

The Use of Data-Linkage Methods in Criminal Justice Research: A Commentary on Progress, Problems and Future Possibilities

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Abstract

Despite technological advances and the growing utilisation of data-linkage (DL) methods in health and medical research, the method is not widely used in criminal justice research. This is surprising, given that some areas of criminological research (e.g. criminal career and life-course criminology) lend themselves naturally to the adoption of DL methods. While a small but growing number of criminological studies have used such methods in Australia, several factors have combined to impede the 'up-take' of DL methods in criminal justice research. These include legislative issues (restrictive and inconsistent privacy laws), resource limitations within the justice sector to support DL-based research and a less-than-willing attitude amongst government agencies and ethics committees to engage with this type of methodology. Notwithstanding these impediments, the future looks bright for DL-based research in Australia. National initiatives aimed at improving health research infrastructure are likely to provide direct and indirect benefits to DL-based research in the justice sector.

Data-linkage (DL) methods are being used increasingly in health sciences and the medical research sector. Typically, these methods bring together administrative data from disparate sources and link them through various approaches (e.g. probabilistic, deterministic and/or fuzzy logic methods), thereby creating a 'linked' dataset which is then used to study individuals and their health outcomes over extended periods of time.¹ A critical feature of linked datasets is that, once assembled, they are stripped of name-identifying information so that researchers work only with de-identified data. The power and utility of such methods are well-recognised,² facilitating studies at population level and providing opportunities to

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¹ The term 'data linkage' has evolved from earlier references to 'record linkage'. According to Brook and colleagues (2008), substitution of the word 'data' for 'record' embraces a broader conceptualisation of information and its origins.

² The most significant advantages of using linked datasets are that i) they allow study of large/whole-population samples and extensive longitudinal research (>30 years); ii) they are relatively time- and cost-efficient; and iii) they have reduced methodological problems relating to loss-to-follow-up, recall, selection, response and reporting bias. However, DL-methods also have disadvantages. Most significantly, they use administrative data which were not collected for the purposes of research but rather to assist agencies in monitoring service provision and funding expenditure.

explore a range of antecedent factors that influence the development of human health and well-being and the progression of disease (Sibthorpe et al 1995).

Despite technological advances and the growing utilisation of DL methods in medical research and health/epidemiological studies, the methods have not enjoyed the same success within the criminal justice sector. This is somewhat surprising given that some areas of criminological research appear to lend themselves naturally to the adoption of such methods. The realms of criminal career research and developmental criminology, for instance, appear to be obvious candidates for the uptake of DL methods given their focus on monitoring offending and offenders over the long term and their interest, like epidemiology, in exploring the risk factor exposure of large groups.

The purpose of this article is three-fold: first, to provide an overview of the use of DL methods in criminal justice research in Australia; second, to consider some of the issues that may account for the relatively slow 'uptake' of the methodology and, finally, to encourage criminal justice researchers to advocate for change and to seize opportunities that are likely to arise from the significant level of investment in DL infrastructure that is occurring across Australia.

DL Methods in Australia

The use of DL methods in health research is well advanced and a number of linkage systems now exist throughout Australia.³ The Western Australian Data Linkage System (WADLS) is the oldest and most prominent setup, having been established in 1995 (Holman et al 1999). This pioneering system rivals similar operations in other countries such as the Oxford Record Linkage System, the Scotland Medical Record Linkage System and systems in Canada (Manitoba Centre for Health Policy and the British Columbia Linked Health Database). A common element of these systems is that they engage in the routine linkage of large, population-level administrative datasets, facilitating an array of health and health-related research such as studies of the prevalence and incidence of chronic diseases, studies of the risk factors associated with such illnesses, assessments of health service utilisation, and evaluations of the impact of clinical treatments and health service provision on health outcomes (Holman et al 1999; Hall et al 2005).

Over time, health researchers have moved towards integrated models and multi-factorial explanations of health outcomes which, in turn, have led to a broadening of the DL base (Holman et al 2008). Investigations of the influence of social factors on health (the so-called 'social determinants of health') and of the 'social gradient' of health⁴ (Marmot & Wilkinson 2006; World Health Organization Commission on Social Determinants of Health 2008) are examples of this. Such studies have led to the inclusion of social services and related data (e.g. child protection, education, crime) in linkage design and implementation. The

³ These include the WA Data Linkage System, the Centre for Health Record Linkage (CHcRL) in NSW, the Population Health and Data Linkage System in SA, Bio21 Molecular Medicine Informatics Model (Bio21:MMIM) in Victoria and the linkage activities conducted by the Australian Institute of Health and Welfare.

⁴ The 'social gradient' of health refers to the *relative difference* in health outcomes among different sections of the population. Outcomes are generally worse in the more socially disadvantaged groups. Studies have not only shown that this difference exists but that the relative difference between these groups is widening. In the health literature, this phenomenon is referred to as the modernity paradox.

Developmental Pathways in WA Children Project (TICHR 2006), described later, adopted this kind of methodology.

Benefits of DL-based Research

The benefits arising from DL-based research in the health sector have been significant. Apart from advancing worldwide scientific knowledge (through publication in peer-reviewed journals), the research has led to improvements in patient care and to reforms in health policy and law (Holman et al 2008). In a recent publication, Holman and colleagues (2008) identify at least two studies that have had a direct effect on surgical care, and three studies that have direct links to mental health policy reforms. Brook, Rosman and Holman (2008) identify a further five research projects that have had similar influences on health policy and clinical practice. Other benefits deriving from DL activities include improvements in the cost-efficiency of research and the conservation of patient privacy, community development, and commercial and competitive benefits (Holman et al 2008).

What Kinds of DL Research have been Undertaken in the Criminal Justice Sector?

Compared with developments in the health sector, DL-based research in the Australian criminal justice sector is in almost embryonic form. Earliest DL initiatives took place in Western Australia (WA) with the establishment of the INOIS system (Integrated Numerical Offender Identification System, Ferrante 1993). This project was (and continues to be) an on-going collaboration between the Crime Research Centre (CRC) at the University of Western Australia and various government departments (i.e. WA Police, the WA Department of the Attorney General and the WA Department of Corrective Services).⁵ The system is designed to routinely link police offender records (i.e. police apprehensions, juvenile cautioning and police lock-up data) with records from the courts, prisons and community corrections. The system returns a unique offender identifier number which is then used to track individuals through the various data collections. The INOIS system has facilitated the development of the de-identified, linked Crime Research Centre Offender Database (CRCOD) which, in turn, has been used in a variety of research studies including criminal career and recidivism research (Harding & Maller 1997; Broadhurst & Loh 1995; Broadhurst & Loh 2003; Valuri et al 2002), studies of criminal justice processes (Ferrante et al 2004) and evaluations of various criminal justice interventions and programs (Ferrante et al 1999; Indermaur & Roberts 2003). Secondary use of the INOIS-linked CRCOD has also ensued, such as through the development of an actuarial risk assessment instrument to support the decision-making processes made by practitioners in the management of offenders (Maller 2002).

Elsewhere in Australia, there has been some uptake of DL methods but these have been more modest. In 2001, the Bureau of Crime Statistics and Research (BOCSAR) in New South Wales (NSW) developed a linked Re-Offending Database (ROD) using DL methods

⁵ Initially, it was a collaboration of the CRC, the WA Police Service, the WA Department for Community Services (who were responsible for juvenile justice), the WA Crown Law Department and the WA Department of Corrective Services. Over time, several government departments have merged and changed names. Responsibilities have also shifted; however, the underlying collaborative arrangement is still in place.

(Hua & Fitzgerald 2006). The database links individuals' criminal court appearance records over time and has been used to measure re-offending (e.g. Vignaendra & Fitzgerald 2006; Smith & Jones 2008), to measure the impact of interventions on offending and to provide evidence to inform policy and program development (e.g. Chen et al 2005; Weatherburn et al 2007).

While the CRC and BOCSAR have developed moderately sized linkage systems to support the routine linkage of justice data at population level, different approaches have been used elsewhere. At a smaller scale, researchers at Griffith University in Queensland have used DL methods in a more piecemeal fashion, progressively adding (linking) information to research datasets for specific birth cohorts (1983, 1984 and 1990 birth cohorts). In the case of the 1983 birth cohort, initial links were made between child protection data and juvenile court records in 2000, followed by linkages to police cautioning data in 2003, and to adult court records in 2008. Linkage of the data to adult corrections data is currently under negotiation (A Stewart, personal communication, 10 October 2008). The datasets have been used to explore, among other things, the links between child maltreatment and offending (Stewart et al 2002) and more recently, the links between child maltreatment, police cautioning and juvenile offending (Dennison et al 2006).

Yet smaller studies are using DL methods to answer questions about the criminal justice system. For example, a recently commenced study by the University of New South Wales (UNSW) involves the once-off linkage of two small administrative datasets from the justice system. The research is investigating people with mental health disorders and cognitive disabilities and the pathways that they follow through the criminal justice system (Indig 2008). Table 1 summarises these major DL-activities within the Australian justice sector.

Table 1: Summary of DL Activities in the Australian Criminal Justice Sector

Agency, jurisdiction	DL activity	DL Characteristics	Sectors involved in DL
Crime Research Centre, UWA	INOIS + CRCOD	population-based routine linkage purpose-built DL system	links w/in justice some cross-sectoral links
BOCSAR, NSW	ROD	population & cohort routine linkage purpose-built DL system	links w/in justice no cross-sectoral links
Griffith University, Qld	1983/84 birth cohort 1990 birth cohort	adhoc linkages	some cross-sectoral links
UNSW, NSW		once-off linkage	some cross-sectoral links

There have been occasions where justice-based researchers have attempted cross-sectoral links (i.e. linkages involving the matching of justice data to non-justice administrative records); however, not all of these attempts have met with success. From WA, five research studies have successfully used cross-sectoral DL methods. These include:

- i) a linkage of offenders to people with intellectual disabilities, as part of an investigation of the treatment of intellectually disabled offenders in the criminal justice system (Cockram & Underwood 2000)

- ii) a linkage of drink driving arrests to road crashes, as part of an investigation of the road crash risk of drunk drivers (Ferrante et al 2001)
- iii) a linkage of offenders to people with a mental illness, as part of an investigation of the prevalence and incidence of criminal behaviour in people with schizophrenia (Jablensky et al 2004)
- iv) a linkage of imprisoned offenders to health records, as part of an investigation of the morbidity and mortality of the offender population (Hobbs et al 2006)
- v) a linkage of juvenile offenders to health, education, child protection and disability data, as part of a large project investigating developmental outcomes in children (TICHR 2006).

In NSW, BOCSAR has undertaken several cross-sectoral linkages using the ROD database. One study involved matching juvenile offender data to the records of the Department of Community Services, the Department of Education and Training as part of a study examining the screening process used with young offenders (Weatherburn et al 2007). An earlier study linked methadone patient records with ROD records to evaluate a methadone program (Lind et al 2005). BOCSAR has also provided data from ROD to a number of university researchers evaluating government programs. The ROD data was subsequently linked to program data as part of these evaluations. However, not all cross-sectoral linkages have met with success. At least two other attempts to link offender data to other datasets (i.e. health and emergency data in one instance and child protection records in another) have been abandoned (C Jones, personal communication, 10 October 2008).

In Queensland, the researchers at Griffith University successfully linked child protection data to juvenile justice records in 2000, as part of the creation of the integrated 1983/84 birth cohort datasets; however, more recent attempts have not been successful and there is uncertainty as to whether child protection data will be linked as part of the integrated 1990 birth cohort dataset (A Stewart, personal communication, 10 October 2008).

Problems and Pitfalls

Legislative Constraints and Privacy

Advances in DL research in the *health* sector have been achieved within a relatively tightly bound, privacy-conscious legislative framework. Laws in each jurisdiction govern the use and disclosure of personal information by government agencies and researchers. For the most part, State government departments are subject to Information Privacy Principles (IPPs) developed under State privacy legislation. However, there is great diversity amongst States in the laws governing privacy. Lovett and colleagues (2008) identify a number of regulations that govern the protection of privacy of *health* information. These range from no specific legislation in Western Australia to various codes of practice, as found in South Australia and NSW.⁶

⁶ In NSW, for example, it is possible to get a code of practice from the Privacy Commission which exempts researchers from the provisions of the *Privacy Act*. Lovett and colleagues (2006) suggest that the more relaxed legislative framework in WA may have given rise to the more advanced developments in DL methods and DL-based research in that State.

In addition to State legislation, there is the Federal *Privacy Act* 1988 (Cth). This legislation sets limits on the use and disclosure of personal information by Commonwealth government authorities and large private organisations. Sections 95 and 95A of the *Privacy Act* 1988 (Cth) deal with exceptions to IPPs for research purposes and it is through these provisions (and equivalent provisions in State-level laws) that much of the data linkage activity conducted in the health research sector is permitted. Strict conditions guide the manner in which data linkage activities are undertaken (Israel 2004), including a best practice protocol for inter-agency record-linkage which is supported by the Office of the Federal Privacy Commissioner (Kelman et al 2002). The protocol makes linked data 'more easily available to researchers by providing a controlled and secure mechanism that guarantees privacy protection' (Kelman et al 2002:251).

Researchers wishing to use linked data are further guided by the National Statement on Ethical Conduct in Human Research (NHMRC et al 2007) which was jointly developed by the National Health and Medical Research Council (NHMRC), the Australian Research Council (ARC) and the Australian Vice-Chancellors' Committee (AVCC). The National Statement requires that an overseeing Human Research Ethics Committee (HREC) or review body be satisfied that the research proposal conforms to State, federal and international law and that there is sufficient protection of privacy and methods for ensuring confidentiality of data (NS 2.3.5).

Despite the considerable constraints imposed on agencies and researchers by privacy legislation and policies, linkage-based research projects in the Australian health sector have thrived over the past decade. In WA, for example, the number of DL-based studies supported by the WADLS grew from approximately 87 projects between 1995 and 1999 to over 108 by 2003-2007 (Trutwein et al 2006). In part, this has been due to the growth in the size, quality and availability of electronic health datasets. Equally, though, it is a consequence of technological advances and the significant growth in DL-infrastructure and the processes associated with data linkage activities. It has been argued that this represents a 'win-win' situation for all concerned:

[F]ar from causing a threat, a comprehensive data linkage system can produce the type of win-win outcome that has evaded privacy legislation and other previous attempts to reconcile the competing interests of beneficial health research and the conservation of privacy. Given the plausibility and evidence that comprehensive population-based data linkage, conducted in accordance with encryption protocols, is the most effective intervention now available to conserve patient privacy in a research-rich environment, there appears to be sound ethical and scientific reasons to implement and maintain such systems for populations when resources exist to make this possible (Trutwein, Holman & Rosman 2006:279).

Differences between Health and Justice

Comparing progress between the health and justice sectors, it is evident that the usage of DL methods is more prevalent in the health sector than in the criminal justice sector. Why? Part of the answer lies with legislation. At a national level, differential (and, arguably, preferential) treatment is given to health and medical research. Specifically, ss95 and 95A of the *Privacy Act* 1988 (Cth) recognise only medical and health research and, as a consequence, criminal justice research (or, indeed, any form of human research that is not medical or health related) is not exempt from the remaining provisions of the *Act*. Thus, Federal law prohibits research requiring the linkage of data from Commonwealth government agencies or from large organisations in the private sector (e.g. private prisons) *unless these studies are framed within a medical or health research context*. This limitation of the *Act* was acknowledged in a recent inquiry into the *Privacy Act* by the Australian Law

Reform Commission (ALRC 2008). In the final report, the ALRC recognises the importance of other forms of research (i.e. criminology and other behavioural sciences) in providing benefits to the community and recommends that amendments be made to the research exception of the *Act* so as to include all forms of human research (Recommendation 65.2).

Differing legislative frameworks within and across jurisdictional boundaries also influence the ability of justice researchers to conduct DL-based research. In some States, such as Victoria and NSW, different laws govern the privacy of information in the different sectors. In NSW, the privacy of health data is protected under the *Health Records and Information Privacy Act* 2004, while the privacy of other personal information is protected under the *Privacy and Personal Protection Act* 1998. Similarly, in Victoria, health information is protected under the *Victorian Health Records Act* but other personal information is protected under the *Information Privacy Act* 2000.

In WA, it is the lack of State privacy laws that has acted to impede DL-based justice research. Without overarching privacy laws, individual Western Australian pieces of legislation have required review in order to determine the permissibility of data release for DL-based research. This is a time-consuming and resource-intensive process with inherently uncertain outcomes. The recent experiences of the Developmental Pathways in WA Children Project (TICHR 2006) provides a clear illustration of this.

Developmental Pathways in WA Children Project

The Development Pathways project was conceptualised in 2005 and received ARC Linkage Grant funding in 2005-2008. The project's primary aim is to identify the key risk factors and pathways leading to poor developmental outcomes in Western Australian children. The project takes a holistic approach to inform early intervention strategies that enhance well-being and life chances. Functionally, the project is a collaboration of the University of Western Australia (Telethon Institute of Child Health Research and the Crime Research Centre), the WA Department of Health, the WA Department of Education and Training, the WA Department of Corrective Services, the WA Department of the Attorney-General, the WA Department for Child Protection and the WA Disability Services Commission. As part of its methodology, the project proposed an ambitious linkage of the administrative datasets of each of the partner government agencies.

In the early stages of the project, the partner agencies sought legal advice from the State Solicitor's Office (SSO) regarding the disclosure of data for linkage purposes. Immediately, the SSO indicated that the linkage of juvenile justice data would be problematic. The Office's letter of advice cited various provisions of law and government regulations that either prohibited or potentially prohibited information disclosure for data linkage. These included the *Police Force Regulations* 1979 reg607(1), the *Young Offenders Act* 1995 ss15, 15A and 17, and the *Children's Court Act* 1988 s36. Also cited were the *Criminal Code* s81(1), the *Public Sector Management Act* 1994 s9(6), Clause 1 of *Administrative Instruction No 711*, and common law precedent regarding breach of confidence, specifically, *Moorgate Tobacco Co Ltd v Phillips Morris Ltd* at 438. The SSO advice also included a reminder to government departments of a Premier's Circular pertaining to the maintenance of minimum privacy standards and compliance with National Privacy Principles.

The linkage of juvenile justice data was unable to be effected until mid-2008, more than two years after the commencement of the project, and only after amendments were made to the *Young Offenders Act* 1995 (amendments enacted in 2007). The linkage of juvenile justice data was only partially accomplished, however. Provisions of the *Children's Court*

Act 1988 still prohibit the release of data by the Department of the Attorney-General. As with the *Young Offenders Act* 1995, amendments to the *Children's Court Act* 1988 have been drafted and these are being advanced within government.⁷

Furtier Impediments – Sector-specific Issues

Aside from differences in the legislative frameworks within which health and justice researchers operate, there are other differences that likely explain why DL activities in the justice sector are not as well advanced as those in the health sector. One important difference between the sectors is size. Justice is a relatively small sector. In 2008, it accounted for \$9.6 billion of government expenditure, compared with \$49.3 billion expended by the health sector (SCRGSP 2008). This not only means that the sector has fewer resources to undertake research *per se* but it also means that it has fewer resources to service and support research – either through administrative structures (e.g. having appropriate review bodies, data supply systems and data access protocols) or through any direct investment in DL technologies.

The relatively small size of the justice sector poses further problems. Fewer DL-based research projects mean that organisations are less exposed to DL technology and DL research methods. This may further constrain DL uptake through approval processes, as administrators and review bodies may be under-developed or have little exposure to DL methods. The lack of familiarity with DL methods and protocols may further impede their acceptance. There is some evidence of this. In its review of the *Privacy Act* 1988 (Cth), the ALRC heard concerns from criminologists that an overly cautious approach to the application of the *Act* was inhibiting the conduct of research, even where the threat to individual privacy was limited and the potential value of the research was very high (ALRC 2008. Israel (2004), too, reports that some ethics committees had placed obstacles in the way of researchers, sometimes only because they were second guessing decisions that they believe would be made by the Privacy Commissioner. He reports that several criminologists believed these standards were well beyond those that would be required by privacy commissioners (Israel 2004:25). Problems are further exacerbated by requirements to seek approval from multiple ethics committees – a common problem facing researchers developing DL research activities.

Cross-sectoral Linkages

Research projects involving cross-sectoral linkages appear to be especially challenging for justice-based researchers to pursue. This is hardly surprising, given the administrative complexity of dealing with multiple bureaucracies and approval processes. Researchers have limited time and resources to engage in such ventures, despite the utility of engaging in cross-sectoral and multi-disciplinary research.

The Future of Data-linkage Research in Australia

Notwithstanding the problems and issues that have troubled DL researchers in the justice sector, the future for DL research in Australia is looking exceedingly bright. Optimism about the future derives from Commonwealth government recognition of the potential of DL research and its commitment to invest in research infrastructure in coming years. In 2006, data-linkage was identified as a key 'capability area' in the National Collaborative Research

⁷ The recent change of government in WA (in October, 2008) has imposed delays, however.

Infrastructure Strategy (NCRIS 2006). In the two years since the release of the NCRIS Strategic Roadmap, progress in the data-linkage area has been considerable. Developments have included the formulation of a Data-Linkage Investment Plan, the signing of funding agreements (which allocates \$51.4 million to the building of DL infrastructure nationwide) and the establishment of the Public Health Research Network (PHRN) to manage the budget and oversee the construction of infrastructure. This infrastructure includes six State-based nodes (each responsible for conducting data linkage at State/Territory level), a National Centre for Linkage Centre and a Program Office. The overall vision is to 'improve the population health through seamless supply of linked, de-identified data for approved research' (Smith 2008).

These developments are likely to offer significant benefit (direct and indirect) to researchers across a spectrum of disciplines. At a direct level, the number of linkages to, and of, non-health datasets is likely to escalate, as the conceptualisation of 'data linkage' in the NCRIS Strategy encompasses linkage of health *and non-health* datasets (Frommer 2007). At an indirect level, the likely rise in DL-based *health* research arising from improved DL capabilities is likely to increase awareness of DL methods. This awareness is likely to occur not only amongst researchers but also within government agencies, within institutional ethics committees and throughout the broader community. However, awareness of DL methods does not necessarily imply that there is, or will be, greater acceptance of such methods. Attitudes to, and acceptance of, DL methods will depend critically on a number of other factors such as the quality and robustness of governance, transparency of processes, cost-effectiveness and, ultimately, the value of outcomes that flow from the research.

Ways Forward for DL Research in Criminal Justice

Aside from the likely benefits to emerge from NCRIS initiatives, criminal justice researchers presently face significant hurdles in the application of DL methods. To move forward and advance the use of DL methods, a number of these hurdles must be addressed or overcome.

Privacy Law Reform

To date, the most significant impediments to the use of DL methods in criminal justice research relate to privacy laws. Privacy is a primary consideration with linked data and it is paramount that it be safeguarded. That said; there is scope to engage in legislative reform which facilitates quality research without compromise to privacy or confidentiality.

Legislative reform in three key areas would benefit DL research in criminal justice. First, it is vital that all jurisdictions have privacy laws in place. As the Developmental Pathways Project found, the lack of privacy laws in Western Australia is a sticking point and the need to review independent pieces of legislation is a time-consuming and resource-intensive process that few research projects can afford to undertake.

Consistency of privacy legislation is another issue. Cross-jurisdictional and national research involving DL methods cannot be contemplated without greater consistency in how individual State privacy laws deal with information disclosure of the purposes of research. As Israel (2004) notes, researchers and agencies have found it difficult to interpret complex and evolving privacy law that operates according to different State and Federal regimes. Different regimes make nationwide research increasingly complex to design and conduct.

Third, greater fairness is needed in the Federal *Privacy Act* in regards to the recognition given to different types of research. The preferential treatment currently extended to health and medical research must be addressed. The research community in the behavioural sciences must rally and advocate strongly for the implementation of recommendations of ARLC 108 – particularly Recommendation 65-2 which moves to recognise all forms of human research.

As Kelman and colleagues (2002) have stressed, privacy protection and maintaining confidentiality of information are critical for ensuring continuing public support for the use of linked data. Processes must be transparent and research effectively communicated. In this way, DL-based research can be appreciated as a cost-effective and powerful means of making best use of available administrative data.

Greater Engagement with Criminal Justice Agencies

To advance DL activities in the justice sector, researchers must also engage more effectively with government agencies. This could and should be done at several levels. Given the heavy reliance that DL studies have on administrative records, it is critical that researchers engage with the ‘data custodians’ within each organisation. This is necessary not only to develop an understanding of operational data and its significance to research but also to establish the relationships needed to facilitate the development of a sustainable data supply system. In most government agencies, data supply systems are nested within larger administrative frameworks that are not specifically designed to service and support research. Researchers need to engage with government officers at this level too, particularly if the administrative framework for supporting research is absent, immature or requires ‘capacity building’ of its own.

It is also important for DL-based researchers to engage with the likely ‘consumers’ of their research, that is, practitioners and policy makers in the criminal justice system. It is not hard to see that DL methods and linked administrative data have considerable practical utility within the sector – assisting not only justice agencies but also allied agencies (e.g. welfare, education) in better evaluating programs that seek to either prevent involvement in crime or reduce re-offending in the longer term. In the health sector, DL studies provide a powerful evidence base for improving patient care and the quality of services. Criminal justice researchers need to argue along similar lines, that is, that DL studies represent an opportunity to improve the quality of justice and crime prevention initiatives through better monitoring and evaluation of outcomes.

In amongst all of this engagement, there is opportunity for researchers to find one or more champions who recognise the value of the research and are prepared to support and promote the use of specific methods. This was the case with the Developmental Pathways project in WA. The initial legal advice provided to the project (described earlier) could easily have scuttled plans to link juvenile justice data. However, through the efforts of one government official in particular, this outcome was averted. Mr Mark Jessop, formerly of the WA Department of Corrective Services, was instrumental in bringing about changes to the WA *Young Offenders Act* 1995. As a result of those legislative amendments, it was possible for the WADLS to undertake the linkage of juvenile justice data as part of the Developmental Pathways Project. While the work of advocates and champions like Mr Jessop are rarely recognised in the final reports of research projects, their value and impact in facilitating research should never be underestimated.

Increased Collaborative Research

Researchers in the justice sector can also promote the use of DL methods through greater involvement in collaborative, cross-disciplinary research. Over the past decade, there has been increasing recognition of the inter-connectedness of individuals, families and their environments. Increasingly, researchers from a spectrum of disciplines have collaborated in studies that seek to unravel these complex interactions and to identify the determinants or 'causes' of certain outcomes at a more holistic level. As mentioned earlier, in the health sector, there has been increasing interest in studying the social determinants of health and those factors affecting the 'social gradient' of health (Marmot & Wilkinson 2006; World Health Organization Commission on Social Determinants of Health 2008). These types of studies are likely to benefit from the linkages which combine the administrative datasets from a range of sectors (i.e. health and social services). Funding bodies such as the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC), too, have shown particular interest in collaborative and cross-disciplinary research. A number of national funding schemes have been established to foster research networks and collaborations.

Multi-disciplinary collaborations offer strategic benefits, too. Forming alliances with the 'right' investigators can promote the use of DL methods at times or in ways that may not be possible otherwise. Again, the Development Pathways Project in WA provides a case in point. The linkage of juvenile justice data was a considerable challenge to the project from inception. It is questionable whether the linkage could have been accomplished by a smaller research project or one that did not have a number of notable health researchers as Chief Investigators. Now that amendments have been made to legislation (with more pending), the pathway to further linkages of juvenile justice data in WA is clearer.

Recognising Opportunity

Given the considerable investment currently being made in Australia to build the infrastructure to support DL-based research, it would seem a lost opportunity if researchers in the justice sector did not seize the moment and make some effort to use this unique methodology. It is unlikely that criminal justice researchers will be at the forefront of DL research initiatives in Australia in the near future; however, there is potential for some researchers to ride the bow wave of current DL initiatives. Justice-based researchers who engage with government agencies and form collaborative alliances with researchers in the health sector are likely to be the more immediate beneficiaries of national DL initiatives.

Other opportunities are likely to come with time. It is not difficult to foresee a rise in DL-based research in Australia once the DL infrastructure is in place. As the prevalence of (health-related) DL research increases, it is likely that government agencies, ethics committees and the broader community will become more accepting of DL methods. As a consequence, individuals and entities within the justice sector are likely to be more receptive to DL-methods. Thus, even for justice researchers who do not 'seize the moment', it should be possible for them to sail in the wake of current developments.

Conclusion

For any criminal justice researcher wishing to harness DL methods in the immediate future, the 'to do' list (as described above) may seem particularly onerous; however, one need only look to the health sector to realise that obstacles can be overcome through the development of best practice protocols that safeguard privacy; through open and accountable governance mechanisms; and through community engagement and acceptance. Researchers in the health sector appear to have struck a balance between privacy and public benefit arising from their research. The community benefit arising from justice-related research is as real and as valid as those arising from health research. Knowledge about crime and what influences offending (and re-offending) feeds directly into crime prevention policy and practice which, in turn, deliver positive outcomes for individuals and communities. In the health sector, researchers have embraced DL methods and have demonstrated the value of their research. The stage is set for criminologists to do likewise.

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Case

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