The Effects of DNA Evidence on Sexual Offence Cases in Court

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Introduction

This study aims to assess how forensic deoxyribonucleic acid (DNA) evidence assists decision-makers in sexual offence cases, in decisions to prosecute, decisions to plead guilty and how it assists juries and judges in decisions of guilt or innocence. Its association with custodial penalties is also examined. The primary method relied on was an archival study of case records. This involved comparing the characteristics of criminal case records from two different categories, those that were referred to the forensic laboratory, and for which a scientist provided a sworn court statement that associated the defendant with either the complainant or the crime scene, and similar cases for which no DNA evidence was presented in court. The differences that DNA evidence made, if any, were then assessed by comparing the characteristics of the DNA group cases to the control group at the various decision-making stages, while allowing for the other evidentiary and extra-legal factors that influenced case outcomes.

Background and Rationale

DNA profiling was first used in the Narborough Village murders in the UK in the mid 1980s. Since then, it has evidentially linked suspects to crime scenes by matching a range of biological samples. Until recently, DNA evidence has been utilised in major crimes such as homicides and sexual offences where body fluid samples were obtainable. Progressive advances in the sensitivity of DNA testing may now allow traces as small as a single cell to be profiled (The University of Queensland 2000:23). The establishment and use in Britain since 1995 of a DNA database is claimed by UK police for having had an important role both in the reduction of overall crime rates and in the increased detection rates in some regions for such volume crime offences as burglaries and car theft (Gunn 1998:10). At the time of writing, the CrimTrac national investigation DNA database (NCIDD) is in the process of being established in Australia. In Queensland, the Police Powers and Responsibilities Act 2000 that facilitates the taking of DNA from suspects through buccal swabs or hair samples, became effective from 1 July 2000 (Green 2000; Mobbs 2001). This replaced the earlier more cumbersome legislation in s259A of The Criminal Code of Queensland that provided for extraction of blood on the order of a magistrate where police held 'reasonable suspicion'.

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Much media hyperbole has heralded the CrimTrac database and Queensland's DNA legislation, almost suggesting DNA profiling as a panacea for crime (e.g. 'Hi-tech key to beating crime' in *The Sunday Mail* August 1999). Anecdotal evidence abounds attesting to the proficiency of DNA profiling,

its use in numerous countries, and its effects on individual criminal cases (Inman & Rudin 1997; Connors et al 1996). Numerous texts and articles are also available on the science of forensic DNA profiling, while the legal profession and civil rights proponents have been well catered for by way of cases that have created precedents, journal articles, research studies and opinions from the bench (National Research Council 1996; The Royal Commission on Criminal Justice 1993; Hocking et al 1997; National Institute of Justice 2000; Saul 2001).

However, what is noticeable in the literature is the dearth of objective in-depth quantitative assessments of the role of DNA profiling from a criminological perspective. That is, studies which explore, through the use of empirical data, the impact of the routine application of DNA evidence at the various stages throughout the criminal justice process. Criminological studies might ask such questions as: What weighting can be attributed to DNA evidence compared to suspects' confessions or eyewitness accounts? Does DNA evidence act to increase the proportion of guilty pleas in sexual offence cases? What effect, if any, does DNA evidence have at the sentencing stage?

Only empirical studies of case histories can provide answers to such questions — answers that will help assess the effectiveness of DNA evidence, its impact on decisions to legally charge; on decisions on whether to proceed with the matter to court; on the decisions by the accused about pleading guilty; and its effect on court decisions about guilt or innocence, and on sentencing types and severity. Such an assessment should be of value to forensic laboratory managers, police, justice practitioners and policy makers.

Court Outcomes: Theoretical Considerations

Theories have been postulated on the relative strengths of legal and extra-legal factors as influences on court outcomes. According to the approach favouring the predominance of legal factors, court decisions rely on the evidence presented in court. In turn, the rules of evidence determine which facts are admissible to be presented (Eggleston, 1978: 43-63). Social theorists, alternatively, place the court process in a broader social milieu and propose that extra-legal factors including income level, race, ethnic and cultural background and sex of all court participants can influence access to courts and court decisions (White and Perrone, 1997: 91-101). The counter-argument to this is that the rules of evidence exist to minimise the influence of social factors, through, for example, the careful selection of jurors, the admissibility of evidence and controls on questions by the prosecution and the defence.

While the reality of which factors predominate may lie in some combination of evidentiary and sociodemographic variables, the emphasis in this study is on assessing the position of DNA evidence in relation to other factors in the determination of the guilt or innocence of an accused, and its relationship, if any, to sentencing. This study therefore examined the effect of forensic DNA in comparison to some other types of court evidence, such as defendant confessions, testimony of independent eyewitnesses and photographic and fingerprint evidence. To allow for any possible contribution by social influences to court decisions, a number of demographic variables for defendants and complainants, such as age, sex, race and more, were collected for each case sampled, and then tested for significance while developing a statistical model. Although previous research has included the effect of other variables, such as the sexual experience and the physical attractiveness of the victim, and the effects on court outcomes of cross-racial rapes (Field 1979), the present research utilised data that was available and considered most relevant to the offences studied.

Hypotheses to Test

Based on previous research (Peterson et al 1984, 1987; Taupin 1994) and on the possibility that DNA evidence could contribute to the efficiency and effectiveness of the court processes, it was decided to test the following hypotheses:

- That a higher proportion of cases reach court where DNA evidence is presented by prosecutors;
- That more guilty pleas result where suspects are confronted with DNA evidence associating them with complainants or crime scenes;
- That a significant relationship exists between DNA evidence implicating the accused and the likelihood of a conviction;
- That incriminating DNA evidence is associated with more custodial penalties;
- That longer custodial penalties are imposed where incriminating DNA evidence is presented.

The hypotheses relating to the sentencing phase were included as a result of studies on the effects of forensic evidence in the United States prior to the use of forensic DNA testing. These studies concluded that 'forensic science reports and testimony have their greatest impact at the time of sentencing, when convicted defendants are more likely to go to prison and for longer periods of time where scientific evidence is presented' (Peterson et al 1987:1730).

Method

To analyse the effects of DNA evidence on the court process, a sample of 200 sexual offence cases was selected. As the study was based in Queensland, cases within the state's jurisdiction were chosen because of the convenient availability of records. However, the findings may well be transposed to jurisdictions with a similar English-based adversarial legal system. Conditional ethical permissions were obtained from Queensland Health, whose Forensic Biology Section conducts forensic DNA analysis for cases throughout the state, and from the Queensland Police Service where the evidentiary and sociodemographic data was obtained through the Police Information Centre. Sentencing information was obtained from criminal history records, also held in the Police Information Centre.

From the forensic laboratory files, 102 sexual offence cases were selected, along with a control group of 98 similar types of sexual offence cases chosen through a search of computerised police records. This sample population of 200 cases was found to be of sufficient size in relation to the number of predictor variables to allow significant relationships to be calculated statistically (Tabachnick & Fidell 2001:521–522). The DNA cases covered offences that occurred between 5 July 1994 and 9 October 1999. The latest date was the most recent case for which court results were available when data were collected in 2001. Proceeding back in time, every available DNA case file was then scrutinised and included if it met the further selection criteria until a sufficient number of cases were obtained. To maintain parity with the DNA group, the non-DNA cases were then chosen from within the same time bracket (to place them in a contemporaneous social and legal environment) and to meet the same criteria except for the second.

The selection criteria were:

- that the cases be completed so that they could be tracked to finality in the justice process, that is, to the appeal stage in the courts;
- that a forensic laboratory scientist had produced a sworn court statement in which the defendant was associated through DNA profiling with either the complainant or the crime scene;
- that no defendants were subject to penalties for juveniles (which can be different from those for adults);
- that police and court records could be located;
- that none of the cases involved the issue of consent at the time of the police investigation.

The last criterion was included because the Forensic Biology laboratory refuses to test evidence in cases where suspects were recorded by police as admitting intercourse or penetration, as DNA evidence would be of no probative value — that is, DNA evidence would act only to confirm admissions by the suspect and should make no discernable difference to case outcomes. If done, such testing would place an unnecessary burden on scarce laboratory resources. Cases selected therefore involved a range of other circumstances: where defendants had made full admissions to police and confessed; where defendants denied being involved in the alleged offence; where suspects refused interviews with police or chose to make no statement (and therefore it was unknown if consent would be used as a defence). When some of these latter cases eventually reached court, the issue of consent, or belief in consent, was raised as a defence.

Other cases eligible for selection involved intellectually impaired complainants legally incapable of consent; criminal paternity cases; incidents where witnesses attested to non-consent; offences where complaints included domestic violence separation orders being breached; indications such as forced entry to dwellings where the offence occurred; victim assault injuries that were obvious to police or were medically diagnosed, torn clothing or bruising (collectively termed 'tangible evidence' as a statistical category in this study); stranger sexual assault, and cases involving serial offenders. Eligible for inclusion too, were cases where complainants were minors. These constitute 58 per cent of reported Queensland sexual offence victims (Legosz 1999: vii). A Victorian study of 311 rape cases referred to the DPP by police in 1988–89 found that only 30 of those cases (10 per cent) were defended in the county court using consent or belief of consent as a defence (Law Reform Commission of Victoria 1991:39, 86). Cases selected for inclusion in the present research would therefore constitute a significant majority of reported sexual offence cases regarded as solved by police.

The control group was selected firstly by assigning Crime Classification Codes as determined by the Australian Bureau of Statistics Australian National Classification of Offences to cases in the DNA group, based on the type of Most Serious Offence (MSO) reported in the incident. This resulted in cases being classified into eight types of offences. An equal percentage of similar offences with no DNA evidence presented was then located in each of the eight categories, so that parity of the two groups was achieved at the time of commencement of tracking the cases from the time of charging. For example, 71 per cent of the DNA cases had rape as the MSO, so reported rapes constituted 71 per cent of the cases selected without DNA evidence. Inevitably, variations occurred in the type or severity of charges laid as some of the cases progressed through the justice process, causing a slight divergence between the two groups. Reasons for this included the Office of the Department of Public Prosecutions (DPP) altering charges from those initially preferred by police, magistrates varying charges as they committed cases to the district courts, and the reductions through charge bargaining.

As all cases in the DNA group involved male defendants, control group cases were also matched on this criterion, as female defendants may have fared differently in the justice system. The non-DNA cases also approximated the DNA cases on a geographical basis, both groups being similarly distributed throughout police districts in the state. Several hundred sexual offence cases were scrutinised in order to generate a suitably matching non-DNA group. It should be noted that the control group was not intended as a random sample, as was the DNA group (within the limits of the selection criteria), but rather, as a selection with characteristics matched to the DNA group in order to minimise any biases.

An important element of parity between both groups in the sample was a rating for the seriousness of the offences and for the number of charges laid when cases reached their final court hearing. This measure was of interest in order to pre-empt the possibility that only more serious incidents were referred for DNA testing. The eight level scale of offence seriousness, where eight was the highest in the hierarchy of offences (rape) and one was the lowest (indecent assault of an adult) was constructed based on the Australian Bureau of Statistics 'order of seriousness of offence types' as set

out in Appendix 6 of the Queensland Government Statistician's publication *Crime and Justice Statistics, Queensland, 1997* (1998:58, 59):

1. Indecent assault of an adult
2. Sexual offence consent prohibited
3. Indecent treatment of a child
4. Assault with intent to rape
5. Attempted rape
6. Incest
7. Unlawful carnal knowledge
8. Rape.

The mean value of 'seriousness', based on the charges finally faced in the district courts, was calculated on this eight level scale. For DNA cases this value was 6.75 and for non-DNA cases 7.29. These values were considered sufficiently close to achieve valid results, with the non-DNA cases, in fact, rating a higher degree of seriousness. For DNA cases the average number of charges laid was 3.30, while for non-DNA cases the average figure was slightly higher at 3.42 charges. Typical examples of secondary charges in rape incidents were indecent assault, common assault and deprivation of liberty. These same offence categories were used in a study of the general statistical characteristics of reported sexual offences in Queensland by the State's Criminal Justice Commission (Legosz 1999:45–46).

The distribution of case seriousness was skewed heavily towards the more serious end of the scale, with 142 of the 200 selected cases (71 per cent) being finally charged as rape offences in the district courts. DNA technology achieved results in rape cases both because of the physical suitability where offenders' bodily fluids such as semen were detected, and because of the seriousness of the offence, which encouraged police to refer such cases to the laboratory. This skewed distribution was closely mirrored in the non-DNA group, where 74 per cent of the cases selected were finally charged as rape offences. The study was unable to account for any charge bargaining or plea-bargaining, and any effects on this of DNA evidence, as the records accessed did not include such details. However, it was found that in nearly all cases the most serious charge faced by the accused in court was the same as that originally laid by police. For the purposes of the later logistic regression analysis (Table 5), the eight-scale rating for the seriousness of the offence was collapsed into binary form. Offence types were therefore recoded as 'other than rape' = 0 and 'rape' = 1.

A listing of descriptors of the independent or predictor variables for the cases sampled is set out in Table 4.1, along with their means and standard deviations where meaningful. The independent variables are divided into four general categories: complainant variables, offence variables, evidence variables and defendant variables. Apart from where indicated on the table, most predictor variables were dichotomous, with the value of one reflecting inclusion in the category. As not all data were available for every case, one column indicates the number of cases for each variable where data could be located. The first variable listed relates to whether the complainant is male or female. This variable was ascertained in all 200 cases; the mean of 0.04 indicates that eight complainants were male (and the remaining 192 female); SD is the standard deviation, and the minimum value of the variable is 0 (female) while the maximum is 1 (male).

Two variables were initially coded as scale variables: defendant race and defendant statement. The former used a three-part classification for race: Caucasian, Aboriginal or Torres Strait Islander (Indigenous) and Other. These were recoded dichotomously using dummy variables by classifying defendants as Caucasian or not (1 or 0), Indigenous or not (1 or 0), and so on. Similarly, the four scale classification for defendant statement was recoded onto "confession or not" (1 or 0), "denied committing offence" or not (1 or 0) and so on. The ages of the complainant and defendant at the time

of the offence were initially recorded in years. These were also later collapsed into binary form, with median ages of 17 and 26 as the divide. Hence for complainants, 17 years or fewer were coded as 0, 18 years or more as 1. No breakdown of complainant race is provided, but this did not affect any later analyses. It was outside the scope of this research to assess the relative effect on guilty pleas or on jurors of the different DNA profiling systems, like the AmpF/STR Profiler Plus Amplification Kit, used from 1997, versus the technology it superseded, such as the British STR Quadruplex. Other studies have examined the effect of DNA match statistics on jurors (see for example, Britton, R., 1998; Koehler, J., 2001a and 2001b; Schklar, J. and Diamond, S., 1999). Cases profiled using alternative systems were differentiated in this study, however, and data recorded for possible future comparative research.

To gauge the effects of DNA evidence on the various decision-making stages in the courts, a multivariate technique, as described by Poulos (1993), was employed that allowed the simultaneous assessment of a large number of theoretically relevant variables. The purpose of this analysis was to develop a model that would allow a comparison of the predicted probabilities of case outcomes for given case scenarios either with DNA evidence or without. For all outcomes examined, excepting the length of custodial penalty, the dependant variables were dichotomous as follows:

1 .Whether the case reached court (coded as 1) or did not (coded as 0);
2. Whether the accused pleaded guilty (coded as 1) or did not (coded as 0);
3. Whether the accused was found guilty through jury trial (coded as 1) or was not (coded as 0);
4. Whether a custodial penalty was imposed (coded as 1) or was not (coded as 0).

A series of bivariate analyses was conducted firstly, to explore the relationship between each predictor variable and the dependent variables. These were followed by logistic regression analyses to provide likelihood ratios and predictor equations, and by a multiple regression analysis to estimate penalty amounts.

Table 1: Independent Variables Examined--200 Sex Offence Cases

Variable Name	No of valid cases	Mean	SD	Min	Max
Complainant Variables					
Complainant is male (0 = female; 1 = male)	200	0.04	0.20	0	1
Complainant age at time of offence (years)	197	21.88	13.6	4	86
Comp. race	197				
Complainant influenced by alcohol or drugs (0 = not influences; 1 = influenced)	183	0.22	0.42	0	1
Complainant disabled/ intellectually impaired (0 = not impaired; 1 = impaired)	200			0	1
Offence variables					
Most serious offence charged 0 = Other than rape 1 = Rape	200 58 (29%) 142 (71%)	0.71	0.45	0	1
Number of charges in court (scale variable)	198	3.36	2.93	1	21
Evidence variables					
Fingerprint evidence(1 = present)	196	0.06	0.24	0	1
Photographic evidence (1 = present)	196	0.50	0.60	0	1
Tangible evidence(1 = present)	196	0.19	0.39	0	1
DNA evidence (1 = present)	200	0.51	0.50	0	1
Independent witness(es) (1 = present)	198	0.11	0.32	0	1
Defendant variables					
Defendant age at time of offence (years) Less than 25 years old 26 years old or more	200 60 (30%) 140 (70%)	31.49	10.7	13	64
Deft employed when arrested (1 = employed)	192	0.47	0.50	0	1
Defendant race 0 = Caucasian 1 = Indigenous 2 = other	200 136 (68%) 46 (23%) 18 (9%)				
Defendant is male (1 = male)	200	1.00	0.00	0	1
Defendant statement: 0 = denies committing offence 1 = makes no statement/ refuses interview 2 = makes some admissions 3 = confesses to offence	162 42 (26%) 66 (41%) 23 (14%) 31 (19%)				
Defendant has prior convictions	180	0.23	0.42	0	1
Complainant-defendant relationship 0 = Complainant and defendant strangers 1 = Complainant and defendant acquainted 2 = Complainant and defendant familial	192 29 (15%) 126 (66%) 37 (19%)				

Table 2: Bivariate Pearson Correlation Coefficients between Dependent and Independent Variables – Court Processing of 200 Sexual Offence Cases

Independent Variables	Disposition		Court Outcome	
	NETO or Nolled[1]	Reached Court	Guilty Plea	Convicted by Jury
Complainant age	0.013	-0.013	-0.159*	0.305*
Complainant sex	0.026	-0.026	0.018	-0.032
Comp. used alcohol	0.172**	-0.172**	-0.185**	-0.337*
Comp. disabled	0.095	-0.095	-0.034	0.049
Complainant race	-0.004	0.004	-0.038	0.091
Assoc. forensic report	-0.077	0.077	0.014	-0.020
Non-assoc forensic rpt	0.025	-0.025	-0.065	0.133*
Tangible evidence	-0.115	0.115	0.114	0.272*
DNA evidence	**-0.135***	**0.135***	**0.035**	**0.290***
Defendant age	0.000	0.000	-0.055	-0.010
Deft employment	0.006	-0.006	-0.103	-0.137
Deft. Caucasian race	-0.027	0.027	0.023	-0.051
Deft ATSI race	-0.041	0.041	0.008	0.200
Deft other race	0.105	-0.105	-0.050	-0.200
Deft confessed	-0.037	0.037	0.299**	0.191
Deft made admissions	-0.103	0.103	-0.026	0.040
Deft denies offence	-0.095	0.095	-0.131	0.146
Deft no statement	0.155*	-0.155*	-0.104	-0.278*
Prior offence record	0.009	-0.009	0.023	0.177
Prior relation to comp	0.095	-0.095	-0.003	-0.339*
Deft-comp strangers	-0.073	0.073	0.002	0.416**
Independent witness	0.022	-0.022	0.026*	-0.145
Number of charges	0.009	-0.009	0.073	0.049
Most serious offence	0.209 **	-0.209**	-0.392**	-0.239

*p < .05; **p < .01.

[1]NETO is 'no evidence to offer' by prosecutor in the magistrates court. Nolle is a *nolle prosequi* decision by the Office of the Department of Public Prosecutions.

Results of Statistical Analyses

Table 2 presents the bivariate Pearson correlation coefficients examined to determine the significance of these relationships. For the first outcome, whether or not cases reached court, four variables were significantly correlated. The "p" values, or probability that the result is due to chance, were set at the conventional significance levels of 0.05 and 0.01. The values of the Table 4.2 variables in the first column relate to whether the case reached court or alternatively, if it did not proceed. In the District Court, the latter occurs when prosecutors enter a *nolle prosequi*, and in the Magistrates Court when there is "no evidence to offer" (NETO). These four variables were, in decreasing order of strength,

seriousness of the offence, use of alcohol or drugs by the complainant, the defendant making no statement to the police, and use of DNA evidence. While DNA evidence had a positive correlation with cases reaching court, the other significant variables maintained a negative correlation. That is, for example, if the complainant had used alcohol or drugs, the case was less likely to reach court through a NETO or *nolle prosequi* being entered.

The second outcome, examining whether or not the defendant entered a plea of 'Guilty', produced five independent variables that were significantly correlated. The strongest of these was seriousness of the offence (negative), and a confession to the police by the defendant (positive). Use of alcohol or drugs by the complainant was again a significant factor, making it less likely to produce a guilty plea from defendants. For a third possible result, cases in which the accused faced a jury trial and was convicted, seven independent variables were significantly correlated. A second group of correlations was calculated for the sentencing phase. However, because additional independent variables had arisen from the previous court decisions that might affect sentencing, their descriptions are provided in Table 3. These new variables were whether the accused pleaded guilty or, alternatively, was found to be guilty by a jury. For completeness, statistical descriptors for cases that reached court were included.

Table 3: Additional Independent Variables for Court Examined — 200 Sexual Offence Cases

Variable	No of cases (N)	Mean	SD	Min	Max
Reached court	200	0.80	0.40	0	1
0 = NETO or Nolle prosequi	40				
1 = Reached court	160				
Guilty plea	190				
0 = Does not plead guilty	103				
1 = Pleads guilty	87	0.46	0.50	0	1
Jury decision	47	0.57	0.50	0	1
0 = Discharges	20				
1 = Convicts	27				
Unknown if guilty plea or trial	10				
Court outcome	200	0.61	0.49	0	1
0 = Not guilty	78				
1= Guilty	122				
Custodial penalty	200			0	1
0 = Not imprisoned	94				
1 = Imprisoned	106				
Penalty amount (years)	106	5.79	4.09	0.17	15

Bivariate correlations for the next court stage, sentencing, are displayed in Table 4. These display the correlations between the independent variables and the sentencing outcomes.

Table 4: Bivariate Pearson Correlation Coefficients Between Dependent and Independent Variables — Sentencing Stage Sexual Offence

Independent Variable	Custodial Penalty or otherwise	Length of Penalty if custodial
Complainant age	0.131	0.283**
Complainant sex	0.086	0.031
Comp. used alcohol/drugs	-0.079	-0.041
Complainant disabled	0.006	-0.037
Complainant race	0.054	-0.043
Assoc forensic report	0.035	0.109
Non-assoc forensic rpt (photos)	0.249**	0.174*
Tangible evidence	-0.026	0.133
DNA evidence	**0.187***	**0.203***
Defendant age	0.283**	0.113
Deft employment	-0.001	0.014
Deft Caucasian race	-0.065	-0.089
Deft ATSI race	0.001	0.080
Deft other race	0.118	0.026
Deft confessed	-0.110	-0.020
Deft made admissions	0.101	-0.107
Deft denies offence	0.142	0.115
Deft no statement	-0.108	-0.011
Prior offence record	0.191*	0.367**
Prior relation to comp	0.016	-0.269*
Comp-Deft strangers	0.150	0.349**
Independent witnesses	0.080	0.025
Number of charges	0.171*	0.160
Guilty plea	-0.133	-0.246**
Jury case (N = 47)	0.190*	0.246**
Seriousness of offence	0.238**	0.330**

*p < .05; **p < .01.

Following these bivariate analyses, multivariate analyses were conducted. The purpose of these was to predict the odds for outcomes at each decision making stage, controlling for all relevant independent variables. For all outcomes except the final one, length of custodial penalty, logistic regression was used because the dependant variable was dichotomous. Standard multiple regression was used to analyse penalty amount. To be meaningfully interpreted, the model allows for the calculation of the conditional probability of the outcome for an accused at each stage, given the case characteristics (Poulos 1993:21).

Table 5 shows the results of the logistic regression analyses. Logistic regression models were created using SPSS version 9.0 for Windows software. Significant variables from the bivariate analyses were entered or removed one at a time. The only independent variables retained were those statistically significant below the 0.10 level while interacting with one another in the regression model.

Table 5: Significant Predictor Variables from Logistic Regression Analysis

Court Process	Predictor	Beta	Odds ratio
Reached Court (N = 200)	Deft. makes no statement or refuses interview	-0.87*	0.42
	Most serious offence	-1.64*	0.19
	DNA evidence	0.74	2.09
	Constant (B_0)	2.84**	
	81% cases correctly classified		
	Pseudo R^2=15%		
	^{2}=15.7**		
Guilty Plea (N = 143)	Defendant confesses to police	1.63**	5.09
	Most serious offence	-1.84**	0.15
	Constant (B_0)	0.82*	
	73% cases correctly classified		
	Pseudo R^2=29%		
	^{2}=37.5**		
Jury finding (N = 47)	Complainant used alcohol or drugs	-3.40*	0.03
	Tangible evidence	3.22*	25.03
	DNA evidence	3.50*	33.14
	Deft. makes no statement	-2.12	0.12
	Constant (B_0)	0.15	
	72% cases correctly classified		
	Pseudo R^2=53%		
	^{2}=18.3%		
Custodial penalty (N = 122)	Non-associative forensic report (photos etc)	1.56*	4.75
	Defendant age (0 = 25 or less; 1 = 26yrs+)	2.30**	10.02
	DNA evidence	1.27*	3.56
	Most Serious Offence	1.21	3.35
	Constant (B_0)	-1.31**	
	88% cases correctly classified		
	Pseudo R^2=36%		
	^{2}=28.8**		

P* < .05; **p < .01.

In Table 5 the 'Predictor' column displays the independent variables that most strongly influence the court process listed in the left column. The 'Beta' column shows the logistic regression coefficient, while the 'Odds ratio' is the exponentiate of the Beta value. The 'Odds ratio' indicates the likelihood of a particular outcome where a designated variable is present in a case. For example, a case is more than twice (2.09 times) as likely to reach court when incriminating DNA evidence is presented

than when it is not. For variables with a negative regression coefficient (negative Beta value), it can be predicted that where the suspect makes no statement or refuses a police interview, the case has less than half (0.42) the chances of reaching court than where the suspect exercises another interview option. Similarly, for cases of rape, the odds of reaching court are only about one-fifth (0.19) those for lesser offences.

'Cases correctly classified' gives a percentage of how accurately the model will correctly classify cases overall. For example, in 100 cases where we know the age of the accused, whether photographs or videos were used in court, and if DNA evidence were available, the model would correctly predict for 88 cases whether the offender would be incarcerated. The fact that the model does not correctly classify 12 per cent of the cases indicates that the decision to imprison is based on additional pieces of information not included in the logistic regression model. These may include other known independent but non-significant variables, or other facts considered by the sentencing judge that did not fit into the variable categories allotted. A pseudo measure of explained variation (Nagelkerke R2) is provided, and for guilty pleas this was 29 per cent. DNA evidence demonstrated no significant effect in sexual offence cases on inducing guilty pleas. This finding was foreshadowed by the low bivariate correlation coefficient of 0.035 in Table 2. The Table does, however, reflect the fact that when a confession is made to police it will act strongly as a precursor to a plea of guilty.

Where DNA evidence did assume its greatest strength was in its influence on jury decisions. A jury was more than 33 times more likely to convict where prosecutors produced DNA evidence than when no DNA results were admitted in evidence. This was followed by tangible evidence (injuries, bruises and so on), the use of which improved the odds of a jury conviction 25 times. The two other significant variables affecting jury decisions acted, when taken positively, to acquit the accused. The Beta values of -3.4 and -2.12 have odds ratios of 0.03 and 0.12 respectively. Thus, when the complainant was influenced by drugs or alcohol, a jury was almost 30 times more likely to acquit. In cases where a suspect made no statement to police (and often this was found to be on legal advice) and had time to compile a defence, usually based on the consent issue, the odds of the jury acquitting were improved eight-fold.

In the sentencing phase, DNA evidence was a significant but weak predictor of custodial penalties, while the defendant's age, classed as either under or over 26 years, was the strongest predictor. As with all statistical analyses involving causal inference, particularly in which one variable is an outcome, the usual cautions, that the variable does not necessarily cause the outcome, apply. Hence, while photographic and DNA evidence are significantly associated statistically with custodial sentencing, they may not necessarily be factors considered by sentencing judges. Instead, photographic evidence may have been garnered where violence was used, which in turn led offenders to be imprisoned. Similarly, both photographic and DNA evidence were found through bivariate correlations in a sample to be strongly associated ($p < .01$ — not shown in Tables) with immediacy of reporting the offence (within 3 days). When combined with other evidence of a recent nature, this improved the chances of a successful prosecution (Legosz 1999:vii, 15–17). The mechanism that links DNA evidence and sentencing may be a topic for further research. Table 6 gives examples to illustrate the effects of DNA evidence as a statistical predictor of the conditional probability of cases reaching court, of jury convictions, and of custodial sentencing. To calculate the conditional probability for a dichotomous outcome when individual case characteristics are known, the formula used is:

$$\text{Probability} = \frac{1}{1 + e^{-\text{logit}}}$$

where the logit = $B_0 + B_1X_1 + B_2X_2 + B_3X_3 \ldots + B_kX_k$. B is the Beta value from Table 5, with B_0 the constant. Case examples demonstrating both significant and minor differences forensic DNA can make to case outcomes are shown in Table 6.

Table 6: Conditional Probabilities of court outcomes for various case characteristics.

Predictor	**Logit** $B_0 + B_1 \ldots + B_i$	**Probability** $1/1 + e^{-logit}$
Whether case reaches court		
Case 1 characteristics:		
Defendant makes no statement to police		
Charged with rape		
Without incriminating DNA evidence	0.33	0.25
With incriminating DNA evidence	1.07	0.74
Case 2 characteristics:		
Defendant consents to police interview		
Charge other than rape		
Without incriminating DNA evidence	17.12	0.95
With incriminating DNA evidence	35.87	0.97
Jury Decision of Guilty		
Case 3 characteristics:		
Complainant intoxicated at time of incident		
Tangible evidence (injuries, bruising, forced entry)		
Defendant makes no statement to police		
Without incriminating DNA evidence	-2.15	0.10
With incriminating DNA evidence	1.35	0.79
Case 4 characteristics:		
Complainant not intoxicated at time of incident		
Tangible evidence (injuries, bruising, forced entry)		
Defendant makes no statement to police		
Without incriminating DNA evidence	1.25	0.78
With incriminating DNA evidence	4.75	0.99
Custodial Penalty		
Case 5 characteristics:		
Photographic evidence		
Defendant 26 years or older		
Charged with rape		
Without incriminating DNA evidence	3.76	0.98
With incriminating DNA evidence	5.03	0.99
Case 6 characteristics:		
No photographic evidence		
Defendant 25 years or younger		
Charged with rape		
Without incriminating DNA evidence	-0.10	0.47
With incriminating DNA evidence	1.17	0.76

Predicting Court Outcomes

Table 6 illustrates how DNA evidence had pronounced effects on whether a case reached court and whether a jury found the accused guilty, and was a predictor of whether custodial penalties would be imposed. If the case configurations are known, the calculations of conditional probability offer answers to questions such as 'Will the case reach court?', 'Will a jury convict or exonerate?' and 'Will a custodial penalty be imposed?'. Pairs of cases in Table 6 illustrate how, in some circumstances, DNA evidence will alter the court outcome prediction, while in other cases, DNA will make little difference. Case scenarios with conditional predictions for guilty pleas are omitted, as DNA evidence had no noticeable effect on this outcome.

In Case 1, where the defendant was charged with rape and made no statement to police, or refused a police interview, incriminating DNA evidence made the difference between whether the case reached court or not. The inclusion of DNA evidence increased the conditional probability from 0.25 to 0.74. That is, the probability altered from being unlikely to being likely, as the value was enlarged to exceed the 0.5 threshold. In Case 2, however, the addition of DNA evidence to the prosecution case made little difference to whether the case reached court, as the conditional probability value increased only from 0.95 to 0.97. The model correctly classified 81 per cent of cases.

With jury decisions, in Case 3, incriminating DNA evidence, along with physical evidence of bruising, injuries, or forced entry to dwellings, caused the conditional probability of a guilty finding to increase from 0.10 to 0.79 in cases where the complainant was intoxicated at the time of the incident. That is, the addition of DNA evidence changed the predicted verdict from not guilty to guilty. In Case 4, however, with similar characteristics except that the victim was not intoxicated, DNA evidence did not alter the predicted finding of guilt, although it increased the conditional probability from 0.78 to a near certainty of 0.99. The model correctly classified 72 per cent of cases decided by juries. Lastly, in predicting a custodial penalty for a rape offence in Case 5, DNA evidence acted in concert with photographic evidence and with the age of defendants (over 26 years) to make little difference (0.98 to 0.99) in the predicted outcome of imprisonment. In Case 6, on the other hand, with no photographic evidence presented and the defendant younger than 25 years old, DNA evidence increased the conditional probability of imprisonment for a rape charge from 0.47 to 0.76. The model for predicting custodial penalty correctly classified 88 per cent of cases.

Effects of DNA Evidence on the Length of Sentence

To assess the impact of DNA evidence on the length of custodial penalty imposed, a multiple regression technique was used, as the dependent variable is a continuous one. The technique selected was standard or simultaneous regression as it allowed the entry of all significant independent variables into the regression equation simultaneously, so that the relationship between the predictors and the dependent variable could be examined. The independent variables predicting length of penalty were: seriousness of the offence, a prior record of serious convictions, DNA evidence and if the offender were unknown to the victim. These factors all acted to increase the penalty. Values in the model summary were:

Multiple correlation coefficient, R = 0.66
R squared = 0.43
Adjusted *R* squared = 0.40
Standard Error of Estimate = 3.89.

Multiple R^2 (0.43) represents the proportion of variance predictable in the dependent variable from the regression equation. That is, all of the independent variables taken together explain 43 per cent of the variance in length of incarceration and the value is highly significant.

Table 7: Regression Coefficients for Penalty Amount — Sexual Offences

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)*	1.36	0.69		1.98	0.051
DNA test*	1.37	0.67	0.17	2.05	0.043
Prior recorded serious offences**	3.19	0.72	0.35	4.42	0.000
Defendant unknown to victim — stranger rape**	3.52	0.77	0.37	4.57	0.000
Most Serious Offence type**	2.89	.66	0.35	4.38	0.000

Dependent Variable: Penalty amount in years. *p < .05, **p < .01

In Table 7, the Standardised Coefficient Beta value for DNA evidence of 0.17 indicates that the inclusion of incriminating DNA evidence will, on average, be associated with a two month increase in custodial sentence. Other factors found to increase sentence length include prior recorded serious offences, seriousness of the offence and if the offender were unknown to the victim — as in 'stranger rape'. Although it was found associated with reduced sentence length, as can be seen in Table 4, a guilty plea was not calculated as statistically significant below the .05 level in the multiple regression analysis, and so this factor was not included in Table 7.

Analysis and Discussion: Findings in Relation to the Hypotheses

Effects on Cases Reaching Court

A trend was discerned confirming the first hypothesis, that a higher proportion of cases reach court where prosecutors present DNA evidence. Forty of the 200 cases sampled (20 per cent) resulted in a *nolle prosequi* by the Office of the Department of Public Prosecution (DPP), or had No Evidence to Offer (NETO) or were 'no true billed' in the magistrates' courts. The logistic regression analysis of cases reaching court found DNA evidence to be the only positive predictor, although not a significant one, of cases being finalised in court. The finding that cases with DNA evidence are marginally more successful at surviving the numerous screening levels in the criminal justice process, supports the conclusion by Peterson et al for forensic evidence generally, that 'cases with physical evidence tend to go to trial a greater percentage of the time' (1984:xxiii).

The only significant predictor of cases not reaching court was if the defendant made no statement to police or refused a police interview. It was apparent from police crime reports that suspects nearly always refused police interviews if they had previous dealings with police, or on the advice of legal counsel. The fact that police have not negated any defences put forward by a suspect during an interview may deter the DPP from pursuing cases. The DPP were also more likely to follow

through to court with cases involving less serious charges than rape, possibly because of the much higher rate of guilty pleas associated with the lesser offences.

According to the report *Heroines of Fortitude*, the New South Wales DPP may decide to 'no bill' a matter in the case of sexual assault proceedings 'where the victim is unwilling or unable to cope with the rigours and stress of a trial'. Twenty-seven per cent of all court cases (including non-sexual offences) 'no billed' in NSW in 1994–95 were related to considerations of the victim/witness. (NSW Department for Women 1996:91–92). It was noted that several cases sampled in this study were similarly withdrawn at the request of the complainant prior to district court trial. A random sample of 50 rape and 50 unlawful carnal knowledge complaints in Queensland from 1997–98 revealed that 24 per cent of the former and 18 per cent of the latter were withdrawn even before any arrests or charges were made.

In addition to considerations of the victim, the most common reasons for the DPP withdrawing prosecutions are 'that there is simply not a sufficient body of admissible, reliable evidence available to establish a case in law and thus to justify a prosecution' (Sallmann & Willis 1984:62). This might explain the high proportion of cases not prosecuted where victims used alcohol, indicated by the high correlation coefficient in Table 2, as a greater potential may exist for the credibility of complainant testimony to have doubt cast upon it during cross-examination.

Delays in the reporting of the offence cause difficulties in preparation of the case, both with witness testimony and forensic evidence. Legosz found that 'only 7.8 per cent of sexual offences were reported to police within the first week of their occurrence' (1999:15). Delays in reporting were largely due to 'the intrusiveness of the offence (penetrative offences) and the relationship of the offender to the victim (relatives)' (Legosz 1999:vii). An overwhelming proportion of such cases were similarly found by Queensland's Project Axis to involve delays in reporting the offence: one survey showed that a minimal two per cent of offences against children were reported within one week of their commission. Where children are sex abuse victims difficulties can arise with eliciting their testimony (Queensland Crime Commission and Queensland Police Service 2000:5, 48). The Project Axis report noted 'the effect of even minimal delay is often the loss of valuable DNA and other forensic evidence' (Queensland Crime Commission and Queensland Police Service 2000:24–26). The majority of non-convictions, 64.5 per cent, on average, for offences of 'indecent dealing with a child under 16 years' were due to a *nolle prosequi* (Legosz 1999:31).

In spite of this claim, it appears that a number of factors other than DNA evidence will impinge with greater strength on whether a case eventually reaches court. Such factors shown in Table 5 that decrease that likelihood include if the defendant makes no statement to police, and if the offence is other than rape. Other reasons include if the victim is unwilling to face the potential trauma of a trial and withdraws the complaint, while instances where the complainant was intoxicated were strongly co-related with cases not reaching court.

Effects on Guilty Pleas

Not surprisingly, confessions to police by suspects were found to be the strongest predictor of the accused entering a guilty plea. Just under half (46 per cent) of the cases sampled, 87 of 190 cases where it could be ascertained, culminated in such a plea. A study in Victoria similarly found 'by far the best predictor of plea was the initial record of interview … of those accused who pleaded guilty, 82 per cent had made full admissions to the police' (Law Reform Commission of Victoria 1991:83). A guilty plea from defendants was found less likely in this study where the victim had used alcohol or drugs, where the offence was rape, and where the defendant was older.

The proportion of cases with guilty pleas has been found to vary with the type of offence, with about a quarter of rape cases involving pleas of guilty, and other types closer to half. In Queensland, the average percentage of guilty pleas for different offence types from 1994–96 was found to be: rape 28.3 per cent; other sexual offences against adults 54.1 per cent and child sex offences 55.8 per cent (Legosz 1999:38). A similar reduced likelihood of a guilty plea where the offence was rape was found in New South Wales (NSW Department for Women 1996:70) and Victorian studies. The reasoning attributed to this was that 'given the seriousness of the charge, there may have been a greater incentive to "go for broke" and try for an acquittal, rather than plead guilty and accept a substantial (albeit reduced) sentence' (Law Reform Commission of Victoria 1991:84). Along with its association with prosecutions not reaching court, complainant use of alcohol correlated in the present study with defendant's decisions to plead not guilty, perhaps because they believed (correctly, according to the findings on jury decisions below) that their chances of an acquittal were improved.

DNA evidence, contrary to a tenet common among forensic scientists, exhibited no significant effect on inducing guilty pleas based on comparing the sexual offence cases sampled. This outcome is tabulated in the low correlation between 'DNA evidence' and 'Guilty Plea' in Table 2. Because of the different guilty plea profiles of rape from other offences, the two categories were separated and tested independently for any significant correlation of DNA group cases to guilty pleas, but none was found. The correlation coefficient between DNA evidence and guilty pleas for non-rape offences was – 0.057. The explanation for this may lie in the timing of the availability of DNA testing results. It was found that test results, in 101 DNA cases sampled, were provided to police on average several months after suspects had been interviewed and arrested (time in days: mean 182; median 133; mode 66; min. 35; max. 621). The apprehension and charging of a majority of suspects for the same 101 DNA cases was accomplished in far shorter times, many being charged within 24 hours (mean 55; median 11, mode 0, min. 0, max. 634 days). While the data sources used in this research were able to reveal which cases were finalised with a guilty plea, the points in time at which these guilty pleas were entered were not available. Experience in Victoria shows that at the committal hearing one quarter of defendants in rape cases were ready to plead guilty; between the committal and the trial 30 per cent indicated an intention to do so; one third did so at the commencement of the trial, and the remaining 12 per cent entered a plea only after the trial was in progress (Law Reform Commission of Victoria 1991:83). A spread of the timing of the pleas would also be expected in Queensland cases.

Both this study and that in Victoria pointed to a confession to police at the initial interview as a predictor of guilty pleas. By confronting suspects with incriminating DNA evidence at that time, more confessions might result, followed by a higher rate of guilty pleas. This may occur when the CrimTrac NCIDD commences operation and if it provides 'cold hits' with DNA test results in advance of arrests for sexual offences. However, further quantitative research on this question will be required to investigate whether any change in the rate of guilty pleas, associated with DNA evidence, does actually follow. The second hypothesis, that more guilty pleas result where prosecutors present DNA evidence, was therefore discounted, as the quantitative evidence did not support it. The implications of this are that expected cost savings through more guilty pleas are not occurring, and will not be realised in sexual offence cases while DNA testing results are provided *post hoc* to investigators.

Effects on Jury Decisions

In jury trials, incriminating DNA evidence emerged as a crucial predictor of a guilty finding, thereby verifying the third hypothesis. Of 47 cases decided by juries, 20 included DNA evidence while 27 did not. Of the former, 14 resulted in guilty verdicts and six accused were found not guilty. Thirteen cases without DNA evidence resulted in guilty findings with the remaining 14 having not guilty outcomes. While the logistic regression model correctly classified 72 per cent of cases, factors that were not

quantified caused the remaining 28 per cent to fall outside the model developed. Such variables include the use of a weapon, delays in making the complaint, effectiveness of the cross-examination of the complainant, lack of corroboration and types of warnings, if any, given to the jury by the trial judge (NSW Department for Women 1996; Law Reform Commission of Victoria 1991). Even the manner in which DNA statistical evidence is presented can make a difference to juror decisions (Schklar & Diamond 1999:159–184; Koehler 2001:493–513).

As a factor affecting jury findings, DNA evidence was followed in significance by whether the victim was under the influence of alcohol or drugs, a variable that influenced juries to acquit (refer Table 5). Alcohol consumption by victims or accused at the time of the alleged offence was found not uncommon in the sexual assault cases sampled. The *Rape Law Reform Evaluation Project* also found in Victoria that '19.6 per cent of complainants had consumed some alcohol … while 10.3 per cent said that they were drunk at the time of the assault [while] 8.2 per cent appeared to be under the influence of other drugs' (Heenan & McKelvie 1997:39). Any inference that the complainant may have contributed to the offence has been criticised as representing 'an antiquated view of women and their participation in the world by saying that women who engage in particular behaviour, such as being out at night and drinking, put themselves at risk and make themselves vulnerable to sexual assault or, worse, freely available for sex' (van de Zandt 1998:134).

Tangible evidence of the offence — medical reports, obvious victim injuries, bruises, forced entry to dwellings and so on — were difficult for defendants to explain away, and, according to the logistic regression analysis, were a strong predictor in swaying juries towards a conviction. Cases where defendants made no statement to police or refused a police interview predicted, though not significantly, a finding of not guilty. They could later use consent, or belief in consent, as a defence. Also by refusing police interviews, defendants gained time to seek legal assistance, if they had none already, and thereby prepare a more effective defence.

Examining DNA evidence cases where acquittals resulted is informative. In five of the six cases, all rapes, with DNA evidence where acquittals occurred, the victim was intoxicated and knew the accused, while for the sixth case information on this aspect was not found. In four of the six cases with DNA evidence and a not guilty finding, suspects made no statement to police or refused to be interviewed; in one case some admissions as to being with the complainant were made, while information was not available on the remaining case. Additional elements in one rape case were two co-accused against whom DNA evidence was not presented. This may have allowed a preponderance of witness evidence against the complainant who had been intoxicated at the time of the alleged offence.

The initial police report, typical of one of the six cases above, begins:

> The complainant states that she had been drinking with friends at nightclubs and returned home at about 0500 hours. She observed the suspect, who is known to her, to be asleep on the lounge room floor. She then went to her own bedroom. She was awoken at about 0900 hours and the suspect was having non-consensual intercourse with her and he was positioned behind her on the bed. Upon waking, she pulled away, got out of bed, went to the adjoining bedroom and notified the witness …

The impact of DNA evidence in child sexual assault trials has been the subject of research using hypothetical scenarios. The study tested mock jurors' reactions to DNA evidence in comparison to child victims' and witnesses' testimony, confirming the potency of DNA evidence in the opinions of the participants (Golding et al 2000:373–383).

Effects on sentencing

Sentences in Queensland are imposed in the District Courts under the *Penalties and Sentencing Act* 1992, and judicial discretion is limited both as to the imposition of custodial sentences and to a lesser extent, on the length of sentences. The Act may be used in conjunction with the *Queensland Sentencing Manual* (Robertson and Mackenzie, 1998). Sentencing guidelines are contained in section 9 of the Act. These state that imprisonment should be imposed as a last resort, and that in sentencing an offender, the court should consider a number of matters, including any prescribed range of penalties, seriousness of the offence, harm suffered by the victim; damage, injury or loss caused; the offender's age, character and intellectual capacity; any aggravating circumstances and prevalence of the offence. The Act does not specify the relevance of any evidence presented at trial, so that no direct nexus between DNA evidence and sentencing decisions necessarily exists.

Maximum sentences are prescribed by Queensland's *Criminal Code Act 1899*: rape offences can incur a penalty of life imprisonment under s.349, while attempted rape and assault to commit rape can attract fourteen years maximum sentences under sections 350 and 351. Of those found guilty of sexual offences in Queensland between 1994 and 1997, DPP data show that 75 percent were imprisoned or received a suspended prison sentence (Legosz, 1999: 40). For rape offences, 23 percent of sentences imposed in 1997-98 were for ten years and over or for life, and 73 percent ranged in length between two and ten years, while the remaining four percent were non-custodial (Government Statistician's Office, 1999: 14).

When tested, DNA evidence did not emerge as a significant variable at the point of sentencing as postulated in the fourth and fifth hypotheses. This contrasts with the findings of American studies in the 1980s on forensic evidence. Peterson et al. explained why, in their opinion, the imposition of more custodial penalties in the U.S. was associated with forensic evidence: "The certainty that the defendant committed the offence, which forensic science evidence sometimes provides, may induce the judge to incarcerate the defendant rather than grant probation or, where incarceration is mandated, to increase the length of incarceration" (1987: 1743).

While this argument may be limited in its application in Australia, there may be other explanations for the association between DNA evidence and sentencing. Firstly, DNA evidence may not act directly on sentencing, but instead may act through other influencing factors. Secondly, DNA evidence, from the Beta value in Table 5, is a relatively weak predictor of custodial penalties: in the first case in Table 6, it increases the probability of imprisonment by only one per cent, and in a dozen possible scenarios, is it associated with altering the decision to imprison in only a couple. Additionally, though the logistic regression analysis correctly classifies 88 per cent of cases overall, this consists of two components. It correctly classifies 97 per cent of sentences involving incarceration, but only 37 per cent of non-custodial sentences. This would imply that the logistic regression analysis does not account well for mitigating factors. In relation to the length of sentences, although the two months added to imprisonment length is rated significant statistically, it is relatively small in comparison to sentence durations of around 10 years.

Other studies have found sentencing for sexual offences to be subject to a variety of influences. Kate Warner examined how appellate decisions treated the issues below, providing arguments made from the bench in specific cases. She then analysed how these factors acted to vary the length of sentences:

- the fact that the victim was intimately known to the offender
- the prior sexual history of the victim
- imprudent or provocative behaviour by the victim
- the unconscious or intoxicated state of the victim
- the type of penetration (Warner 1998:174–190).

Not all the factors considered for deciding sentences in the *Penalties and Sentencing Act* nor all those examined by Warner could be measured statistically for effect in the present study. Those that did display a significant effect on outcomes when imposing a custodial sentence were the accused's age, younger offenders being treated more leniently; but where the defendant was unknown to the victim a sentence increase resulted. A prior history of serious or sexual offence convictions further acted to increase the sentence length.

The Price of Justice

Research findings reported here have implications for cost estimates and projections in the criminal justice arena. As has been seen, DNA evidence was a significant predictor of more cases reaching court, but did not show any significant effect in producing guilty pleas. DNA evidence was associated with a trend toward imprisonment, and with a slight increase in the length of custodial penalties. While DNA typing can be credited with providing greater justice for the community because of its greater accuracy and reliability over the earlier forensic serological techniques, it also places an increased financial burden on the taxpayer through increasing the number of court cases and, it might be argued, through its association with a larger prison population.

This finding, that DNA evidence in sexual offence cases does not cause a significant increase in pleas of guilty, is contrary to some expectations. Justice administrators are increasingly faced with justifying capital and recurring expenditure to policy makers. An optimistic projection in the Queensland Police Service's *Environmental Scan* of June 2000, for example, was that 'the conclusive nature of DNA will also cause a greater proportion of guilty pleas resulting in savings throughout the criminal justice system' (2000). The Australian government CrimTrac organisation echoed a parallel forecast: 'When confronted with DNA evidence, guilty suspects may be more likely to confess and plead guilty, saving police time and court costs' (2002). These predictions are not sourced to any quantitative control and comparison studies.

The eventual use of the CrimTrac NCIDD is not likely to change this situation. It could be argued that the national DNA database will assist in solving many more sexual offence cases by providing suspect names to investigators through producing 'cold hits'. However, around 90 per cent of sexual offenders are known to their victims (Legosz 1999:13; NSW Department for Women 1996:56), so that suspect nomination and offender identity are not at issue in most cases. Further, examination of a random sample of 50 reported rape cases from 1997–98 showed that only about a quarter (24 per cent) remained unsolved by police — rape offences constituting about 70 per cent of the sexual offence cases where DNA evidence was provided by the laboratory. Although sexual offence cases are where forensic DNA profiling has been most commonly used in Australia to date, the vast majority of such offences are indecent assaults from which no DNA trace evidence is forthcoming.

If cost savings to the community are to be found through utilising DNA evidence to induce guilty pleas, it may have to be in conjunction with other offence types. By 2002, property crime — burglaries and motor vehicle thefts — were by far the largest category of offences being referred to the forensic laboratory by police. Further comparative quantitative research is indicated to ascertain whether DNA evidence, when used for these offence types, particularly with 'cold hits', can produce more guilty pleas and the desired cost savings.

Conclusion

This study found that DNA evidence could make critical differences in decisions to prosecute after charging, in jury findings, and it was associated with whether or not an offender was imprisoned, as well as with a slight increase in sentence length. However, the most important form of evidence for explaining convictions in sexual offence cases was a confession by the suspect to police. In cases of rape, if a suspect made no statement to police, or refused an interview, the case was less likely to reach court. Evidence of victim injuries, bruising, forced entry to dwellings and torn clothing ('tangible evidence') influenced juries towards a guilty verdict, but complainant use of alcohol or drugs was shown to weaken the case against the defendant throughout the different stages in the court process. DNA evidence did not act as a precursor of guilty pleas in sexual offence cases and reduce court costs. Rather, its inclusion was associated with cost increases. Arguably, this cost to the community is the price that must be paid for the greater certainty and improved technical accuracy that DNA profiling brings to the courts.

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