MONASH University
Accident Research Centre

THE RELATIONSHIP BETWEEN CRIME AND ROAD SAFETY

by
Charlotte Brace,
Michelle Whelan,
Belinda Clark
Jennie Oxley

December 2009

Report No. 284

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE
REPORT DOCUMENTATION PAGE

Report No.	Date	ISBN	Pages
284	December 2009	0 7326 2354 5	(40+Appendices)

Title and sub-title:
The relationship between crime and road safety

Author(s):
Charlotte Brace, Michelle Whelan, Belinda Clark & Jennie Oxley

Sponsoring Organisation(s):
This project was funded through the Centre's Baseline Research Program for which grants have been received from:

Department of Justice
Roads Corporation (VicRoads)
Transport Accident Commission

Abstract:
The aim of this project was to review the literature on the relationship between crime and road safety, to identify pertinent Victorian crime and road safety data, and discuss how such data can be utilised to examine the relationship between crime and road safety. Of specific interest was the relationship between criminal activity of individuals and the likelihood of these individuals being involved in a fatal or serious injury outcome road crash. The key findings of this research suggests that there is a positive relationship between: general negative behaviour (e.g. involvement in antisocial behaviours) and risky driving behaviour; criminal behaviour and traffic offences (specifically violence, theft & burglary and recidivist/drink driving, driving whilst disqualified; risky traffic behaviour contributing to a crash and criminal history (particularly for violent crime, vandalism, property crime, and involvement in traffic crime), and; crash involvement, drink driving and general criminal history including theft, car theft, drug and alcohol related crimes, violence and property damage. This report documents a variety of approaches that have been adopted internationally to examine these relationships, and highlights that such work has not been undertaken in Victoria to date. Moreover, the limitations and barriers for linking crime and road safety data in Victoria are discussed and these predominantly concern privacy and ethics, matching of data, issues with data analysis and cost/resource factors. A number of recommendations are made to overcome these data limitations, and to explore more fully the relationship between crime and road safety in Victoria.

Key Words:
Crime, road safety, road crash, criminal history, recidivism

Reproduction of this page is authorised.

Monash University Accident Research Centre,
Building 70, Clayton Campus, Victoria, 3800, Australia.
Telephone: +61 3 9905 4371, Fax: +61 3 9905 4363

www.monash.edu.au/muarc

Preface

Project Manager / Team Leader:

Charlotte Brace

Research Team:

Charlotte Brace

Belinda Clark

Michelle Whelan

Jennie Oxley

ACKNOWLEDGEMENTS

Our thanks to the Project Advisory Committee for this project:

- Damian MacDonald, Department of Justice
- Antonietta Cavallo, VicRoads
- Samantha Cockfield, Transport Accident Commission (TAC)
- Anne Harris, Royal Automobile Club of Victoria (RACV) Ltd
- Kevin Casey, Victoria Police
- Ian Johnston, MUARC

Thanks to Stuart Newstead, MUARC, for general information about existing road safety data systems. Thanks also to Sergeant Patrick Ferdinands, Wendy Kimber and Victoria Police staff for their valuable assistance on this project.

EXECUTIVE SUMMARY

Aim and Objectives

The aim of this project was to review the literature on the relationship between crime and road safety, to identify pertinent Victorian crime and road safety data, and discuss how such data can be utilised to examine the relationship between crime and road safety. Of specific interest was the relationship between criminal activity of individuals and the likelihood of these individuals being involved in a fatal or serious injury outcome road crash. The specific objectives of the research were:

- To examine and document the link between crime and road safety from an international/national perspective, with particular emphasis on the relationship between criminal history and involvement in fatal and serious injury crashes.

- To identify the best practice approaches to examining the link between crime and road safety in Victoria and internationally.

- To determine the existing barriers and facilitators to examining the issue of crime and road safety in Victoria.

- To develop strategies to overcome the existing barriers and present a set of recommendations for data collection, data management and analysis.

Methods

In order to achieve these objectives, the scientific and contemporary literature and information with respect to the link between crime and road safety was reviewed and documented and international experts were consulted to establish best practice approaches to examining the research issue. The available information on existing Victorian databases was reviewed, including: Law Enforcement Assistance Program (LEAP), Collisions Management Information System (CMIS), Traffic Information Management System (TIMS), Fatal Collisions Management Information System (FCMIS). Based on knowledge gathered during previous activities, the viability of data comparisons and data sharing were examined. The intrinsic issues and limitations including information collection, management and analysis were investigated. The barriers and stakeholder-friendly facilitators to reviewing the link between crime and road safety were identified. Based on knowledge gathered during previous activities, recommendations for improved practices to benefit all stakeholders in sharing/obtaining data were provided.

Key Findings

- The classifications of (non-traffic) criminal behaviour and traffic offences and the key relevant psychological theories that have relevance to general risk taking and criminal behaviour were identified and documented. Four psychological theories were discussed; Theory of Self-control, Hierarchical Approach, The Problem Behaviour Theory, and the Theory of Moral Development;

- While there has been very little work undertaken to explore the effects of the relationship between general criminal behaviour and traffic offences on road safety, and specifically, crash involvement, the findings of the literature review suggest

that there are, indeed, positive relationships between general negative behaviour (e.g., involvement in antisocial behaviours) and risky driving behaviour, and between criminal behaviour and traffic offences;

- The findings support the hypotheses proposed in the relevant psychological theories and would suggest links between criminal behaviours themselves as well as between criminal behaviour and traffic offences;

- Research has been conducted internationally to explore the relationships between the various categories of criminal behaviour and the different types of traffic offences. International studies have identified links between mainstream crime (specifically violence, theft & burglary), a criminal history (for violent crime, vandalism, property crime and traffic crime) and traffic offences (specifically recidivist/drink driving, driving whilst disqualified) (e.g., Bailey, 1993; Spolander, 1997), with suggestions that the rate of crash-involvement for those individuals with a criminal history is double that for those without a criminal history (Junger, West & Timman, 2001);

- It was not possible to comment on best practice approaches as there is limited research that could be related to best practices, and no evaluative research into these practices was found;

- It should be noted that cultural differences may mean that the international findings may not apply in other countries (Broughton, 2007). Additionally, it is suggested that the factors of alcohol use and exposure to crash risk, either alone or in combination, might be sufficient to explain the co-variation between crime and road crashes and that the relationship between crashes and crime could be an artefact of these factors (i.e., the relatively high exposure of criminals to traffic may be sufficient to explain the relationship between crime and crashes);

- While there have been attempts to examine the relationship between crime and road safety using various data sources and study methods, there are clearly large gaps in our understanding of these issues in Australia. Research within the Australian context to explore the possible links between crime and road safety is therefore warranted; and,

- There are a variety of approaches that have been adopted internationally to examine these relationships, although such work has not been undertaken in Victoria to date.

Recommendations for Data Collection and Recording

LEAP

- A LEAP search could be run within TIS, with a person's name used in a search demonstrating their involvement in a road crash. One option could be to link the crash involved person's name and the date of birth back to criminal history. This activity would be appropriate for examining any subset of crash severity outcome recorded by the police; and,

- A LEAP search could be run for individuals identified within the Traffic Infringement Database as incurring penalties.

MCIG

- A LEAP search could be run for individuals involved in MCIG investigated road crashes. MCIG should record the information that they retrieve from LEAP on criminal history within their Take-Ons database (or similar). Even simple data recording (e.g., yes/no criminal history, category/brief description) for each individual involved in a crash would enable analyses to be run to examine the relationship between crime and road safety. Using MCIG information would enable contributory factors in the crashes (from the Police perspective) to be examined more fully than by using any other source, which would provide useful detail. Additionally, if the data on criminal history can be examined for the individuals involved in road crashes investigated by MCIG for a reasonable period (e.g., last 10 years), an approximate figure can be obtained to compare the road crash involved population with the general population in terms of their likelihood of having a criminal history.

VIMS

- As part of the new tender, VIMS is scheduled for replacement/modification over the next 12 months. Discussion is taking place between interested parties such as DOJ and Victoria Police regarding the possibility of including minor summary offences e.g. offensive language, minor thefts into the VIMS system. This would then involve forming links with the LEAP System. When developing this tender, links and ways of capturing crime and road safety data with an automatic lookup and automatically generated report could be considered. Moreover, it is suggested that road safety research stakeholders could be involved in this process to aid effective research tool development.

Licence checks

- In the state of Victoria license checks are not currently routinely conducted at RBT sites, due to legislative challenges. Many unlicensed drivers are aware of loopholes to avoid roadside license checks. Research suggests that one's perception of likelihood of being detected plays a key role in the decision to engage in illegal behaviours or not. Therefore, pro-active detection/prevention could be implemented through enforcement strategies targeting behaviours such as unlicensed driving.

Recommendations for Data Analysis

- Create clear definitions for what constitutes criminal history and how to categorise crimes;

- When conducting searches, it is important to identify variations on pertinent variables, such as name and address, as variations on these variables can result in low levels of data matching. Databases that have a Boolean-type search function could be used to enhance data matching; and,

- Devise sound, statistically valid approaches for overcoming influencing factors in the data, e.g. age, time held licence etc.

Recommendations for Data Management

General comment

- The need to extract summary data for research purposes is currently overlooked. A process for improving the potential for research use and access to data should be implemented, e.g., by including key research stakeholders in the design and development of new data systems in the future; and,

- The relatively recent changes to privacy legislation have created many new challenges for data analysis to be carried out across agencies, in many cases excluding the possibility totally. Whilst the importance of adhering to this legislation is recognised, examples of over interpretation and thus data access restrictions are common. Data custodians within agencies would benefit from clear guidelines that support data release and sharing within the current legislation.

Data output

- It appears from comments made by stakeholders and from MUARC's past research experience that there is often difficulty in producing data output in a useable form/file type, e.g., MS Excel. If a more useable output could be produced, this could dramatically reduce time taken for data conversion cleaning leaving more time for analysis; and,

- With the increasing outsourcing of database design and management, it is important for agencies to ensure their ability to access their data is not compromised, either through access limitations or excessive costs.

Contents

1 INTRODUCTION 1

1.1 BACKGROUND 1

1.2 PROJECT AIMS 2

1.3 STRUCTURE OF REPORT 3

2 REVIEW OF RESEARCH 5

2.1. INTRODUCTION 5

2.2 CLASSIFICATIONS OF CRIMINAL BEHAVIOUR 6

2.3 CLASSIFICATIONS OF TRAFFIC OFFENCES 7

2.4 PSYCHOLOGICAL THEORY 9

2.5 INTERATIONAL EXPERT CONSULTATION 10

2.6 WHAT IS THE RELATIONSHIP BETWEEN GENERAL NEGATIVE BEHAVIOUR AND RISKY DRIVING BEHAVIOUR? 11

2.7 WHAT IS THE RELATIONSHIP BETWEEN CRIMINAL BEHAVIOUR AND TRAFFIC OFFENCES? 11

2.8 WHAT IS THE RELATIONSHIP BETWEEN CRIMINAL BEHAVIOUR AND CRASH INVOLVEMENT? 15

2.9 HOW HAVE THESE RELATIONSHIPS BEEN EXAMINED? 17

2.10 SECTION SUMMARY 19

3 REVIEW OF VICTORIAN CRIME AND ROAD CRASH DATA SOURCES 21

3.1 INTRODUCTION 21

3.2 VICTORIA POLICE DATA 21

3.2.1 The Law Enforcement Assistance Program 21
3.2.2 The Traffic Incident System 22
3.2.3 The Major Collisions Investigation Group 23
3.2.4 The Vehicle Impoundment System and Fatal Diary 24
3.2.5 The Collisions Management Information System 24
3.2.6 Fixed Payment Penalty Database 24

3.3 RELATIONSHIPS BETWEEN VICTORIA POLICE DATA SOURCES 25

3.3.1 Mobile Data Network MDN 25
3.3.2 TIS Enterprise Application Integration (EAI) 25
3.3.3 Victoria Police Operational Performance System 26

3.4 LINKING VICTORIA POLICE DATABASES 26

3.5 VICROADS DATA 27

3.5.1 The Road Crash Information System 27
3.5.2 Driver Licensing System 27
3.5.3 Victorian Registration Database 27

3.6 DEPARTMENT OF JUSTICE DATA 28

3.6.1 The Courtlink Database 28

3.7 OTHER RELEVANT DATA 28

3.7.1 The Traffic Infringement Database 28

3.8 SECTION SUMMARY 29

4 APPROACHES FOR LINKING CRIME AND CRASH DATA 31

4.1 INTRODUCTION 31

4.2 PROCESS OF LINKING DATA 31

4.3 CONTEMPORARY APPROACHES TO LINKING CRIME AND CRASH DATA 31

4.4 LIMITATIONS IN LINKING DATA 31

4.4.1 Privacy and ethics 31
4.4.2 Matching of data 32
4.4.3 Analysis issues 33
4.4.4 Cost/Resource issues 34

4.5 SECTION SUMMARY 34

5 KEY FINDINGS AND RECOMMENDATIONS 35

5.1 INTRODUCTION 35

5.2 KEY FINDINGS OF THIS WORK 35

5.3 RECOMMENDATIONS FOR DATA COLLECTION AND RECORDING 36

5.3.1 General comments 36
5.3.2 LEAP 36
5.3.3 MCIG 36
5.3.4 VIMS 36
5.3.5 Licence checks 37

5.4 RECOMMENDATIONS FOR DATA ANALYSIS 37

5.5 RECOMMENDATIONS FOR DATA MANAGEMENT 37

5.5.1 General comment 37
5.5.2 Data output 37

6 REFERENCES 39

APPENDIX A: MAIN TIS VARIABLES COLLECTED BY VICTORIA POLICE 41

APPENDIX B: MAIN VIMS FIELD DESCRIPTIONS IN TENIX DATA WAREHOUSE 47

Figures

FIGURE 1.1 ACKNOWLEDGEMENT OF THE IMPORTANCE OF ROAD POLICING FOR CRIME POLICING. 1
FIGURE 1.2 RESEARCH METHODOLOGY 3
FIGURE 2.1 FROM JUNGER ET AL. (2001): PERCENTAGE OF INDIVIDUALS IN THE DATABASE OF OFFENDERS, INHABITANTS OF THE CITY OF THE HAGUE COMPARED WITH THE TRAFFIC USERS IN CRASHES. 16
FIGURE 3.1 FLOWCHART OF RELEVANT ROAD SAFETY AND CRIME DATA AND ASSOCIATED AGENCIES 30

Tables

TABLE 2.1 OFFENCE CATEGORIES (FROM ASOC NO. 1234.0, AUSTRALIAN BUREAU OF STATISTICS, 1997). 6
TABLE 2.2 OFFENCE CATEGORIES (FROM VICTORIA POLICE CRIME STATISTICS 2006/2007, VICTORIA POLICE, 2007) 6
TABLE 2.3 OUTLINE OF SCHEDULE 4 (TRAFFIC INFRINGEMENTS) OF THE ROAD SAFETY (GENERAL) REGULATIONS (1999). 8
TABLE 2.4 SUMMARY OF STUDIES LINKING CRIME AND ROAD SAFETY DATA 17

GLOSSARY OF TERMS

CMIS	Collision Management Information System
FPPO	Fixed Payment Penalty Office
LEAP	Law Enforcement Assistance Program
MCIG	Major Collision Investigation Group
MDN	Mobile Data Network
MNI	Master Name Index
MUARC	Monash University Accident Research Centre
NEVDIS	National Exchange of Vehicle and Driver Information System
RCIS	Road Crash Information System
TIS	Traffic Incident System
VicOPS	Victoria Police Operational Performance System
VIMS	Victorian Information Management System
VIS	Vehicle Impoundment System

1 INTRODUCTION

1.1 BACKGROUND

It is a widely held belief that there is an association between crime, criminal behaviour and road safety. Unfortunately, however, the crash involvement, traffic offence rates and overall driving behaviour of individuals with a criminal history[1] ("criminals") has not been studied widely and therefore few unequivocal relationships have been established. Much of the relevant research has been conducted in the separate fields of criminology and road safety, with criminology disciplines focussing efforts on understanding the underlying behaviour and motivation for committing crimes, and, road safety disciplines focussing on high rates of crash involvement and traffic offences. The main area where the two fields overlap is when the role of visible traffic enforcement in detecting non-traffic crime is assessed (Whelan & Haworth, 2005). Such studies reinforce the fact that many crimes involve the use of motor vehicles and so detection of these crimes may occur as part of visible traffic enforcement. Whilst it is clear that most drivers are not criminals the reverse is often true; most criminals are drivers, Figure 1.1.

> "*Most drivers are not criminals but most criminals are drivers…Routine traffic duties often bring officers into contact with such criminals and traffic patrols continued to make crime a priority during the year – 36% of all arrests made by traffic officers were for crime.*"
>
> West Midlands Police, Traffic Division, (1997), quoted in Rose (2000.)
>
> "*A criminal can rob a bank in Carlisle and be back in London in a few hours. My own traffic officers arrest more persons for crime than did my Criminal Investigation Division.*"
>
> Joslin (1994) quoted in Rose (2000).

Figure 1.1 Acknowledgement of the importance of road policing for crime policing.

It has been suggested that analysis of the criminal careers of minor traffic offenders could provide useful information regarding links with serious traffic offending and mainstream offending. Moreover, exploration of the links between serious traffic offending and mainstream criminal offending (e.g., the relationship between car theft and dangerous driving) could enable the development of more sensitive profiles of traffic offenders (Rose, 2000) and therefore guide road safety initiatives to reduce road trauma associated with criminal activity.

The propensity of criminals to engage in risky driving and commit traffic offences is an area of interest for researchers in criminology, social psychology and road safety (Junger, West, & Timman, 2001). Assessment of the traffic offence history of criminals is useful for several reasons. Most importantly, it is accepted that most criminals are drivers, which provides a method to assess and compare their behaviour by analysing traffic offence data. Criminals are not considered a homogonous group – largely due to the range of criminal offences and the varying motivations for committing these offences. Traffic offence data

[1] In the context of this report, a 'criminal history' refers to the cumulative record of court appearances of an individual.

provides a method for assessing the vast array of criminal behaviour and linking this with traffic offences.

Indeed, the MUARC Baseline Committee recognised the need to address these important issues and to gain a better understanding of the links between crime and crash involvement in Victoria (e.g., the extent of the problem, crash and injury types and severity, outcomes, contributing factors to crashes, and measures to reduce road trauma associated with this group of road users), and commissioned MUARC to undertake this preliminary research project.

1.2 PROJECT AIMS

The aim of this project was to review the literature on the relationship between crime and road safety, to identify pertinent Victorian crime and road safety data, and discuss how such data can be utilised to examine the relationship between crime and road safety. Of specific interest was the relationship between criminal activity of individuals and the likelihood of these individuals being involved in a fatal or serious injury outcome road crash. The specific objectives of the research were:

- To examine and document the link between crime and road safety from an international/national perspective, with particular emphasis on the relationship between criminal history and involvement in fatal and serious injury crashes;

- To identify the best practice approaches to examining the link between crime and road safety in Victoria and internationally;

- To determine the existing barriers and facilitators to examining the issue of crime and road safety in Victoria; and,

- To develop strategies to overcome the existing barriers and present a set of recommendations for data collection, data management and analysis.

The specific tasks undertaken to achieve the above aims were developed using a strategic approach to identify capabilities, issues (e.g., ethics, privacy, ownership, variety in data classification systems) and opportunities (e.g., resources, facilities, knowledge) to introduce an integrated system to acquire, store, use and secure information. The research methodology is documented in Figure 1.2.

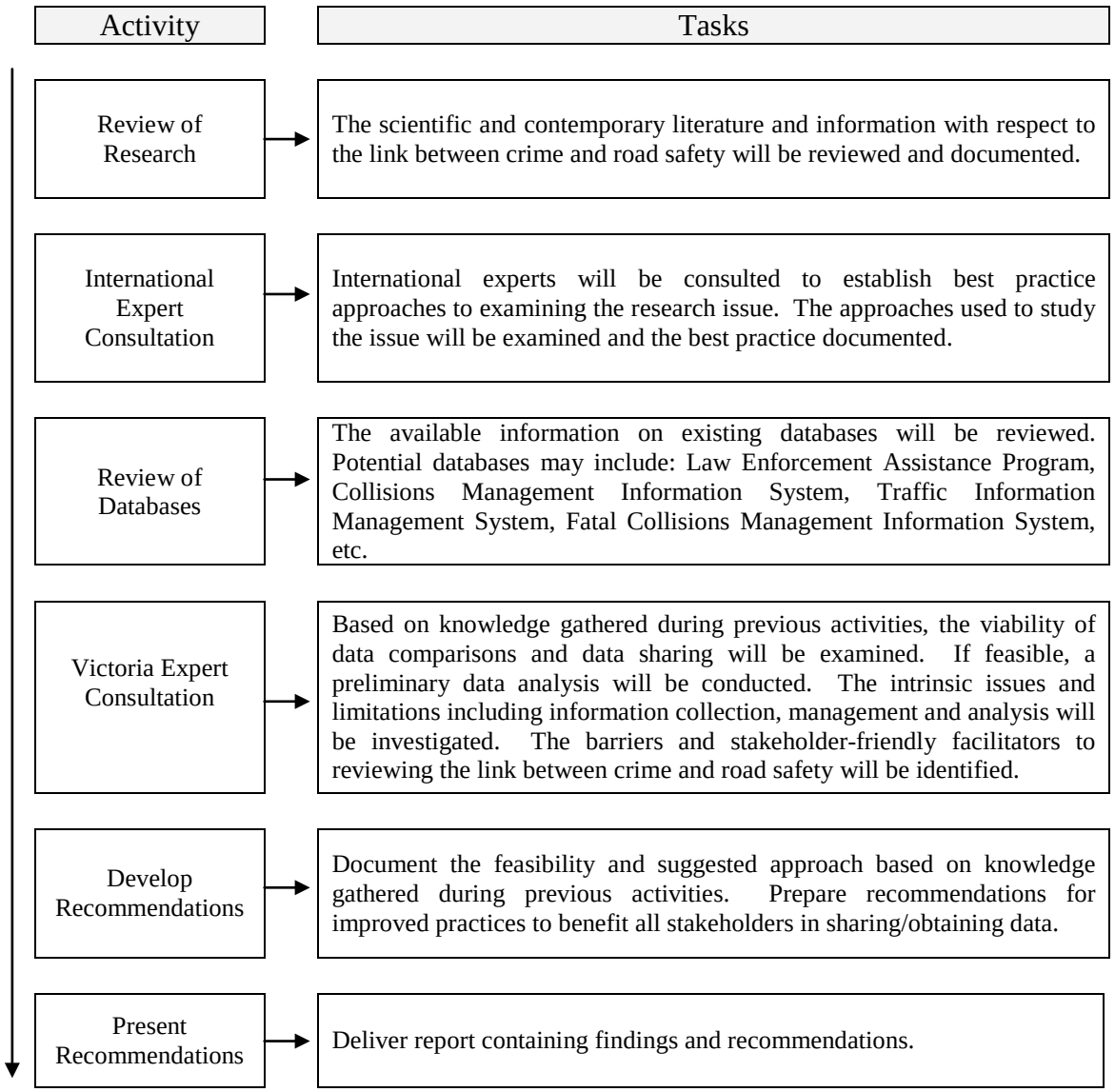

Figure 1.2 Research methodology

1.3 STRUCTURE OF REPORT

This report presents the findings of the research. Chapter 2 presents the findings of the literature review. A critical review of the available literature was undertaken to gain a better understanding of the issues surrounding crime and road safety. Classifications of criminal behaviour and traffic offences are provided as well as discussions of psychological theories of criminal behaviour. In addition, the available general literature on criminal behaviour and crash risk is presented.

A major component of this study was to examine the Victorian databases that may be utilised to understand the issues associated with criminal behaviour and road safety. A review of relevant Victorian databases was undertaken and is reported in Chapter 3.

Chapter 4 follows with an assessment of how the various data sources can be utilised to understand the issues surrounding crime and road safety and guide the development of countermeasures. A description of the opportunities, limitations and barriers to linking the data sources is detailed here.

Last, Chapter 5 brings together the findings of the above study components to provide a set of recommendations and approaches to tackle the problem of crime and road safety in Victoria.

2 REVIEW OF RESEARCH

2.1. INTRODUCTION

The aims of the literature review were broken down into fundamental questions to be answered, specifically:

- What are the classifications of (non-traffic) criminal behaviour?
- What are the classifications of traffic offences?
- What are the key psychological theories that have relevance to general risk taking and criminal behaviour?
- What is the relationship between general negative behaviour and risky driving behaviour?
- What is the relationship between criminal behaviour and traffic offences?
- What is the relationship between criminal behaviour and crash involvement (especially fatal and serious injury crashes)?
- How have these various relationships been examined (i.e. statistical tests, linking of databases etc.)?

The following keywords (and combinations of each) were used to search the Australian Transport Index, the TRIS (US Transportation Research Information Service) and the ITRD (International Transport Research Documentation) for relevant published studies:

- Crime/criminal behaviour and:
    - Road safety;
    - Road accidents;
    - Crash rates;
    - Driving convictions;
    - Problem drivers;
    - Disqualified drivers.
- Non-traffic related crime and road safety.

These search terms retrieved a total of 128 papers. Of these 128 papers the abstracts were reviewed and sorted by relevance leaving 40 papers for further examination and of these papers 23 were deemed relevant to this project and are included in the following literature review.

2.2 CLASSIFICATIONS OF CRIMINAL BEHAVIOUR

The Australian Standard Offence Classification (ASOC, 1997) was developed for use by the Australian Bureau of Statistics to provide a national statistical framework for classifying criminal offences. Subcategories are grouped into eleven broad offence categories, as shown in Table 2.1. In addition, Victoria Police have developed a list of offence categories and these are summarised in Table 2.2.

Table 2.1 Offence categories (from ASOC No. 1234.0, Australian Bureau of Statistics, 1997).

Offence Category	Subcategory
Homicide and related offences	Murder, Attempted murder, Manslaughter, Driving causing death, Total homicide and related offences
Kidnapping/abduction	
Assault	
Robbery	Armed robbery, Unarmed robbery, Total robbery
Fraud	
Blackmail/extortion	
Unlawful entry with intent	Involving the taking of property, Other, Total unlawful entry with intent
Motor vehicle theft	
Other theft	
Other	Transport offence, Harassment, threatening behavior and public nuisance including telecommunications offence, Trespass, Liquor Act offences, Other street offence, Marine/Waterway Act offence
Drug offences	

Table 2.2 Offence categories (from Victoria Police Crime Statistics 2006/2007, Victoria Police, 2007)

Offence Category	Subcategory
Crime against the person	Homicide, rape, sex (non-rape), robbery, assault, abduction/kidnap
Crime against property	Arson, property damage, burglary (aggravated), burglary (residential), burglary (other), deception, handle stolen goods, theft from motor vehicle, theft (shop steal), theft of motor vehicle, theft of bicycle, theft (other)
Drug offences	Drug cultivating, drug manufacturing, drug trafficking, drug possession, drug use
Other crimes	Going equipped to steal, justice procedures, regulated public order, weapons/explosives, harassment, behaviour in public, other

2.3 CLASSIFICATIONS OF TRAFFIC OFFENCES

Table 2.1 indicates that the 'Other' offence category contains 'Transport offence'. Transport offences are detailed in the Road Safety Act (1986) and in the Road Management Act (2004). Specific offences that incur fixed penalties fall into several groups:

The Road Safety (Drivers) Regulations 1999. The objective of these Regulations is to make provision under the Road Safety Act 1986 for driver licenses and permits, hours of driving of heavy trucks and commercial buses and the charging of fees.

Road Safety (Driving Instructors) Regulations 1999. The objective of these Regulations is to make provision with respect to driving instructor authorities.

The Road Safety (General) Regulations 1999. The objectives of these Regulations are: (a) to prescribe devices and procedures for obtaining evidence in relation to (i) blood or breath alcohol concentration or the presence of alcohol or any other drug; and (ii) the speed of vehicles; and (iii) the mass of vehicles; and (iv) other traffic offences; and (b) to prescribe the matters to be included in parking infringement notices and traffic infringement notices; and (c) to prescribe the penalties for parking infringements and traffic infringements; and (d) to provide for the application of provisions of the Act and regulations to land of public authorities; and (e) to prescribe other matters authorised under the Road Safety Act 1986.

Road Safety (Road Rules) Regulations 1999. The main objectives of these Regulations are (a) to incorporate into the law of Victoria, as the Road Rules Victoria, a modified version of the Australian Road Rules1; (b) to establish rules to be observed by road users in matters not otherwise dealt with in the Road Rules; (c) to revoke the Road Safety (Traffic) Regulations 1988 and certain other Regulations relating to traffic regulation; (d) to provide for the installation, operation and maintenance of traffic control items; (e) to make consequential amendments to various Regulations made under the Road Safety Act 1986 because of the introduction of the Road Rules.

Road Safety (Vehicles) Regulations 1999. The objectives of these Regulations are (a) to establish a registration and permit system for motor vehicles and trailers used on highways that— (i) ensures that vehicles are appropriately registered having regard to whether they meet standards for registration; and (ii) records the identification details of each vehicle and the name and address of the person responsible for it; and (iii) provides for the collection of associated fees; and (b) to ensure that when vehicles are used on highways they are safe for use and are used in a safe manner; and (c) to provide the general mass and dimension limits and other requirements for vehicles; and (d) to provide for uniform conditions under which vehicles may safely exceed general mass and dimension limits; and (e) to improve road safety; and (f) to minimise the wear and damage caused by vehicles to roads and related structures, including bridges.

Road Management (Works and Infrastructure) Regulations 2005. These regulations have been developed under the Road Management Act 2004. The objectives of these Regulations are (a) to prescribe exemptions from the requirement to obtain consent under section 63(1) of the Road Management Act 2004 before conducting certain works; (b) to prescribe exemptions from the requirement to give notice as to the conduct

or completion of certain works; (c) to prescribe restrictions on the powers of a coordinating road authority to impose conditions on consents given under section 63(1) of the Road Management Act 2004; (d) to vary periods referred to in Schedule 7 to the Road Management Act 2004 within which certain notices must be given or consent is to be taken to have been given; (e) to prescribe particulars for the purpose of clause 16 of Schedule 7 to the Road Management Act 2004; (f) to prescribe fees for applications under Schedule 7 to the Road Management Act 2004 for written consent to the conduct of proposed works on a road.

Road Management (General) Regulations 2005. These regulations have been developed under the Road Management Act 2004. The objectives of these Regulations are (a) to exempt certain road discontinuances from certain requirements of section 12 of the Act; and (b) to prescribe certain matters that must be recorded in a register of public roads; and (c) to prescribe the interval at which a road authority must review its road management plan; and (d) to prescribe the manner in which a road authority must review its road management plan; and (e) to prescribe the manner in which a road authority may amend its road management plan in certain circumstances; and (f) to prescribe the particulars to be contained in a notice of incident; and (g) to prescribe particulars to be contained in a condition report; and (h) to provide for the protection of roads and property; and (i) to authorise the removal of vehicles and other objects and refuse from roads; and (j) to make provision with respect to the matters that a road authority must consider in exercising its powers in relation to hoardings and advertisements on roads, and to confer certain appeal rights; and (k) to make provision with respect to road management infringement notices; and (l) to fix certain fees and charges.

The most pertinent offences with respect to individual negative behaviour and/or criminal intent are documented within the Road Safety (General) Regulations (1999), specifically within Schedule 4, displayed in Table 2.3.

Table 2.3 Outline of Schedule 4 (Traffic Infringements) of the Road Safety (General) Regulations (1999).

SCHEDULE 4 - Regulation 105 - TRAFFIC INFRINGEMENTS
Large vehicles exceeding their speed limit
Speeding
Failing to give way or stop
Inappropriate keeping left and diverging
Inappropriate overtaking
Inappropriate signalling
Inappropriate turning
Inappropriate lighting (of vehicle)
Inappropriate safety procedures (e.g. use of mobile phone)
Drink driving
Failure to obey signals
Licensing and registration failures

2.4 PSYCHOLOGICAL THEORY

Several theories of human behaviour which have relevance to the relationship between criminal and unsafe behaviour have been proposed and are summarised below. These illustrate some of the underlying psychological theory behind the potential for the relationship between crime and road safety.

According to the Theory of Self-control[2], by Gottfredson and Hirsch (1990, cited in Junger et al., 2001), behaviour is consistent across a range of situations. People with low levels of self-control are more likely to succumb to short-term pleasures with little or no regard for the consequences in the long-term. As a consequence of this, they are more likely to be involved in risky behaviours and suffer the cost of these behaviours, including for example, traffic crashes, divorce, unemployment and illness. If behaviour is consistent across a range of situations then people engaging in risky criminal activity and risky driving behaviour may do so because of their general tendency towards risk taking.

Hatakka and colleagues (Hatakka, Keskinen, Gregersen, Glad, & Hernetkoski, 2002) took a similar holistic attitude when proposing the Hierarchical Approach. This hypothesis appreciates that driving behaviour is not an isolated behaviour and that it is connected to other aspects of life and is affected by motivational and attitudinal issues as well as by individual driving skill, e.g., goals for life and skills for living, refers to the motives and goals of an individual in the broadest sense.

The Problem-Behaviour Theory (Jessor, 1987 cited in Bina, Graziano, & Bonino, 2006); Jessor, Turbin & Costa, 1997, cited in Bina et al., 2006) is a social-psychological framework which helps to explain the nature and development of alcohol abuse, drug misuse and other problem behaviors. It stresses the need to consider driving behaviour as part of a complex system that includes variables related to adolescents' problematic and conventional behaviours, to the peer, school and family contexts, and to individuals' values, opinions and feelings. The authors suggest that within each system, the variables represent the risk factors or protective factors that create likelihood that problem behaviour will occur (i.e., psychosocial proneness). This theory forms the basis of suggestions that different risk behaviours usually take place together and can be considered as risky lifestyles.

The importance of exploring socio-moral maturity and its relationship with individual criminality and recidivism has been a focus over recent years in the field of criminology (Stevenson, Hall & Innes, 2003). The theoretical underpinnings of socio-moral development derive from cognitive theorist Kohlberg's *Stages of Moral Development* (Kohlberg, 1984) and the recognition of the importance of acquiring a certain level of moral reasoning before an individual's recognition of their social responsibility towards law abidement develops. As recognised by Jurkovic (1980, cited in Arbuthnot & Gordon, 1988) law abiding behaviour is not just related to an individual's knowledge of laws but to the higher order rationalisation of the universal ethics associated with social justice. According to Kohlberg's Theory of Moral Development this social responsibility is reached in the third stage of moral development. Intervention programs based on this

[2] In the literature the Theory of Self-control is also known as the General Theory of Crime.

theoretical model have been designed with the aim of promoting the attainment of Kohlberg's third stage of moral development. Arbothnot and Gordon (1986, cited in Arbuthnot & Gordon, 1988) conducted such a program with Australian high school students displaying delinquent behaviours, finding that the students who displayed greatest behaviour change were those who recorded greater development in socio-moral reasoning.

In conclusion, each of these psychological theories provide insight into broad motivational factors underlying criminal behaviour. A detailed discussion of all theories pertaining to criminal behaviour is beyond the scope of this project. The aim here is to provide an overview of some of the more common psychological theories that inform criminal behaviour. At basic level, these theories indicate that driving behaviour is closely connected to other behaviours, that driving behaviour is a part of a complex system linked to social and attitudinal factors, that propensity to engage in criminal activity may be influenced by levels self-control which may in turn be related to propensity to engage in risk-taking behaviour, and that opportunities to promote safe behaviours may exist during a specific developmental period.

2.5 INTERATIONAL EXPERT CONSULTATION

Several international and national experts were contacted to ascertain further information about methods applied in the studies reviewed. In addition, experts were requested to provide details on any unpublished literature, non-English language/grey literature or ongoing work examining the relationship between criminal history and involvement in fatal and serious injury crashes.

Authors with work published in the area or a closely related area were consulted. Those who responded include:

- David Giacopassi (Memphis University, USA)
- Jeremy Broughton (Statistics and Engineering Group, TRL Limited, UK)
- Bill Frith (ex-Ministry of Land Transport, New Zealand)
- Gerry Rose (Institute of Criminology, University of Cambridge, UK)
- Sharon Pickering (Department of Criminology, Monash University)
- Andrew Carroll (Centre for Forensic Behavioural Science, Monash University)

Although only a small amount of additional information to that sourced in the literature review was obtained, this exercise was useful. For example, it yielded information on an internally published document from New Zealand and information was also obtained that pointed the project team in the direction of a Swedish study (published in the Swedish language), thereafter obtained from Thomas Lekander (Swedish Road Administration). Very little work has been undertaken to examine explicitly the relationship between crime and road safety, as described in the findings of the literature review in the following Sections (2.6-2.10).

2.6 WHAT IS THE RELATIONSHIP BETWEEN GENERAL NEGATIVE BEHAVIOUR AND RISKY DRIVING BEHAVIOUR?

When considering the relationship between crime and road safety, it is useful to start by contemplating the relationship between general unsociable and/or criminal behaviour and driving behaviour. This is because it has been suggested that early patterns of unsociable and/or criminal behaviour (often demonstrated during adolescence) can set the scene for more serious and ongoing patterns. Bina et al. (2006) explored risky driving and lifestyle behaviours as part of adolescent development. In this context, risky driving such as showing off for peers, stretching individual limitations and demonstrating adulthood is viewed as a functional part of adolescent development. Data was collected via survey questionnaires administered in secondary schools. The research utilised three main categories to identify risky behaviour: risky driving, health risk behaviour, and leisure activities. They found that displays of risky driving practice in adolescents were associated with anti-social and low-level criminal behaviours. Furthermore, a relationship between gender and risky behaviour was identified. Bina et al. found that adolescent males who displayed risky driving practices were more likely to adopt a lifestyle characterised by engaging in antisocial behaviours, tobacco smoking, comfort eating, and time spent in non-organised activities with friends. Adolescent females who displayed risky driving practices were more likely to be involved in other risk-taking behaviours, anti-social behaviours and drug use.

The evidence suggests that there are links between criminal behaviours themselves, as well as criminal behaviour and traffic offences. Other research has demonstrated a relationship between risky driving and use of alcohol, marijuana, other illicit drugs and anti-social behaviour (Donovan, 1993, cited in Bina et al., 2006; Everett, Lowry, Cohen & Dellinger, 1999, cited in Bina et al., 2006). These findings support the hypotheses proposed in the psychological theories outlined in Section 2.4.

2.7 WHAT IS THE RELATIONSHIP BETWEEN CRIMINAL BEHAVIOUR AND TRAFFIC OFFENCES?

Research has been conducted internationally to explore the relationships between the various categories of criminal behaviour and the different types of traffic offences. Studies in the United Kingdom (UK), United States of America (USA), New Zealand and Australia have examined criminal histories and identified links between mainstream crime and traffic offences. These studies are outlined below.

A New Zealand study investigated the social characteristics of 1,509 serious traffic offenders (Parsons, 1978). Each offender's patterns of traffic and non-traffic related offences were analysed. A pattern was identified whereby serious traffic had distinctive characteristics, especially in terms of their criminal record. They were more likely to have offences for violent and anti-social behaviour. He argued that those who have accepted violence as a part of normal behaviour would tend to continue this type of behaviour when driving. Such findings relate to the psychological theories outlined in section 2.4, and in particular, the Hierachical Approach by Hattaka et al., (2002) and the Theory of Self-control by Gottredson and Hirsch (1990, cited in Junger et al., 2001).

A US study by Nochasjski, and colleagues found that even after completing a drink driving treatment program, individuals with a criminal history were more than twice as likely to be convicted for recidivist drink driving within a two year period, when compared to driver's without a criminal history (Nochajski, Miller, Wieczorek, & Whitney, 1993). Recidivism

for drink driving arrests was found to be associated with a prior criminal record (Nochajski et al., 1993). The best predictors of the number of drink driving arrests for a group of drink drive offenders were the number of minor (e.g., disorderly conduct, shoplifting etc.) and major (e.g., theft, assault, homicide etc.) crimes (Nochajski et al., 1993). This study relates to the psychological theories outlined in section 2.4, and in particular, the Problem-Behaviour Theory (Jessor, 1987, cited in Bina et al., 2006).

In just over a decade, there have been several studies in the UK that have investigated the relationship between criminal behaviour and traffic offences (Sugg, 1998; Chenery Henshaw & Pease, 1999; Rose, 2000; Davies & Broughton, 2002; Broughton, 2003; 2006; 2007). Sugg (1998) found that British drivers convicted of traffic offences (including driving whilst disqualified, taking a vehicle without consent, and driving without insurance) were more likely to have prior convictions including theft, burglary, criminal damage, and violence offences.

Chenery et al., (1999) showed evidence of offender targeting through monitoring illegal parking in disabled bays in the UK. Interestingly, the study showed that 20% of vehicles parked illegally in a disabled space would warrant immediate Police attention in comparison to 2% of legally parked vehicles. When exploring criminal history, it was found that 33% of the keepers of illegally parked vehicles had a criminal record compared with 2% of the keepers of legally parked vehicles.

In the UK, Rose (2000) examined three types of serious traffic offenders - drink drivers, disqualified drivers and dangerous drivers. The results showed that many offenders from each of these three groups had committed mainstream offences[3]. Rose (2000) found clear differences between the three serious traffic offender groups, especially in comparison with mainstream offenders. Specifically, 40% of drink drivers had a previous criminal history, 79% of disqualified drivers had a previous criminal history, and 50% of those charged for dangerous driving had a previous criminal history. Rose also found significant differences between the groups in terms of their socio-demographic profile and frequency of offending. Drink drivers were often older than those in other serious traffic offender groups, and were less involved in other offending - although they were still twice as likely as the general population to have a criminal conviction. Disqualified drivers had criminal histories and an age-profile similar to that of mainstream offenders. Assessment of gender differences indicated that serious traffic offending was predominantly a male activity.

Rose's work suggests that each of the serious traffic offences vary in their level of association with mainstream crime. This depicts quite a complex relationship between criminal behaviour and traffic offences in comparison to previous research and also the psychological theories outlined in section 2.4. Rose's work showed that drink drivers were not closely associated with mainstream criminal offences, whereas disqualified drivers were shown to have criminal histories similar to mainstream offenders. Furthermore, dangerous drivers showed less involvement with crime than disqualified drivers but more involvement in crime compared to drink drivers. It is suggested that these findings highlight the potential to disrupt mainstream crime through targeting serious traffic offenders and, as such, the report provides a useful basis for further developing an intelligence-led approach to road policing (Rose, 2000). The findings also suggest that a clearer understanding of how specific traffic offences relate to mainstream criminal is

[3] In this context, 'mainstream' criminal offending includes violence against the person, burglary, robbery, theft and handling, criminal damage, drug offences.

required. The study has links with the Problem-Behaviour Theory developed by Jessor (1987, cited in Bina et al., 2006), especially as this theory suggests that driving behaviour exists as part of a complex system, and that the propensity to engage in problem behaviour is influenced by many factors.

Davies and Broughton (2002) conducted an investigation into the UK based High Risk Offenders (HROs) Scheme. The HROs is intended for those who commit drink driving offences whereby their driving behaviour suggests that they pose a particular risk to other road users[4]. The authors analysed the criminal and traffic offences committed by drink driving offenders before they became HROs, and their criminal behaviour afterwards. Females were found to form a relatively small group (11%) of all HROs so the analyses focussed on males. The male offenders with the best (or least bad) record were defined as HROs detected with a high BAC who have not been convicted of a drink driving offence within the last three years. Davies and Broughton reported that the rate of offending amongst this group, in the previous three years, was generally low even when compared to non-HROs. Offenders with the worst record were those who committed two or more drink drive offences within three years. Interestingly, drivers who refused to supply a specimen and had a previous drink drive offence were reported to have the worst criminal record, displaying particularly high levels of convictions for theft of, or from a vehicle, violence against the person (i.e. assault), and robbery, burglary and other theft.

Davies and Broughton (2002) found that those drivers who were convicted of drink driving, had a BAC exceeding 2.5 times the legal limit, and who had received no previous drink driving convictions, had a similar traffic and criminal history to that of first time drink drive offenders detected with a lower BAC. Younger drivers (aged under 30 years) were found to have more offences than older drivers across all socio-economig groups. In the younger age group, the offence record was greater for the lowest socio-economic group, and lower for the highest socio-economic group. For older drivers, although the offence record was greater for the lowest socio-economic group, the offence histories for all the other socio-economic groups are similar to each other (Davies & Broughton, 2002). These findings relate to the psychological theories outlined in Section 2.4, particularly The Problem Behaviour Theory developed by Jessor (1987, cited in Bina et al., 2006)

Broughton (2003) analysed UK driver licence information and the Home Office's Offenders Index to investigate the relationship between an individual's traffic and non-traffic offences. Broughton found that a driver's willingness to commit traffic offences tends to be associated with a willingness to commit other types of offences. The results showed that drivers who were convicted of several non-traffic offences were far more likely than non-offenders to also commit offences such as drink driving or dangerous driving. In comparison to males who had not committed any criminal offences, males who were convicted of 4-8 non-traffic criminal offences, on average, committed 18 times as many serious traffic offences, and 6.5 times as many other traffic offences. The effect was even stronger for females. Broughton also found that drivers in the lowest socio-economic group committed more serious traffic offences than those in the highest socio-economic group. Broughton (2003) reported that specific types of non-traffic criminal offences were associated with an increased number of traffic offences, these include:

[4] If a person is disqualified from driving for any of the following reasons they are classified under the HROs: providing an evidential sample with an alcohol level exceeding 2.5 times the legal limit; providing an evidential sample with an alcohol level between 1 and 2.5 times the legal limit, and having been disqualified for a drink/driving offence in the previous ten years; refusing to supply an evidential sample.

- theft of a vehicle – on average, drivers with 4 or more prior vehicle theft convictions committed 25 times as many serious[5] traffic offences compared to a driver with no vehicle theft conviction history; and,

- theft (i.e. burglary, robbery) – on average, drivers with 4 or more prior theft convictions committed 9 times as many serious traffic offences compared to a driver with no theft conviction history.

Broughton also reported that the number of non-traffic criminal offences committed impacted upon involvement in certain types of traffic offences. For example the number of dangerous driving and driving whilst disqualified offences increased dramatically in relation to the number of non-traffic criminal offences: males with 4 or more non-traffic criminal convictions were 40-50 times more likely to be convicted of dangerous driving than males with no criminal conviction history. Females with 4 or more non-traffic criminal convictions were almost 100 times more likely to be convicted of dangerous driving than females with no criminal conviction history. The number of speeding offences was not significantly affected by the number of non-traffic criminal offences: males with only one non-traffic criminal conviction were only twice as likely to be convicted of speeding compared with males with no criminal conviction history.

In summary, Broughton (2003) found that, in the UK between 1995 and 1999, 25% of traffic offences for males and 3% for females were committed by drivers who also committed non-traffic criminal offences during that time period. Additionally, 25% of traffic offences for males and 8% for females were committed by drivers who also committed drink driving offences during that time period. Furthermore, 50% of traffic offences were committed by drivers who also committed dangerous driving during that time period. Finally, 75% of traffic offences were committed by drivers who also committed driving whilst disqualified during that time period.

Further work by Broughton (2006; 2007) reported that, on average, males convicted of between 4 and 8 non-traffic offences committed 21 times as many serious traffic offences and almost 4 times as many other traffic offences as males not convicted of non-traffic offences. Again, the effect was even stronger for females. The strongest relationship was found for the offence of driving whilst disqualified: on average, men convicted of at least 9 traffic offences between 1999 and 2003 committed more than 100 times as many driving while disqualified offences as men not convicted of non-traffic offences.

The only comprehensive analysis of the relationship between crime and road safety found in Australia was that of Palk and Davey (2005). Palk and Davey adopted comparative analysis of serious traffic (drink driving, disqualified driving and dangerous driving) and non-traffic crimes in Queensland. Police Officers' logs purposely modified for the research project were collected for five weeks from three Queensland regions. The results showed that certain serious traffic offences and non-traffic offences, such as disturbances and offences against the person, share similar characteristics and occur in concentrated places and at similar times. More specifically, for both criminal and traffic offences young males were the most represented, alcohol was frequently involved and these events most frequently occurred on weekends after midnight. The locations also corresponded with greater night-club and licensed venue concentrations.

[5] 'Serious' traffic offences include: drink driving, dangerous driving and driving while disqualified.

2.8 WHAT IS THE RELATIONSHIP BETWEEN CRIMINAL BEHAVIOUR AND CRASH INVOLVEMENT?

Despite the general consensus in psychological hypotheses and data evidence, there has been very little work undertaken to explore the effects of the relationship between general criminal behaviour and traffic offences on road safety, and specifically, crash involvement.

Bailey (1993) conducted a study that explored prior traffic and criminal convictions for all New Zealand drivers involved in fatal crashes during 1986. Post crash traffic conviction data was collected for 5 years for all surviving drivers. A major focus of this study was on drink driving as 55% of the 1,593 fatally injured drivers in New Zealand during 1987-1991 were proven or suspected drink drivers. From the sample of 893 drivers it was identified that 38% of drivers had one or more prior traffic convictions and 25% had one or more prior criminal convictions. From the "at fault" drivers, drink drivers were approximately two and a half times more likely to have a criminal conviction, crimes involving violence being the most common type of conviction. They also reported four times the proportion of prior drink driving convictions and double the dangerous or careless driving convictions compared with sober "at fault" drivers. Of the drink drivers found to have a prior criminal conviction for violence, 46% had a prior drink driving conviction. Of those on their first drink driving conviction, 37% had a past criminal conviction compared to 72% of the recidivist drink drivers. The highest proportion of drivers convicted for drink driving were unskilled workers or were unemployed. Furthermore, in the four years following their crash involvement 18.5% of the drivers (who survived the fatal crash, and continued driving) received a subsequent conviction for drink driving. These findings suggest that there is a relationship between alcohol-related crash involvement, drink-driving conviction and other criminal convictions, leading Bailey to suggest that increasing police resources to detect drink drivers may by default lead to the increased detection of individuals wanted for other criminal activities. This study relates to the Palk and Davey study in that alcoholism, crash involvement, non-traffic crime occur in the high alcohol hours.

According to Spolander (1997, p.2), "motor vehicle drivers involved in accidents have more crimes in their records than comparable crash-free drivers. This holds for all types of crime". Data was extrapolated for the years 1990-1994 from 200,000 motor vehicle drivers in Sweden, 100,000 of whom had been involved in a police reported traffic crash that involved personal injury and matched with 100,000 crash free drivers (Spolander, 1997). Traffic and criminal history for five years prior to the crash was explored. Drivers found to be drunk at the time of the crash (of whom 90% were males), were also reported to have the most extensive criminal and traffic histories, with 54% having prior criminal convictions. The most common types of crime identified within this drink driver population were theft, car theft, crimes relating to narcotics and alcohol, causing of bodily injury, and property damage. Of the drivers with a prior criminal record, 39% did not possess a valid driver's licence at the time of the crash. This study followed on from an earlier study by Spolander (1994). Spolander (1994) explored the relationship between drink driving and other criminal and/or traffic crime history. The study identified that eight out of ten drink drivers involved in crashes had a previous criminal history, three times higher than crash free motorists. The majority of sober crash-involved drivers did not have a previous criminal history.

The hypothesis of the Theory of Self-control was confirmed in a Dutch study of crash and criminal records data by Junger, West and Timman (2001). Risky driving behaviour was defined using Police accident reports and included behaviours such as speeding and ignoring traffic signals, these behaviours had to have occurred immediately before the

accident. After controlling for exposure to crashes, plus age and gender, log linear analyses revealed that individuals who displayed risky traffic behaviour contributing to or causing a crash had an odds ratio of 2.6 for having a Police record for violent crime, 2.5 for vandalism, 1.5 for property crime, and 5.3 for being involved in traffic crime, compared with those who did not display risky traffic behaviour. The authors suggested that the results were consistent with the idea of a common factor underlying risky behaviour in traffic and criminal behaviour and that this trait may represent an individual's general disregard for the consequences of their actions, which could be referred to as lack of self control, risk taking, or impulsiveness. Junger et al.'s sample of road users involved in crashes had, in general, a high rate of criminal history (males: 31% compared with 15.2% for the population of The Hague as a whole, $p<.001$; females: 11.4% versus 3.5%, $p<.001$) which was found for all age groups, see Figure 2.1. The authors suggested that one reason for this was the use of all criminal history as opposed to only crimes committed within the last twelve months.

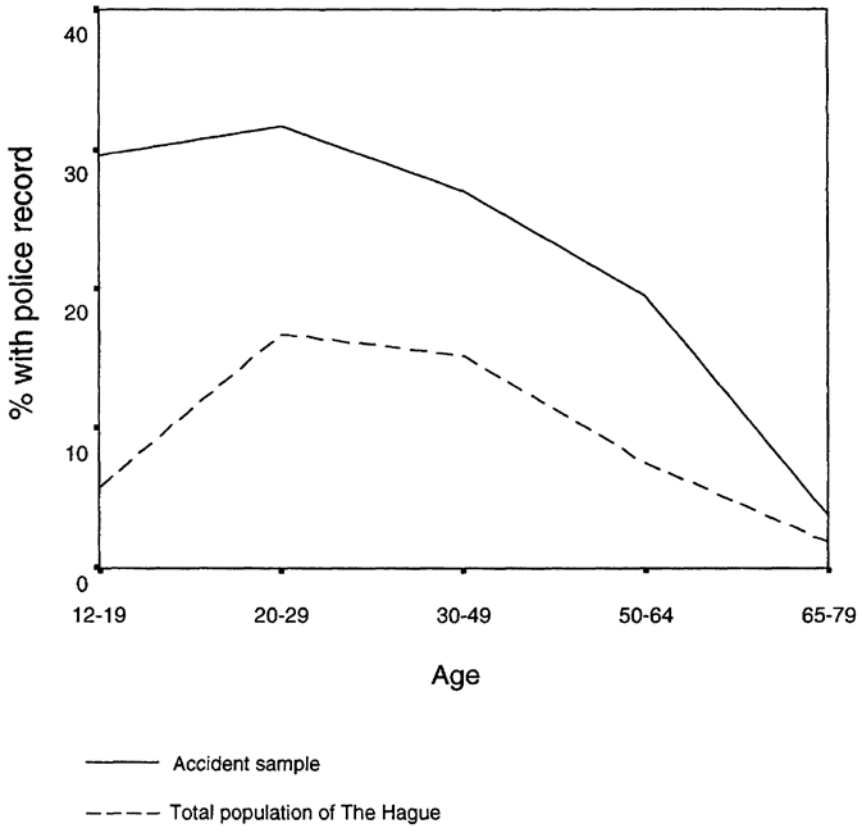

Figure 2.1 From Junger et al. (2001): Percentage of individuals in the database of offenders, inhabitants of the City of The Hague compared with the traffic users in crashes.

Junger et al. (2001) reported an interaction between risky behaviour and crime that suggested this association was weaker for younger individuals. It was suggested that this is because younger people are generally more likely to commit crimes than older people, and committing a crime is therefore less related to traits and more related to opportunities. It was also proposed that the specific measure of crime used in the study is influenced by age and exposure, i.e., the Police have had more time to build a criminal record for older people and if people commit more serious crimes they will stay in the system for a longer time. The authors suggest that the factors of alcohol use and exposure to crash risk, either alone or in combination, might be sufficient to explain the co-variation between crime and

road crashes. Furthermore, they suggest that the relationship between crashes and crime could also be the result of the differential exposure of criminals to traffic, therefore, the relatively high exposure of criminals to traffic may be sufficient to explain the relationship between crime and crashes (Junger et al., 2001).

2.9 HOW HAVE THESE RELATIONSHIPS BEEN EXAMINED?

One of the aims of this study is to understand the data sources that enable an analysis of the relationship between crime and road safety. It is therefore important to understand and document the data sources used in previous studies. Table 2.4 summarises the data sources used in the most relevant studies reviewed, particularly those that have involved data linking activities to examine the relationship between criminal history and road crash involvement. Detailed information about these sources is found below.

Table 2.4 Summary of studies linking crime and road safety data

Study	Data source	Agency	Country
Bailey (1993)	New Zealand Ministry of Transport (MOT), EHFS data, Wanganui Computer Centre	New Zealand Ministry of Transport (MOT)	New Zealand
Spolander (1997)	Traffic crash data, Crime data	Police	Sweden
Rose (2000)	Home Office's Offender Index (OI) & national survey of Young People and Crime (YPAC)	Home Office	U.K
Junger et al. (2001)	National Database on Offenders, and the Police Accident Registration	Police	Netherlands
Broughton (2003; 2006; 2007)	Archive driving license information. Home Office's Offender Index (OI)	TRL (based on licensing information by national Driving and Vehicle Licensing Agency (DVLA)	U.K

To examine the relationship between prior criminal and traffic history with fatal crash involvement, Bailey (1993) accessed demographic and severity of injury data from the New Zealand Ministry of Transport's (MOT) fatal crash files. While the MOT data did identify drivers over the legal BAC limit, DSIR Chemistry (now EHFS) data was additionally cross matched to provide BAC level data obtained from hospital records. Variables used in this matching process were: surname, first initial, date, location, and name of hospital attended. Ethnicity and marital status data was obtained from the Department of Health by matching names. Criminal and traffic conviction data was obtained from the Wanganui Computer Centre (central law enforcement computer) using name and date of birth. Difficulties with data matching arose due to variations in names

and dates of birth provided by the individuals across the various systems. For this reason, where feasible, manual data matching was used to compensate for computerised matching challenges.

Unfortunately, information about data sources, variables and linkage processes were not available for Spolander's (1997) study as the report was not fully documented in English.

Rose (2000) examined the socio-demographic characteristics and the criminal histories of serious traffic offenders in the UK using two existing data sources: the Home Office's Offender Index (OI) and a national survey of Young People and Crime (YPAC). YPAC was a large study investigating self-reports of offending based on a national random sample of 1,721 young people aged 14-25. Respondents were asked about their involvement in criminal offences including five serious traffic offences (licence and insurance offences, drink driving, dangerous driving, disqualified driving, crash offences [had a crash when driving, without stopping to see what had happened or reporting it to the police]). Analysis of criminal histories from the OI concentrated on the links between serous traffic offending, 'mainstream' criminal offending and vehicle theft. The analysis examined current court convictions, past offending behaviour and reconvictions. The OI sample consisted of 42,861 offenders, with national (UK) coverage and comprehensive records of criminal convictions. As a basis for the analysis, seven main groups of offence were identified, including:

1. Mainstream criminal offences (violence, burglary, robbery, theft and handling, criminal damage, drug offences);

2. Car theft (theft or unauthorised taking of a vehicle, theft from a vehicle);

3. Serious traffic offences (drink driving, driving whilst disqualified, dangerous driving (including causing death);

4. Other standard list offences (offences not classified within the specified main types of offence, or where the offence classification was not recorded);

5. Breaking bail and breach cases (failing to surrender to bail, cases arising from a breach of the requirements or conditions of a previous sentence);

6. Summary traffic offences (traffic offences that are not on the standard list);

7. Other summary offences (other offences (not including traffic offences) that are not standard list offences).

As an offender's court appearance may involve several charges, the OI defines the principle offence as the most serious sentence given, therefore, Rose's study regarded the principle offence as the most importance for classifying offenders.

Junger et al. (2001) inspected data from two independent police databases to examine the relationship between risky behaviour in traffic and criminal history based on a random sample of 1,531 people involved in crashes. Descriptions of the crashes by the police were used to identify individuals who had displayed risky traffic behaviour contributing to or causing a crash, and evidence of offending was based on a register of contacts with police.

Broughton (2003; 2006; 2007) analysed the UK's archive of driving license information held by TRL which is based on licensing information supplied by the national Driving and

Vehicle Licensing Agency (DVLA). The DVLA information supplied included details of convictions for traffic offences only and is recorded in the form of archived material because DVLA data can change in short time periods (e.g. points can be cleared from a licence after 3 years) in accordance with legislation. The archive therefore overcomes this loss of historical information and contains approximately 1% of licence records, maintained solely for research purposes. Information on other criminal offences was made available to the author from the Offenders Index (maintained by the UK Government's Home Office). A stratified sample of drivers was selected from the TRL archive and matched to the Offenders Index.

2.10 SECTION SUMMARY

This chapter has identified and documented classifications of non-traffic criminal behaviour and traffic offences, and the key psychological theories that have relevance to general risk taking and criminal behaviour. Experts in the field were consulted and the available scientific literature was examined. It has been reported that there is a positive relationship between general negative behaviour (e.g., involvement in antisocial behaviours) and risky driving behaviour. These findings support the hypotheses proposed in the relevant psychological theories and would suggest links between criminal behaviours themselves as well as between criminal behaviour and traffic offences. Additionally, the literature reviewed suggests that there is a positive relationship between criminal behaviour and traffic offences. Some international research has explored the relationships between the various categories of criminal behaviour (specifically mainstream crime such as violence, theft & burglary), criminal histories and the different types of traffic offences (specifically recidivist/drink driving, driving whilst disqualified).

Unfortunately, there has been very little work undertaken to explore the effects of the relationship between general criminal behaviour and traffic offences on road safety, and specifically, crash involvement. The work that has been done shows a positive relationship between risky traffic behaviour contributing to a crash and criminal history (particularly for violent crime, vandalism, property crime, and involvement in traffic crime). For example, a doubling in the rate of crash-involvement amongst individuals with a criminal history compared to those without a criminal history (Junger et al, 2001). For the work that has been conducted, the focus has been predominantly on the relationship between drink driving, criminal history and road safety, and significant relationships have been identified for drink driving Spolander, 1997; Junger et. al., 2001; Bailey, 1993; Spolander, 1997) and general criminal history including theft, car theft, drug and alcohol related crimes, violence and property damage (Broughton, 2003; Rose, 2000; Bailey, 1993). The identification of best practice from the international literature was not possible due to the limited research available in this area.

It should be noted that cultural differences may mean that the results of foreign studies do not apply in other countries (Broughton, 2007). Additionally, it is suggested that the factors of alcohol use and exposure to crash risk, either alone or in combination, might be sufficient to explain the co-variation between crime and road crashes and that the relationship between crashes and crime could be the result of the differential exposure of criminals to traffic. Therefore, the relatively high exposure of criminals to traffic may be sufficient to explain the relationship between crime and crashes. The relationship between crime and road safety has been examined by investigating a variety of data sources, both retrospectively and prospectively. Due to the limited literature that is available to determine the link between crime and road safety and the limitations of the studies to date,

it is clear that more research is warranted in the Australian context to explore the possible links between the two.

3 REVIEW OF VICTORIAN CRIME AND ROAD CRASH DATA SOURCES

3.1 INTRODUCTION

Information on data sources relevant to crime and road safety data has been obtained from online electronic sources, a limited number of publications, but primarily from a variety of contacts within Victoria Police, Victorian Department of Justice, and VicRoads, as well as from colleagues at MUARC.

Additionally, a multi-disciplinary meeting was convened on 19 September 2007 with senior members of Victoria Police to find out more about the data that Victoria Police hold, how it is currently being used, and ideas for collaboration in data sharing/research direction. Participants included staff from Victoria Police's Corporate Strategy and Performance Department (researchers, statisticians), Traffic and Transit Safety Department, as well as the secretary to Victoria Police's Research Coordination Committee. Staff from the MUARC project team and other senior MUARC researchers were also in attendance.

The most relevant data sources were identified and are listed in this section, with summaries of the variables included in each. At the end of the section, a flowchart is provided to summarise the relationship of each of the main data sources to each other (see Figure 3.1).

3.2 VICTORIA POLICE DATA

3.2.1 The Law Enforcement Assistance Program[6]

Victoria Police implemented the Law Enforcement Assistance Program (LEAP) state-wide in 1993. LEAP and TIS (see section 3.2.2) are the two entry portals for Police data. The LEAP database is fully relational and stores particulars of all crimes bought to the notice of police as well as family incidents and missing persons. It also includes details on locations, vehicles and persons involved. Victoria Police uses three methods of counting crime depending on the particular offence. For all crime against the person, and most crime against property, the counting unit is the number of principal victims for each separate occurrence of the offence. For example, if three offenders assault two persons, then two offences of assault are recorded.

Only the most serious offence which best describes a distinct course of criminal conduct is recorded in official crime statistics, even though an offender may be charged with other offences resulting from the one incident. For example, an offender carrying a firearm commits an armed robbery - only the offence of armed robbery is recorded although the offender would be charged with armed robbery and possession of a firearm.

[6] The information in this sub-section has been extracted from Victoria Police's web site: http://www.police.vic.gov.au/content.asp?Document_ID=781

The number of distinct courses of criminal conduct occurring within an incident will generally be one unless there is a break in time and/or location. For example, if an offender presents three valueless cheques to a teller only one offence would be recorded but if the three cheques were presented at different times or at different branches then three offences would be recorded.

There are in excess of 4000 individual statutory and common law offences recorded on LEAP which have been grouped into 27 broad offence categories. These categories are further subdivided into four general classes of:

- Crime Against the Person
- Crime Against Property
- Drug Offences
- Other Crime

Offences dealt with by way of penalty notice and/or traffic offences are not recorded on LEAP and are not included in the official crime statistics. Offences are classified as substantive offences, attempts, conspiracies, accessories and/or aid or incitement and abet. Unless otherwise stated, the statistics presented in publications include all degrees of the offence.

Of relevance to this project, the offence category of 'homicide' is not restricted to the offence of murder but includes offences such as manslaughter and culpable driving which also result in the death of a person. The offence category of homicide also includes attempts and other degrees of the offence. LEAP also captures data under the heading of "Road User Violence". This is easily searchable and will include incidents where vehicles have come together accidentally or otherwise and where offences against property and persons have occurred thereafter (up to and including murder, extremely serious assaults, criminal damage etc). Almost all of these will have been followed up by Police with charges laid. There may be some suggestion that this is a separate category of behaviour but in some cases it will definitely not be because crashes will have occurred that have then led to violence whether against property or persons (in some cases both) and they will have been recorded as "Road User Violence" (Mayne, 2009).

3.2.2 The Traffic Incident System

The 'Traffic Incident System' (TIS) contains information collected by police officers who attend the scene of a road crash that fits particular criteria[7]. The Traffic Incident system

[7] Criteria for attending the scene of a road crash:

1. The crash resulted in: the death of any person within thirty days of the crash, and/or; personal injury as identified by the police officers completing the crash report.
2. The crash occurred on any road, street, thoroughfare, footpath, railway level crossing, or any place open to the public.
3. The crash involved one or more road vehicles which, at the time of the accident were in motion, including motor cars, station wagons, utilities, panel vans, motor cycles, trucks, buses, trams and railway vehicles, pedal cyclists and ridden animals.

provides specific data and investigation management information for Traffic Accident, Police Accident and Impaired Driver incidents.

Prior to 2006, the Victoria Police Collision Report Form (VP510 Form) was used by police officers to officially record information about a crash (fitting the criteria). The VP510 Form was either completed at the scene of the crash or on return to the station by the attending member. The data recorded on the VP510 Form was then mailed to a central data entry point and entered into the Traffic Accident Information System (TAIS) database. The VP510 form and TAIS database were made obsolete in January 2006, at which point a computer based application for entering collision data was implemented, i.e. the Traffic Incident System (TIS). The types of variables held in TIS include:

- day, date and time the crash occurred;
- location (e.g., street, road or highway, that the crash occurred on, suburb that the crash occurred in, Melway reference etc);
- type of collision (e.g., collision with vehicle, collision with fixed object etc);
- information regarding the people involved (e.g., road user type, name, etc);
- information regarding the vehicles involved (e.g., make and model, registration, etc.);
- diagram of collision scene;
- brief description of collision (with no apportioning of blame);
- environmental conditions (e.g., road surface type, condition, lighting conditions, atmospheric conditions);
- traffic control involved (e.g., intersection signals operating, pedestrian crossing etc.);
- driver movement prior to impact (e.g., going straight ahead, avoiding animals, out of control etc.);
- driver intentions prior to collision;
- initial point of impact;
- level of damage; and,
- whether the vehicles involved were towing a trailer of some sort.

Further details about the variables are provided in Appendix A. The TIS system allows the user to check a person against LEAP using a Master Name Index (MNI), which is given to a person whether they are a victim of crime or involved in a crime. The result of this check is not recorded anywhere in LEAP however, if matched the name data is stored in the TIS Database.

3.2.3 The Major Collisions Investigation Group

The Major Collisions Investigation Group (MCIG) consists of a group of approximately 50 officers specially trained in collision investigations that are called out to assist patrol officers with fatal collisions and/or major injury collisions.

The MCIG criteria for attending a crash are: if three or more people are killed; if someone is killed or suffers life-threatening injury and the person who caused that crash is in some way culpable, and that culpability can be by way of excessive speed, or drug, or alcohol, or reckless behaviour. The MCIG attend approximately 300 crashes a year but fully investigate approximately 150 of these crashes. The team take measurements and photographs and reconstruct the crash based on the available evidence. Due to the detailed nature of their investigations, it is usual for this team to collect and record additional records that TIS may not have, although the standard data is still entered into TIS. Driver's name, date of birth, address and if available MNI are used to identify any criminal history recorded in LEAP. Past traffic offence is also linked via LEAP through the licensing and vehicle registration section. Details of any past criminal and traffic offence history are recorded onto an Inquest Brief of Evidence for court sentencing purposes. However this information is not recorded in the MCIG Yearly Take-Ons database.

3.2.4 The Vehicle Impoundment System and Fatal Diary

The Vehicle Impoundment System (VIS) holds information about individuals convicted under the Vehicle Impoundment Legislation and the Fatal Diary database contains data on road fatalities. Like the MCIG databases both of these databases are managed by the Traffic and Transit Safety Department and they are all stand alone databases. To identify an individual's past traffic offence or criminal history from TIS or LEAP an extensive search would have to be undertaken relying on matching common variables such as name, address, DOB, licence or registration number.

3.2.5 The Collisions Management Information System

The Collisions Management Information System (CMIS) was designed and is managed by Corporate Statistics. The system provides summary information relating to all traffic collisions reported to Victoria Police, by reading data from TIS (based on crash data submitted by Police officers).

CMIS data is similar to the Road Crash Information System (RCIS) data (held and maintained by VicRoads and described in more detail below in Section 3.5.1) but not as detailed; it is more of an overview of the situation. CMIS data contains information relating to vehicles and persons and their injury levels. It contains data for 'Fatal', 'Serious', 'Other', and 'Non-injury' levels at all levels of approval ('Draft', 'Ready for review', 'Returned – Prepare brief', etc.). It does not contain discarded incidents or Police collisions. This can provide additional information to the RCIS, as RCIS only receives information for crashes with an injury outcome (Fatal, Serious, Other) and at an approved level.

Corporate Statistics is also responsible for the collection, collation and analysis of road traffic fatalities throughout Victoria. The fatal collisions management information system (FCMIS) provides management and operational information relating to fatal traffic crashes.

3.2.6 Fixed Payment Penalty Database

The Fixed Payment Penalty Office (FPPO) database records all penalties/fines including traffic penalties administered directly from Police members, often referred to as on-the-spot fines. This is a stand alone database although it does share relevant variables such as name, address, driver's license and registration numbers. Outstanding/unpaid fines are then linked in with the Department of Justice's Warrants database.

3.3 RELATIONSHIPS BETWEEN VICTORIA POLICE DATA SOURCES

In addition to the above main data sources, the Police have a range of other data networks and systems that may be relevant to understanding the issues surrounding crime and road safety/crash involvement. These are described briefly below.

3.3.1 Mobile Data Network MDN

The Mobile Data Network (MDN) is a wireless data network that enables data to be accessed on-road through the use of in vehicle computer terminals. While this service has many uses (it is also utilised by the Metropolitan Ambulance service), the relevant information for this report is the ability for officers to enter data at the roadside as well as access Victoria Police database information e.g. vehicle registration and driver's licence information. MDN can be used to check Tenix (see below section 3.7.1) records for outstanding warrants through LEAP. This type of network provides an example of how various databases can be interlinked. While this system has been designed mainly for strategic purposes, exploration of the systems capabilities for data linking for research and evaluative purposes should be further explored.

3.3.2 TIS Enterprise Application Integration (EAI)

It was reported that there is a middleware system TIS Enterprise Application Integration (EAI) that has been implemented (but still in development) that enables several data systems to be linked. It was reported that when this system is fully initiated it will enable two options for examining and collecting data:

> *"As well as producing TIS, you will notice that we have a thing in the middle there called an EAI, which is like middleware, a bit like a telephone exchange, and the fact that we installed that means that all of the systems can come into that one point and then feed the data out. What that means, without getting into all the acronyms, is that in the future you will have two options in terms of collecting data: you can collect data into the traffic incident system, which is a database designed to collect this data, or you can take data from other systems and link it through this middleware, this telephone exchange, and use that as a feeder point to pass data through. For example, the way we have set up TIS, it links through the middleware, it links to VicRoads for license registration checks, for driver's license checks, and to our LEAP system for personnel checks, and feeds that back into the traffic incident system as a database. The advantage of this is that, depending on where you want to go in the future, you have the option of connecting things together so that it feeds the data through, so it is a lot more integrated."*
>
> *Quotes from A/Inspector Jeff Cole, Victoria Police in the transcript of the Road Safety Committee Inquiry into Driver Distraction, 27 March 2006, Melbourne.*

This system, therefore, enables linking of data that has not previously been possible. The TIS system will have two main functional interfaces to the TIS EAI system, which are, online validations and Incident Transactions[8]. The LEAP system will provide a number of services to the TIS EAI system with regards to driver license and vehicle registration

[8] *The TIS application & EAI middleware interface is now fully operational with validation and data supply links via the EAI to internal and approved 3rd party external systems.*

details. The TIS EAI system will make requests to the LEAP system on behalf of the TIS system. However, as suggested by the comments received from the stakeholders, this new system may enable data examination but does not enable recording of findings/analyses.

3.3.3 Victoria Police Operational Performance System

Victoria Police Operational Performance System (VicOPS) is a corporate data warehouse that can be utilised for searches, queries and reports. It currently holds TIS, LEAP, Complaints and Human Resource Management data, in the near future it will hold financial and Computer Aided Dispatch data. VicOPS provides the ability to link different subject areas containing shared Person information, which is unique and provides an almost categorical match (subject to Police members' discretion in the matching process in TIS). VicOPS collects all TIS data, which comprises the LEAP Master Name Index (MNI) number (where such exists when the member has added the person to TIS). VicOPS also holds the LEAP MNI number for all offenders. It is possible to provide a count of all Accidents involving persons with an Offender Involvement in LEAP. VicOPS technical staff are at present looking at the feasibility of this function at the moment, confirmation of this capability will come in due course (Ferdinands, 2009). Completion of this process will enhance VicOPS capacity to be used for data linkage queries relevant to both crime and road safety.

3.4 LINKING VICTORIA POLICE DATABASES

It was suggested that LEAP is used as a source of validation rather than for analysis purposes. For example, LEAP is used to validate crash data that is collected, i.e., TIS uses LEAP to look at vehicle registration, driver licence, stolen vehicles etc. There is no overlap of data between LEAP and TIS and it was suggested that perhaps there should be (Stakeholder, LEAP Management Unit, Victoria Police). Another stakeholder verified that there is no direct link between criminal records and crash records (Stakeholder, Corporate Statistics, Victoria Police).The approach to data linking currently being implemented within the Victoria Police was summarised during the Road Safety Committee Inquiry into Driver Distraction:

> "(TIS) is a multi-agency system, which shows you that we have moved towards broadening it out from just Victoria Police. There are a number of parties involved in this and we are looking at producing a whole-of-government type approach (to)… lead on to the future."
>
> *Quotes from A/Inspector Jeff Cole, Victoria Police in the transcript of the Road Safety Committee Inquiry into Driver Distraction, 27 March 2006, Melbourne.*

As a result of the activities undertaken in this project, that is, the review of the literature, existing types of data and databases, and discussion with the stakeholders, there were two main suggestions for linking Victorian data to explore the link between crime and road safety, in terms of fatal and serious injury outcome crashes.

The following options can be presented:

- A LEAP search could be run within TIS, with a person's name used in a search demonstrating their involvement in a road crash. One option could be to link the crash involved person's name and the date of birth back to criminal history. This

activity would be appropriate for examining any subset of crash severity outcome recorded by the Police.

- A LEAP search could be run for individuals involved in MCIG investigated road crashes. Using MCIG information would enable contributory factors in the crashes (from the Police perspective) to be examined more fully than by using any other source, which would provide useful detail.

In terms of exploring other links, such as crime and traffic infringement, which has not currently been done in Australia, the following options can be presented:

- A LEAP search could be run for individuals identified within the Traffic Infringement Database as incurring penalties.

3.5 VICROADS DATA

3.5.1 The Road Crash Information System

The TIS information on crashes[9] is sent to VicRoads who enhance the data set with VicRoads information. This enhanced data is then held in the Road Crash Information System (RCIS). The RCIS contains records of every road crash involving injury reported to Police in Victoria. The data covers crash circumstances, road user and vehicle information in great detail but only has limited information on the injuries sustained by persons involved in the crash and is a particularly useful source of information on fatal and serious road crashes. MUARC holds complete records from 1987 onwards, the database is currently available up to December 2007.

3.5.2 Driver Licensing System

This database contains all Victorian Driver license data and is maintained by VicRoads. Data is recorded in a case by case manner and includes variables such as driver's licence number, name, address, DOB, licence status and conviction and demerit points history. As this is an individual client based data system it can be challenging and/or time consuming to extract summary data, e.g., number of Victorians who have had their licence disqualified. Traffic Infringements that involve a loss of demerit points are recorded against client's files from DOJ via weekly electronic file transfers from Tenix Solutions. VicRoads then notifies DOJ about any non-matched data. The Victoria Police have direct access to the Driver Licensing System via LEAP.

3.5.3 Victorian Registration Database

This VicRoads database holds Victorian car registration details such as registration plate number, name, DOB, address, status of vehicle. This database also holds information as to whether the vehicle is stolen, and this information is provided to VicRoads from the Victoria Police via the LEAP system.

VicRoads Victorian driver's licence and car registration information is also partially linked to the National Exchange of Vehicle and Driver Information System (NEVDIS). This enables interstate licence and registration transfers and also tracking of stolen vehicles.

[9] The Members of Opinion of Cause for the crash that is held in TIS is not included in the information that is sent to VicRoads because it is not a 'proven fact' and is a subjective opinion of the reporting police officer.

3.6 DEPARTMENT OF JUSTICE DATA

3.6.1 The Courtlink Database

The Courtlink Database is managed by the Department of Justice and is a case management system for the courts, including both criminal and road traffic offences. The majority of the cases are initialised electronically from the Victoria Police following a chargeable offence. An individual's past criminal history is not recorded in this initial process. If found guilty, in relation to the Finalising Order, a magistrate will be provided with a paper copy of an individual's prior convictions from the Police Prosecutor obtained via LEAP. The Magistrate's Office then enters the final court orders including past criminal convictions into the individual's case records within the Courtlink database. Courtlink is not used to link past criminal histories, especially as the identifiable variables are difficult to match due to discrepancies in details provided by the individual e.g., DOB, address, name. Summary data from the Courtlink database is used internally for monitoring the court system, e.g. how many cases were heard in each court over a period of time but not for analysis regarding the types of criminal activities heard by the courts.

The Courtlink system is scheduled to be phased out and replaced by the "Court View" system over the next 12 months. This new system will incorporate data from the Magistrates Court, County Court, Supreme Court, Children's Court, Coroners Court, VCAT and the Disputes Settlements Centre. Details of the proposed system were not readily available at the time of writing this report, however, it is envisaged that this new amalgamated database will allow for more interactive data access across the Courts system.

The statistical section of DOJ produces regular publications for each of the court jurisdictions. These publications provide summary data such as: number of offenders processed through the courts; demographic characteristics of offenders; types of offences; and types of penalties prescribed. Presently they do not report on links between crime and road traffic offences, again because of the challenges with matching individual cases. Currently if an individual is charged with an offence one day and then for another offence at a later date their records are entered as two completely separate cases. As expressed by the Courtlink data staff, they hope to have more flexibility in data analysis with the introduction of the Court View system.

3.7 OTHER RELEVANT DATA

3.7.1 The Traffic Infringement Database

Traffic infringements occurring within Victoria are recorded in the Victorian Infringement Management System (VIMS). Up until recently this database has been managed by Tenix Solutions on behalf of the State. Requests to access this data must be made through the Infringement Management and Enforcement Services (IMES) Unit of Department of Justice (DOJ). The data field codes that are included in the database are included in Appendix B of this report. All traffic infringements are entered into VIMS including red-light and speed cameras and on-the-spot infringements which are entered in a manual process. Registration numbers are identified in camera detected offences personal contact details are obtained though links with the VicRoads Registration and Licensing database, which also keeps record of respective demerit point losses. These personal details and infringement history are stored in VIMS. These infringements are then linked with VicRoads for the allocation of demerit points. VIMS also links with the Sheriff's Office

(DOJ) who serve warrants for outstanding fines. As part of the new tender, VIMS is scheduled for replacement/modification over the next 12 months. Discussions are underway between interested parties such as DOJ and Victoria Police regarding the possibility of including minor summary offences e.g. offensive language, minor thefts into the VIMS system. This would then involve forming links with the LEAP System.

3.8 SECTION SUMMARY

Figure 3.1 is a flowchart which summarises the relationships between the main data sources listed within this chapter and the jurisdictions that manage them.

It is recognised that this is not an exhaustive list of potential databases, for example further exploration of Corrections' prisoner and community corrections databases could prove relevant to data linking possibilities. It is also important to note that this section has focussed on identifying the major relevant and existing data collection sources. The feasibility of collecting data relating to both crime and road safety via surveys/questionnaires of individuals with a criminal record to compare with individuals without a criminal record is warranted and should be further explored.

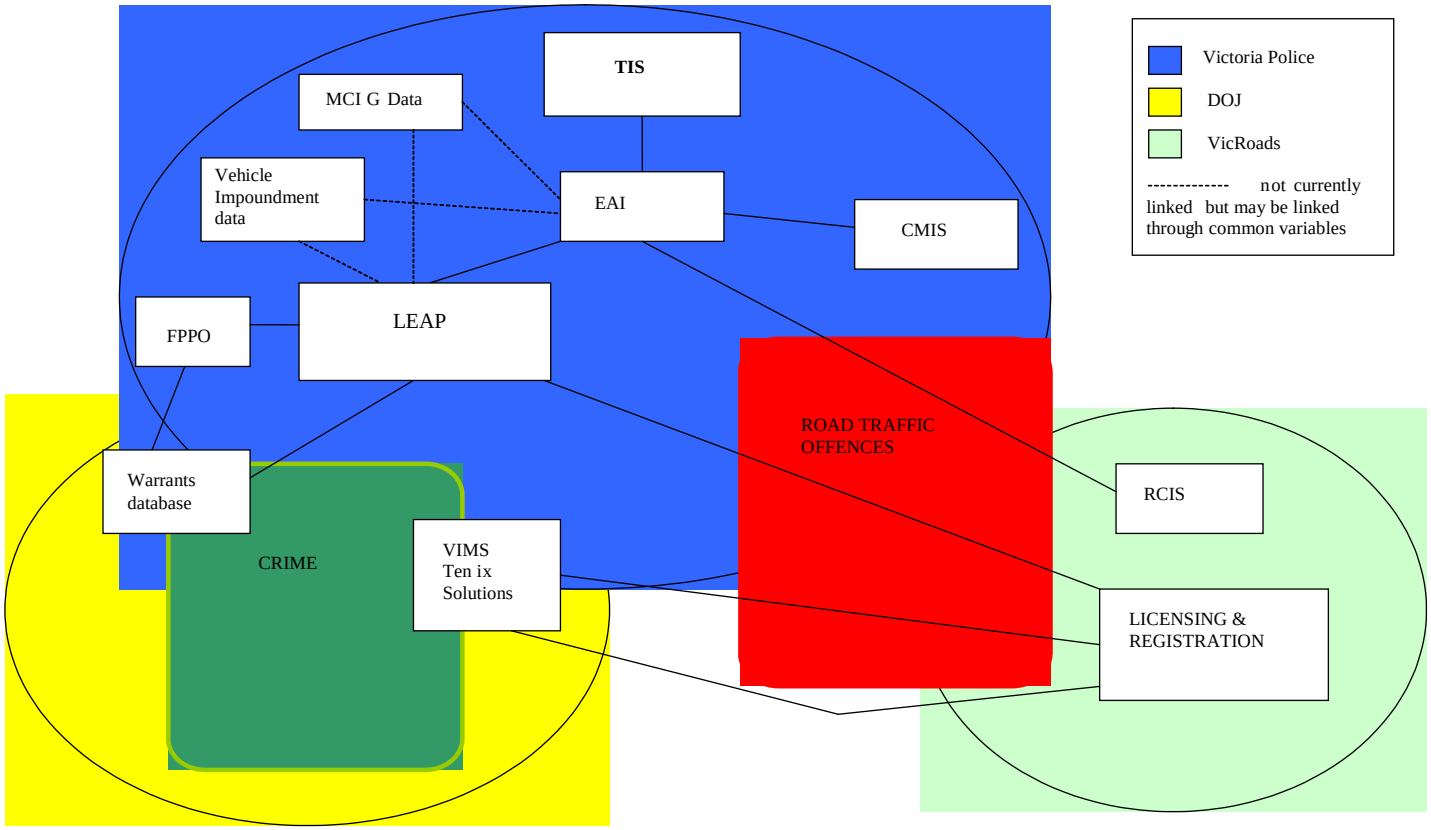

Figure 3.1 Flowchart of relevant road safety and crime data and associated agencies

*Note: This flowchart is a summary of the relevant databases and existing links between them. Access to the various levels within many of these databases is governed by authorisation within individual departments with more senior staff having more extensive access.

4 APPROACHES FOR LINKING CRIME AND CRASH DATA

4.1 INTRODUCTION

This section contains a summary of the potential approaches for linking crime and crash data and their relevance to the Victorian context. Limitations and barriers in linking data are also described.

4.2 PROCESS OF LINKING DATA

The key steps identified within the literature for the process of examining crime and crash data are:

Step 1 Data Supply – drawing on data sources summarised in Section 3.

Step 2 Data Matching – matching common field codes using automatic/manual matching, or middleware matching.

Step 3 Data Checking – basic descriptive analysis of data to ensure consistency across field codes, no outliers or errors in data.

Step 4 Data Analysis – having a reference year which is used as a historical marking point and years prior to this time are examined.

4.3 CONTEMPORARY APPROACHES TO LINKING CRIME AND CRASH DATA

Generally, crime and crash data has to be linked to be analysed simultaneously. It is rare that this information is contained in the one database. The linking of data sources is generally achieved by using matching variables to link two sources of data to identify drivers with serious injury and/or fatal crash involvement and drivers who have criminal history. The previous key studies have linked crime and road safety data using two or more Government databases (see Table 2.4).

4.4 LIMITATIONS IN LINKING DATA

The following sub-section discusses some of the issues and limitations that arise in linking data sources. The documentation of these issues is based on the discussions with many stakeholders and researchers from Victoria, nationally and internationally, and, the methodological issues that have been cited in the scientific literature.

4.4.1 Privacy and ethics

Privacy and ethics considerations are important factors when discussing linkage of databases. A secure environment must be ensured in any database to protect the privacy of individuals.

One stakeholder commented that “privacy would be a nightmare to enforce” if combining data from LEAP and TIS, for example, due to the need to explore multiple variables to ensure reliable linking of data. It was suggested that even this approach would result in some missing data and would only give a “rough” match. The nomination of an agency to

be the custodial of linked databases and access issues for other relevant agencies would need to be investigated.

There was uncertainty amongst the stakeholders over exactly which process would need to be followed for obtaining ethical consent and meeting ethical standards, e.g., privacy commissioner, Victoria Office of Public Prosecutions, and this would need to be investigated, specific to any linking strategy adopted. , Therefore, the key issues are:

- Stringent privacy legislation:
    - All data requests for Victoria Police must be authorised by Victoria Police's Research Coordinating Committee and/or other bodies; and,
    - Data would have to be de-identified and unidentifiable (as most data linking would rely on name or date of birth the Victoria Police would have to do the data matching internally)

4.4.2 Matching of data

It was suggested by stakeholders that variations in data entry (e.g., spelling errors) within the TIS and LEAP systems could cause difficulties in obtaining reliable data from queries. Indeed this was an issue identified in the Bailey (1993) study. Moreover, it is common for the criminal population to frequently change their names, removing the common thread. To overcome this issue, it was suggested that variations on multiple variables would need to be run, e.g., name, address, date of birth, aliases. Therefore, the key issues are:

- Issues with data matching:
    - Not many common variables to link traffic data with licensing data and crime data;
    - Common variables are identifiable e.g., name, DOB, again this may cause privacy issues;
    - Matching rates are often poor due to anomalies in common variables e.g., changes in spelling names, changed address, use of alias;
    - Common variables not a reliable source for cross matching variations in DOB, spelling of name, the use of an alias;
    - Difficulties have even been experienced when common variables exist e.g., when matching crash data with VicRoads registration data again as mentioned above this is often due to variations in DOB, spelling of name, the use of an alias; and,
    - The closest data we currently have exploring repeat offences is road traffic recidivism data held by VicRoads however data extraction complications have hindered access to this type of data.

- Difficulties with operational definitions:

    - Challenges when defining what constitutes criminal history and how to categorise crimes, e.g., Police department uses 27 offence categories (see Crime Statistics 2005/06 for examples);

    - Relevance of criminal history would need clear definition e.g., first offence, all offences, offences that occur when licensed; and,

    - Whether a database contains information on the details of an offence and sentence imposed, and whether serious traffic convictions are contained within such a system.

4.4.3 Analysis issues

The longer a person has held a driving licence, the more likely they are to have obtained a criminal history, as this is time dependent. When we consider past criminal offences, what information should be used, how should data be examined? For example, we need to question if we examine all offences, the worst offences, violent vs. non-violent, repetition of offending, property/drug related offences only, age of onset of offences.

While it is possible to link some existing databases using one or more variables (depending on the databases concerned), this linking is often limited to a retrospective linking of individual cases. For road safety research purposes it is important to be able to link whole databases for exploration of the overall extent of problems and to analyse the influences of several variables. Database records do not show the type of vehicle being driven when a traffic offence was committed which also affects the analysis and interpretation of the data. Listed below are issues surrounding data analysis when exploring relationships between crime and road safety.

- Issues with data analysis:

    - When undertaken any retro/prospective research considering crime it is important to incorporate time spent in jail. Individuals in jail will not be accruing any road traffic offences;

    - Similarly, research should also consider the treatment of demerit points after a certain period. That is, whether demerit points are erased from the data sources after a set time. If so, an archive may need to be created to preserve this data;

    - Individuals with criminal histories are often a transient population who seek interstate licenses and registration in attempts to avoid detection (thus changes in address and registration data); and,

    - The link between criminal activity and mental health and/or substance abuse history further complicates clear identification of factors involved and adds complexity to any treatment recommendations.

4.4.4 Cost/Resource issues

As for most initiatives, the costs associated with implementation, maintenance and resources are key considerations. Indeed, a number of barriers and limitations were identified by stakeholders as follows:

- Limited resources within Victoria Police:
    - Staff resources – may take a long time to complete our request or may refuse altogether; and,
    - Staff may not have time to de-identify data for our research purposes.
- Associated costs:
    - Fee for service (unless in some cases Baseline sponsors may find a way that MUARC research is exempt from these fees or alternatively if the research is commissioned from the departments such as the Victoria Police):
    - MDN is an example of data linking with its links between VIMS and LEAP however this linkage was costly to undertake; and,
    - If data was linked into a middleware type database the agency that would fund the associated maintenance and data requests would need to be determined.

4.5 SECTION SUMMARY

There are a variety of limitations and barriers for linking crime and road safety data in Victoria, predominantly concerning privacy and ethics, matching of data, issues with data analysis and cost/resource factors.

The majority of professionals working in the Departments and organisations approached during this project identified data accessibility as an important issue. In some cases it seemed apparent that Privacy Legislation was over-interpreted making it virtually impossible to access even de-identified data. Large amounts of data are collected by each individual agency however much of this data is not available for research or evaluation purposes. When external bodies are contracted to conduct research they often cannot access the necessary data. As an example, MUARC is required to adhere to strict University ethics protocols when conducting research which should satisfy any privacy and confidentiality concerns of these departments. With the trend now being that evaluative research is tendered out to external organisations the importance of developing a workable protocol to provide data access while preserving confidentiality needs to be devised. Large delays in waiting for data access approval and barriers to even de-identified data are both costly to research projects and often make important road safety research impossible.

5 KEY FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

A number of recommendations have been made as an outcome of the key findings of this work. The recommendations can be grouped into those for data collection, data management and analysis. It should be emphasised that the current database systems are not designed or used with research purpose as their priority. Therefore, several of the recommendations refer to improved coordination between practice and research.

5.2 KEY FINDINGS OF THIS WORK

The specific objectives of the research were:

- To examine and document the link between crime and road safety from an international/national perspective, with particular emphasis on the relationship between criminal history and involvement in fatal and serious injury crashes;
- To identify the best practice approaches to examining the link between crime and road safety in Victoria and internationally;
- To determine the existing barriers and facilitators to examining the issue of crime and road safety in Victoria; and,
- To develop strategies to overcome the existing barriers and present a set of recommendations for data collection, data management and analysis.

The key findings of this research suggest that:

- There is a positive relationship between:
    - General negative behaviour (e.g., involvement in antisocial behaviours) and risky driving behaviour;
    - Criminal behaviour and traffic offences (specifically violence, theft & burglary and recidivist/drink driving, driving whilst disqualified);
    - Risky traffic behaviour contributing to a crash and criminal history (particularly for violent crime, vandalism, property crime, and involvement in traffic crime); and,
    - Crash involvement, drink driving and general criminal history including theft, car theft, drug and alcohol related crimes, violence and property damage.
- There are a variety of approaches that have been adopted internationally to examine these relationships, although such work has not been undertaken in Victoria to date.
- There are a variety of limitations and barriers for linking crime and road safety data in Victoria that need to be considered, predominantly concerning privacy and ethics, matching of data especially across agencies, issues with data analysis and cost/resource factors.

- It was not possible to comment on best practice approaches as there is limited research that related to best practice, and no evaluative research into these practices was found

A number of recommendations are presented to overcome the above factors and to explore the relationship between crime and road safety in Victoria. These are outlined below.

5.3 RECOMMENDATIONS FOR DATA COLLECTION AND RECORDING

5.3.1 General comments

- A broad recommendation is that the relationship between crime and road safety, specifically the link between criminal history and crash involvement, be examined within the Australian context. This research should be undertaken at a state level due to state-based agencies and their individualistic data collection methods.

5.3.2 LEAP

- A LEAP search could be run within TIS, with a person's name used in a search demonstrating their involvement in a road crash. One option could be to link the crash involved person's name and the date of birth back to criminal history. This activity would be appropriate for examining any subset of crash severity outcome recorded by the police.

- A LEAP search could be run for individuals identified within the Traffic Infringement Database as incurring penalties.

5.3.3 MCIG

- A LEAP search could be run for individuals involved in MCIG investigated road crashes. MCIG should record the information that they retrieve from LEAP on criminal history within their Take-Ons database (or similar). Even simple data recording (e.g., yes/no criminal history, category/brief description) for each individual involved in a crash would enable analyses to be run to examine the relationship between crime and road safety. Using MCIG information would enable contributory factors in the crashes (from the Police perspective) to be examined more fully than by using any other source, which would provide useful detail. Additionally, if the data on criminal history can be examined for the individuals involved in road crashes investigated by MCIG for a reasonable period (e.g., last 10 years), an approximate figure can be obtained to compare the road crash involved population with the general population in terms of their likelihood of having a criminal history.

5.3.4 VIMS

- As part of the new tender, VIMS is scheduled for replacement/modification over the next 12 months. Discussion is taking place between interested parties such as DOJ and Victoria Police regarding the possibility of including minor summary offences e.g. offensive language, minor thefts into the VIMS system. This would then involve forming links with the LEAP System. When developing this tender, links and ways of capturing crime and road safety data with an automatic lookup and automatically generated report could be considered. Moreover, it is suggested

that road safety research stakeholders could be involved in this process to aid effective research tool development.

5.3.5 Licence checks

- In the state of Victoria license checks are not currently routinely conducted at RBT sites, due to legislative challenges. Many unlicensed drivers are aware of loopholes to avoid roadside license checks. Research suggests that one's perception of likelihood of being detected plays a key role in the decision to engage in illegal behaviours or not. Therefore, pro-active detection/prevention could be implemented through enforcement strategies targeting behaviours such as unlicensed driving.

5.4 RECOMMENDATIONS FOR DATA ANALYSIS

- Create clear definitions for what constitutes criminal history and how to categorise crimes;

- When conducting searches, it is important to identify variations on pertinent variables, such as name and address, as variations on these variables can result in low levels of data matching. Databases that have a Boolean-type search function could be used to enhance data matching; and,

- Devise sound, statistically valid approaches for overcoming influencing factors in the data, e.g. age, time held licence etc.

5.5 RECOMMENDATIONS FOR DATA MANAGEMENT

5.5.1 General comment

- The need to extract summary data for research purposes is currently overlooked. A process for improving the potential for research use and access to data should be implemented, e.g., by including key research stakeholders in the design and development of new data systems in the future; and,

- The relatively recent changes to privacy legislation have created many new challenges for data analysis to be carried out across agencies, in many cases excluding the possibility totally. Whilst the importance of adhering to this legislation is recognised, examples of over interpretation and thus data access restrictions are common. Data custodians within agencies would benefit from clear guidelines that support data release and sharing within the current legislation.

5.5.2 Data output

- It appears from comments made by stakeholders and from MUARC's past research experience that there is often difficulty in producing data output in a useable form/file type, e.g., MS Excel. If a more useable output could be produced, this could dramatically reduce time taken for data conversion cleaning leaving more time for analysis; and,

- With the increasing outsourcing of database design and management, it is important for agencies to ensure their ability to access their data is not compromised, either through access limitations or excessive costs.

It is concluded that the ability to successfully identify trends, develop preventative strategies, and target existing high-risk groups relies heavily on the ability to research and apply complex statistical analysis to existing data. The outcomes of this research are of interest to policy makers in both crime and road safety areas. Inferior data systems can result in the implementation of ineffective strategies. The benefits of initiatives that are based on sound data analysis using sophisticated interactive databases may outweigh the costs associated with the development of these databases. It is important that with the development of any new data system that consultation occurs with experts in the area of database management and statistics (e.g. organisations such as MUARC, or internal database managers within agencies), during this development phase. Whilst there is much research work required that directly investigates the relationship between crime and road safety, it is encouraging that recent opportunities to further explore this relationship have emerged and are currently being undertaken at MUARC.

6 REFERENCES

Arbuthnot, J., & Gordon, D. A. (1988). Crime and cognition: Community applications of socio-moral reasoning development. *Criminal Justice and Behaviour 15(3)*, 379-393.

Australian Bureau of Statistics (ABS, 1997). Australian Standard Offence Classification (ASOC) number 1234.0. Available from: http://www.abs.gov.au/ausstats/abs@.nsf/66f306f503e529a5ca25697e0017661f/E7D1DAFA4B677037CA25697E00184BEE?opendocument

Bailey. J. (1993). *Criminal and traffic histories, blood alcohol and accident characteristics of drivers in fatal road accidents in New Zealand*. EHFS Publication Series, No: 3. Lower Hutt, NZ: Institute of Environmental Health & Forensic Sciences.

Bina, M., Graziano, F., & Bonino, S. (2006). Risky driving and lifestyles in adolescence. *Accident Analysis & Prevention, 38*(3), 472-481.

Broughton, J. (2003). The number of motoring and non-motoring offences. *Prepared for the Road Safety Division, Department of Transport, TRL Report TRL562*.

Broughton, J. (2006). The correlation between motoring offences and other types of offence. *Prepared for the Road Safety Strategy Division, Department for Transport, TRL Report TRL650.*

Broughton, J. (2007). The correlation between motoring and other types of offence. *Accident Analysis & Prevention, 39*(2), 274-283.

Chenery, S., Henshaw, C., & Pease, K. (1999). *Illegal parking in disabled bays: A means of offender targetting*. London: Home Office, Policing and Reducing Crime Unit, Briefing Note 1/99.

Cole, J. (2006). Transcript of the Road Safety Committee Inquiry into Driver Distraction, 27 March 2006, Melbourne. Quotes from A/Inspector Jeff Cole, Victoria Police.

Davies, G., & Broughton, J. (2002). Criminal and motoring offences of drink/drivers who are High Risk Offenders. *Prepared for the Road Safety Division, Department for Transport, TRL Report TRL551*.

Hatakka, M., Keskinen, E., Gregersen, N. P., Glad, A., & Hernetkoski, K. (2002). From control of the vehicle to personal self-control; broadening the perspectives to driver education. *Transportation Research Part F: Traffic Psychology and Behaviour, 5*(3), 201-215.

Junger, M., West, R., & Timman, R. (2001). Crime and Risky Behaviour in Traffic: An Example of Cross-Situational Consistency. *Journal of Research in Crime and Delinquency, 38*(4), 439-459.

Kohlberg, L. (1984). *Essays on moral development, Volume II. The Psychology of Moral Development: The Nature and Validity of Moral Stages*. San Francisco: Harper & Row.

Nochajski, T., Miller, B., Wieczorek, W., & Whitney, R. (1993). The Effects of a Drinker-Driver Treatment Program: Does Criminal History Make a Difference? *Criminal Justice and Behavior, 20*(2), 174-189.

Palk, G., & Davey, J. (2005). *A comparative analysis of the nature and extent of traffic offences and their relationship to other non-traffic offences*. Paper presented at the Road Safety Research, Policing and Education.

Parsons, K. (1978). *Violence on the road, a logical extension to the subculture of violence thesis?* : Research Section, Dept. of Justice.

Rose, G. (2000). *The criminal histories of serious traffic offenders*. London, UK: Home Office Research Study.

Spolander, K. (1994). Crime records of drunken drivers involved in traffic accidents. A study of 30 000 motor vehicle drivers. Stockholm: Statistics Sweden

Spolander, K. (1997). Crime records of drivers of motor vehicles. A comparison of accident involvement and accident-free drivers. Stockholm: Statistics Sweden

Stevenson, S., Hall, G., & Innes, J. (2003). Sociomoral reasoning and criminal sentiments in Australian men and women violent offenders and non-offenders. *International Journal of Forensic Psychology 1 (1),* 111-119.

Sugg, D. (1998). Motor projects in England and Wales: An evaluation. Unpublished Research Findings. Home Office Research Development and Statistics Directorate.

Whelan, M., & Haworth, N. (2005). *The relationship between visible traffic enforcement and reductions in crime* (Report Prepared for the Transport Accident Commission). Clayton, Victoria: Monash University Accident Research Centre.

APPENDIX A: MAIN TIS VARIABLES COLLECTED BY VICTORIA POLICE

The computer based forms include a variety of requests for variables, embracing environmental, vehicle, and road-user related facts. A brief introduction to each form and the few variables relating to factors contributing to crashes are commented upon below:

1. TIS Checklist (quick reference guide) – officers use this on scene to prompt them as to what data to collect
2. TIS Notification Sheet – was designed to automatically populate another IT System, the 'Incident Fact Sheet' system (IFS) however, this interface was not implemented but may still be developed in the future. This system is used for policing incidents of a significant nature, such as serious crimes, major events and serious collisions, where other police may need to monitor or know about the incident or incidents of that kind. Specific variables to crash causation are:
    a. Probable main cause of death (if category is fatal)
    b. Additional factors
3. TIS Fatal/Injury Collision Notes – completed for all fatal or injury outcome crashes. Specific variables to crash causation are:
    a. Incident detailed description
    b. FOR THE (SOLE) LOCATION OF THE CRASH
        i. Light conditions [1 response allowed from:] (daylight, dark – street light on, dark – no street lights, , dusk, dawn etc.)
        ii. Atmospheric conditions [up to 4 responses allowed from:] (clear, dust in the air, fog, raining, smoke, snowing, strong winds, not known)
        iii. Offending unit (yes, no, unknown)
        iv. Scene plan
    c. FOR EACH CRASH-INVOLVED VEHICLE
        i. Prescribed lamps on (yes, no, not known/not applicable, other)
        ii. Driver's intention [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
        iii. Driver's actual movement [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other, etc.)
        iv. Road surface type (gravel, paved, unpaved, not known)
        v. Road surface conditions (dry, icy, muddy, snow, wet, not known, etc)
        vi. Direction of travel (east, north, north-east, north-west, south, south-east, south-west, west, not applicable, not known)
        vii. Traffic control [1 response allowed from:] (give way sign, intersection signals operating (stop/go), roundabout sign, not applicable, other (specify), etc.)
        viii. Traffic control status (operational, not applicable, other (specify))
    d. FOR EACH CRASH-INVOLVED DRIVER AND PASSENGER [Occupant 1, 2, 3, etc, respectively] details gathered on:
        i. Licence number, state
        ii. Statement taken (written statement taken, not known/not indicated)
        iii. FOR DRIVER ONLY - Licence type [1 response allowed from:] (learner, probationary, standard, not applicable, never licensed)

iv. PBT conducted and PBT result (if conducted)
v. FOR DRIVER ONLY - Mobile phone used (yes, no, not known)
vi. FOR DRIVER ONLY - Purpose of journey (at work, commuting to/from work, private, not known)
vii. FOR DRIVER ONLY - At fault (yes, no, not known) and reason (if at fault)
viii. IF FATAL - Deceased cause [1-3 response allowed from:] (alcohol, driving behaviour (careless/reckless), speed – exceeding the limit, other(s), injury admitted, hospital name)

4. TIS No Injury Collision Notes – completed for no injury crashes that result in police action, and no injury crash that do not result in police action. Specific variables to crash causation are:
    a. Incident detailed description
    b. FOR THE (SOLE) LOCATION OF THE CRASH
        i. Light conditions [1 response allowed from:] (daylight, dark – street light on, dark – no street lights, other)
        ii. Atmospheric conditions [up to 4 responses allowed from:] (clear, dust in the air, fog, raining, smoke, snowing, strong winds, not known)
        iii. Offending unit (yes, no, unknown)
        iv. No Scene Sketch as not a serious crash, therefore does not warrant this
    c. FOR EACH CRASH-INVOLVED VEHICLE
        i. Prescribed lamps on (yes, no, not known/not applicable, other)
        ii. Driver's intention [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
        iii. Driver's actual movement [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
        iv. Road surface type (gravel, paved, unpaved, not known)
        v. Road surface conditions (dry, icy, muddy, show, wet, not known)
        vi. Direction of travel (east, north, north-east, north-west, south, south-east, south-west, west, not applicable, not known)
        vii. Traffic control [1 response allowed from:] (give way sign, intersection signals operating (stop/go), roundabout sign, not applicable, other (specify))
        viii. Traffic control status (operational, not applicable, other (specify))
    d. FOR EACH CRASH-INVOLVED DRIVER AND PASSENGER [Occupant 1, 2, 3, etc, respectively] details gathered on:
        i. Licence number, state
        ii. Statement taken (written statement taken, not known/not indicated)
        iii. FOR DRIVER ONLY - Licence type [1 response allowed from:] (learner, probationary, standard, not applicable, never licensed)
        iv. PBT conducted and PBT result (if conducted)
        v. FOR DRIVER ONLY - Mobile phone used (yes, no, not known)
        vi. FOR DRIVER ONLY - Purpose of journey (at work, commuting to/from work, private, not known)
        vii. FOR DRIVER ONLY - At fault (yes, no, not known) and reason (if at fault)
        viii. Non-fatal outcome, therefore no – Deceased cause [1-3 response allowed from:] (alcohol, driving behaviour (careless/reckless), speed – exceeding the limit, other(s))

5. TIS Police Incident Notes – completed for incidents of a minor nature with no third party involved (used for minor collisions in car park etc.). Specific variables to crash causation are:
    a. Incident detailed description
    b. FOR THE (SOLE) LOCATION OF THE CRASH
        i. Light conditions [1 response allowed from:] (daylight, dark – street light on, dark – no street lights, other)
        ii. Atmospheric conditions [up to 4 responses allowed from:] (clear, dust in the air, fog, raining, smoke, snowing, strong winds, not known)
        iii. Offending unit (yes, no, unknown)
        iv. No Scene Sketch as not a serious crash, therefore does not warrant this
    c. FOR EACH CRASH-INVOLVED VEHICLE
        i. Prescribed lamps on (yes, no, not known/not applicable, other)
        ii. Driver's intention [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
        iii. Driver's actual movement [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
        iv. Road surface type (gravel, paved, unpaved, not known)
        v. Road surface conditions (dry, icy, muddy, show, wet, not known)
        vi. Direction of travel (east, north, north-east, north-west, south, south-east, south-west, west, not applicable, not known)
        vii. Traffic control [1 response allowed from:] (give way sign, intersection signals operating (stop/go), roundabout sign, not applicable, other (specify))
        viii. Traffic control status (operational, not applicable, other (specify))
    d. FOR EACH CRASH-INVOLVED DRIVER AND PASSENGER [Occupant 1, 2, 3, etc, respectively] details gathered on:
        i. Licence number, state
        ii. Statement taken (written statement taken, not known/not indicated)
        iii. FOR DRIVER ONLY - Licence type [1 response allowed from:] (learner, probationary, standard, not applicable, never licensed)
        iv. PBT conducted and PBT result (if conducted)
        v. Not asked - Mobile phone used (yes, no, not known)
        vi. Not asked - At fault (yes, no, not known) and reason (if at fault)
        vii. Non-fatal outcome, therefore no – Deceased cause [1-3 response allowed from:] (alcohol, driving behaviour (careless/reckless), speed – exceeding the limit, other(s))

6. TIS Police Collision Notes – completed for police crashes resulting in either fatal, injury or non-injury outcomes and where there is another vehicle or 3rd party involved in the collision. Specific to crash causation are the following variables:
    a. Incident detailed description
    b. FOR THE (SOLE) LOCATION OF THE CRASH
        i. Light conditions [1 response allowed from:] (daylight, dark – street light on, dark – no street lights, other)
        ii. Atmospheric conditions [up to 4 responses allowed from:] (clear, dust in the air, fog, raining, smoke, snowing, strong winds, not known)
        iii. No Scene sketch? Why not? (Scene sketches are completed for Fatal and Injury incidents)

iv. Offending unit (yes, no, unknown)

c. FOR EACH CRASH-INVOLVED VEHICLE
    i. Prescribed lamps on (yes, no, not known/not applicable, other)
    ii. Driver's intention [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
    iii. Driver's actual movement [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
    iv. Road surface type (gravel, paved, unpaved, not known)
    v. Road surface conditions (dry, icy, muddy, show, wet, not known)
    vi. Direction of travel (east, north, north-east, north-west, south, south-east, south-west, west, not applicable, not known)
    vii. Traffic control [1 response allowed from:] (give way sign, intersection signals operating (stop/go), roundabout sign, not applicable, other (specify))
    viii. Traffic control status (operational, not applicable, other (specify))

d. FOR EACH CRASH-INVOLVED DRIVER AND PASSENGER [Occupant 1, 2, 3, etc, respectively] details gathered on:
    i. Licence number, state
    ii. Statement taken (written statement taken, not known/not indicated)
    iii. FOR DRIVER ONLY - Licence type [1 response allowed from:] (learner, probationary, standard, not applicable, never licensed)
    iv. PBT conducted and PBT result (if conducted)
    v. FOR DRIVER ONLY - Mobile phone used (yes, no, not known)
    vi. FOR DRIVER ONLY - Purpose of journey (at work, commuting to/from work, private, not known)
    vii. FOR DRIVER ONLY - At fault (yes, no, not known) and reason (if at fault)
    viii. IF FATAL OUTCOME, FOR EACH OCCUPANT – Deceased cause [1-3 response allowed from:] (alcohol, driving behaviour (careless/reckless), speed – exceeding the limit, other(s))

7. TIS Pedestrian Notes – completed if pedestrian involved in crash. Specific variables to crash causation are:
    a. Mobile phone used (yes, no, not known)
    b. At fault (yes, no, not known) and reason (if at fault)
    c. Movement at time of crash (crossing carriageway; not on carriageway, e.g. on footpath; working, playing, lying or standing on carriageway; other)
    d. Road surface type (gravel, paved, unpaved, not known)
    e. Road surface conditions (dry, icy, muddy, show, wet, not known)
    f. Direction of travel (east, north, north-east, north-west, south, south-east, south-west, west, not applicable, not known)
    g. Traffic control [1 response allowed from:] (give way sign, intersection signals operating (stop/go), roundabout sign, not applicable, other (specify))
    h. Traffic control status (operational, not applicable, other (specify))

8. TIS Additional Vehicle Notes – completed if there are more than 2 vehicles involved in a crash. This form is therefore completed for each additional vehicle. Specific variables to crash causation are:
    a. FOR EACH CRASH-INVOLVED VEHICLE
        i. Prescribed lamps on (yes, no, not known/not applicable, other)
        ii. Driver's intention [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)

iii. Driver's actual movement [1 response allowed from:] (going straight ahead, parked – illegally, turn left, turn right, other)
iv. Road surface type (gravel, paved, unpaved, not known)
v. Road surface conditions (dry, icy, muddy, show, wet, not known)
vi. Direction of travel (east, north, north-east, north-west, south, south-east, south-west, west, not applicable, not known)
vii. Traffic control [1 response allowed from:] (give way sign, intersection signals operating (stop/go), roundabout sign, not applicable, other (specify))
viii. Traffic control status (operational, not applicable, other (specify))

b. FOR EACH CRASH-INVOLVED DRIVER AND PASSENGER [Occupant 1, 2, 3, etc, respectively] details gathered on:
   i. Licence number, state
   ii. Statement taken (written statement taken, not known/not indicated)
   iii. FOR DRIVER ONLY - Licence type [1 response allowed from:] (learner, probationary, standard, not applicable, never licensed)
   iv. PBT conducted and PBT result (if conducted)
   v. Mobile phone used (yes, no, not known)
   vi. At fault (yes, no, not known) and reason (if at fault)
   vii. IF FATAL OUTCOME – Deceased cause [1-3 response allowed from:] (alcohol, driving behaviour (careless/reckless), speed – exceeding the limit, other(s))

9. TIS Additional Occupant Notes – completed if there are more than 2 occupants (i.e. Driver plus one passenger) in a crash-involved vehicle. This form is therefore completed for each additional vehicle occupant. Specific variables to crash causation are:
   a. Licence number, state
   b. Statement taken (written statement taken, not known/not indicated)
   c. PBT conducted and PBT result (if conducted)
   d. FOR FATAL OUTCOME – Deceased cause [1-3 response allowed from:] (alcohol, driving behaviour (careless/reckless), speed – exceeding the limit, other(s))
10. TIS Witness Notes – completed if non-crash involved witnesses are available at scene of crash. Specific variables to crash causation are:
    a. Statement taken (written statement taken, not known/not indicated)
11. TIS Object Notes – completed if object or animal involved in crash (e.g. fence, trees, kangaroo) – documents ownership and notification process. No specific information collection on crash causation.

APPENDIX B: MAIN VIMS FIELD DESCRIPTIONS IN TENIX DATA WAREHOUSE

Field Name	Field Description
Address Line 1	Debtor's Address Line 1
Address Line 2	Debtor's Address Line 2
Address State	Debtor's Address State
City	Debtor's Address City
Confirm Date	Debtor's Name & Address Confirm Date
Country	Debtor's Address Country
Date of Birth	Debtor's Date of Birth
Debtor Id	Debtor Id
First Name	Debtor's First Name
IPP Plan No	IPP Plan No if there is an IPP Plan
IPP Plan Status	*6.1.1.1.1.1 IPP Plan Status* A=Active, C=Cancelled D=Defaulted F=Fulfilled J=Rejected P=Pending R=Revised V=Void 4=Balloon Respread
IPP Plan Status Date	For IPP Plan Status = C, D, F, J and R, it is the IPP Plan Cancelled/ Fulfilled Date. For IPP Plan Status = A, it is the IPP Plan Approval Date
Last Name	Debtor's Last Name
Licence No	If the Licence State = 'XX', it is the Debtor's Company's

Field Name	Field Description
	ACN Number. If the Licence State = 'LL', it is the Debtor's Liquor Licence Number. If the Licence State is any of the states (Note: list of states is in Appendix B) , it is the Debtor's Driver's Licence Number.
Licence State	Debtor's Licence State. Note: See Appendix C for the list of states.
Nixie Date	Date of the last nixie status changed at Debtor's Level
Nixie Status	6.1.1.1.2 Debtor's Nixie Status IT HAS VALUES OF '0' TO '9' STARTING FROM '0' OR SPACE. AN "EVEN" VALUE OR SPACE INDICATES IT IS A GOOD DEBTOR ADDRESS AND AN "ODD" VALUE INDICATES IT IS A BAD DEBTOR ADDRESS.
Open Infringement Amount Due	Sum of Amount Due of all OPEN infringements for Debtor
Open Infringement Count	Count of all OPEN infringements for Debtor
Open Interest Indicator	'Y' denotes there is interest accumulating for open civil warrants
Open Order Amount Due	Sum of Amount Due of all OPEN court orders for Debtor
Open Order Count	Count of all OPEN court orders for Debtor
Open Ticket Count	Count of all OPEN obligations for Debtor
Open Warrant Amount Due	Sum of Amount Due of all OPEN warrants for Debtor
Open Warrant Count	Count of all OPEN warrants for Debtor
Postcode	Debtor's Address Postcode
Sex	Debtor's Sex
Total Amount Due	Include Amount Due for all obligations
Total Unapplied Cash	Include Unapplied Cash for all obligations

Obligations Folder

Field Name	**Field Description**
Account No	Account No for the latest payment. It is linked to Account Reference Folder. Please see field descriptions of Account Reference Folder for details.
Agency	Agency Code. This is linked to Agency Reference Folder. Please see field descriptions of Agency Folder for details.
Agency Court	Court Number linked to Court Reference Folder and it is displayed on the Revocation Screen in VIMS. Please see field descriptions of Court Reference Folder for details.
Amount Due	Amount Due of Obligation
Appeal Court	6.1.1.1.3 Appeal Court Code. It is linked to Court Reference Folder. Please see field descriptions of Court Reference Folder for details.
Appeal Date	6.1.1.1.4 Date of Appeal at Appeal Court.
Badge No	Badge Number of Infringement
Car Colour	Colour of Offending Vehicle
Charges Incurred for Criminal Court	Obligation's Charges Incurred for Criminal Court
Combined Date of Birth	It contains the Obligation Date of Birth and if there is no Obligation Date of Birth, it contains the Debtor Date of Birth. It will be empty if there is no Obligation and Debtor Date of Births.
Corro History Indicator	'Y' indicates if there are more correspondence in history.
Court Costs	Obligation's Court Costs
Court Interest Due	Obligation's Court Interest Due
Court Order Expiry Date	6.1.1.1.5 Expiry Date of Court Order
Courtesy Fees	Obligation's Courtesy Fees
Date of Birth	Obligation's Date of Birth
Debtor Id	Debtor Id linked to Debtor Folder. Please see field descriptions of Debtor Folder for details.
Demerit Points	Demerit Points for the Obligation

Field Name	Field Description
Demerit Process Date	Process Date for the Demerit Points
Division	Station Code
Due Date	Obligation's Due Date
Enforcement Certificate Date	6.1.1.1.6 Enforcement Certificate Date for infringements sent to Perin
Enforcement Certificate Fees	Obligation's Enforcement Certificate Fees
Error Code from SIPS	Error Code from the SIPS System
Fine Amount	Penalty Amount of Obligation
First Court Accept Date	6.1.1.1.7 Date of First Court Order
First Warrant Date	6.1.1.1.8 Date of First Warrant for 'PE' Warrants
Infringement No	Infringement Number if it has an Infringement Number
Input Type	6.1.1.1.9 Input type 1A=Analogue Camera Speed and Redlight Infringements 1B=On the Spot Moving/Parking Infringements 1C=Tolling and Digital Camera Speed Infringements 2=Inputs from Councils or Agencies 3A=Open Court Warrants 3B=Civil Warrants
Interest Due on Costs	Obligation's Interest Due on Costs
Interest Due on Fine	Obligation's Interest Due on Fine
Interest Rate on Costs	Obligation's Interest Rate used to calculate Interest Due on Costs
Interest Rate on Fine	Obligation's Interest Rate used to calculate Interest Due on Fine

Field Name	Field Description
IPP Indicator	6.1.1.1.10 Obligation IPP Plan Indicator (*** will be confirmed later) 6.1.1.1.11 0=Not in IPP 1=Active in IPP 2=Fulfilled 3=Cancelled 4=Defaulted
Issue Batch Date	Batch Date when obligation is added to VIMS.
Issue Batch No	Batch Number when obligation is added to VIMS.
Issue Date	For input type '1A', '1B' and '1C', it is the Infringement Issue Date. For input type '2', it is the Court Order Date. For input type '3A' and '3B', it is empty.
Issue Process Date	Process Date when obligation is added to VIMS.
Last Issue Fee	Current Issue Fee for Warrant
Latest Corro Code	Correspondence Code of the latest correspondence. It is linked to Correspondence Code Reference Folder. Please see field descriptions of Correspondence Code Reference Folder for details.
Latest Corro Date	Correspondence Date for the latest correspondence.
Latest Corro Mail Type	6.1.1.1.12 Correspondence Mail Type 0=Telephone 1=Mail 4=Walk M=Mail
Latest Dispo Code	Dispo Code of the latest disposition. It is linked to Disposition Code Reference Folder. Please see field descriptions of Disposition Code Reference Folder for details.

Field Name	Field Description
Latest Dispo Date	Disposition Date for the latest disposition.
Latest Dispo Officer	Disposition Officer for the latest disposition.
Latest Dispo Process Date	Process Date for the latest disposition.
Latest Obligation Status Change Date	6.1.1.1.13 Date of the latest change in Obligation Status.
Latest Payment Amount	Payment Amount of the latest payment
Latest Payment Batch No	Batch Number of the latest payment.
Latest Payment Date	Payment Date of the latest payment
Latest Payment Method	Payment Method Code for the latest payment. It is linked to Payment Method Reference Folder. Please see field descriptions of Payment Method Reference Folder for details.
Latest Payment Process Date	Process Date for the latest payment.
Latest Payment Type	Payment Type Code for the latest payment. It is linked to Payment Type Reference Folder. Please see field descriptions of Payment Type Reference Folder for details.
Latest Suspend Code	Suspend Code of the latest suspend. It is linked to Suspend Code Reference Folder. Please see field descriptions of Suspend Code Reference Folder for details.
Latest Suspend Process Date	Process Date for the latest suspend.
Latest Suspend Till Date	Suspend Till Date of the latest suspend.
Licence Susp Process Date	Process Date for the Licence Suspension
Licence Susp Request Date	Licence Suspension Request Date to VicRoads
Licence Susp Status	Licence Suspension Status
Lodgement No	6.1.1.1.14 Obligation's Lodgement Number for Court Order.

Field Name	Field Description
Microfilm No	For input type '1A', it is a combination of film number (6 digits), session number (3 digits) followed by frame number (4 digits) starting from the left. For input type '1B', it is the Microfilm Number of the ticket. For input type '1C' and tolling offence, it is the CTCS Number. For input type '1C' and digital speed offence, it is the film number (9 digits) followed by frame number (4 digits) starting from the left. The film number is '1yymmddccc' where yymmdd is the date and ccc is the camera number.
More Dispo Indicator	'Y' indicates if there are more dispositions in history.
More Mail Indicator	'Y' indicates if there are more mail in history.
More Suspends Indicator	'Y' indicates if there are more suspends in history.
Name Reason Indicator	6.1.1.1.15 Name Reason Indicator Code 0 or space =No Request Made 1=Request Made but No Return C=Courtlink F=From FPPO M=Manual R=From RTA
Nixie Date	Date nixie status was last changed at Obligation Level
Nixie Status	OBLIGATION'S NIXIE STATUS It has values of '0' to '9' starting from '0' or space. An "Even" value or space indicates it is a good obligation address and an "Odd" value indicates it is a bad obligation address.
Nominated from Prior TIN	Nominated from old TIN Number if a nomination has been processed on the old TIN or Infringement Number
Nominated to New TIN	Nominated to new TIN Number if a nomination has been processed on this TIN or Infringement Number
Notice Date 1	Notice Date for the first notice.

Field Name	Field Description
Notice Date 2	Notice Date for the second notice.
Notice Date 3	Notice Date for the third notice.
Notice Date 4	Notice Date for the fourth notice.
Notice Date 5	Notice Date for the fifth notice.
Notice Process Date 1	Process Date for the first notice.
Notice Process Date 2	Process Date for the second notice.
Notice Process Date 3	Process Date for the third notice.
Notice Process Date 4	Process Date for the fourth notice.
Notice Process Date 5	Process Date for the fifth notice.
Notice Type 1	Notice Type Code for the first notice. It is linked to Notice Type Reference Folder. Please see field descriptions of Notice Type Reference Folder for details.
Notice Type 2	Notice Type Code for the second notice. It is linked to Notice Type Reference Folder. Please see field descriptions of Notice Type Reference Folder for details.
Notice Type 3	Notice Type Code for the third notice. It is linked to Notice Type Reference Folder. Please see field descriptions of Notice Type Reference Folder for details.
Notice Type 4	Notice Type Code for the fourth notice. It is linked to Notice Type Reference Folder. Please see field descriptions of Notice Type Reference Folder for details.
Notice Type 5	Notice Type Code for the fifth notice. It is linked to Notice Type Reference Folder. Please see field descriptions of Notice Type Reference Folder for details.
Obligation Status	<u>Current Obligation Status</u> I=Infringement O=Court Order W=Warrant

Field Name	Field Description
Offence Location	For input types '1A' and '1C', it contains the location code. This is linked to the Location Reference Folder. Please see field descriptions of Location Reference Folder for details. For other input types, it contains the actual offence location.
Offence Suburb	For input types '1A' and '1C', it is empty. For other input types, it contains the actual offence suburb.
Offender Category	6.1.1.1.16 Offender Category C=Corporate I=Interstate V=Victorian
Order Accept Date	Court Order Accept Date
Order No	Court Order Number if it has a Court Order Number
Ownership Type	6.1.1.1.17 Ownership Type C=Corporate I=Individual O=Owner
Payment More Indicator	'Y' indicates if there are more payments in history.
Red Seconds	Red-light Seconds of Red-light Offences
Reduction Amount	Obligation's Reduction Amount.
Registration Confirm Date	Obligation's Registration Confirm Date from VicRoads
Registration Expiry Date	Registration Plate Expiry Date
Registration Plate	Registration Plate Number
Registration Plate Colour	Colour of the Offending Vehicle's Registration Plate
Registration Plate Letter Colour	Colour of the Letters on the Registration Plate of Offending Vehicle
Registration Plate Year	Year Registration Plate is issued

Field Name	Field Description
Registration State	6.1.1.1.18 State of Registration Plate. Note: See Appendix C for list of States.
Rental Indicator	6.1.1.1.19 Rental Indicator C=Correspondence F=Fleet (**** Not used) R=Rental (**** Not used)
Revocation Status	6.1.1.1.20 Revocation Status A=Agency Withdrawal C=Agency to Court D=Default to Court G=Granted L=Appeal P=Appeal Posted R=Revocation Refused W=Withdrawn x=Revocation Refused, Costs Varied
Revocation Status Date	6.1.1.1.21 Date of Revocation Status
Sex	Sex of Obligation
Sheriff Licence Susp Date	6.1.1.1.22 Date of Sheriff Licence Suspension
Sheriff Licence Susp Effective Date	6.1.1.1.23 Effective Date of Sheriff Licence Suspension at VicRoads
Sheriff Licence Susp Status	6.1.1.1.24 Status of Sheriff Licence Suspension (*** will be confirmed later) NS=Not Suspended NLS=No Licence Suspension ULS=Unsuccessful Licence Suspension
Speed Actual	Detected Speed for speeding offence

Field Name	Field Description
Speed Alleged	Alleged Speed for speeding offence
Speed Zone	Speed Zone for speeding offence
Ticket Licence Number	If the first 2 characters = 'XX', the remaining details is the Obligation's Company's ACN Number. If the first 2 characters = 'LL', the remaining characters is the Obligation's Liquor Licence Number. If the first 2 characters equals to one of the states (Note: list of states is in Appendix C) , it is a Obligation's Driver's Licence number.
Ticket No	Ticket/Obligation Number
Unapplied Amount	Unapplied Amount of Obligation
Vehicle Make	Vehicle Brand e.g. Holden, Ford
Violation Code	VIMS Internal Offence Code. This is linked to Violation Reference Folder. Please see field descriptions of Violation Reference Folder for details.
Violation External Code	Offence Code of Obligation
Violation Date	Offence Date of Obligation
Warrant Accept Date	Warrant Accept Date
Warrant Expiry Date	6.1.1.1.25 Date when warrant expired.
Warrant Issue Date	6.1.1.1.26 Date when warrant is issued.
Warrant Issue Fee	Obligation's Warrant Issue Fee
Warrant Jurisdiction	6.1.1.1.27 Current Warrant Jurisdiction.
Warrant Jurisdiction Date	6.1.1.1.28 Date when Warrant Jurisdiction is last changed.
Warrant No	Warrant Number if it has a Warrant Number
Warrant Solicitor	6.1.1.1.29 Solicitor Code
Warrant Status	6.1.1.1.30 Warrant Status Code. It is linked to Warrant Status Reference Folder. Please see field descriptions of Warrant Status Reference Folder for details.

Field Name	Field Description
Warrant Status Date	6.1.1.1.31 Date when Warrant status is last changed.
Warrant Type	6.1.1.1.32 Warrant Type Code. It is linked to Warrant Type Reference Folder. Please see field descriptions of Warrant Type Reference Folder for details.
Zone	6.1.1.1.33 Fixed Speed Camera Zone e.g. Burnley Tunnel, Domain Tunnel

Field Descriptions for Reference Folders

Field Name	Field Description
Account Internal Code	Account Internal Code
Account External Code	Account External Code
Account Long Name	Account Long Description
Account Short Name	Account Short Description

Field Name	Field Description
Agency Code	Agency Code
Agency Short Name	Agency Short Name
Agency Long Name	Agency Long Name
Agency Status	6.1.1.1.34 Agency Status A=Active I=Inactive
Agency Type	6.1.1.1.35 Agency Type G=Government N=Non-Government
Agency Court No	6.1.1.1.36 Agency Court No. It is linked to Court Reference Folder. Please see field descriptions of Court Reference Folder for details.

Field Name	Field Description
Correspondence Code	Correspondence Code
Correspondence Short Name	Correspondence Short Description
Correspondence Long Name	Correspondence Long Description

Field Name	Field Description
Court No	Court No
Court Name	Court Name

Field Name	Field Description
Disposition Code	Disposition Code
Disposition Name	Disposition Description

Field Name	Field Description
Notice Type	Notice Type Code
Notice Type Long Name	Notice Type Long Description
Notice Type Short Name	Notice Type Short Description

Field Name	Field Description
Payment Method Type	Payment Method Type
Payment Method Name	Payment Method Description

Field Name	Field Description
Payment Type Code	Payment Type Code
Payment Type Name	Payment Type Description

Field Name	Field Description
Suspend Code	Suspend Code
Suspend Name	Suspend Description
No of Suspend Days	Number of Suspend Days

Field Name	Field Description
Violation Code	Violation Internal Code
Violation External Code	Violation External Code or Offence Code
Violation Description	Violation Description

Field Name	Field Description
Warrant Status Code	Warrant Status Code
Warrant Status Name	Warrant Status Description

Field Name	Field Description
Warrant Type Code	Warrant Type Code
Warrant Type Name	Warrant Type Description