

Qualitative and quantitative pedestrian research in NSW

Greg Allsopp*, Lyndall Johnson*, David Span#, Mich Preston#, Eliane Morel#,
Camden FitzGerald^, Qingjian Jiang^, Doris Lee^

*NSW Centre for Road Safety, Roads and Traffic Authority of NSW

#AMR Interactive

^Parsons Brinckerhoff Pty Ltd

Introduction

In NSW, pedestrian fatalities represent about one fifth of the road toll and as high as a third of all road deaths in metropolitan areas. Between 2002 and 2006, around 70 per cent of pedestrian fatalities occurred in the Sydney, Newcastle and Wollongong conurbation.

Previous research commissioned by the Roads and Traffic Authority of NSW (RTA) has highlighted several pedestrian safety issues, including a general belief that the road is for drivers rather than pedestrians, confusion over who has right of way in different situations, pedestrians' desire to take the shortest route with no regard for pedestrian facilities, driver intolerance of risky pedestrian behaviours, and the importance of non-verbal communication between drivers and pedestrians (AMR Interactive, 2003; Job and Hatfield, 2002; Woolcott Research, 2004).

The current pedestrian study has been designed to include a review of the existing literature, an observational study of pedestrian and driver behaviour and a survey of attitudes and self-reported behaviours regarding pedestrian safety.

A literature review of the risk factors for pedestrian crashes was undertaken by the NSW Injury Risk Management Research Centre in 2006, but is as yet unpublished.

A pilot observational study of pedestrian and driver behaviour at 10 selected pedestrian facilities in the Sydney metropolitan area has just been completed on behalf of the RTA by Parsons Brinckerhoff Pty Ltd. The results of the pilot observational study will form the basis for a large-scale, comprehensive observational study of pedestrian and driver behaviour at up to 100 selected pedestrian facilities in the Sydney, Newcastle and Wollongong conurbation.

A survey of community attitudes towards pedestrian safety is currently underway and is due to be completed by the end of 2007. This survey is being undertaken on behalf of the RTA by AMR Interactive, and complements the observational study. Previous qualitative research identified a range of issues relating to pedestrian safety, including the behaviour of drivers at pedestrian crossings, risk taking by both drivers and pedestrians, and a road system which is perceived to favour motorists (AMR Interactive, 2003). This current attitudinal research will enable us to further explore community attitudes and behaviours towards pedestrian safety, and to gain a deeper understanding of the factors that contribute to pedestrian crashes.

This paper will outline the methodologies utilised in the pilot observational study and the attitudinal survey, and will discuss the preliminary findings that were available at the time of writing.

Pilot observational study

Aims

The main aim of the pilot study was to evaluate alternate data capture methodologies to determine whether they could accurately and efficiently capture and analyse the required data, and would be appropriate for a large scale study. The aim of the large scale study will be to determine if and how variables such as the type of pedestrian facility, the crossing location, the age of the pedestrian and the gender of the pedestrian might contribute to driver and pedestrian behaviour.

While the sample sizes were very small in the pilot study, the indicative behavioural findings have been reported in this paper.

Methodology

The pilot observational study required an enormous amount of data to be captured, such as:

- Characteristics of the site.
- Date, time and weather conditions.
- Age and gender.
- Characteristics of pedestrian behaviour.
- Characteristics of driver behaviour.
- Illegally parked vehicles that might adversely affect sight distances.
- Characteristics of pedestrian and driver interactions.

- Pedestrian crossing behaviour within 50 m on either side of the facility, or the designated location in the absence of a pedestrian facility.
- Traffic and pedestrian counts at each site.

The data were required to be collected on a weekday, outside of school holidays, and over the eight hour period of 8:00 am to 12:00 noon and 3:00 pm to 7:00 pm.

The types of pedestrian facilities that were being observed included:

- Pedestrian crossing (zebra), both mid-block and at an intersection.
- Pedestrian crossing (zebra) with kerb extensions or refuge elements, both mid-block and at an intersection.
- Pedestrian refuge.
- Signalised pedestrian crossing, both mid-block and at an intersection.
- No facilities provided, both mid-block and at an intersection.

The behavioural observations were achieved using a mix of video and manual observations. All traffic and pedestrians counts were obtained from video recordings.

A critical element of the behavioural observations was the design of the survey instrument. Substantial effort went into its design to facilitate the ease and consistency of data capture. The same survey instrument was used by both the manual and video observers.

Manual observations

Pedestrian and driver behaviour was recorded by two trained observers at each site. The observers were positioned on opposite sides of the pedestrian facility. Each observer recorded details for pedestrians that would be facing them while crossing the road. This eliminated the possibility of duplication and allowed the observer a better view of the pedestrian's behaviour. As pedestrians walked along the footpath on the other side of the road, the observer would randomly select one person to observe. That person would then be observed until they had completed crossing the road, either at the pedestrian facility or within 50 m on either side. Driver behaviour, parked vehicles, etc were all recorded relative to each pedestrian observed.

Video observations

The study utilised digital video recorders mounted on three metre poles. Several camera configurations were tested during the study. The video data was then analysed by five observers using the same observation criteria as were utilised by the manual observers. Up to 100 per cent of pedestrians could be observed using the

video footage. However, at sites with very high pedestrian volumes, the data were sampled using the same random method as the manual observations.

Results

The video method provided an opportunity to capture a greater number of observations, around 73 per cent of the pedestrians counted, as opposed to the manual method which captured 32 per cent. However, counting errors at the Surry Hills site resulted in more pedestrians being observed than were counted. Problems experienced setting up the video equipment at Lidcombe meant only 6 hours of data were captured, also resulting in more pedestrians observed than counted. The pedestrian count at Bondi Beach was under represented due to lost data for the last 2.5 hours of capture.

The video equipment appeared unable to capture the level of detail required, especially concerning the age of the pedestrians and behavioural characteristics such as whether the pedestrian looked for vehicles before crossing, or whether the pedestrian waited for vehicles to slow or stop before crossing. Loss of data was also a major issue associated with the video capture method, and was the cause of three of the sites being resurveyed.

Difficulties were also encountered with the manual observations. The data collection sheets were necessarily complex due to the amount of data being collected in this study. The manual observers had been briefed and trained prior to data collection. However the method for observing pedestrians was altered at some of the sites to enable all legs of the pedestrian crossing to be captured. The complexity of the data sheets, coupled with the inherent differences between observers, inevitably led to errors in the data. The main issues with the manual data collection were missing data and incorrect coding. A comparison of the video and manual methods is summarised in Table 1.

The data analyses have been undertaken as part of the overall testing and evaluation of the research methodology. Given the small number of sites included in the pilot study, the following results are indicative only and not necessarily considered to be representative of behaviours at pedestrian facilities.

General trends observed included:

- Younger people had a greater tendency to cross the road away from pedestrian facilities than older people.
- Pedestrians would not go out of their way to use refuges or, to a lesser extent, mid-block signalised crossings.

- Drivers were more likely to take evasive action at signalised and zebra crossings, whereas pedestrians were more likely to take evasive action at refuges and in locations where there are no facilities.
- Conflicts were caused by a range of behaviours, eg:
 - Pedestrians not looking, particularly on zebra crossings.
 - Pedestrians not waiting for a clear gap at refuges.
 - Pedestrians running across the road at any location.

Table 1. A comparison of the video and manual data collection methods, including the number of pedestrians observed and the main data issues encountered.

	Site	Total pedestrians counted	Manual observations		Video observations		Manual data issues	Video data issues	Resurvey required
1	Lidcombe	248	250	101%	248	100%		count and observational data incomplete	yes
2	Burwood	321	210	65%			incorrect location code		
3	Fairfield	1,660	386	23%			inconsistent recording of people not using the facility	count data lost	yes
4	Merrylands	4,036			3,809	94%			
5	Liverpool	2,044	827	40%				count data lost	yes
6	Guilford	2,252			2,252	100%			
7	Mona Vale	3,648	671	18%			inconsistent and poor recording of people not using the facility		
8	Kensington	6,072			2,734	45%		suspected traffic signal fault during first survey	yes
9	Surry Hills	523			598	114%		poor weather during first survey	yes
10	Bondi Beach	597	340	57%			incorrect location code	count data lost	Extrapolate count from number of manual observations
	Total	21,401	2,684	32%	9,641	73%			

Attitudinal study

Aims

The aims of the attitudinal study were to:

- Determine general community attitudes towards pedestrian safety.
- Identify major themes in pedestrian safety.
- Identify community attitudes to specific pedestrian safety issues.
- Identify the key factors influencing pedestrian and driver behaviours relating to pedestrian safety, including core beliefs, attitudes, prior behaviours and experiences relating to drivers and pedestrians.

Methodology

The attitudinal study incorporated both qualitative and quantitative components of research. The qualitative component comprised 10 focus groups with residents from Sydney, Wollongong, Newcastle and the Central Coast. The focus groups utilised projective techniques, which can reveal deeply held attitudes and motivations that are often not verbalised when people are questioned directly. The groups were predominantly distinguished by age, and included a mixed group of 17-25 year olds, a male only group of 17-25 year olds, mixed groups of 26-39 year olds, 40-59 year olds, 60+, 70+, and parents aged 26-59. The focus groups identified the main themes, issues, misconceptions, common terminology, etc, relating to pedestrian safety. These factors contributed to the design of the telephone questionnaire, which comprised the quantitative component of the study.

Prior to implementation, the telephone questionnaire was question-tested to ensure the intent of each question was clear. The questionnaire was also pilot tested on a sample of 200 people to test the statistical validity of the instrument. The survey was then conducted with 1000 residents from Sydney, Wollongong, Newcastle and the Central Coast.

Results

At the time of writing this paper, the quantitative component of the attitudinal study had not been completed. Therefore, only the key findings from the focus groups will be reported and discussed.

A number of themes and factors around pedestrian and driver behaviour were raised in the groups. Generally, the focus group participants thought pedestrian safety was becoming more important as traffic volumes were increasing. Parents were

particularly aware of pedestrian safety issues, especially when walking with their children. Older people, over 60 years, also appeared more conscious of pedestrian safety issues, whilst young people, 17-25 years, appeared to be the least likely to think about pedestrian safety. Location affected participants' attitudes, with pedestrians more conscious of pedestrian safety in suburban or semi-rural areas, while drivers appeared more concerned about pedestrian safety in higher density urban areas. Participants who had been involved in, or witnessed, an accident were also more likely to be concerned about pedestrian safety. Minor accidents or incidents appeared to have a short term effect on behaviour, while major accidents had a more profound, long term effect.

Drivers mentioned several pedestrian behaviours that were likely to intimidate them, eg:

- Pedestrians stepping out without looking.
- Jaywalking, especially if forced to slow down for the pedestrian.
- Pedestrians who are distracted and not paying attention to the road.
- Alcohol-affected pedestrians.
- Elderly pedestrians who may be quite slow.
- Pedestrians who stand in the middle of the road waiting to cross.
- Unpredictable behaviour from children, which frightens most drivers.

Pedestrians also mentioned driver behaviours that were likely to intimidate them, eg:

- Drivers who sped up when approaching pedestrian crossings to avoid stopping.
- Intimidating behaviour in an attempt to hasten the pedestrian off the road.
- Drivers who are distracted and not paying attention to the road.
- 'I own the road' attitude exhibited by some drivers.

Participants who exhibited 'intimidating' behaviours as a pedestrian were not necessarily tolerant, as a driver, of those behaviours in other pedestrians, and vice versa.

Drivers tended to believe they obeyed the rules most of the time. When rules were broken, such as speeding on high speed roads and running red lights, they were not seen as a significant threat to pedestrian safety as they would not expect pedestrians to be crossing in those situations. Driver behaviour appeared to be moderated by the risk of being caught and penalised for breaking the rules, as well as a perception of the car as a 'killing machine'.

On the other hand, many pedestrians admitted to frequently breaking the rules. There was an almost universal belief that they would not be penalised. Those

pedestrians who took risks saw their behaviour as 'risk management' rather than 'risk taking', as they felt in control, able to weigh up the situation and could justify their behaviour, eg they were only risking their own safety, not anyone else's. Pedestrian behaviour appeared to be motivated by a combination of impatience, laziness or convenience, and a sense of invincibility. Figure 1 illustrates the key factors which affect pedestrian risk-taking behaviour.

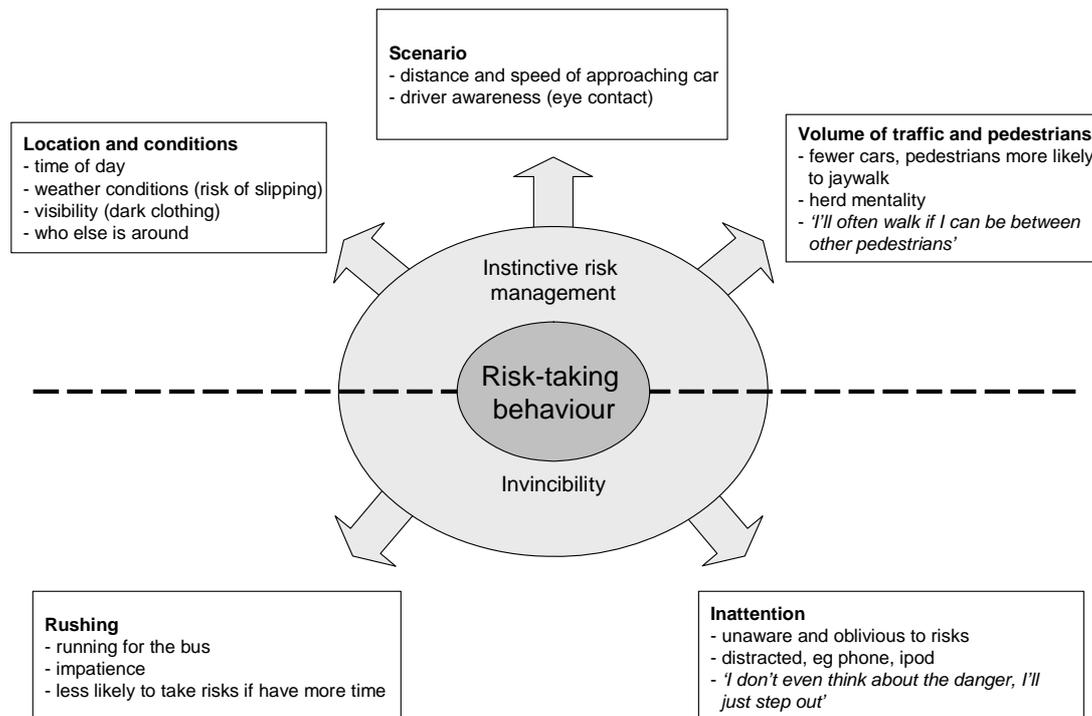


Figure 1. Key factors that affect the level of pedestrian risk-taking behaviour.

Other factors were also found to influence risk taking behaviour, such as age, gender, and journey type. Younger participants generally felt more confident in their abilities, both as a driver and pedestrian, and did not perceive their behaviour as risk-taking. As the participants aged, their behaviour generally became more moderate and their awareness of risk increased (see Figure 2).

Gender differences were more marked in the younger age groups, with 17-25 year old males acknowledging riskier behaviour more than females the same age. Gender differences appeared to diminish as age increased. However, among participants in the groups over 60 years, women seemed to place less emphasis on the rules than their male counterparts.

When journeys were routine and familiar, both drivers and pedestrians were more likely to acknowledge complacency and higher risk-taking behaviour, whereas they were more cautious on unfamiliar routes. However, when pedestrian journeys

included children, a strong compliance with the rules was indicated, both to protect the child and to set a good example. Risk-taking with children clearly came across as socially unacceptable.

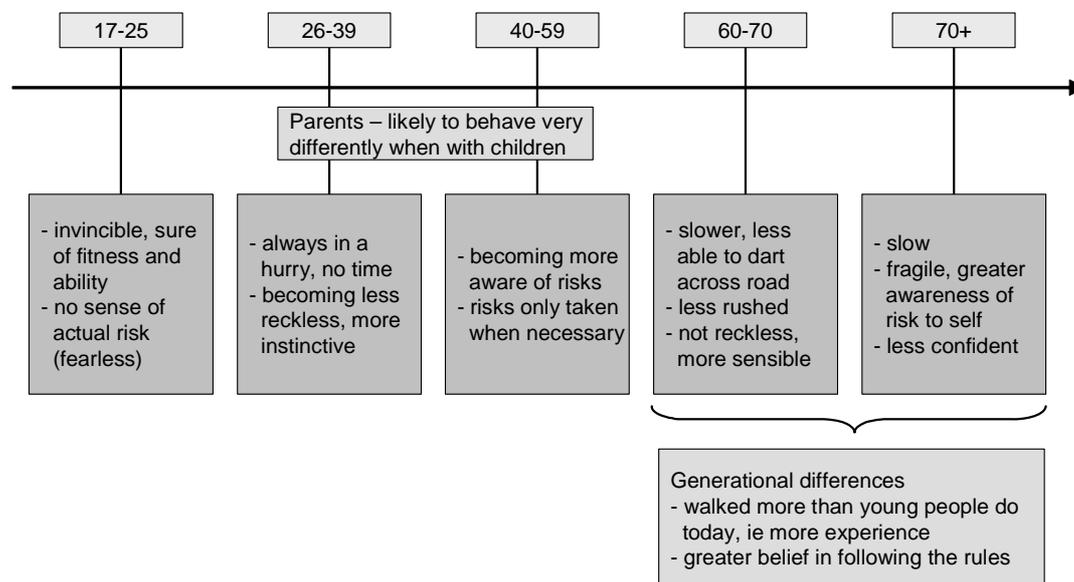


Figure 2. Risk-taking characteristics of different age groups.

Discussion

The preliminary evaluation of the data collection methods for the observational study indicated clear strengths and weaknesses between the video and manual methods.

The in-situ nature of the manual method appeared to provide greater context for the observations and was generally able to capture more detail in both descriptive, eg age and gender, and behavioural observations. However, the possible number of observations is compromised when large numbers of variables need to be recorded, as in this study. This suggests that manual methods may be more suited to pedestrian facilities and sites that experience lower volumes of pedestrian traffic.

Inversely, the video method can provide a significantly larger number of observations, but the quality of the video footage may inhibit the level of descriptive and behavioural detail able to be captured. We suspect that sophisticated camera deployment will increase the quality of the video footage, rendering it a satisfactory data collection tool, especially at complex and high volume pedestrian facilities.

On preliminary evaluation, the results of the observational study suggest that, rather than committing to either video or manual collection, a better approach may be site-specific deployment that utilises the strengths of each method while attempting to minimise their weaknesses. However, care would need to be exercised when

analysing the data to reduce any bias that might be introduced by the different methods.

Regarding the behavioural data, the indicative trends identified in the observational study were borne out to some extent by the preliminary findings of the attitudinal study, such as the tendency for younger people to engage in potentially risky behaviour and the reluctance for pedestrians to go out of their way to use pedestrian facilities. However, the observational study suggests pedestrian behaviour alone is the cause of conflicts. This attribution of cause is probably an artefact of the data collection and analysis methods, rather than real cause and effect, as some participants in the focus groups acknowledged that, as a driver, they will break the rules at times. There is some evidence to suggest both drivers and pedestrians understand they have a joint responsibility when using the roads, for example the higher likelihood for drivers to take evasive action when pedestrians have the right of way, and for pedestrians to take evasive action when using refuges or in areas where there is no pedestrian facility, ie when they do not have right of way.

The general attitudes and behaviours identified in the focus groups showed some consistency with the 2003 study, eg general belief that the road favours drivers over pedestrians, pedestrians' reluctance, at times, to go out of their way to use pedestrian facilities, drivers' intolerance for risky pedestrian behaviours and the importance of non-verbal communication between drivers and pedestrians. However, some attitudes appeared to have gained prominence in the recent study, such as a greater awareness of the risk of distractions in both drivers and pedestrians, particularly related to the use of iPods and mobile phones.

The focus groups were extremely useful in helping to crystallise general attitudes and behaviours in the community, and to identify the language commonly used by people to describe pedestrian facilities and other aspects of pedestrian safety. It has also generated a number of themes and factors around pedestrian safety, and hypotheses about risk-taking, which will be addressed in the telephone survey.

Conclusion

While people's attitudes and behaviours are very individual, the current observational and attitudinal studies allow us to identify general characteristics within the population. Knowledge of these characteristics, in turn, allows us to develop policies and strategies that target the particular behaviours that cause the most concern in pedestrian safety and that, when addressed, may achieve the greatest gains for the community.

References

AMR Interactive (2003). *Survey of Community Attitudes on Pedestrian Safety*. Prepared for the Roads and Traffic Authority of NSW.

Job RFS, Hatfield J. (2002) *Observational study of older pedestrian behaviour at various pedestrian facilities*. Prepared for the Roads and Traffic Authority of NSW.

Woolcott Research (2004). *An Exploration of Drink Walking Amongst Young Males*. Prepared for the Roads and Traffic Authority of NSW.