the one year point after commencing a community penalty, that around a quarter of those who have been reconvicted will have been reconvicted for offences committed prior to the community penalty. Identification of pseudo-reconvictions in the PNC data makes it more defensible and feasible to use short term follow-up periods for interim evaluations.

RDS have worked with the Police Information Technology Organisation (PITO) to produce a system for generating computerised extracts of criminal career data held on the PNC. RDS have also devised a system for translating PNC codes, so that versions of PNC extract files can be produced that follow a similar format to OI output files and use the same coding structure.

However, a disadvantage of PNC, for the time being at least, is that information can only be extracted where the PNC-ID number or CRO (Criminal Record Office) number for an offender is known. (This contrasts with the OI where searches can be made using information on

name, initials, date of birth and gender.) The current limitation of the PNC extract system to offenders with known PNC-ID or CRO numbers does significantly reduce the scale and number of research studies for which a PNC search can be undertaken. In order to obtain information from PNC, researchers are advised to record PNC-ID in the course of their studies. (In addition to the use of PNC information for research studies, probation services and prisons are accessing PNC to obtain antecedents on clients and inmates.)

Another point to bear in mind is that information on PNC is 'weeded' to remove records which are no longer of any interest to the police. The main area of concern is the deletion of records for offenders who have not been convicted within the last 20 years nor cautioned within the last 5 years, and who satisfy a number of other conditions concerning age and previous offences, disposals and mental health status. Records are also deleted one year after the death of an offender. Long-term follow-up studies will be affected in particular.

Finally, there have been concerns about data quality on PNC (see Russell, 1998). These have focused particularly on the time it has taken police forces to enter data on reconvictions onto the PNC. ACPO (Association of Chief Police Officers) have now set targets that forces enter reconviction data within two months of a conviction. PITO have been monitoring timeliness of data entry and significant improvements have been made by some of the worst performing forces. Following PITO advice, a two month 'buffer period' for reconvictions to reach the PNC has been adopted for interim evaluations. Using this buffer period provides more rapid results than are possible with the 6 to 9 month timelags associated with OI data. RDS recognise that more work needs to be done to assess the quality of PNC before it is used more widely, and will commission research into PNC and OI data quality during 2000 (to be completed in 2001).

Issues to be Considered when Interpreting Reconviction Rates

Care must be exercised when drawing inferences from reconviction rates. Lloyd et al (1994) indicate the importance of making an adjustment for the effects of pseudo-reconvictions when comparing reconviction rates for different disposals. There tend to be more pseudo-reconvictions for community penalties than for custody (outstanding cases can be dealt with during a prisoners stay in custody). When comparing two year overall reconviction rates for community penalties with analogous rates for custody a downward pseudo-reconviction adjustment on the community penalty rate of around four percentage points is required.

It is important to have some way of predicting reconviction outcomes from background characteristics of offenders. Lloyd et al (1994) and Kershaw (1999b) discuss the characteristics, or factors, that affect reconviction; these are, in particular, the number of previous convictions, current offence, age and gender. As an example, Figure 1 illustrates the variation in reconviction rates by original offence group for prisoners discharged in 1995. Reconviction rates for sexual offenders tend typically to be relatively low and those for burglars tend to be relatively high. Reconviction rates also tend to decrease as the age of the offender increases and offenders with a high number of previous convictions tend to have higher reconviction rates.

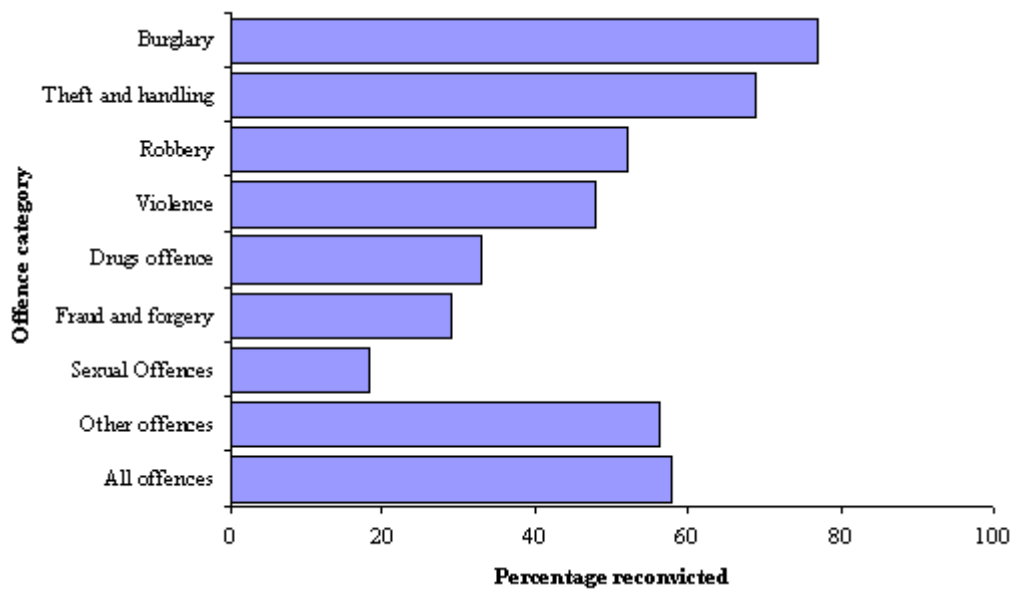


Figure 1: Percentage of prisoners reconvicted within two years of discharge in 1995, by original offence

Reconviction rates for particular disposals or offender treatment programmes have descriptive value, but do not necessarily indicate the effect of the programme. As reconviction rates are heavily influenced by the characteristics of the offenders these must be 'controlled for' before conclusions can be drawn about the programme.

Access to Criminal Career Data

In recent years technical advances have made it easier for RDS to provide OI access to researchers working outside the Home Office. Those requesting data from the OI are required to provide a detailed written explanation of how they intend to use the data and what they are hoping to gain from it. For medical based studies details of the ethics committee approval is requested.

Recipients of data from the OI are also asked to sign a declaration that they will not use OI data for any other purpose and ensure that only authorised personnel have access to the data. The results of research must not be made available in a form, which enables any offender to be identified. RDS now asks for feedback, as a matter of course, on the purposes for which the information was used or whether any useful conclusions which have been drawn from it. We are interested in any findings, whether published or not. Similar procedures are followed if PNC data is requested.

In almost all cases, researchers supply RDS with a list of details (name, date of birth, gender and Criminal Record Office number if known) relating to offenders to be traced on the OI. The list of offenders has to be supplied to RDS in a specified format (failure to follow this format has delayed work on some studies). PNC searches are more difficult to mount as the PNC-ID or CRO number for offenders needs to be known. At present it would be difficult to give a PNC based study high priority if this information is not supplied.

RDS has been able to accommodate most requests from researchers for OI data. One of our main concerns is that OI data should not be used for purposes other than statistical analysis or research (this would breach our data protection registration). We have, for example, turned down a request from a practitioner to use OI data relating to offenders that he had supervised. Although the data was to be used as part of a research project, it was felt that there was a danger that the data could influence the way in which individual offenders were supervised. RDS has worked with existing users of the OI to further improve access. Many recipients of OI data had been reporting difficulties in the data, due to its complex hierarchical structure and detailed coding structure. Early in 1999 an Offenders Index User Group was established with an associated website:

<http://www.mailbase.ac.uk/list/oi-users/>

Information relating to the OI is posted at the website, including the Offenders Index users guide (Kershaw and Goodman, 1999). This guide contains guidance for researchers on the interpretation of Offenders Index data. It also contains SPSS code, devised by members of the OI user group, that shows how the hierarchical datafiles generated by OI searches can be analysed using SPSS. Kershaw (1999b) also describes the background history of Home Office reconviction studies and discusses in detail factors to be taken account of in interpreting reconviction rates.

The Criminal Careers Section has devised a system for "flattening" OI output files. These flattened files substantially reduce the work involved in undertaking a standard analysis of reconviction results. The files contain summary information on age, gender, current offence, previous criminal history and date of any reconviction. They also contain a predicted chance of reconviction based on OGRS. Given the variability of reconviction rates by factors such as age, offence and previous criminal history it is very important that information on predicted reconviction rates is used in making judgements about effectiveness. Even where predicted rates are available it is also important to ensure some form of control or comparison group. This and other important factors to consider are discussed in guidance for researchers in Kershaw and Goodman (1999). RDS has also developed further guidance for the conduct of offender programme evaluations: see Colledge, Collier and Brand (1999). An RDS guidance note on obtaining PNC data is available on request.

Evaluation

Two examples are given to illustrate the role of criminal careers data and prediction models in monitoring performance and in evaluating initiatives and interventions. The first concerns monitoring the performance of the probation service, the second examines an initiative to help prisoners to gain employment on release from prison.

Example 1: National Performance Monitoring for the Probation Service

The main ways in which RDS have made adjustments for the effect of offender characteristics on reconviction rates are illustrated by the model fitting undertaken for the probation service Key Performance Indicator 1 (KPI 1). KPI 1 has been calculated on an annual basis since 1994. The target for KPI 1 is 'to maintain actual reconviction at a rate lower than predicted'. To do this the most recent reconviction rates are compared with what would be predicted on the basis of results for an earlier time period.

The prediction model used for KPI 1 is similar to that used for the Offender Group Reconviction Scale (OGRS). Copas and Marshall (1998) describe the development of OGRS.) The KPI 1 model used nine factors:

- number of previous occasions on which the offender was convicted,

- age at sentence
- type of offence
- sex
- age at first offence
- rate at which the offender has acquired convictions (as defined for OGRS)
- the number of prior prison sentences an offender has had under the age of 21
- the number of prior prison sentences an offender has had at age 21 or over
- the primary clear-up rate for the local police force

The clear-up rate is for the year following commencement of the order and relates to the force that brought the original charges. Different regression slopes for the effect of age at sentence were used within the model for those aged under 21 and those aged 21 and over at sentence. In addition, type of disposal was included as a factor. This enabled each disposal to be compared for the first quarter of 1995 with 1993. The results are *not* designed to enable direct comparison of the relative effectiveness of disposals. Comparisons are made over time *within* disposal rather than *between* disposals. Fitting a 'disposal effect' also means that no pseudo-reconviction adjustment is necessary.

The following table gives KPI 1 results for offenders commencing community penalties in the first quarter of 1995. The prediction model is based on offenders commencing orders or discharged from custody in 1993. In effect, results for 1993 are compared with those for the first quarter of 1995.

First quarter of 1995	Community service order	Probation centre specified activities ²	Other probation ³	Combination order
% reconvicted ¹	43.7	59.1	55.0	54.3
predicted ⁴ % reconvicted	42.9	59.1	56.0	54.6
Difference ⁵	+0.8	+0.0	-1.0	-0.3
Variability of the difference ⁶	±0.8	±1.7	±0.9	±1.4
Base ⁷	13751	2962	11212	3988

1 Reconviction rates exclude breach proceedings and offences added to the "standard list" in 1995 and 1996. They are not adjusted to take account of pseudo-reconvictions; this does not alter differences between predicted and actual rates as the model fits separate disposal effects.

2 These are probation orders with probation centre or specified activity requirements.

3 This consists of probation orders without probation centre or specified activity requirements.

4 The model for prediction is based on 1993 results.

5 Sometimes the difference is not equal to the difference of the rounded values due to the rounding to one decimal place.

6 The variability is twice the standard error of the difference. This is an indicator of the degree of variation one might expect by chance. It indicates the approximate bounds for a 95% confidence interval.

7 The base is the number of offenders commencing a community penalty in the first quarter of 1995.

Table 1: Two year Reconviction Rates¹ for the community service, probation and combination orders

For combination orders and probation with probation centre or specified activity requirements the difference between the actual and predicted rate is well within the range for chance variation. The reconviction rate for 'other probation' is 1 percentage point below predicted, this being outside the range for chance variation. For community service the rate is 0.8 percentage points above predicted, this being at the boundary of the range expected due to chance variation.

Home Office (1999) contains similar information on reconviction rates at the regional and local level. For commencements in the first quarter of 1995 the overall reconviction rates are highest in the North, Wales and North West regions (62, 57 and 56% respectively) and lowest in the West Midlands, South East and London regions (47, 47 and 44% respectively) (see Figure 2). These differences can be partly accounted for by differences in predicted rates.

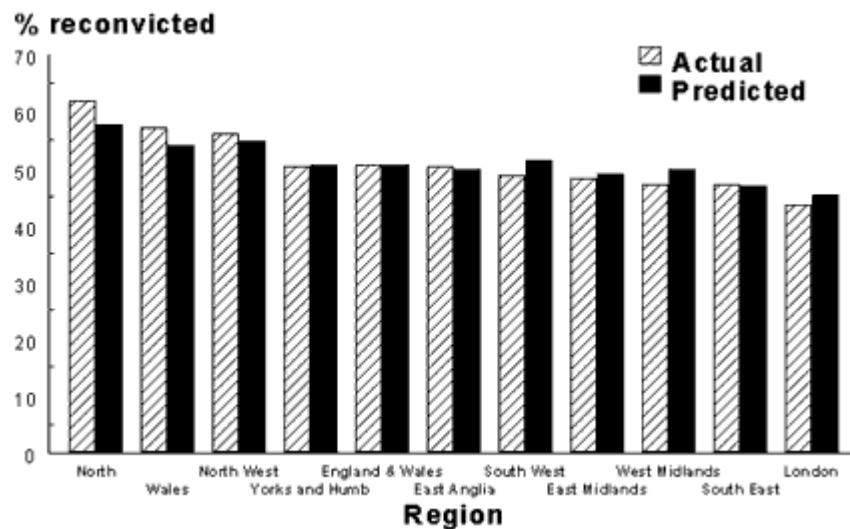


Figure 2: Actual and predicted two year reconviction rates for offenders commencing probation, CS and combination orders in the first quarter of 1995 by region

For first quarter of 1995 commencements the overall rates were above the range for chance variation (ie. outside a 95% confidence interval) for three areas and below this range for four areas. Regional factors may influence results (corresponding regional rates are above the range for chance variation for the North, North West and Wales regions and below for the London, South West and West Midlands regions).

Factors such as police clear-up rates, social conditions and CPS success in prosecuting cases are likely to affect regional variations in reconviction rates. The model that produces predicted rates makes allowance for the nature of offenders commencing orders. It is known, for example, that a large number of previous convictions, being male and young are all associated with higher reconviction rates. Attempts were made to use various locally available statistics in developing the KPI 1 model. The extent to which such statistics accounted for local variation in the model was very limited and it was decided that the clear-up rate was the only locally available statistic that warranted inclusion.

The absence of any effect of other local factors might be considered surprising. However, past criminal history, which is very influential in predicting reconviction rates, is, itself, influenced by local conditions. It may be, therefore, that past criminal history acts as a proxy for many local factors. For example, offenders in an area with a low clear-up rate are likely to have a lower chance of reconviction than those in an area with a high clear-up rate. However, for this reason, they are likely to have fewer previous convictions and this would result in a lower predicted rate from application of the model.

Figure 3 illustrates the pattern of results at the probation area level. Differences in predicted rates account for much of the difference between the probation areas with the highest and lowest reconviction rates. It is clear that the prediction model enables better understanding of differences in reconviction rates between areas. The predicted reconviction rate gives an indication of the reconviction rate that one might expect for offenders commencing orders in a particular probation area. For most probation areas the differences between actual and predicted reconviction rates lie within 95% confidence intervals. However, eight of the 55 areas do lie outside this range (more than the two or three that might be expected according to chance). Three of the eight areas had lower than predicted reconviction rates and 5 had higher than predicted rates. However, bearing the above caveats in mind, these results should not be interpreted as proving that any particular probation area has 'good' or 'bad' performance. They do, however, raise important issues warranting further explanation or investigation in cases where the rate differs significantly from that predicted. It should also be noted that any differences between actual and predicted rates would be more difficult to detect for the smaller probation areas.

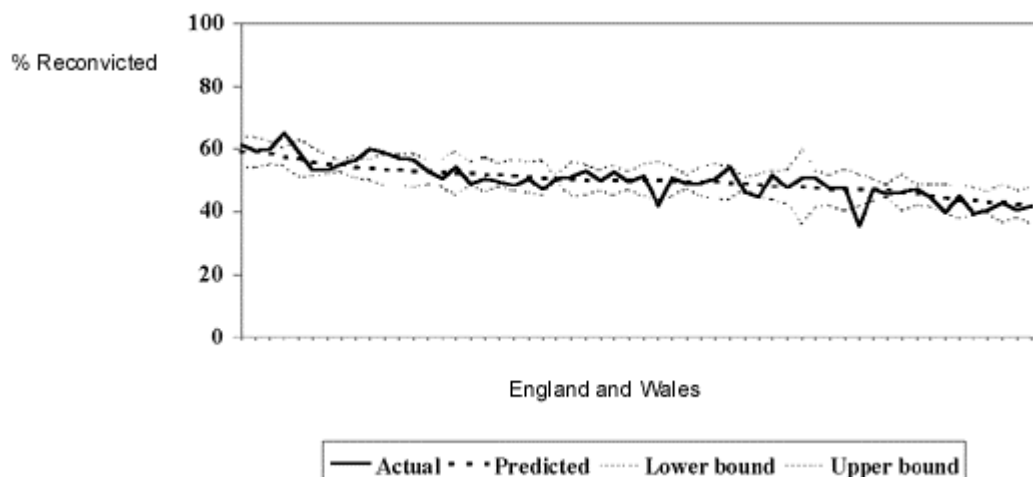


Figure 3: Actual and predicted two year reconviction rates for offenders commencing community penalties in 1995

Example 2: Prison Welfare to Work evaluation

Welfare to Work for Prisoners is a voluntary, non-selective programme for 18-24 year old prisoners in England and Wales (there is a similar scheme in Scotland) who are approaching the end of the custodial part of their sentences. It offers two months of basic education and vocational training, leading towards accredited certification, psychometric testing, careers advice and the booking of a Jobseekers Allowance interview to be held soon after discharge (a New Deal Gateway interview should quickly follow this). The programme ties in with the overall New Deal programme, which aims to improve the employability of 18-24 year olds. Ex-offenders are one of the groups eligible for entry into the New Deal Gateway without a 6 month qualifying period of unemployment.

The Prison Service started to pilot the scheme in eleven establishments, mostly Young Offender Institutions, in April 1998. The scheme now runs in a further three establishments. The evaluation is currently being undertaken by RDS. Information in this paper is based on interim findings.

The interim evaluation focused on offenders who completed the programme by the end of March 1999 ('completers'), and their contemporaries who could have completed the programme but were unable or unwilling to start ('non-starters') or complete it ('non-completers'). These are together known as the pilot group. They are compared with a control group of similar (though not matched) offenders who were discharged from the pilot establishments between March and May 1998, just before the pilot group. The whole of the pilot group is analysed, in order to negate selection effects which could determine the composition of its three subgroups - the pilot group as a whole proved to have similar characteristics to the control group.

As well as the reconviction analysis discussed here, the study will examine the Prison Service's ability to run the programme, how well prisoners transfer to the New Deal Gateway entry and their subsequent employment progress.

Data Capture

Data on each offender's personal background and characteristics, activities and behaviour while in custody, discharge preparations and Welfare to Work participation was collected by pilot establishments on paper forms. Information on previous criminal history was extracted from the OI, and on reconviction from the PNC. The two month 'buffer period' for data to reach the PNC (discussed earlier) was observed.

Reconviction Rates

With exact dates of discharge and reconviction, together with the ability to screen PNC data for pseudo-reconvictions, reconviction rates can be calculated for multiple time periods, as shown in Table 2.

PNC Data	Control Group	Completers	Non-completers	Non-starters	All Group	Pilot Group
After 2 months	778	566	174	316	1056	
Number eligible reconvicted	19 2.4%	23 4.1%	11 6.3%	5 1.6%	39 3.7%	

After 3 months	778		458		144		247		849	
Number eligible reconvicted	56	7.2%	34	7.4%	18	12.5%	18	7.3%	70	8.2%
After 4 months	778		351		104		173		628	
Number eligible reconvicted	117	15.0%	43	12.3%	20	19.2%	23	13.3%	86	13.7%
After 5 months	778		220		72		99		391	
Number eligible reconvicted	161	20.7%	26	11.8%	21	29.2%	17	17.2%	64	16.4%
After 6 months	778		107		33		42		182	
Number eligible reconvicted	207	26.6%	23	21.5%	10	30.3%	8	19.0%	41	22.5%

Table 2: Reconviction 2 - 6 months after discharge, Police National Computer

The pilot group when considered as a whole had slightly inferior reconviction rates within very short follow-up periods, but had slightly superior outcomes in the 5 and 6 month periods (where the numbers involved are smaller due to the wide range of discharge dates of pilot group offenders). The high reconviction rate of the 'non-completers' and the low reconviction rate of the 'non-starters' may reflect differences in composition between the three pilot subgroups. None of the differences between the pilot and control groups are statistically significant. A PNC extract will be drawn for the final evaluation, and should trace around 2,300 pilot group members to one year after discharge.

Logistic Regression Modelling

To control for differences in offender characteristics logistic regression is also being used in the evaluation. A logistic regression model has been fitted to interim results. Past criminal history, based on information from the OI, was included in the regression. Not all prisoners could be traced in the OI. This reduced the numbers from 960 to 737, and slightly increased the overall reconviction rate from 26% to 28%.

The model produces a prediction of the probability that each offender will be reconvicted within six months of discharge. The small number of pilot group members meant that any pilot group effect would be difficult to detect. Demographic, criminal history and social variables were included in the model. A number of other variables, including social variables, were finally selected, as Table 3 shows:

Variable	Parameter estimate	Standard error	p-value
Intercept	-2.883	0.382	.000
RATE of offending (as per OGRS)	0.0242	0.0054	.000
Most recent offence is theft/handling	0.931	0.274	.001
Has dependent children	-0.436	0.234	.068
Prison Service sentence planning substance abuse predictor:			
Medium-high or high risk	0.665	0.281	.018
Information not available	0.462	0.239	.053
No fixed abode upon discharge	0.468	0.180	.009
Job or study arranged upon discharge	-0.724	0.281	.010

Table 3: Logistic regression model of reconviction within 6 months of discharge

The probability of reconviction is calculated as follows:

$$\text{Probability} = \frac{e^{\sum (\text{variable} \times \text{parameter estimate}) \text{ for all variables}}}{1 + e^{\sum (\text{variable} \times \text{parameter estimate}) \text{ for all variables}}}$$

P-values are included for guidance only, as some factors proved to be slightly inter-correlated.

One diagnostic statistic indicating how well models predict reconviction is called the 'percentage correctly predicted'. If x% are actually reconvicted, one would calculate this statistic by predicting that the x% of offenders with the highest predicted chance of reconviction would be reconvicted and that the rest would not be reconvicted. This is then compared with the actual outcome. Providing the risk level for offenders is reasonably evenly spread across the range 0 to 100 percent, it can be shown that the upper limit for this statistic is close to 75%. The model fitted here correctly predicted 69 per cent of outcomes, a reasonable fit for reoffending data.

Social variables were found to be important and were included in the model. This finding is contrary to other, previous, studies which indicated only a limited role for social variables in predicting outcomes. May (1999) is typical. In his study he found social variables to be significantly related to reconviction but that their effect in *improving upon* predictions based on criminal history and demographic variables was modest. The greater apparent importance of social variables in this Welfare to Work evaluation may reflect the care that was taken in ensuring consistent coding of the social variables. (May was reliant on information previously gathered by probation services.)

Further analysis will be undertaken for the final evaluation. Longer follow-up periods will be used, which will better reflect the continuing effect of the programme as well as allowing more time for cases to be processed through the criminal justice system.

Although logistic regression has been used in this evaluation, survival analysis is being used increasingly in developing prediction models in reconviction research. Survival analysis utilises information on the time interval to reconviction within the follow-up period. It is thus a potentially more powerful tool than logistic regression which merely considers the binary outcome of whether or not reconviction occurs. Details of survival analysis can be found in Tarling (1993) and an example of its application can be found in Copas, Marshall and Tarling (1996). Survival analysis may become particularly useful in evaluating programmes which are expected to delay the onset or resumption of offending, rather than permanently preventing it. Cost-benefit analysis may also be used to evaluate the benefits of programmes that reduce the frequency and seriousness of reoffending, whether or not there are changes in overall reconviction rates. Colledge, Collier and Brand (1999) offers general guidance.

Conclusions

In the preface to Lloyd et al, (1994), Tarling remarked that 'reconviction rates are one of the key tools of criminology', but for many years little evaluative work was undertaken in the UK that made use of reconviction information. This situation has changed rapidly. As well as the central initiatives described above many more local evaluations are now taking place. Hough and Chapman (1998) provide extensive guidance of the principles that underpin effective practice with offenders and how quantitative evaluation of programmes can be undertaken. The drive to demonstrate *outcome* effectiveness of offender programmes has been accompanied by rapid improvement in the availability of research data on criminal careers. There is a growing need for application of quantitative techniques in evaluation. These developments provide criminologists with new opportunities for research and new challenges. Results from performance monitoring and evaluation work have indicated that reconviction prediction models are required in order to interpret results. The opportunity to discover 'what works' in reducing reoffending has now been enhanced by the development of prediction instruments such as OGRS and the increased availability of social variables and reconviction information. These can be used in combination with qualitative research methods to aid evaluation of the effectiveness of programmes.

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