

ROAD SAFETY FOR PEDESTRIANS’ WHO ARE BLIND OR HAVE LOW VISION

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# EXECUTIVE SUMMARY

**INTRODUCTION AND BACKGROUND**

Independent travel is an important goal that humans undertake regularly in their everyday lives. For individuals who experience functional impairments, achieving this task becomes more challenging, along with a range of associated risks. One of these risks involves being a pedestrian, a particularly vulnerable road user group within the road network system. Pedestrians are at an increased risk on roads due to their lack of protection and limited biomechanical tolerance to violent forces when impacted by a vehicle or other road user. For pedestrians who experience functional impairments, this risk increases greatly as their needs while using the road network system differ. Pedestrians who experience vision impairment, therefore are blind or have low vision are an example of such a group.

At present, there exists limited research within the area of pedestrians who experience vision impairment. The need for this research however is increasing dramatically, particularly against the ageing population observed within Australia. The limited existing literature surrounding the experiences, patterns of behaviour, and challenges associated with safe mobility for this pedestrian group remain inconclusive however, there is evidence to suggest that they are exposed to increased collision risk. Therefore, it is crucial to further investigate the factors associated with increased crash risk, while also examining effective strategies adopted to ensure reduced risk while undertaking independent travel, and in particular walking, which forms a fundamental aspect of an individual’s everyday life. This is particularly significant for people who are blind or have low vision, without the capacity to drive.

Based on this need, the overall aim of the study was to identify and address issues surrounding the safety and experiences of pedestrians who are blind, or have low vision in Victoria. More specifically, the individual objectives of this study include:

* Provision of a better understanding of the experiences of Victorian pedestrians who are blind or have low vision;
* Develop an understanding of the contributing factors to pedestrian collisions amongst Victorians who are blind or have low vision;
* Build data on the prevalence and nature of pedestrian collisions in Victoria where vision loss may be a factor;
* Explore the experiences and impact of orientation and mobility (O&M) training for pedestrians who experience vision impairment;
* Explore aspects related to the O&M profession, and the experiences of O&M instructors who work with individuals that have vision impairment; and
* Provision of recommendations for future research within this field, through identifying avenues of change necessary in the context of services, training, as well as urban planning and road infrastructure.

**METHODOLOGY**

This study comprised of two complementary components; the survey exploring safe mobility of adult pedestrians who are blind or experience low vision, and the focus group sessions, which looked at developing a better understanding of a range of issues related to O&M training (both for the instructor, as well as the experiences of their clients).

A total of 607 participants (301 males and 306 females) were recruited for the survey, using a stratified sample design to obtain a representative sample of the Australian population who have vision impairment. Each participant took part in a telephone survey (Road Safety for Adult Pedestrians who are Blind or Vision Impaired), developed by the project research team (Vision Australia and Monash University Accident Research Centre) from existing national and international literature. Interviews were conducted between October and November, 2011 during business hours. The results were collated and analysed using the Statistical Package for Social Sciences (SPSS) program.

A total of two focus group sessions were conducted at Vision Australia and Guide Dogs Victoria, with O&M instructors. A total of 22 participants took part across the two focus group sessions. Themes that were explored included access to O&M services, training and strategies, barriers and limitations and training programs designed for O&M instructors. A short presentation was provided prior to the focus group discussions, aimed at providing some context and background of results obtained from the survey. The focus group sessions took place over the course of two to three hours and participants were provided with a short questionnaire at the completion of the sessions. A total of 12 respondents were obtained for the questionnaire. Data from the focus group sessions, as well as the questionnaire were analysed both qualitatively and quantitatively where appropriate.

**RESULTS**

Pedestrian Survey: In total, a net response rate of 42 percent was achieved for the survey. Of the participant sample, gender was evenly distributed and the age distribution was relatively distributed in the context of vision impairment prevalence within the community. The majority of participants experienced either moderate or severe levels of vision loss, with smaller proportions indicating profound vision loss, or blindness. Again, this was consistent to the prevalence expected, in the population. Based on these findings, it was concluded that the pedestrian survey sample was representative of the population who experience vision impairment.

Participants were asked a series of questions related to travel patterns. The main findings from this section include:

* The level of vision impairment has a significant positive relationship to an individual walking unassisted (i.e. it was more likely for individuals with greater levels of vision loss to walk assisted);
* Of the reasons reported for walking either assisted or unassisted, the majority indicated shopping and reaching essential services (e.g. banking or postal services) as the main reason, followed by recreation/fitness, work and public transport access;
* There were significant differences between responses between those who walked assisted, and those, unassisted; where unassisted walkers were more likely to take part in walking for a range of reasons;
* Participants who responded that they walked with assistance indicated issues surrounding levels of vision loss and additional impairments, across varying lengths of time; and
* Participants who responded that they walked unassisted appeared to be a highly mobile group, who also rated their overall performance on a selection of skills and abilities that assist with walking as “excellent” or “good”.

Further analyses explored specifically, the participants who responded that they walk unassisted. It was important to understand how pedestrians who are blind or have low vision interact with the road network system. A range of questions were asked regarding their experiences with the road network, and in particular the experiences with specific traffic environments and situations, as well as their overall confidence levels during their interactions. The main findings from this section include:

* The majority of participants reported having interacted with a range of traffic environments (mostly signalised crossings, heavy traffic, non-signalised intersections, and traffic islands), while also reporting feeling “somewhat” or “very confident” about their interaction;
* In contrast, two scenarios (interaction with cyclists and electric vehicles) found one-third reporting “not at all confident” with their interactions; and
* Closer analyses of confidence levels also revealed that i) totally blind respondents were less likely to report a loss of confidence in one or more road scenarios, ii) more males reported no road scenarios where they were “not at all confident” compared to females, iii) no relationship between age and confidence was found.

A range of questions relating to strategies and training were included in the survey. More specifically, it was of interest to indentify the techniques and skills that pedestrians who are blind, or have low vision use. The main outcomes from this section include:

* The majority of participants indicated that they used mobility aids (the main ones being long canes and seeing eye dogs/guide dogs);
* At least three-quarters of participants indicated that they always used most strategies (looking in two directions, look at distance of cars, listening, speed of approaching cars, crossing when both directions are clear, crossing only with large gaps and seeking assistance), with listening however being by far, the most frequently used strategy; and
* It appeared that participants demonstrated adaptability in the use of available sensory modalities (i.e. individuals with greater vision loss had a tendency to utilise their sense of hearing more often, whereas individuals with less severe vision loss were more likely to utilise their remaining vision).

O&M training was also an area of interest of the survey, with over two-thirds of participants indicating that they had received O&M training. Of individuals who had receiving training:

* Participants with a greater degree of vision loss were more likely to have received O&M training;
* The timing and frequency of O&M training varied across participants (no specific pattern was identified);
* O&M training is highly individualised, reflecting the specific needs of the individual, which may include strategies and skills associated with crossing roads safely, use of canes and other mobility devices, use of and accessing public transport, training in Seeing Eye Dogs/Guide Dogs, as well as wayfinding; and
* The majority of respondents indicated that they felt O&M training was beneficial to their safe mobility.

Interestingly, findings from this section relating to O&M instruction also found: i) an association between having received O&M training with reduced confidence levels in a number of different road scenarios; and ii) O&M training being associated with increased rates of collisions and near collisions. These results however must be interpreted with caution, as the nature of this relationship remains unclear and no causal conclusions can be drawn.

The final section in the survey examined collision and near-collision experiences of participants. Of the total survey sample, almost eight percent of respondents reported having being involved in a collision with a vehicle or cyclist within the past five years. A further almost 20 percent reported having been involved in a near-collision within the same period. The nature of these collisions and near collisions was explored in greater details. The main findings include:

* The vast majority of collisions and near collisions occurred with cars or cyclists;
* In general, collisions and near collisions mainly occurred in metropolitan areas, with collisions mostly occurring at footpaths, and near collisions most frequently occurring at intersections;
* The majority of respondents involved in a collision or near collision were alone at the time;
* Collisions and near collisions affected walking patterns and confidence in walking and crossing roads; and
* Overall, totally blind respondents reported the highest collision involvement rate.

Focus Group and O&M Questionnaire: Overall, the results from this component indicate that O&M training has an invaluable impact on enhancing an individual’s mobility, independence and emotional wellbeing. The focus group discussions, as well as responses to the questionnaire indicate that O&M training requires a multifaceted approach, with a range of different skill sets demonstrated by the instructor. Training is very client-focused, tailored to the specific needs and goals of the client. At present, there are a range of limitations within the context of O&M training, ranging from public awareness of the services available, to training programs offered in O&M study programs. Furthermore, gaps in the context of road safety (e.g. driver awareness, safe infrastructure) were also highlighted.

**SUMMARY AND RECOMMENDATIONS**

The present study provides some preliminary results to understanding the experiences of pedestrians who are blind, or have low vision. More specifically, the study concludes that:

* Maintaining safe mobility is important for pedestrians with vision loss;
* The degree of vision loss impacts on the skills and strategies utilised by the road user group;
* The degree of vision loss impacts on the confidence felt by this road user group; and
* Safety is a concern, with a high proportion of pedestrians experiencing collisions or near collisions.

Furthermore, in the context of O&M training, it was found that:

* O&M training is a client-centred approach providing a range of different skills to individuals with vision loss; and
* O&M instructors have a complex role to play that requires flexibility, adaptability and a range of skill sets to cater for the clients physical, psychological and emotional needs.

Inconclusive results were also found regarding O&M training being related to reduced confidence levels and increased levels of collisions, or near collisions. There are limitations within the study related to data collection, which prevents a more detailed analyses related to these results. Therefore these results must be interpreted with considerable caution, as the study is unable to determine the nature of the relationship identified.

In addition, another noteworthy finding from the study highlights potential challenges for pedestrians who are blind, or experience vision loss. The study identified electrical vehicles and cyclists as being two of the most difficult interactions within the road network system for these individuals to navigate safely. Given the significant promotion and movement towards sustainable transport within many western societies currently, it highlights the need to consider other more vulnerable road user groups in the process of creating a safe road network environment.

Given the outcomes of this study, it is clear that more initiatives are required to manage the safe mobility of pedestrians with vision loss. Therefore, it is recommended that:

* Further research be conducted in specific areas of safe mobility for pedestrians (e.g. effect of confidence, collision risk) to enhance current understanding of these factors;
* More research conducted in the area of orientation and mobility instruction to inform a more evidence-based training program for training O&M professionals; and
* Engagement of relevant stakeholders to encourage safer behaviour by road user groups as well as improvements to infrastructure and road design to enhance environments that provide for safe mobility of pedestrians with vision loss.

It is important to note that in the area of road safety for pedestrians who are blind, or experience low vision, there are numerous avenues for further developments. The above recommendations only reflect and highlight some overall, immediate needs. As research within the area begins to develop further, it is likely that a better understanding of more practical requirements for this population group will be identified.

# CHAPTER 1: INTRODUCTION AND BACKGROUND

## 1.1 RESEARCH RATIONALE AND AIMS

Independent travel is an important goal sought by many people who are blind or have low vision. While there is some anecdotal evidence that adults who are blind or have low vision are over-represented in pedestrian collisions and also experience significant mobility limitations, there is little scientific evidence attesting to their increased crash risk, the contributing factors to risk, and the experiences of this group as pedestrians. Moreover, there is little understanding of the travel patterns and strategies this group adopt to maintain safe walking and road crossing practices, or the impact of orientation and mobility (O&M) training on improving overall safe mobility. These issues combined form the underlying rationale for the present study.

The overall aim of the study was to identify and address issues surrounding the safety and experiences of pedestrians who are blind or have low vision in Victoria. More specifically, the individual objectives of this study include:

* Provision of a better understanding of the experiences of Victorian pedestrians who are blind or have low vision;
* Develop an understanding of the contributing factors to pedestrian collisions amongst Victorians who are blind or have low vision;
* Build data on the prevalence and nature of pedestrian collisions in Victoria where vision loss may be a factor;
* Explore the experiences and impact of O&M training for pedestrians who experience vision impairment;
* Explore aspects related to the O&M profession, and the experiences of O&M instructors who work with individuals that have vision impairment;
* Provision of recommendations for future research within this field, through identifying avenues of change necessary in the context of services, training, in addition to urban planning and road infrastructure.

This study was undertaken in two components, which included: i) a survey of Victorians who are blind or have low vision; and, ii) focus group discussions with O&M instructors working with clients who are blind or have low vision. The study design and findings are presented in this report. A discussion surrounding the theoretical and practical implications of the results, along with recommendations for future developments within the area are presented.

## 1.2 PEDESTRIANS

### 1.2.1 The Benefits of Walking

Walking is a major mode of transport, is a component of most trips, and has obvious benefits for health and wellbeing of individuals and the environment. Walking is one of the main ways of increasing physical activity (Catford, 2003), and is strongly recommended by the public health sector because it has a range of health benefits. These include, but are not exclusive to, enhanced mental performance and concentration levels, decreased feelings of tension and stress levels, a sense of well-being, relaxation and enjoyment (Lee & Buchner, 2008). In addition, walking has been found to lower the risk of developing chronic diseases such as coronary heart disease (Lee, Rexrode, Cook, Manson, & Buring, 2001), obesity, diabetes, and osteoporosis (Lee & Buchner, 2008). A number of health conditions can be managed effectively via physical activity, which in turn reduces the societal costs of illness and disease. Walking offers a universal form of physical activity that people of any age, race, education level or income level can participate in.

The benefits of alternative transport options such as walking and cycling have received increased recognition from an environmental and planning aspect, as agencies and communities move to reduce reliance on cars and other forms of carbon dependent transport. In response, there has been a major push to promote safe walking and cycling in urban areas, particularly in Europe and Australia (Austroads, 2005; WHO, 2001) in order to meet important goals in urban traffic policy (i.e. accessibility for all, safety and a ‘good’ environment). Pedestrian activity and safety concerns in Victoria (and Australia) are likely to grow if initiatives that promote walking and public transport use, such as the Victorian Government Travel Smart program (Harbutt & Meiklejohn, 2003), the Victorian Government’s Victorian Families Statement (Victorian Government 2011), and the Local Governments for Sustainability Strategic Plan 2007-2021 (ICLEI, 2006) are successful in increasing the amount of walking. Therefore a review of pedestrian trauma research is important.

### 1.2.3 Pedestrian Trauma

Vulnerable road user trauma remains of great concern to road safety. Crashes involving vulnerable road users represent a major road safety problem worldwide and there is a growing awareness within the road safety community that vulnerable road users may have their own particular needs and difficulties using the road transport system. Pedestrians, in particular, are considered extremely vulnerable road users, largely due to their lack of protection and limited biomechanical tolerance to violent forces when impacted by a vehicle or other road user. Moreover, there are particular sub-groups of pedestrians who are at higher risk of collision and injury including the young, the elderly and those with functional impairments such as blindness or low vision.

While there has been a consistent downward trend of pedestrian deaths and serious injuries in Australia, and internationally, pedestrian crashes alone constitute a substantial proportion of all deaths and injuries worldwide. Despite major gains since the early 2000s, the general trend for pedestrian deaths in Australia appears to at least have reached plateau, or increased. In Australia there were 174 pedestrian deaths in 2010 (Dept. Infrastructure, Transport & Regional Development, 2010) and over 3,770 people sustained serious injuries as a pedestrian in 2005-06 (Harrison & Berry, 2008). This represented approximately 13 percent of all road deaths and approximately 9 percent of all serious injuries. In Victoria alone, 39 pedestrians were killed in 2010, and 50 were killed in 2011 (representing 17.4% of all road related deaths in 2011).

Figure 1 shows the rate of pedestrian fatalities per 100,000 people for individual age groups in Australia. It is clear that there are two major sub-groups of at-risk pedestrians. Older adults comprise the largest proportion of pedestrian deaths. In addition, those aged between 17 and 25 years are also at high risk.



**Source: Dept. Infrastructure, Transport, Regional Development & Local Government, 2010)**

*Figure 1* Rate of pedestrian fatalities per 100,000 population for individual age groups, Australia 2008

For many of the fatalities occurring amongst young pedestrians, alcohol is the major contributing factor. In Victoria, approximately 60 percent of young adult pedestrians killed have a BAC of at least 0.05g/100ml. For older adults, other factors come into play. The high death rate of older adults reflects, in part, the frailty of older adults – once involved in a crash older adults are more likely to sustain serious or fatal injuries compared to younger adults (OECD, 2001). It is also likely that functional limitations contribute to some of these deaths.

According to VicRoads, the average serious injury rate for pedestrians in the five years to 2009 for all of Victoria was 10.9 for every 100,000 pedestrians. Melbourne Local Government Area (LGA) recorded the highest rate at 95.6 per 100,000 pedestrians. State-wide, the lowest rate within the top 30% of injury rates by LGA was 10.8 per 100,000 pedestrians. That is, just over one in every 10,000 pedestrians was involved in a serious accident in a five year period across all of Victoria.

## 1.3 VISION IMPAIRMENT

### 1.3.1 Prevalence of Vision Impairment

The World Health Organization (WHO, 2011) reports that around 285 million people worldwide have at least some degree of visual impairment, of which 39 million are blind. For developed countries like Australia, many eye conditions are directly associated with ageing, and approximately 82 percent of all people who are vision impaired are aged 50 years and older. As the population ages and individuals live longer, the number of vision impaired individuals is expected to increase. Currently in Australia, approximately 292,700 individuals are either blind or experience some form of vision impairment, and it is estimated that this figure is set to continue increasing with the expected ageing population (ABS: Ausstats, 2004).

There are four levels of visual function (ICD-10) and include: i) normal vision, ii) moderate visual impairment, iii) severe visual impairment, and iv) blindness. Generally, blindness is regarded as total loss of sight or a degree of sight loss such that it results in a person having no more than light perception, or is defined as ’legally blind‘. To understand the term ‘legally blind’ it means visual acuity on the Snellen scale after correction by suitable lenses must be less than 6/60 in both eyes; or constriction to within 10 degrees of fixation in the better eye irrespective of corrected visual acuity; or a combination of visual defects resulting in the same degree of visual impairment as that occurring in the above points, established by the Australian Government for the purposes of determining permanent blindness for Disability Support Pension or Age Pension - Blind under Section 95 of the Social Security Act 1991. Legal blindness means that someone is not able to see at 6 metres what a person with normal vision could see at 60 metres (6/60). It could also be that they have a field of vision which is less than 10 degrees compared to a visual field of 100 to 135 degrees for someone with a normal visual field (Vision Australia, 2011).

It is important to note that people who are legally blind may be visually functional to a certain extent, despite their significant impairment. Therefore, some legally blind individuals still retain some ‘useful vision’, in contrast to others who only have light perception and may be considered totally blind. Moderate visual impairment combined with severe visual impairment are frequently grouped under the term ‘low vision’, and many Australians are affected with some level of vision loss – this is defined simply as an individual who has some degree of sight loss (Vision Australia, 2011). Low vision refers to moderate to severe visual impairment, and not necessarily limited to distance vision. Very low visual acuity is often present in individuals with low vision, and this level of vision impairment has been defined by the National Eye Institute (NEI) in the US to be ‘best-corrected visual acuity of less than 20/40 in the better seeing eye’. Low vision is best understood on a dynamic continuum because the impairment often depends on vision status, as well as the effects of the environment, such as illumination and contrast (Jenness & Singer, 2006).

Common eye conditions can be caused by a number of different factors including diseases, medical conditions or trauma, however, globally, the major causes of visual impairment include:

* Uncorrected refractive errors (Myopia, Hyperopia or Astigmatism), 43%;
* Cataract, 33%; and
* Glaucoma, 2%.

According to the Centre for Eye Research Australia, there are two additional common eye conditions to these affecting Australians including Age-Related Macular Degeneration and Diabetic Retinopathy, and these five conditions account for about three quarters of all vision loss (Taylor, Keefe & Mitchell, 2004).

The most common eye condition, refractive error, has affordable, cost effective and simple correction. Cataract is also common among older adults and is treatable with effective surgical techniques. The visual loss associated with the other three prevalent conditions can usually be managed if detected early enough. Importantly, however, in many cases some visual deterioration will have occurred and the individual affected by the condition will usually want to continue to drive or walk in order to maintain independence and mobility. However, under the Australian Road Rules, mandatory loss of driver’s licence occurs at 6/12 visual acuity. With the inability to drive, an individual becomes reliant on public transport, walking, family and friends to access economic and social opportunities, as well as community facilities. As pedestrians who are blind or have low vision, this has high potential to lead to increased crash and injury risk.

## 1.4 VISION IMPAIRMENT AND ROAD SAFETY FOR PEDESTRIANS AND DRIVERS

### 1.4.1 Vision Impairment and Pedestrian Safety

In all crashes involving a motor vehicle and a pedestrian, the pedestrian is more severely injured than the driver and this is predominantly due to the significant difference in mass between the vehicle and the pedestrian as well as the protection afforded the car occupant by the physical structure of the vehicle. Even at relatively low impact speeds (in the order of 40-50km/h), pedestrians receive severe injuries mainly because their only protection is their clothing. While it is clear that there are many contributing factors to pedestrian crash and injury risk including the road and traffic environment, vehicle speeds, vehicle design, and behaviour of both pedestrians and drivers, much of the research on pedestrian safety points to pedestrian behaviour as a significant factor in pedestrian injuries and fatalities (Spainhour, Wootton, Sobanjo & Brady, 2006).

Crossing a road is a relatively difficult task, involving a host of functional skills. Safe walking and making decisions about when it is safe to cross roads in relation to available traffic gaps requires adequate functioning of a range of sensory, perceptual, cognitive, executive and physical abilities. More specifically attention, perception of speed and distance, processing of sensory input, judgement, decision-making, as well as memory are particularly crucial. In order to cross a road safely without engineering assistance, pedestrians must, while approaching or stopping at the edge of the road, inspect the roadway in both directions and look for approaching vehicles. This part of the task involves detecting objects and motion, ascertaining the direction and velocity of moving objects, the identity of the object and estimating when the vehicle will arrive at the crossing point. This may involve judgements about vehicle distance, velocity, acceleration and deceleration. These operations rely on reasonably intact perceptual, attention and cognitive skills.

Furthermore, in many situations pedestrians must integrate and remember information about traffic in both directions and in multiple lanes as well as combine vehicle arrival times with own walking speed in order to reach a decision to cross safely. This requires focussing and re-focussing attention on the traffic in both directions, switching attention from one source of information to another, as well as selecting and integrating the relevant information to arrive at a safe decision. Once a crossing has been initiated, near- and far-sides of the road have to be re-scanned to verify (or update) earlier estimates of arrival time of vehicles, where adjustments to walking speed may need to be initiated. These operations require ability to process complex information rapidly.

Walking, crossing roads and negotiating traffic are complex processes requiring good functioning and performance and it is likely that diminished capability in any sensory, cognitive or executive function has the potential to compromise pedestrian performance because of poor detection of oncoming vehicles and difficulty in crossing the road quickly enough to evade oncoming vehicles. These factors have the potential to lead to increased crash risk.

Conversely, it is also possible that some people adapt well to changes in functional performance and have the potential to make appropriate adjustments to behaviour and performance. Indeed, it is noted frequently in the older road user literature that many older adults adopt certain compensatory behaviours, often termed ‘self-regulatory behaviours’ such as reducing walking or driving in complex environments, increased cautiousness when crossing roads or making turns at intersections. The adoption of these adaptive behaviours are thought to maintain overall safe mobility of these groups. Likewise, it is possible that people who are blind or who have low vision may manage their own safety by adapting their behaviour to overcome (at least in part) their visual limitations. To date, however, little is known about these behaviours and the effect on safety and mobility.

There are few publications addressing the specific visual skills for safe road crossing, and little identification of the risks associated with specific vision conditions. Notwithstanding, there is strong evidence that other impairments, such as multiple cognitive impairment and dementia, affect road crossing skills and risk of collision amongst older pedestrians (Carthy, Packham, Salter & Silcock, 1995; Oxley, 2000; Gorrie, Waite, Sachdev, et al., 2004).

### 1.4.2 Managing Safe Mobility for Pedestrians who are Blind or Experience Low Vision

In its narrowest sense, mobility may be defined as “the ability to travel” (Giuliano, Hu, & Lee, 2003) however, recent literature stresses that mobility should encompass more than travel alone. For example, Suen & Sen (2004) argue that mobility refers to being able to travel where and when a person wants, being informed about travel options, knowing how to use them, being able to use them, and having the means to pay for them – with the private vehicle coming closest to providing full mobility. Metz (2000) extended the notion of mobility even further to encompass the following elements:

* Travel to achieve access to desired people/places;
* Psychological benefits of movement, ‘getting out and about’ (closely associated with feelings of independence and self-esteem);
* Exercise benefits (muscle and bone strength, cardio-vascular improvements and overall health);
* Social involvement in the local community (associated with reduced mortality); and
* Potential travel (knowing that a trip could be made even if not actually made, e.g., in an emergency).

Quality of life is a concept that is closely linked with mobility and transportation plays a major role in achieving a high quality of life level. Banister and Bowling (2004) argued that the ability to engage in social activities, to interact in a neighbourhood with good facilities and to feel safe in one’s neighbourhood are all heavily influenced by transport options. They found that where there were negative perceptions of the transport circumstances amongst older adults (for example, speed and volume of traffic), quality of life was duly threatened. By implication, these findings suggest that inability to travel, even for short distances, would, for many people, directly threaten most, if not all, aspects of quality of life.

For most, mobility fulfils an integral role in maintaining quality of life. Mobility provides an important means for establishing, or retaining, an independent lifestyle which is essential to an individual’s social, emotional and psychological wellbeing. Furthermore, people with vision loss suffer a higher incidence of functional limitations, comorbid conditions, obesity, depression and mortality compared with people with normal vision (Ackley-Holbrook, Stevens, Kang & Morgan, 2011; Gallagher, Hart, O’Brien et al., 2011).

Importantly, many individuals with low vision or blindness may experience limited mobility, and, together with a fear of falling, has significant implications for overall independence, health and wellbeing. Those living in rural or remote areas may experience even more pronounced mobility difficulties as access to varied and regular forms of transport is often limited (Gallagher et al., 2011). In order to maintain a high, or at least acceptable, level of mobility, it is therefore essential to understand what mobility means to this population subgroup, the difficulties they face, and the strategies that they adopt to maintain mobility. This is a key aim of the current study.

While there is limited understanding of the mobility difficulties of adults who are blind or have low vision, there are some reported issues. Avoiding, locating and identifying obstacles and hazards have long been ranked as the most important mobility problems facing adults who are blind or have low vision (Smith, De L’Aunne & Geruschat, 1992; Jones & Troscianko, 2006). Gallagher et al. (2011) sought to understand some of these issues utilising focus group discussions amongst 121 adults with vision impairment in Ireland. The major issues raised during sessions centred on themes of mobility, access to transport, loss of independence, loneliness, social isolation, coping strategies, public attitudes and disability awareness. These findings suggest a need to improve the environment to ensure ease of access, as well as expanding the availability of and access to transport, improving the walking environment, and disability awareness training at the community level.

The task of walking in traffic can be extremely difficult for individuals who are blind or who have low vision for many reasons including fast-moving and heavy traffic, lack of availability of mobility aids, and road infrastructure that does not cater well for mobility impairments. Indeed, it has been suggested that current urban environments are not well designed, nor with the full requirements for the vision impaired population in mind (Liu, Mulvihill & Logan, 2011). Consequently, pedestrians who have vision impairment experience significant difficulties in travelling even short distances within public spaces, even though many of them rely on walking and the use of other public transport modes to retain their mobility (Hersh & Johnson, 2008). Further, while some infrastructure design features have simplified some tasks and increased safety, there is evidence showing that pedestrians who are blind or have low vision have considerable difficulty locating crosswalks in complex environments (Barlow, Bentzen & Bond, 2005; Ståhl, Newman, Dahin-Ivanoff, Almén & Iwarsson, 2010).

Hersh and Johnson (2008) proposed that there are two critical components to designing the travel network system to accommodate pedestrians with vision impairment: i) the development of reliable travel aids and ii) fully accessible environments. In addition, pedestrians with vision impairment often require the services of professionals to assist with developing the strategies to walk safely and develop the skills to make safe crossing decisions.

It is vital to understand how pedestrians who are blind or have low vision make the decision to cross roads, and what sources of information they utilise to do so (e.g. spatial information). Brambring (1985, as cited in Hersh & Johnson, 2008) developed a useful travel model (see Figure 2) summarising how spatial information is be understood by pedestrians with visual impairment. The model comprises two types of processes: perception and orientation. Within this context, perception refers to obtaining information about the environment through any of their senses, whilst orientation is the knowledge of their general position on the journey path.



*Figure 2* Brambring's model conceptualising locomotion for pedestrians with vision impairment

### 1.4.3 Orientation and Mobility (O&M) Training

For pedestrians who are blind or have low vision, walking between locations involves skills of orientation and mobility (O&M) comprising balance, gait, environment recognition, establishing a position in relation to the environment, landmark identification, identifying and reaching sub-goals, and orientating to the direction of travel. Ranavolo, Conte, Lavicoli et al., (2011) examined walking strategies of vision impaired people and noted that they develop excellent abilities to integrate proprioceptive, somatosensory and auditory sensory input over time to compensate for vision loss and to improve and optimise their walking efficiency, energy expenditure and overall safety. In addition, it is reported that pedestrian who are blind or have low vision recognise intersections and continually check their position against a mental map of the route, using information ranging from unchangeable features, such as voice guidance devices and other acoustic signals, tactile interfaces and guides (Takamiya & Hamada, 1998).

These skills and processes are some of the components that O&M Instructors focus on to assist people who are vision impaired. O&M training is a component of rehabilitation facilities for people who are blind or have low vision, providing education and training services aimed at maintaining independence of travel. Essentially O&M training embraces the two distinct and complementary disciplines of orientation and mobility: orientation skills training includes methods of navigation, route familiarisation, sensory interpretation and understanding, spatial, physical and environmental relationships; mobility training involves physical techniques of travel that include sighted guides, personal protection and tactual travel, as well as the use of assistive devices. O&M instructors therefore aim to develop and teach people who are blind or have low vision to ambulate and negotiate their environment safely and independently. For those wishing to maintain mobility out of home, O&M training encompasses teaching the skills to make appropriate and safe walking and crossing decisions, along with a range of other strategies. Some of the strategies include development and use of alternative sensory modes to detect other road users, particularly oncoming traffic. O&M training can also comprise training in use of mobility assistive devices such as canes (identification/symbol and long canes), seeing-eye dogs and guide dogs, mobile phone GPS, and other electronic mobility aides (Liu, Mulvihill & Logan, 2011). With appropriate training, individuals who are blind or have low vision can gain a better understanding of their environment, further enabling them to travel more comfortably, efficiently and safely.

### 1.4.4 Vision Impairment and Driving

Much of the literature addressing the behavioural factors that may contribute to older road user crash risk focuses on functional impairment, with a particular emphasis on medical conditions that result in cognitive and vision limitations (e.g., Oxley, Charlton & Fildes, 2005; Charlton, Koppel, Odell, Devlin, Langford, O’Hare, et al., 2010). While a full discussion of the effect of cognitive impairment is outside the scope of this report, it is important to note that, overall, the evidence indicates that drivers with dementia have a higher risk of deficits in driving skill and crashes compared with healthy age-matched drivers without dementia (e.g., Gorrie, Rodriguez, Sachdev, Duflou & Waite, 2007; Marshall, 2008; Allahyari et al., 2008; Lafont, Laumon, Helmer, Dartigues & Fabrigoule, 2008).

Vision impairment is, perhaps, one of the most researched areas in traffic participation and crash risk particularly for driving, and this is not surprising, given that good visual function is fundamental to driving a motor vehicle. In Australia, under the Australian Road Rules, a person must have 6/12 or better vision to be eligible for an unconditional driver’s license. It is estimated that vision may be responsible for up to 95 percent of the sensory input for drivers (Hills, 1980; Shinar & Scheiber, 1991). The remainder of this section discusses the available evidence addressing the impact of blindness and low vision on driving performance and crash risk. There is some evidence drawing conclusions about the impact of poor vision and presence of eye conditions on driving performance and crash risk. A brief review of this evidence is provided below, although it should be noted that particular vision impairment conditions vary across individuals.

***Refractive Errors:***Refractive errors (Myopia, Hyperopia, Astigmatism, and Presbyopia) are the most common eye disorders (Taylor et al., 2004), and most people have some level of refractive error. All of these conditions can be treated or corrected by using prescription glasses or contact lenses.

Worldwide, refractive errors are the second leading cause of blindness after cataract, and the cause of almost half of all visual impairment (Resnikoff, Pascolini, Mariotti & Pokharel, 2008). In Australia, the prevalence of refractive error is around 22 percent of the population aged over 40 years (Taylor et al., 2004).

Impairments associated with refractive errors are varied, dependent upon the type of condition, however, in general, difficulties relevant to driving include focussing on distant objects (e.g., oncoming vehicles or traffic lights in the distance), near objects (speedometer), distortion of focus on near and far objects and adjusting focal length between objects in the near and far field of view. In addition, dynamic visual acuity affects the ability to perceive movement-related information. This is likely to influence judgements about speed of other vehicles and will also have important consequences for gap selection and making turns across traffic. Despite the impairments caused by refractive errors and their high prevalence, associations between these conditions, crash involvement and driving performance are largely unknown (Charlton et al., 2010).

***Cataracts:***Cataracts can compromise many aspects of vision including visual acuity (Mantyjarvi & Tuppurainen, 1999; Owsley, Stalvey, Wells & Sloane, 1999), contrast sensitivity (Rubin, Adamson & Stark, 1993), and visual field sensitivity (Owsley et al., 1999). The limited evidence indicates that individuals with cataracts may have a greater crash risk than those without cataracts. Although surgical removal of cataracts is effective with at least 85 percent of cases reaching 20/40 acuity or better post-surgery (Talbot & Perkins, 1998; McCarthy, Nanjin & Taylor, 2000), surgery is usually only performed when limitations in visual function become serious. Therefore, it is estimated that a large number of older adults may be driving with cataract-affected vision.

Owsley et al., (1999) found that older drivers with cataracts were almost 2.5 times more likely than those without eye disease to have had an at-fault crash during the previous five years, even after adjusting for driving exposure and other health conditions. Owsley and colleagues (1999) also reported that drivers with cataracts experienced difficulties when driving, particularly in the rain, driving alone, turning across traffic, driving on (unfamiliar) interstate roads, in heavy traffic, in rush hour, reduced their amount of driving, and were more likely to have received advice to limit or stop driving. A more recent Australian study (Carberry, Wood, Watson & King, 2006) also found poorer driving performance amongst older adults with cataract-related impaired visual acuity and contrast sensitivity compared with age-matched control participants. In contrast to Owsley et al., (1999) however, Carberry et al., (2006) did not report any significant differences between groups in terms of driving behaviour (i.e., no differences in driving patterns, driving difficulties, etc).

***Glaucoma:***Glaucoma refers to a group of eye diseases that damage the optic nerve. In most cases this is caused by blockage in the systems that circulate or drains the aqueous fluid from the eye. In other cases, it is caused by a lack of blood flow to the nerve fibres, or a weakness in the nerve structure. When sufficient optic nerve tissue loss occurs, peripheral vision declines with central vision loss occurring much later (Coleman, 1999). Damaged vision from glaucoma is irreversible. Taylor (2001) estimates that one in eleven Australians will develop glaucoma and of the estimated 210,000 Australians who have glaucoma, around half are undiagnosed.

A number of studies have examined the association between glaucoma and crash risk (McGwin, Mays, Joiner, DeCarlo, McNeal & Owsley, 2004; McGwin, et al., 2005; Haymes, LeBlanc, Nicolela, Chiasson & Chauhan, 2007), however, the results are mixed, and a clear conclusion is difficult to reach. There are some shortcomings in methodologies employed in earlier studies, and more recent studies have shown a stronger link between glaucoma, crash risk and poorer performance, with a strong association between poorer performance and visual field loss complications.

***Age-related Macular Degeneration (AMD):***Age-related Macular Degeneration is a condition where the photoreceptors in the macular degenerate. The loss of central vision associated with this condition can seriously affect quality of life by causing difficulties performing tasks such as reading, driving, and other activities (Scilley, Jackson, Cideciyan, Maguire, Jacobson & Owsley, 2002). There are two forms of AMD: the more common non-exudative or ‘dry’ AMD is a milder form that progresses relatively slowly and accounts for approximately 85 percent of all cases (Gottlieb, 2002), and the exudative, or ‘wet’ form that progresses more rapidly, is more severe, and results in extensive loss of central vision and field. Prevention of AMD is not possible; however, there are some new treatments that are being tested with some success.

There is a significant amount of early stage AMD reported in Australia, with estimates that nearly two-thirds of Australians living into their nineties will develop the disease, and one in four will suffer a loss of vision from it (Taylor, 2001). When considering AMD that result in visual impairment, prevalence estimates increase from less than 0.1 percent in the 50-59 year age group to 13 percent in those aged over 90 years (Taylor et al., 2004). Half of all Australians who are vision impaired from AMD have visual acuity less than 6/60, that is, they are generally blind (Taylor et al., 2004).

Despite the prevalence of AMD, there is very little evidence linking this disease with increased crash risk. Szylyk, and colleagues (1993; 1995) found no differences in crash records of participants with central vision loss compared with those with no impairment. However, the findings suggested that drivers with AMD may compensate for their impairment by restricting their night-time driving, driving in familiar areas, driving at slower speeds, and taking less risks. Owsley, McGwin and Ball (1998) also assessed crash risk associated with AMD and revealed that AMD was related to injurious crash involvement (odds ratio: 3.3), but not crashes without injury. However, there were no independent associations with crash involvement after adjusting for other visual variables.

***Diabetic Retinopathy (DR):***Diabetic Retinopathy is caused by complications from Diabetes Mellitus, and the longer a person has diabetes, the greater the likelihood of developing DR with greater damage and vision loss. There are around half a million Australians over the age of 40 years with confirmed Diabetes Mellitus and similar numbers of undiagnosed cases are estimated (Taylor et al., 2004). Tapp et al., (2003, as cited in Taylor et al., 2004) estimated that approximately 15 percent of Australians with Diabetes also have some level of DR. More recent data reported that a minimum of 1.6 percent of Australians with a diagnosis of DM had vision-impairing DR (Taylor et al., 2004).

Despite the serious implications DR can have for visual function, there are no identified studies of sufficient scale to adequately estimate the crash risk associated with the disease. One exception is a study by Salzberg and Moffat (1998), which specifically examined the driving records of older drivers with DR in one jurisdiction (Washington State). The study found that drivers with DR had a crash rate of 1.7 times higher prior to examination, than participants with DM, 3.2 times higher than age-matched control participants without medical conditions, and 3.5 times higher than the Washington State population. In contrast, other studies have found no association between DR and crash risk (McCloskey, Koepsell, Wolf & Buchner, 1994; McGwin, Owsley & Ball, 1998).

## 1.5 SUMMARY

To summarise, walking is a fundamental mode of transport and affords a viable mobility option for short trips. Independent travel is an important goal sought be many people who are blind or have low vision, however, this group generally has more mobility challenges and may be exposed to an increased risk of collision, compared with sighted adults. Currently, there remains limited understanding within the research area of pedestrians who are blind or experience low vision. More specifically, there is inadequate literature outlining the walking experiences, strategies adopted to maintain safe mobility, and collision risk for this population subgroup. In order for safer environments to be established for pedestrians who are blind, or have low vision, a better understanding of such issues is necessary. As discussed and emphasised in the background literature, the ability for an individual to maintain independent mobility through active transport, hence walking, is fundamental to one’s overall physical, psychological, emotional and social wellbeing. The study seeks to explore the underlying aspects that will assist in achieving such a goal, in the context of community members with vision impairment.

# CHAPTER 2: METHODOLOGY

The current study comprised two complementary components, which aimed to capture the experiences of pedestrians who are blind or experience low vision. The survey component entailed a series of questions that reflect the experiences of individuals who are blind or have low vision. The focus group component entailed a discussion surrounding the observed experiences of individuals who are blind or have low vision, from an orientation and mobility (O&M) training perspective. This section outlines the methodological details of both components.

## 2.1 SURVEY

The aim of the survey component was to explore safe mobility of adult pedestrians who are blind or experience low vision.

### 2.1.1 Recruitment Design and Participants

Potential participants were recruited through a sustained awareness activity by Blind Citizens Australia, Guide Dogs Victoria and Vision Australia and supplemented through the Vision Australia client database. A semi-random recruitment design was employed in order to target a representative sample of adults in Victoria who are either blind or experience low vision. Potential participants were selected and stratified according to the following criteria:

* *Gender* (50% males and 50% females);
* *Age group* (approximately 15% each of 18-29 year olds and 30-39 year olds; approximately 20% each of 40-59 year olds, 50-59 year olds, 60-69 year olds and 70+ year olds);
* *Level of blindness* (a representative sample of the population who are blind, or experience low vision consisting of approximately 10% who are blind, and 90% who experience low vision).

In total, 1,451 potential participants were contacted, with a target sample size of 600. The recruited sample comprised 607 participants (301 males and 306 females), aged 18 years and over, who experience visual impairment (either low vision or legal blindness). This represents a net response rate of 42 percent. Figure 3 illustrates the participant sample distribution of age and gender. Figure 4 presents the distribution of vision loss throughout the sample. Both Figures 3 and 4 demonstrate that the study includes a representative sample across gender, age and level of blindness.



*Figure 3* Age and gender distribution of participant sample



*Figure 4* Degree of vision loss across participant sample

### 2.1.2 Survey Development

The project research team (Vision Australia and Monash University Accident Research Centre) developed the “Road Safety for Adult Pedestrians who are Blind or Vision Impaired” telephone survey (see Appendix A). The questions generated were based on national and international literature, in addition to existing questionnaires on general pedestrian safety and travel patterns. The survey comprised six main sections, designed to elicit important information relating to vision loss, travel information, interaction with the road system and pedestrian infrastructure, strategies used as a pedestrian who is blind or experiencing low vision, collision involvement, in addition to demographic characteristics.

Draft versions of the questionnaire were tested for clarity, wording and format as well as content. Professionals working with clients who are blind or experience low vision (including O&M instructors), in addition to researchers at MUARC provided reviews and comments. Revisions were completed to the questionnaire based on feedback and the final version (Appendix A) was utilised for the study.

### 2.1.3 Procedure

Telephone interviews were conducted between October and November 2011, during business hours. Contacted individuals were invited by interviewers to take part in the survey on a voluntary basis. On average, the telephone interviews were completed in approximately 15 to 20 minutes. Reasons for non-participation were not recorded. Once a potential respondent declined to participate, the telephone conversation was terminated.

Responses to the telephone survey were recorded on a standalone online database, generated for ease of data recording. Participant responses were simultaneously entered into the database during the interview sessions. Data collected from the Road Safety for Adult Pedestrians who are Blind or Vision Impaired telephone survey was analysed using the Statistical Package for Social Sciences (SPSS) program.

## 2.2 FOCUS GROUPS

The aim of the focus group sessions was to explore and develop a better understanding of a range of issues related to orientation and mobility (O&M) training, both for the instructor and the experiences of their clients.

### 2.2.1 Participants

A total of 22 O&M instructors from Vision Australia and Guide Dogs Victoria participated in one of two focus group sessions conducted.

### 2.2.2 Orientation and Mobility Focus Group Themes and Questionnaire

The focus group themes developed for discussion included: access to O&M services, O&M training strategies, barriers and limitations to O&M training implementation, in addition to O&M instruction training programs. Table 1 presents a breakdown of the issues relevant to each theme explored.

Table 1 *Themes and range of issues discussed in O&M focus group sessions*

|  |  |
| --- | --- |
| **Themes** | **Issues** |
| Access to O&M services | How to access O&M servicesCurrent funding arrangements for clients seeking O&M educationOverview of range of clients seeking O&M educationBarriers to accessing the service and areas in the process that require development |
| Training and strategies | Overview of training process (e.g. length of time, breakdown of content covered)Ranges of strategies used to assess, advise, and train clientsMost effective strategies (what works and why)Feedback from clientsAreas for improvement |
| Barriers and limitations | Obstacles associated with implementing trainingChallenges associated with working with clientsAvailability of resourcesSuggestions for addressing barriers and limitations to O&M education |
| Training programs for O&M instructors | O&M training courses available in AustraliaAdequacy of training programs offeredAreas that require further development in O&M training programs |
| Other considerations | Accessibility of environments and technological aids to assist with clients following trainingTraining booster sessions (how to bridge the pay between changes in road infrastructure and O&M skills) |

A questionnaire (see Appendix B) was also provided to O&M instructor participants following their focus group session, addressing demographics, O&M instruction history and clientele. In addition, issues related to O&M training were also addressed in order to consolidate findings from the focus group discussions.

### 2.2.3 Procedure

Each focus group began with a short presentation detailing background research on pedestrian safety, and the main findings from the telephone survey. The aim of the short presentation was to provide some context for participants surrounding the aims of the present research. This was followed by an approximate two-hour focus group session, which discussed the themes outlined in Table 1.

At the conclusion of the focus group, participants were provided with a questionnaire (as described in Section 2.2.2) to complete and return to the researchers. Data collected from the questionnaire was analysed using the Statistical Package for Social Sciences (SPSS). A total of 12 completed questionnaires were received from participants, producing a response rate of 55%.

# CHAPTER 3: RESULTS FOR PEDESTRIAN SURVEY

This section presents the findings from the survey. First, some overall information on respondent characteristics is presented, detailing age distribution, marital status, living arrangements, employment status, vision loss and self-reported health status. Second, travel information is presented including extent of travel, reasons for travel, and some additional information on those who indicate that they walk unassisted by another person. Some associations between level of vision loss, demographic characteristics, strategies and level of mobility are provided. Third, findings relating to how participants interact with the road system, including confidence in specific situations are presented. Again, associations between key variables and confidence are presented. Fourth, information on strategies used to maintain safe mobility are presented including personal strategies and training from O&M Instructors. Last, some information on collision involvement is provided.

## 3.1 OVERALL SAMPLE CHARACTERISTICS

A total of 607 participants responded to the telephone interview. In total, 1,451 potential participants were contacted, with a target sample size of 600. This represents a net response rate of 42 percent. Reasons for non-participation were not captured, as once a potential respondent refused to participate, the conversation was terminated. The 607 respondents were distributed equally across the two genders (as per stratification criteria for recruitment) and overall, two-thirds of the sample was aged 50 years or older. There were no obvious gender differences, apart from a slight tendency for male respondents to be from the youngest age group and conversely, for females to be from the two oldest age groups. However these differences were not statistically significant.

Participants were asked to classify the level of their vision loss and responses are illustrated in Figure 5 by age group (note: age groups have been combined to form two overall age groups, younger participants aged 59 years and under, and older participants aged 60 years and over). The majority of participants indicated they had moderate or severe vision loss, with smaller proportions having profound vision loss or being totally blind. Over two-thirds of all participants had at least severe vision loss. A higher proportion of younger participants indicated they had moderate vision loss compared with older participants, while older participants were more likely to indicate they had severe or profound vision loss. These differences were not significant, however.



*Figure 5* Level of vision loss by age group

Although not illustrated in the graph, the leading conditions associated with vision loss included:

* Retinitis Pigmentosa (13.7%)
* Macular Degeneration (13.5%)
* Glaucoma (9.7%)
* Diabetic Retinopathy (5.4%)
* Injury/trauma (3.6%)
* Cataract (2.5%)
* Congenital (2.5%)

With regard to age of onset, approximately one-quarter (25.9%) of participants had vision impairment since birth and more than 60 percent reported onset of vision impairment between 0 and 59 years of age. The remaining 13.8 percent acquired their vision loss after the age of at 60 years old.

Table 1 provides a summary of other demographic characteristics of the survey participants by age group including gender, living arrangements, employment status, and self-rating of health. Overall, respondents in each age group were distributed equally across the two genders. Other demographic information revealed that the majority of respondents did not work; most lived with a spouse and rated their overall health as ‘good’. Older participants were more likely than younger participants to not work while younger participants were more likely to be working either full or part time, χ2(7)=112.47, *p*<0.001. Older participants were also more likely than younger participants to live with a spouse, while younger participants lived with other family members, χ2(5)=73.65, *p*<0.001. In terms of self-rated health, group differences were found, χ2(5)=27.02, *p*<0.001, with 23 percent of younger participants reporting excellent health compared with 9 percent of older participants, and the older group more likely to report fair or poor health (37%) compared with the younger group (25%).

Table 2 *Demographic characteristics of participants by age group*

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Younger Group (18-59 years) %****(n=352)** | **Older Group (60+ years) %(n=254)** | **Total %(n=606)** |
| ***Gender:***MaleFemale  | 51.448.6 | 46.953.1 | 49.550.5 |
| ***Employment status:***Working full timeWorking part timeNot workingStudentVolunteer | 19.319.043.58.88.6 | 3.16.379.1011.4 | 12.513.758.45.19.8 |
| ***Living arrangements:***With spouseWith other family membersAloneOther | 29.838.426.14.3 | 53.59.832.73.5 | 39.826.428.94.0 |
| ***Self-rated overall health:***ExcellentGoodFairPoor | 22.851.917.96.8 | 8.753.52610.6 | 16.952.621.38.4 |

## 3.2 TRAVEL PATTERNS

Participants were asked a series of questions to gauge their level of mobility and travel patterns. First, it was important to make a distinction between those who walk assisted and those who walk unassisted. The findings revealed that, level of assistance was associated with level of vision impairment, χ2(4)=22.81, *p*<0.001. Eighty percent of participants with moderate impairment and 70 percent of those with severe impairment reported walking unassisted. In contrast, 40 percent of blind participants indicated that they walked unassisted. Analyses also revealed age group differences in assisted walking. Over 77 percent of younger participants aged 59 years and under reported walking unassisted, compared with 66 percent of older participants aged 60 years and over, χ2(1)=8.59, *p*<0.01.

A range of reasons for walking were also reported (see Figure 6), with the majority of participants (both those who walked assisted and unassisted) walking to reach shops and to reach essential services such as banking and postal services. High proportions of respondents also reported walking for recreational and fitness reasons. It is noteworthy that there were overall and significant differences between responses by those who walked unassisted compared with those who walked with assistance. Overall, assisted walkers were less likely to respond positively to all categories compared with unassisted walkers, apart from walking to medical or health appointments. Unassisted walkers were also significantly more likely than assisted walkers to indicate they walked for shopping purposes, to work, for education, to social outings and for fitness and recreation, visiting family and friends, and to reach public transport.



*Figure 6* Reasons for walking, assisted and unassisted walkers

For those who walked with assistance, two additional questions were asked: i) the main reasons why assistance is required, and ii) the length of time assistance has been required. With regard to reasons why assistance is required, a wide range of responses were provided, many centring around the issues of vision loss and difficulty seeing oncoming traffic or other objects while walking, and low spatial awareness. Other responses related to additional impairments (e.g., requirement to use a wheelchair, difficulty maintain balance), fear of falling or becoming lost. With regard to the length of time assistance has been required, a wide range of time periods were recorded, from only a few weeks, to 20+ years. No clear pattern was apparent here, however, the results suggested that a high proportion of respondents had required assistance for at least 10 years.

The remainder of the analyses in this section relate only to those who walked unassisted by another person (n=442). Participants were asked to indicate how often they walked outside their home and the results indicated that this group were highly mobile. Overall, 76 percent of participants walked outside daily or almost daily and 15 percent walked 3-4 times a week. Table 3 shows frequency of walking outside by age group and level of vision loss. An effect of level of vision loss on frequency of walking was not found. There was some indication that younger participants were slightly more likely than older participants to walk daily while a higher proportion of older participants walked 3-4 time a week, however, these difference were not significant, χ2(6)=11.158.59, *p*=0.08.

Table 3 *Frequency of walking outside home by age group and level of vision impairment (expressed as a percentage of 442 respondents)*

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency** | **Age Group** | **Vision Loss** | **Total** |
|  | Young | Old | Mod. | Sev. | Prof. | Blind | Total |
| Daily | 79.0 | 71.6 | 73.5 | 79.9 | 69.5 | 79.2 | 76.2 |
| 3-4 times per week | 21.1 | 18.3 | 19.2 | 8.9 | 18.6 | 15.1 | 14.5 |
| 1-2 times per week | 7.0 | 5.3 | 5.3 | 7.3 | 8.5 | 3.8 | 6.3 |
| Few times per month | 1.5 | 1.2 | 1.3 | 1.7 | 1.7 | 0 | 1.4 |
| Once a month | 0 | 1.2 | 0.7 | 0.6 | 0 | 0 | 1.5 |

The high level of mobility amongst this group was also represented by the distances walked each week. Overall, 40 percent of participants reported walking 10 km or more each week, and another 28 percent walked between 3 and 10 km each week. Only 13 percent walked less than 2 km per week. There we no effects of age group or level of vision impairment on walking distance.

Participants were asked to rate their overall level of performance on a selection of skills and abilities for walking outside, as illustrated in Table 4, where some group differences were found. In general, skills and abilities not directly related to vision were rated highly in relation to ability to walk (i.e., overall health, hearing, decision-making, selection of safe gaps and head and neck movement). Not surprisingly, both day and night vision were rated as poor. Table 4 summarises these responses overall, and provides information on effects of age group and level of vision impairment on these ratings.

Table 4 *Summary of skill/ability ratings for walking ability*

|  |  |  |  |
| --- | --- | --- | --- |
| **Skills** | **Rating** | **Age group effect p-value** | **Vision loss effect p-value** |
|  | **Excellent** | **Good** | **Fair** | **Poor** |
| Overall health | 20.6 | 50.8 | 20.6 | 7.5 | *p*<0.001 | *p*=0.09 |
| Day vision | 1.6 | 15.4 | 32.8 | 39.8 | *p*=0.06 | *p*<0.001 |
| Night vision | 1.4 | 5.7 | 15.2 | 66.0 | *p*=0.06 | *p*<0.001 |
| Hearing | 39.4 | 40.5 | 12.7 | 6.8 | *p*=0.001 | n/s |
| Decisions | 43.5 | 45.8 | 8.4 | 1.6 | n/s | n/s |
| Gap selection | 12.0 | 36.7 | 24.7 | 21.7 | n/s | *p*<0.01 |
| Head/neck movement | 39.7 | 45.8 | 8.8 | 4.3 | *p*<0.001 | *p*<0.05 |

## 3.3 INTERACTION WITH THE ROAD SYSTEM

We were interested to gather information about some of the experiences of low vision and blind pedestrians while interacting with the traffic, and differences in specific traffic environments and situations. In particular, we were interested in how confident participants were in these environments and whether they avoided them. This section presents the findings of this series of questions. (Note: all analyses are based solely on the responses of participants who indicated that they walked unassisted, n=442). It should be noted that confidence plays an important role in safety of pedestrians and this is discussed in greater detail in the Summary and Recommendations section (Chapter 5).

Table 5 summarises the findings related to use of and confidence in interacting in traffic situations. High proportions of participants indicated that they had interacted with traffic in selected situations recently, particularly crossing at signalised crossings, at non-signalised intersections, in heavy traffic and when traffic islands were present. Only 14 percent indicated that they had interacted in situations where there were electric vehicles.

Table 5 *Use of and confidence in interacting with selected traffic situations*

|  |  |  |  |
| --- | --- | --- | --- |
| **Traffic environment** | **Recent interaction (yes)** | **Confidence** | **Effect of vision impairment** |
|  |  | **Very** | **Somewhat** | **Not** |  |
| Heavy traffic | 79.9 | 28.9 | 56.1 | 15.0 | *p*=0.07OR: 2.73 |
| Non-signalised intersection | 79.4 | 28.5 | 53.8 | 17.4 | n/s |
| Signalised crossing | 95.9 | 60.6 | 36.1 | 2.8 | *p*<0.01 |
| Roundabouts | 58.1 | 26.8 | 52.5 | 19.8 | n/s |
| Multiple lanes | 57.7 | 33.1 | 52.6 | 13.9 | n/sOR: 2.85 |
| Traffic islands | 76.6 | 33.9 | 54.9 | 10.9 | *p*<0.05OR: 3.08 |
| Electric vehicles | 13.8 | 21.3 | 39.3 | 36.1 | n/s |
| Cyclists | 67.1 | 18.9 | 40.4 | 39.7 | *p*<0.05OR: 4.04 |

A range of confidence levels were reported for each traffic situation, however, generally, participants reported being somewhat or very confident walking in the majority of these environments. Indeed, 60 percent of participants reported being very confident crossing the road at signalised intersections and 80 percent or more of all appropriate respondents expressed being at least ‘somewhat confident’ in six of the eight road scenarios. The two exceptions were crossing roads also used by cyclists and electric vehicles – where over one-third of appropriate respondents reported being ‘not at all confident’. There is no readily explanation as to why cyclists should pose a greater problem for pedestrians who are vision impaired outside of the circumstances where there is heavy traffic or complex traffic scenarios – unless the relative quietness of cyclists makes it more difficult for them to be detected. However, it is of concern that pedestrians are not confident when interacting with electric vehicles as these vehicles may pose a significant threat, particularly in the coming years as these vehicles start to enter the general vehicle fleet. This issue will be explored further in the Summary and Recommendations section (Chapter 5).

Additional analyses were conducted to assess the effect of vision loss severity on confidence levels, with a focus on those who reported being not at all confident in at least one scenario. Table 6 details for those participants who walked unassisted by another person, the numbers of road scenarios where they were ‘not at all confident’ analysed by degree of vision loss.

Table 6 *Number of road situations where 'not at all confident' responses were given by degree of vision loss*

|  |  |  |
| --- | --- | --- |
| **Number of road situations** | **Degree of vision loss** | **Total** |
|  | **Moderate** | **Severe** | **Profound** | **Totally blind** |  |
| 0 | 51.0 | 50.8 | 52.5 | 67.9 | 53.2 |
| 1 | 27.2 | 23.5 | 22.0 | 13.2 | 23.3 |
| 2 | 13.2 | 16.8 | 11.9 | 9.4 | 14.0 |
| 3 | 6.0 | 3.4 | 6.8 | 5.7 | 5.0 |
| 4 | 0.7 | 3.4 | 0 | 1.9 | 1.8 |
| 5 | 2.0 | 1.7 | 3.4 | 1.9 | 2.0 |
| 6 | 0 | 0.6 | 1.7 | 0 | 0.5 |
| 7 | 0 | 0 | 1.7 | 0 | 0.2 |

There was no consistent relationship between confidence and vision loss – except that relative to other groups, totally blind participants were less likely to report a loss of confidence in one or more road scenarios. For example, 68 percent of totally blind respondents reported there were no scenarios where they were ‘not at all confident’, compared to 51 percent of all other respondents. This difference was statistically significant (OR=2.02, 95%CI 1.06-3.90).

Further analyses revealed that there was a slight tendency for more males to report no road scenarios where they were ‘not at all confident’ and conversely, more females to report multiple road scenarios where they were ‘not at all confident’. For example, 55 percent of male respondents reported that they were never ‘not at all confident’, in contrast to 51 percent of female respondents. However, the difference was not statistically significant. With respect to the age variable, there was no consistent relationship with confidence.

In sum, it can be concluded that:

* Totally blind respondents were less likely to report a loss of confidence in one or more road scenarios (significant difference);
* More males reported no road scenarios where they were ‘not at all confident’ and more females reported multiple road scenarios where they were ‘not at all confident’ (indicative differences); and
* There was no consistent relationship between confidence and age.

Overall, analyses of confidence levels show high confidence amongst this sample, and some effect of degree of vision loss on confidence. The most surprising result from these analyses relates to the totally blind groups’ high levels of confidence when compared with other vision impaired groups. While the differences were only statistically significant in four scenarios, there was at least indicative evidence of greater confidence for at least six of the eight traffic situations. While there is no ready explanation for this counter-intuitive finding, a tentative hypothesis might be that totally blind respondents are more likely to receive O&M training or have developed their own strategies and approaches, and perhaps resulted in them being better equipped (or at least more confident) to deal with different road scenarios. Such hypotheses will be explored in the Summary and Recommendations section (Chapter 5).

## 3.4 STRATEGIES AND TRAININGS

The majority of pedestrians who walk unassisted by another person (63%) reported that they used mobility aids while walking outdoors, and the most frequently used aids were: long cane (52.5%); Seeing Eye Dog/Guide Dog (24.6%); short cane (16.8); walking frame (5%); orthopaedic cane (4.3%); and GPS device (5%).

All pedestrians use strategies when deciding to cross roads safely unassisted. A series of questions were posed to participants asking about some of the strategies that they used when deciding to cross the road. Table 7 presents responses to these questions by level of vision impairment.

Table 7 *Summary of crossing strategies by degree of vision impairment*

|  |  |  |
| --- | --- | --- |
| **Strategy** | **Degree of vision impairment** | **Total** |
|  | **Mod.** | **Severe** | **Prof.** | **Blind** |  |
| ***Looking in two directions***AlwaysSometimesNever | 93.45.31.3 | 81.06.79.5 | 57.613.618.6 | 24.5052.8 | 75.36.313.1 |
| ***Looking at distance of car***AlwaysSometimesNever | 81.511.94.0 | 64.79.520.1 | 44.113.650.5 | 11.33.862.3 | 60.910.221.0 |
| ***Listening***AlwaysSometimesNever | 89.48.62.0 | 92.21.73.9 | 94.95.10 | 98.100 | 92.34.32.3 |
| ***Speed of approaching cars***AlwaysSometimesNever | 76.213.96.6 | 67.612.311.2 | 74.610.210.2 | 84.99.41.9 | 73.512.28.4 |
| ***Crossing when both directions are clear***AlwaysSometimesNever | 74.817.94.0 | 70.415.67.3 | 81.413.63.4 | 71.720.81.9 | 73.516.75.0 |
| ***Crossing only with large gaps***AlwaysSometimesNever | 74.220.52.9 | 71.516.24.5 | 76.313.65.1 | 67.926.40 | 72.618.63.2 |
| ***Seeking assistance***AlwaysSometimesNever | 7.351.741.1 | 7.365.426.4 | 8.561.030.5 | 5.767.924.5 | 7.260.431.7 |

At least three-quarters of participants indicated that they always used most of the strategies listed, apart from looking at how far away the vehicle is (60%), and seeking assistance from another person, in which case, only 7 percent reported always doing this. It was also interesting to note that listening was, by far the most frequently used strategy, and that significant proportions of participants reported never looking in both directions (13%), and never looking at how far away the vehicle is (21%).

Some group differences were also noted for looking and listening strategies. Participants with moderate and severe vision loss were more likely to report looking in both directions compared with those who were blind and those with profound vision loss, χ2(12)=167.49, *p*<0.001. Similarly, participants with moderate and severe vision loss were more likely to report looking at the distance of the approaching vehicles compared with those who were blind and those with profound vision loss, χ2(12)=131.36, *p*<0.001. In contrast, participants who are blind were more likely to always use listening strategies compared with those with less severe vision impairment, χ2(12)=22.87, *p*<0.05. This result demonstrates the use of available sensory modalities available to the individuals, and the pattern of use as a function of level of vision impairment.

Analyses was also completed on the use of O&M training amongst the group of pedestrians who were blind, or had low vision, yet walked unassisted by another person, particularly the frequency of use, the strategies taught and the benefits of training. First, participants were asked if they had received O&M training. Overall, two-thirds of participants reported having received O&M training, as illustrated in Figure 7.



*Figure 7* Proportion of individuals who have received O&M training as a function of vision impairment level

There was a significant effect of degree of vision impairment on receiving training. As degree of vision impairment increased, so did the likelihood of having received O&M training, χ2(6)=33.86, *p*<0.001. Almost all participants who are blind received training, while only about half of those with moderate vision impairment received training. In the context of O&M training, clients are offered particular services following an initial assessment of their needs, followed by a developed plan and any subsequent requests for services.

For those participants who indicated they had *not* received O&M training, reasons for not receiving training included:

* Not applicable to individual needs (40.3%);
* Unaware of the service (14.6%);
* Unable to take up the option for personal reasons (14%);
* Service not available in an individual’s area (2.8%); and
* Other reasons, not otherwise specified (28.5%).

For those participants who indicated that they *had* received O&M training, the timing of last utilisation of services was fairly evenly distributed across timing options. Approximately one-third reported having received their last training session more than five years ago (34.9%), with 28.2 per cent reporting receiving it less than 12 months ago. Approximately 20 percent reported receiving training 2-5 years ago, and 15 per cent 1-2 years ago. No effects of degree of vision impairment or age of onset were found for timing of last use of O&M training.

Responses to the question of frequency of O&M training were varied. Approximately 20 percent of respondents received training once a week, 13 percent received training 2-3 times a week, and 13 percent received it 2-3 times a month. A high proportion (42.6%) of participants responded in the ‘other’ category, and investigation of these responses revealed that many received a few sessions of O&M training following intensive training sessions (e.g., Guide Dogs Camp), every day when training dogs, once off sessions (1-2 sessions in total), and ongoing sessions (every 6 or 12 months). No effect of degree of vision impairment was found for frequency of O&M training.

Many descriptions of what the O&M training mainly focussed on were provided, which likely reflects the individualised nature of training. O&M training focuses directly on specific individual needs and requirements. Notwithstanding, some key themes emerged from the descriptions and generally, O&M training focuses on training and managing the following skills:

* Crossing roads safely (position, choosing safe gaps in the traffic, listening to traffic, appropriate head movements, finding safe routes, etc.);
* Use of canes and other mobility aid devices;
* Use of an accessing public transport (bus, train and tram, making use of infrastructure);
* Training Seeing Eye Dogs and Guide Dogs; and,
* Wayfinding (getting to places and home).

In response to the question ‘Do you think O&M training was beneficial to your safe mobility?’, the majority of participants (87.2%) responded positively. Positive responses could be grouped into the following categories:

* Provided good advice and use of new technologies;
* Provided good strategies to cross roads;
* Increased confidence;
* Increased feeling of safety;
* Maintained independence; and
* Fewer injuries.

Some of the negative responses included:

* Didn’t think training was necessary;
* Did not address personal safety; and
* Already knew how to move about independently and safely.

In summary, it appears that O&M training is more likely to be provided to those with more severe vision impairment, particularly those who are totally blind, and that most participants found the training to be of some benefit, particularly in terms of increasing confidence and providing strategies to cross roads safely. This would lead us to hypothesise that O&M training should be effective in better equipping pedestrians who are blind or have low vision to deal with different road scenarios. If this hypothesis is true, it would also follow that those who were least confident in the different scenarios were least likely to have received O&M training. Some additional analyses were therefore undertaken to understand the benefits of O&M training further and these included the effects of O&M training on levels of confidence in traffic environments and collision risk. Table 8 shows for all appropriate participants (those who walked unassisted by another person), the number of traffic scenarios where they were ‘not confident at all’ analysed by whether they had received O&M training.

Table 8 *Low confidence levels by O&M training*

|  |  |  |
| --- | --- | --- |
| **Not confident: Number of road scenarios**  | **O&M Training** | **Total** |
|  | **Yes** | **No** | **Don’t know** |  |
| 0 road situations | 61.7 | 37.0 | 1.3 | 67.4 |
| 1 road situation | 71.8 | 28.2 | 0 | 31.7 |
| More than 1 road situation | 76.0 | 23.1 | 1.1 | 0.9 |

There was a consistent increase in the proportion of respondents with O&M training as the number of road scenarios in which respondents were “not at all confident” increased. For example, 76 percent of respondents “not at all confident” in more than one road scenario had received O&M training, compared to 63 percent of respondents who were at least “somewhat confident” in all road scenarios. This difference was statistically significant (Odds ratio=1.98, 95%CI 1.13-2.47).

Further, when the analysis conducted for Table 8 was conducted separately for each level of vision impairment (that is, separately for moderately impaired, severely impaired, profoundly impaired and totally blind participants), it was again found that there was a reasonably consistent association between having received O&M training and being “not at all confident” in an increasing number of road scenarios, regardless of level of impairment. While it was encouraging that there were overall high levels of confidence reported within the sample, it was an unexpected finding that confidence was not highly associated with receiving O&M training, particularly as this is a key aspect of training. It is important that this finding be interpreted with caution as there are a range of factors that may explain this negative relationship, that when controlled for, may change the direction of the relationship. This will be explored in more detail in the Summary and Recommendations section (Chapter 5).

Analyses were conducted to explore whether O&M training had other mobility or safety benefits. With regard to mobility benefits, O&M training was examined in terms of weekly distance travelled (Figure 9) and the findings revealed a positive association between training and increased distances travelled, χ2(8)=16.2, *p*<0.05.



*Figure 8* Weekly distance travelled by O&M training

O&M training was also examined in terms of use of mobility aides, as illustrated in Figure 9. Those who indicated they had received training were more likely than those who had not received training to use mobility aids, χ2(2)=86.86, *p*<0.001.



*Figure 9* Use of mobility aids by O&M training

In terms of overall safety benefits, the effect of O&M training on collision or near collision involvement was assessed. Table 9 shows respondents’ involvement in collisions and near collisions, analysed by whether they had received O&M training.

Table 9 *O&M training by collision involvement*

|  |  |
| --- | --- |
| **O&M training** | **Collision involvement (%)** |
|  | **Yes collision** | **Yes near collision** | **No** | **Don’t know** |
| Yes | 11.1 | 25.5 | 62.4 | 1.0 |
| No | 2.1 | 20.0 | 77.9 | 0 |
| Don’t Know | 25.0 | 25.0 | 50.0 | 0 |

The results suggest that O&M training was associated with collision and near collision involvement however, similarly to its negative relationship with increasing confidence, this finding needs to be interpreted with care. Participants who had received O&M training were found more likely to have been involved in both collisions and near collisions compared to participants with no O&M training – and the difference in collision involvement was statistically significant, χ2(6)=16.63, *p*<0.05. Again, there are a range of underlying factors that may impact on the direction of this relationship, and a more in depth exploration will be completed in the Summary and Recommendations section (Chapter 5). It is important to note that it cannot be assumed that O&M training had a causal role in collision and near collision involvement. The involvement frequencies related to events at any time in the five years previous to the survey and it is not clear whether collision incidents occurred prior or post O&M training. This data was not collected from the survey.

In summary, this section addressed the issues surrounding use of strategies and training resources amongst those who walked outside unassisted. Amongst this group, there was a high level of use of mobility aids, both in terms of physical aids such as canes, Seeing Eye and Guide dogs and walking frames, as well as behavioural strategies such as looking in two directions, listening, and crossing in a safe manner (e.g., selecting large gaps in the traffic). Interestingly, lower proportions of participants reported that they always sought assistance from others.

O&M training resources were utilised by approximately two-thirds of participants, particularly those with higher level of vision impairment. O&M training is generally individualised and this was evidenced in the variety of descriptions of training received. Encouragingly, the majority of participants indicated that the training they received had benefited them in terms of both maintaining mobility and increasing safety. There were positive associations between distance travelled and use of mobility aids and O&M training, however, the findings also revealed some less positive results. While participants reported increased confidence as a result of training, responses to questions on specific road environment revealed a lack of confidence associated with O&M training. Furthermore, O&M training was associated with an increase in collision and near-collision involvement. However, no causal relationships can be inferred and a range of underlying factors may help to explain the why these negative relationships were found. This will be explored in greater detail in the Summary and Recommendations section (Chapter 5).

## 3.5 COLLISIONS

This final section presents the findings of collision experiences and risk factors. Participants were asked to indicate whether they had been involved in a collision or near collision with a vehicle or cyclist as a pedestrian in the last five years. Of the total sample of 607 participants, 48 people (1 in 12 respondents, or 7.9%) reported being involved in a collision in the last five years. Additionally, 117 people (nearly 1 in 5 or 19.5%) reported being involved in a near collision in the same period. This represents a total of 165 people, or more than 1 in 4 respondents (27.2%) reporting they have experienced a pedestrian safety issue relating to collision and near collision involvement.

For those participants who indicated they had been involved in a collision or near collision, a series of additional questions were asked regarding the characteristics and circumstances of their most recent collision or near collision. Figure 10 presents the collision partner and shows that the vast majority of collisions and near collision (63.9%) were with a passenger vehicle. Interestingly, substantial proportions of collisions and near collisions were with bicycles (24.1%). The remainder of collisions were with trucks, public transport or other (including a combination of motor vehicle/cyclists, motorcycles, electric scooters, wildlife, skateboard and unsure).



*Figure 10* Collision and near collision involvement by collision partner

Table 10 shows additional information about road and traffic systems where collisions and near collisions occurred. In general, collisions occurred mostly in metropolitan areas (67%), with an additional 22 percent in regional areas, and 12 percent in rural areas. There was no difference in collision severity. Approximately half of collisions occurred during the week, however, substantial proportions of respondents did not remember the day of the week.

Table 10 *Summary of characteristics of collisions and near collisions*

|  |  |  |  |
| --- | --- | --- | --- |
| **Collision Characteristic** | **Collision (%)(n=48)** | **Near Collision (%)(n=117)** | **Total %(n=165)** |
| ***Location (1):***MetropolitanRegionalRural | 68.117.014.9 | 66.123.510.4 | 66.721.511.7 |
| ***Location (2):***IntersectionMid-blockOn footpathAt signalised crossingOther | 14.616.729.26.333.3 | 31.914.213.314.226.5 | 26.714.918.011.828.6 |
| ***Day of Week:***Weekday (Mon-Fri)Weekend (Sat-Sun)Don’t know/remember | 56.312.531.3 | 41.95.153.0 | 46.17.346.7 |
| ***Travel Circumstances:***Walking with othersAssisted by Guide/Seeing Eye DogWalking alone | 14.618.866.7 | 17.914.567.5 | 17.015.867.5 |

With regard to road location, 43 (26.1%) occurred at intersections, and approximately 28 percent occurred in other locations. The remainder were fairly evenly distributed between mid-block locations, at signalised crossings and on the footpath. Interestingly, there were some differences between collisions and near collisions. Almost 30 percent of those involved in collisions occurred on the footpath (compared with only 13% of near-collisions), while 32 percent of near collisions occurred at intersections, χ2(6)=12.80, *p*=0.05.

Importantly, the findings revealed that the majority of respondents involved in a collision or near collision were walking alone (overall 68%) at the time of the incident. A further 17 percent were with another person or people, and 16 percent were with a Seeing Eye Dog or Guide Dog.

Respondents were also asked to describe the purpose of trip at the time of incident. Of the 165 people involved in an incident, 54 people (32.7%) were undertaking essential financial, shopping and postal activities. A further 35 people (21.2%) reported incidents occurring in the course of pedestrian travel associated with employment, followed by 17 people (10.3%) undertaking recreation or fitness activities. There were a further 13 people (7.9%) whose purpose of pedestrian travel was to attend a medical or health appointment. Other purposes of pedestrian travel that ended in an incident include 9 people (5.5%) visiting family and friends, and 9 people (5.5%) while accessing public transport. People attending education or training (4), Church or place of worship (2) and Sport or Social clubs (2) comprised the remainder, with 6 persons unable to say. The remainder of responses were classified as ‘other’.

Respondents were asked an additional two questions regarding outcomes or consequences of collision and near collision involvement. Figure 11 shows changes in walking patterns, and Figure 12 shows the changes in confidence in walking and crossing roads by collision severity. Overall, substantial collision and near collision involved respondents indicated that their walking patterns and confidence in walking and crossing roads had changed as a result of the collision/near collision (38.2% and 53.3%, respectively). Moreover, those who had been involved in a collision were more likely to report changes, compared with those involved in a near-collision.

|  |  |
| --- | --- |
|  |  |
| *Figure 11* Walking patterns by collision severity | *Figure 12* Confidence by collision severity |

Some additional analyses were conducted to understand other factors associated with collision and near collision involvement, including assistance required when walking, degree and condition of vision loss, and self-report on functional abilities. Collision and near collision involvement was examined first relative to whether participants required assistance while walking outside or not, as illustrated in Figure 13.



*Figure 13* Collision and near collision involvement by assistance required when walking

As shown in Figure 13 there was an effect of group on collision and near collision involvement, χ2(3)=22.99, *p*<0.001, Odds ratio=3.45, 95%CI 1.60-7.65. The majority of participants (both assisted and unassisted walkers) had not been involved in a collision or near collision, particularly unassisted walkers. While similar proportions of each group had been involved in a collision, assisted walkers were more likely than unassisted walkers to have been involved in a near collision.

Collision and near collision involvement was also examined relative to degree of vision loss, as illustrated in Figure 14. The following analyses have been conducted to identify possible risk factors for those vision impaired pedestrians in collisions and near collisions. In order to broadly control for exposure, only the 502 respondents who reported walking at least 3-4 days a week (representing 83% of the initial sample of 607 respondents) have been included. Both ‘assisted’ and ‘unassisted’ pedestrians have been included.



*Figure 14* Proportion of collisions, near collisions and non-collisions by degree of vision loss

Figure 14 reveals that there was no consistent association between collision involvement and degree of vision loss. However, an overall effect of degree of vision loss was found, χ2(12)=24.47, *p*<0.05. Relative to all other participants, totally blind participants reported the highest collision involvement rate but also the highest rate of avoidance of both collisions and near-collisions (Odds ratio=2.25, 95%CI 1.18-4.37). Participants with moderate to severe reported more near-collisions compared with those with more severe vision loss.

Table 11 outlines for appropriate respondents, collision involvement analysed by condition of vision loss. Considering only the four conditions incurred by 20 or more respondents, two conditions (Macular Degeneration and Diabetic Retinopathy) on the face of it protected against collisions and near-collisions, compared with other conditions. In contrast, Glaucoma and Retinitis Pigmentosa appeared as risk factors for collisions and near-collisions. It is important to note that a causal relationship cannot be concluded however, this finding highlights the potential for different eye conditions to impact on risk of collision.

Table 11 *Collision involvement by vision condition*

|  |  |
| --- | --- |
| **Vision condition** | **Collision involvement** |
|  | **Collision (%)** | **Near collision (%)** | **No** |
| Congenital  | 15.4 | 15.4 | 69.2 |
| Macular degeneration | 3.0 | 9.0 | 86.6 |
| Optic atrophy | 0 | 20.0 | 80.0 |
| Congenital Aniridia | 0 | 50.0 | 50.0 |
| Glaucoma | 10.4 | 27.1 | 62.5 |
| Albinism | 14.3 | 28.6 | 57.1 |
| Diabetic retinopathy | 0 | 12.0 | 88.0 |
| Retinitis Pigmentosa | 10.8 | 25.7 | 63.5 |
| Cataract | 6.7 | 13.3 | 8.0 |
| Optic damage | 7.1 | 7.1 | 85.7 |
| Injury/Trauma | 6.3 | 31.3 | 62.5 |
| Other | 10.2 | 24.5 | 64.4 |

Participants’ self-reports on functional abilities for walking outside were analysed relative to collision and near collision involvement (see Tables 13, 14 and 15). As reported overall health declined, the involvement in collisions and near collisions also decreased. For example, 28 percent of respondents in only fair or poor health were involved in collisions or near collisions, compared to 35 percent of respondents in excellent or good health. However the difference was not statistically significant. There was also no consistent association between self-reported decision-making capability and collision involvement.

Table 12 *Collision and near collision involvement by self-reported overall health*

|  |  |
| --- | --- |
| **Self-reported health** | **Collision involvement** |
|  | **Collision** | **Near collision** | **No** |
| Excellent | 9.4 | 29.4 | 61.2 |
| Good | 6.8 | 27.1 | 66.2 |
| Fair | 11.1 | 19.8 | 69.1 |
| Poor | 11.5 | 7.7 | 76.9 |

Table 13 *Collision and near collision involvement by self-reported decision-making capability*

|  |  |
| --- | --- |
| **Self-reported decision-making** | **Collision involvement** |
|  | **Collision** | **Near collision** | **No** |
| Excellent | 11.3 | 26.6 | 62.1 |
| Good | 5.5 | 25.1 | 69.4 |
| Fair | 15.2 | 18.2 | 63.6 |
| Poor | 16.7 | 0 | 83.3 |

Table 14 *Collision and near collision involvement by self-reported ability to select safe gap in traffic*

|  |  |
| --- | --- |
| **Ability to select safe gap** | **Collision involvement** |
|  | **Collision** | **Near collision** | **No** |
| Excellent | 9.6 | 17.3 | 73.1 |
| Good | 10.7 | 21.5 | 67.1 |
| Fair | 3.1 | 30.6 | 66.3 |
| Poor | 12.6 | 27.6 | 59.8 |

As reported ability to select safe gaps declined, the involvement in collisions and near collisions combined increased. For example, 31 percent of respondents in excellent or good health were involved in collisions or near collisions, compared to 37 percent of respondents in only fair or poor health. However the difference was not statistically significant.

In summary, this section gathered information on collision and near collision experiences of the respondents and a number of key findings were noted. Substantial proportions of respondents reported having been involved in a collision or near collision. Collisions and near collisions mainly involved an incident with a passenger car, however, a substantial proportion also involved bicycles. Incidents generally occurred on metropolitan roads, at intersections or other locations (however, there was a tendency for collisions to occur on footpaths), and approximately half occurred during the week (although many respondents did not recall the day of the week). Importantly, those walking by themselves were significantly more likely than those walking with others or with the assistance of a Seeing Eye Dog or Guide Dog to be involved in an incident.

With regard to outcomes, there were noted effects on walking patterns and confidence in walking and crossing roads, particularly amongst those who had been involved in a collision, compared with those who reported being involved in a near collision. Additional findings included:

* Totally blind respondents reported the highest collision involvement rate (indicative only) but also the highest rate of avoidance of both collisions and near-collisions (statistically significant);
* Macular Degeneration and diabetic retinopathy seemed to be protective against collisions and near-collisions combined (indicative only and statistically significant, respectively), whereas Glaucoma and Retinitis Pigmentosa appeared as risk factors for collisions and near-collisions (indicative only in both instances);
* Respondents who walk unassisted had higher separate collision and near collision rates than respondents who never walk outside unassisted (indicative only and statistically significant, respectively);
* As reported overall health declined, the involvement in collisions and near collisions combined also decreased (indicative only); and
* As reported ability to select safe gaps declined, the involvement in collisions and near collisions combined increased.

# CHAPTER 4: RESULTS FOR ORIENTATION AND MOBILITY INSTRUCTORS FOCUS GROUP SESSIONS

## 4.1 FOCUS GROUP SESSIONS

Two focus group sessions were conducted with orientation and mobility (O&M) instructors from Vision Australia and Guide Dogs Victoria. Section 4.1 presents detailed findings from these discussions. Appendix C and D provide tables outlining the main issues within each theme that were identified during the focus group discussions with Vision Australia, and Guide Dogs Victoria respectively.

### 4.1.1 Access to O&M Services

Orientation and mobility services are offered at both Vision Australia and Guide Dogs Victoria however, the results from the focus group suggest that public awareness of such services is limited. A range of limitations were presented regarding barriers to public awareness including inadequate marketing campaigns, inadequate community engagement, in addition to inaccurate media reporting, which has lead to public misunderstanding of concepts such as “vision loss” and “vision impairment”. At present, there is a high prevalence of vision loss experienced in the community however, the focus group discussions suggests that awareness of the range of services provided by organisations like Vision Australia and Guide Dogs Victoria are limited, even to those who would benefit greatly from the services available.

Both Vision Australia and Guide Dogs Victoria offer a range of services to assist individuals of all ages, who are blind or have low vision. These services are provided for free. Vision Australia offers 15 core services outlined in Table 15 (Vision Australia, 2010). Guide Dogs Victoria also provides a range of different services across their different teams, which include Guide Dog Mobility, Children’s Mobility, Orientation and Mobility, Acquired Brain Injury Mobility and Occupational Therapy. Vision Australia is a national service, whereas Guide Dogs Victoria services the state of Victoria. Both organisations discussed the challenges associated with servicing more remote regional areas.

Table 15 *Core services provided by Vision Australia*

|  |  |
| --- | --- |
| **Aim of Service** | **Service** |
| Enhancing access to information | BrailleAlternate format productioni-access(r)Radio for the print handicapped |
| Making the most of technology | Assistive technologiesTrainingLeveraging expertise |
| Being part of the community | Peer, emotional and social supportChildren’s servicesFacilitating and maintaining employmentLow vision clinicsIndependence in the home and community*Seeing Eye Dogs, orientation and mobility*RecreationCreating social inclusion |

Note: For a more detailed description of services, refer to Vision Australia (2010, p.6-8).

Clients are able to gain access to services via a range of referral options. These include, but are not exclusive to: self/individual referral, family or friend referral, other health service providers (e.g. eye care professionals, hospitals and rehab departments), education centres and the Low Vision Clinic. Both organisations (Vision Australia and Guide Dogs Victoria) undergo a standard initial assessment to screen for the clients’ needs. The needs assessment is comprehensive, and screens a range of areas related to physical, mental and emotional health. Within the screening, there are flagged items to indicate the potential need for orientation and mobility training. Of those individuals where screening indicates the need for orientation and mobility training, clients are referred to O&M teams.

### 4.1.2 Training and Strategies

When clients are referred for orientation and mobility training, most clients undergo an initial functional assessment session aimed at individual goal setting. For clients who are children, or not independent, parents or carers, as well as family or friends may also attend the session in support of the client. Often these sessions are completed in the client’s home environment so that they can be observed within the context of their everyday setting.

The task of goal setting depends on a number of factors, but is always client-focused. O&M instructors work with clients to identify and develop goals they want to meet, and a program is then generated for the clients to complete. This program is required to be flexible and may change as clients achieve individual goals. Two main barriers to goal setting may include clients’ readiness to undertake O&M training (acceptance of vision impairment) and insight. Given training is an ongoing process; the reshaping of goals according to the client’s progress is highlighted.

When training individual clients, there is a wide array of strategies that O&M instructors utilise depending on the characteristics and knowledge demonstrated from the client, in addition to the goals that the client has set. The overall aim of training is to offer clients alternative strategies to achieving orientation and mobility. Some of the main strategies that were discussed include:

* Use of other senses (e.g. hearing, remaining vision);
* Visualisation of a route (i.e. practicing in one’s mind prior to undertaking the travel trip);
* Depth perception and reducing glare/adapting to lighting;
* Use of cognitive functions (e.g. problem solving, insight);
* Breaking down the task into smaller, more manageable parts (one trip can consist of a series of mini steps);
* Use of trial and error to determine which strategies suit the individual best;
* Concept development (visiting different environments so client can build a good understanding of how their environments are constructed);
* Preparing for “worst case scenario”

These strategies can be used in overall tasks such as orienting a child client to school or assisting an adult client to the bank. One of the essential experiences fostered in O&M training is client confidence, or empowering the client to feel comfortable with their individual ability in orientation and mobility. Confidence can be enhanced through increasing positive experiences and preparing for “worst case scenario” situations so the client feels safe. In addition to this, peer support groups, as well as social support received from family or friends, are also significant factors. The former enables the client to share some of their experiences with others who may have had similar experiences also. The latter is crucial to overall health and wellbeing of the client. A solid support network can also assist with encouraging and reinforcing clients to utilise the strategies they develop during their training.

O&M training duration varies depending on the client. Completion of O&M training is a significant stage for clients and determining when to discontinue O&M training has the potential to be challenging and frightening. During training, O&M instructors gradually reduce their level of input as the client progresses both in skills, and confidence. This process gradually raises their independence. Ending O&M training is a process and includes a conversation between the instructor and the client to establish a time that the client is comfortable with. O&M instructors also ensure that clients are well connected with any other relevant services they may require in the future, prior to ending their O&M training. It is also possible for clients to resume O&M training services in the future, should the need arise.

### 4.1.3 Barriers and Limitations

There are a series of barriers and limitations for orientation and mobility training associated with a range of individuals including the clients themselves, working with other health professionals, in addition to working relationships with local council, government and road authorities. Furthermore, the availability of resources and education can also be limited. Combined, these aspects can impact on the overall effectiveness of orientation and mobility training, as well as general pedestrian safety for individuals with vision impairment.

In terms of working with clients, one of the main obstacles for O&M instructors is the ability to design different programs to suit different clients. Given the very nature of working with different clients entails interacting with a range of personalities, varying levels of cognition and existing skills, in addition to different set goals, the task of facilitating this process can be challenging in any of the specified areas. This suggests that O&M instructors are required to be adaptable and flexible when working with clients.

In terms of working with other allied health staff (e.g. Occupational Therapists, Psychologists, Social Workers/Case Managers etc) one of the main challenges can be their limited understanding in the orientation and mobility training field. Some allied health professionals are not aware of the role O&M instructors play for individuals who have vision impairment, and this can impact on their ability to recognise the need for such services, referral rates, and the ability to work in a collaborative manner for the client.

O&M instructors also play a crucial “advocacy” role for pedestrians with vision impairment. This role includes communicating to local councils, other government stakeholders, in addition to road authorities regarding issues such as urban planning (in terms of accessibility and user friendliness) and road infrastructure (in terms of safety and other transport related issues). This role is essential as O&M instructors can be the voice for this particular population group.

Lastly, there can be challenges associated with adequate resourcing in terms of provisions for educating clients. Given the small size of the O&M profession, resources are also impacted due to funding and support.

### 4.1.4 Training Programs for O&M Instructors

Over the past few decades, there have been different programs available for orientation and mobility instruction. These range from courses offered at university, to courses developed by organisations such as Vision Australia. There are limited courses available due to the small size of the professional group, and at times the university courses are not always offered.

In terms of course content, there are deviations in structure between different O&M courses. However, all courses appear to involve a theory component, a practical component and a supervised practice component. The content of the theory component has varied over the years, ranging from the physical condition of blindness or vision loss, to strategies that can be implemented in O&M training. In some courses, basic counselling skills are also taught to assist with the psychological, emotional and mental health impact of vision impairment. The practical component (including supervised practice) enables the student to experience O&M training within the context of a real life situation. There is consensus that the practical component is crucial to success, when the student enters the professional world. During discussions, participants clearly indicated that the opportunity to work with and have experience with “real life” clients was invaluable to their education and skill development.

There exists a general consensus that there are some areas of improvement necessary to enhance current training programs. One suggestion was to advocate for an accreditation process for O&M training courses to ensure consistency and standard of courses offered. It is believed that this may also assist with obtaining recognition of the field. Another suggestion was to implement O&M refresher courses, or professional development options to ensure that skills and knowledge are up to date with current, evidence-based best practice. In terms of content of such courses or professional development areas, novel road infrastructure design, as well as technologies would be two significant areas).

### 4.1.5 Other Considerations

When working with individuals who have vision impairment, it is important to be aware of the range of physical, psychological and emotional experiences of the client. This is significant because it is highly likely that these factors will in turn affect client experiences and outcomes of O&M training. It is important to note that each client is an individual with different degrees of vision loss, other co-morbid physical conditions that have the potential to impact on their mobility, a range of mental health symptoms (e.g. depression or anxiety symptoms, adjustment to condition), as well as a range of conflicting emotions.

At present, there is limited research that has been conducted in this field. In future, further research investigating the experiences of clients undertaking O&M instruction, and the development of a more evidence-based understanding in terms of theories and practice within this field, would greatly benefit the O&M profession, as a whole.

## 4.2 ORIENTATION AND MOBILITY QUESTIONNAIRE

A questionnaire was presented to participants who took part in the O&M focus group sessions. As previously reported, of the 22 participants, 12 completed questionnaires were returned, producing a responses rate of 55%. Section 4.2 describes the results from the data analysis. It is important to note that given the small sample size, these results must be interpreted with caution.

### 4.2.1 Demographics

Of the 12 respondents, there were four males (33.3%) and eight females (66.7%). Table 16 outlines a breakdown of age across the respondents. All 12 respondents indicated that they experienced no vision impairment.

Table 16 *Distribution of age across the respondents to the O&M questionnaire*

|  |  |  |
| --- | --- | --- |
| **Age Group** | **Frequency** | **Percentage (%)** |
| 18-29 Years | 1 | 8.3% |
| 30-39 Years | 2 | 16.7% |
| 40-49 Years | 5 | 41.7% |
| 50-59 Years | 4 | 33.3% |
| 60 Years and Above | 0 | 0% |

### 4.2.2 Orientation and Mobility (O&M) Instruction History and Clientele

Participants completing the questionnaire were asked about how long they had been working as a professional O&M instructor. Responses indicated that there was a wide breadth of experience across participants, ranging from half a year (newly trained and having just started in the field) to more than 30 years experience working in the field. In terms of type of training, all respondents indicated that they had been formally trained. Courses ranged across different participants but included:

* Bachelor Degrees, majoring in Orientation and Mobility (O&M);
* Graduate Diplomas or Post Graduate Diplomas in Orientation and Mobility (O&M); and
* Graduate Certificate in Vision Impairment

It is important to note that the courses were undertaken at different points in time, so may have varied in structure and content. One respondent also indicated that they have since undertaken informal training, in the context of professional development sessions and conferences during their time, working as a professional O&M instructor.

Participants were asked some questions relating to their client workload. With respect to the average number of clients trained per month, responses ranged from six to 40 clients. Closer analysis of qualitative data from this question suggests that this number can vary depending on client circumstances, and the longevity of their planned orientation and mobility training program. Similarly, responses to the question relating to number of sessions each client required were varied. Responses suggest that the number of sessions required is highly dependent upon the client’s needs. These results were consistent with the focus group discussions.

O&M instructors train a range of clients with varying levels of vision impairment. Table 17 details the level of vision loss each respondent most often works with. These results indicate that the majority of clients trained by the sample experience “moderate” levels of vision loss. Respondents were also asked to highlight the main concerns expressed by their clients, related to their training in orientation and mobility. Consistent with this range of clients, the main issues highlighted from this question include: readiness to undertaken orientation and mobility training; a range of road safety issues (e.g. crossing roads, navigating difficult road infrastructure such as slip lanes and roundabouts, navigating conditions with high traffic volume); use of public transport; and other psychological and emotional aspects including stigma attached to being identified as “blind” or having “low vision”.

Table 17 *Level of vision loss most commonly worked with*

|  |  |  |
| --- | --- | --- |
| **Level of Vision Loss** | **Frequency** | **Percentage (%)** |
| Moderate | 7 | 58.3% |
| Severe | 3 | 25.0% |
| Profound | 1 | 8.3% |
| Totally Blind | 0 | 0% |

Note: There was 1 missing response (N=12)

### 4.2.3 Orientation and Mobility (O&M) Training

*Access to Orientation and Mobility Services*

The issue of access to O&M instructors and the services provided was explored in the questionnaire. Table 18 summarises respondents’ perception of orientation and mobility training accessibility. The majority of respondents rated accessibility as either “somewhat easy to access” or “very easy to access”. Closer analysis of qualitative data relating to comments regarding access indicate that one of the main obstacles seen to limit greater client numbers, is awareness of the availability of orientation and mobility services. In addition, another barrier to access described was reaching clients that live in more remote or regional areas.

Table 18 *Perceived level of accessibility to orientation and mobility training services for clients*

|  |  |  |
| --- | --- | --- |
| **Accessibility Level** | **Frequency** | **Percentage (%)** |
| Very easy to access | 4 | 33.3% |
| Somewhat easy to access | 5 | 41.7% |
| Neutral | 2 | 16.7% |
| Somewhat difficult to access | 1 | 8.3% |
| Very difficult to access | 0 | 0% |

*Training, Strategies and Barriers*

The questionnaire asked respondents to describe some of the training strategies that they used with clients, and to indicate why such strategies are effective. Qualitative analyses of the responses suggest that O&M instructors use a range of different strategies with their clients. Some examples include use of sensory modalities (e.g. remaining vision, listening), cognitive strategies (e.g. problem solving, planning, interpreting information from the environment), navigating complex road environments (e.g. identifying risks, crossing roads, gap selection), use of canes and other mobility aids, in addition to confidence building. With respect to why these strategies are effective, respondents reported that they enable the client to slowly increase their independence through breaking down their tasks, understanding concepts related to safe orientation and mobility, increasing their awareness of the road traffic environment and fostering their confidence to be more independently active.

Overall, the majority of respondents (83.3%) felt that gaps remain in the current orientation and mobility training program they provide to their clients. Qualitative analysis of their responses suggest that the gaps reside in areas such as provision of access to regional clients, the availability of O&M instructors, being up to date and trained in the use of various novel technology aids to assist with mobility, and the ability of programs to adequately address road safety concepts for pedestrians who are blind or experience low vision.

Road safety is an important aspect for pedestrians who are blind or experience low vision. Most respondents (75%) indicated that they believe the orientation and mobility training program they provide, adequately addresses pedestrian safety aspects, such as detecting motor vehicles, vehicle speeds and directions; and determining safe gaps for completing a road crossing. However, respondents reported a range of areas in the context of road safety that could be improved upon. These generally reflect new issues for pedestrians with vision impairment, such as locating cyclists and electric cars. It is interesting to note that many pedestrian safety issues outlined by respondents relate to overall road infrastructure design and driver awareness of pedestrians who have vision impairment. This suggests that orientation and mobility training programs need to be complemented with safe road infrastructure design, as well as road user education.

Lastly, respondents were asked about their perceptions of the most beneficial outcomes achieved by their clients through orientation and mobility training. Respondents indicated that benefits achieved for clients through orientation and mobility training include an enhanced understanding of the road environment, which can translate across different environments, an increase in independence, confidence and also self-esteem, which contributes to the greater likelihood of activity and social engagement for individuals with vision impairment. Overall all of these aspects are crucial to overall health and wellbeing of an individual.

## 4.3 SUMMARY OF ORIENTATION AND MOBILITY TRAINING

Overall the results from the orientation and mobility training focus group, in conjunction with the post focus group questionnaire brings to the forefront a range of skills, strategies and benefits offered by the professional service. It becomes apparent that orientation and mobility training has an invaluable impact on enhancing an individual’s overall mobility, independence and emotional wellbeing. A range of barriers and limitations have also been identified and it would be beneficial for these aspects to be addressed in future to further enhance the delivery of successful orientation and mobility programs to individuals with visual impairment.

# CHAPTER 5: SUMMARY AND RECOMMENDATIONS

## 5.1 SURVEY

Independent travel is an important goal sought by most, and good mobility options (including transportation options) are essential to maintain quality of life. However, many adults who are blind or have low vision experience mobility limitations and difficulties, and may be at increased risk of collision while walking outside. The overall aim of the study was to examine issues surrounding the safe mobility, travel patterns and walking in traffic experiences of pedestrians who are blind or have low vision in Victoria.

Overall, the survey group were highly mobile, with a high proportion walking outside daily and substantial distances, and degree of vision loss did not appear to affect the frequency of or distance walked by participants. However, there was a positive relationship between assisted travel and increased severity of vision loss. Level of vision loss also had a significant effect on particular self-rated skill levels utilised during travel. Not surprisingly, participants rated day and night vision skills more poorly than other skills that did not require vision (e.g., hearing, decision making, and gap selection). This suggests that pedestrians with visual impairment are more likely to rely on other senses and non-visual skills when they are required to travel outside.

In terms of interaction with the road system and pedestrian infrastructure, the results suggested that pedestrians with vision loss were likely to be exposed to a range of different traffic environments (including, heavy traffic, non-signalised intersections, signalised crossings, roundabouts, multiple lanes, traffic islands, electric vehicles and cyclists). Generally, participants reported being at least somewhat confident walking in most environments, with the majority being very confident crossing at signalised crossings, but less confident in heavy traffic, at non-signalised intersections, at roundabouts and crossing multiple lanes. Interestingly, the majority reported that they were least confident when interacting with electric vehicles and cyclists. A potential hypothesis for this finding may be the difficulty that pedestrians with vision loss may experience when interacting with these transport vehicles due to the limited noise they create. For pedestrians with vision loss, the hearing sensory system may be used more often, however such vehicles pose limitations when relying on this strategy. This is an issue that will need to be considered in the future, as the proportion of electric vehicles increase, as well as the promotion of cycling, which combined, encourages environmentally sustainable transportation.

Interestingly, when participants were asked about their confidence levels, the results suggest that respondents who were blind reported a greater level of confidence overall, across the different traffic environments, compared with respondents who had low vision. There may be a range of different explanations that can account for such results. One hypothesis may be that individuals who are blind have less visual information available about the situation to reduce their confidence level. Alternatively, individuals who are blind may have received more training associated with mobility. In fact, results exploring orientation and mobility (O&M) training indicate that the percentage of participants having received O&M training were highest amongst those who are blind. Almost all individuals in this group had received O&M training, with the proportion decreasing, as the severity of vision loss decreased.

A range of behavioural strategies were identified, and at least three-quarters of the participant sample reported “always using” most of the strategies listed, with the exception of “looking at how far the vehicle was” and “seeking assistance from another person”. Further analysis found that individuals with less severe vision loss were more likely to use the “looking” strategies, in contrast to individuals with more severe vision loss, who were more likely to use the “listening” strategies. These results confirm the likelihood that pedestrians with vision loss are likely to use alternative sensory systems to compensate for deficits in their visual function. This is an important finding that highlights the adaptive nature that can prevail, and also offers potential alternatives for developing strategies to assist with orientation and mobility.

In terms of the use of and experiences with O&M training, a variation in the overall frequency and content of training was reported by the participant sample. O&M training focuses directly on specific individual needs and requirements, and therefore the experiences often vary amongst individuals. The results from the study found that training received had focused on strategies to address crossing roads safely, use of canes and other mobility aid devices, use of and accessing public transport, training guide dogs, and way-finding. Most participants who had received training reported finding it beneficial to their safe mobility. However, some disadvantages reported by participants included not feeling training is necessary and training not addressing personal safety. This suggests that there remains scope for the development and refinement of training programs, ideally utilising evidenced based methods to promote consistency.

A contradictory finding in the study related to the negative relationship between confidence and O&M training received. It is expected that participation in O&M training will foster strategies that enhance independent mobility and build confidence within clients. Therefore a possible explanation for these results may relate to exposure rates. For example, individuals who undergo O&M training may be more likely to experience orientation and mobility circumstances that encompass greater complexity. This may have been reflected in the reduced confidence levels identified. Furthermore, it is also possible that clients, whom experience lower levels of confidence, are more inclined to seek O&M training to assist. Without temporal information detailing when O&M training was receiving in the context of their confidence levels, no firm conclusions can be drawn regarding this finding. In fact, the complementary component of the study, which included O&M instructor focus groups found a positive relationship between O&M training, and client confidence levels. Future research exploring client confidence levels would be greatly beneficial, in order to understand this relationship more clearly.

Another contradictory finding related to O&M training was the notion that it was positively related to increased collision rates. Similarly to the discussion above, without the temporal relationship between training and the occurrence of the incident, it cannot be concluded that a causal relationship exists. An explanation for this finding may be related to increased exposure rates, therefore, individuals who have received O&M training are more likely to partake in independent travel. Alternatively, it is possible that individuals who have been experienced collisions or near collisions are more likely to seek O&M services to assist with there independent mobility in future. Again, future research exploring the nature of this relationship is essential in the context of road safety for pedestrians who experience vision impairment.

Lastly, collision or near collision involvement was examined in detail. Eight percent of respondents indicated that they had been involved in a collision in the last 5 years, and a high proportion (19%) indicated that they had experienced a near collision. A number of variables were associated with increased collision/near collision risk including walking unassisted, severe vision loss, poorer self-reported overall health, and poorer self-reported ability to select safe gaps. While these findings are indicative, they should be interpreted with caution. Although it is likely that assisted travel will reduce the likelihood of collisions and near collisions, the relationship between vision loss condition and collisions require further analyses in order to understand how aspects of each particular condition may contribute to an increased or decrease risk. The results identified for reduced self-rated overall health may have a relationship with exposure, and more stringent controlling of exposure levels in the analyses may be required to understand the true nature of this relationship.

It is important to note that there were some limitations with the survey design. One apparent limitation as discussed above relates to the ability of the survey to capture the temporal relationship of events (i.e. the timing between collision or near collisions with that of O&M training). This impacts on the ability to draw conclusive findings between such variables. With that being said however, the study offers a good overview of the different areas associated with safe mobility of pedestrians who experience vision impairment. It provides preliminary findings, as well as an understanding of the challenges, strategies and areas for improvement in the context of mobility, for this population subgroup. These aspects should be explored further in future studies.

## 5.2 FOCUS GROUPS

Orientation and mobility (O&M) training offer individuals with vision impairment a service to assist them with maintaining, or increasing their independence and mobility. Although the profession remains small, it provides a crucial service fundamental to a range of positive physical, psychological, emotional and social outcomes. O&M instructors undertake a complex role that encompasses a large range of skill sets, which assist their clients. The current study explored both the client and the instructor’s experiences, as reflected by professional O&M instructors who participated in the focus groups and O&M questionnaire.

The main themes identified related to access to O&M services, training strategies, barriers and limitations, as well as O&M training programs for instructors. Overall, one of the most highlighted points throughout the discussions and questionnaire responses, is the individual nature of the clients. O&M training is highly client-centred and designed to be driven by the clients needs and established goals. Each training program is designed for the individual client specifically, and a whole range of different strategies are fostered. These strategies often surround utilising all sensory modalities available, concept development and understanding of environments, in addition to a range of cognitive skills (e.g. problem solving, insight, trial and error).

Interestingly, the results also identified a range of areas that participants’ felt could be improved upon. Some issues related to the training availability and content of O&M training programs, while other issues were directed at external aspects (e.g. urban planning and road infrastructure). These findings suggest that creating a safe environment for pedestrians with vision impairment requires a collaborative approach between services provided and stakeholder organisations that play a role in urban planning, and road infrastructure design. This parallels with the “Safe System” approach often used in road safety, which encourages a combination of safe road user behaviour, along with safe provisions of infrastructure and vehicle design to complement. Recommendations in the area of orientation and mobility will be discussed in the Conclusions and Recommendations Section (Chapter 6).

It is also important to note that there were limitations within this study design. Focus groups were conducted with a limited number of organisations, although this is representative of the small O&M profession. In addition, the sample size received for the questionnaire was small. This limited the ability to complete more in-depth qualitative and quantitative analyses of the data provided. However, the results contributed to providing rich preliminary findings on O&M training and the experiences of both the clients, and the instructors. This is invaluable to understanding pedestrian road safety for individuals with visual impairment.

## 5.3 CONCLUSIONS AND RECOMMENDATIONS

In summary, the current study provides new knowledge on mobility needs and travel patterns, behaviours and strategies adopted to maintain safe mobility, and collision involvement amongst adult pedestrians who are blind or who have low vision. These results contribute to the limited epidemiological information currently existing on the topic. It can be concluded that:

* Maintaining safe mobility is important for pedestrians with vision loss;
* The degree of vision loss impacts on the skills and strategies utilised by the road user group;
* The degree of vision loss impacts on the confidence felt by this road user group; and
* Safety is a concern, with a high proportion of pedestrians experiencing collisions or near collisions.

Furthermore, in the context of orientation and mobility training, it can also be concluded that:

* O&M training is a client-centred approach providing a range of different skills to individuals with vision loss; and
* O&M instructors have a complex role to play that requires flexibility, adaptability and a range of skill sets to cater for the clients physical, psychological and emotional needs.

Although an understanding of the patterns and behaviours of individuals with vision loss is fundamental, along with services like O&M training that assist with enhancing their independence and mobility, it is also important to realise that relevant stakeholders also play a role in the provision of safe environments that promote active transport for this population group.

In light of these preliminary findings, it is clear that more initiatives are required to manage the safe mobility of pedestrians with vision loss. Therefore, it is recommended that:

1. Further research to be conducted in specific areas of safe mobility for pedestrians (e.g. effect of confidence, collision risk) to enhance current understanding of these factors;
2. More research conducted in the area of orientation and mobility instruction to inform a more evidenced-based training program of training O&M professionals; and
3. Engagement of relevant stakeholders to encourage safer behaviour by road user groups as well as improvements to infrastructure and road design to enhance environments that provide for safe mobility of pedestrians with vision loss.

In the area of road safety for pedestrians who are blind, or experience low vision, there are numerous avenues for further developments. The above recommendations only reflect and highlight some overall, immediate needs. As research within the area begins to develop further, it is likely that a better understanding of more practical requirements for this population group will be identified.

# APPENDICES

## APPENDIX A ROAD SAFETY FOR ADULT PEDESTRIANS WHO ARE BLIND OR VISION IMPAIRED TELEPHONE SURVEY

**Road safety for adult pedestrians who are blind or vision impaired**

Hi, could I please speak to XXX. My name is YYY from Vision Australia. We are currently conducting a survey on the safe mobility of adult pedestrians who are blind or have low vision. The information collected will be used to assist Monash University to report on the pedestrian experiences of Victorians who are blind or have low vision. The survey is supported by Vision Australia, Guide Dogs Victoria and Blind Citizens Australia. The survey should take approximately 15-20 minutes to complete.

You must be 18 years of age or older to participate. The information you provide will be treated in the strictest confidence, will not be used to identify you as an individual, and you are free to not answer any question if you wish.

**Section A: Vision Loss**

**A.1 Do you have a degree of vision loss in both eyes that cannot be corrected by glasses or contact lenses and impacts on your day-to-day life?**

* Yes (please go to A.2)
* No (please thank the participant and discontinue the interview)

**A.2 Would you say your vision loss is....**

* Moderate (i.e., you have usable vision but have difficulty reading signs or seeing traffic)
* Severe (i.e., you have minimal vision only)
* Profound (i.e., you have no usable vision)
* Totally blind

**A.3 Can you please describe which condition affects your vision?** *(please do not read out the options – please use the list to prompt if necessary)*

|  |  |
| --- | --- |
| * Congential
* Macular Degenetation
* Optic Nerve Atrophy
* Congenital Aniridia
* Glaucoma
* Albinism
 | * Diabetic Retinopathy
* Retinitis Pigmentosa
* Cataracts
* Optic Nerve Damage
* Injury/Trauma
* Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |

**A.4 What age were you at the onset of your vision impairment?**

|  |  |
| --- | --- |
| * Since birth
* 0-18 years
* 18-29 years
* 30-39 years
 | * 40-49 years
* 50-59 years
* 60-69 years
* 70+ years
 |

**Section B: Travel Information**

**B.1 When you walk outside, do you walk alone or are you always assisted by another person?**

* Yes, I walk unassisted by another person
* No, I never walk outside unassisted

**B.2 How many days a week do you typically walk outside your home?**

|  |  |
| --- | --- |
| * Daily or almost daily
* 3-4 days a week
* Once or twice a week
 | * A few times a month
* Once a month or less
* Don’t know
 |

**B.3 In a typical week, what are the main reasons you would walk? (Please indicate as many as appropriate).**

|  |  |
| --- | --- |
| * Post office/bank/shops
* Work
* Education or training
* Medical/health appointments
* Sports/social club
 | * Church or place of worship
* Visit family/friends
* Recreation/fitness
* To access and use public transport
* Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |

***For those who responded no to question B1 – the system will be set up for them to answer only questions B2 and B3 and the following two questions in this section, then will be directed straight to Sections E and F***

***For those who walk assisted:***

1. *What are the main reasons why you require assistance when walking outside? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*
2. *How long have you required assistance when walking outside? \_\_\_\_\_\_ years*

**B.4 How far do you normally walk each week?**

* 2 km or less
* 3-5 km
* 5-10 km
* 10 km or more

**B.5 Compared to 5 years ago, would you say you......**

* Are walking more
* Are walking less
* Are walking about the same amount
* Don’t know/can’t say

**B.6 If your amount of walking has changed, why do you think it has changed?** *(please do not read out the options – please use the list to prompt if necessary)*

|  |  |
| --- | --- |
| * Health-related issues
* Lifestyle changes
* Availability of other transport options
* Advice from others
* Heavy traffic
 | * Loss of confidence
* Change or onset of vision condition
* Change in circumstances of partner/spouse/guide, etc
* Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |

**B.7 We would like you to think about when you would walk outside and rate some of your abilities. We would like you to rate these using a scale and choosing either excellent, good, fair or poor.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Exc. | Good | Fair | Poor | Don’t know |
| Overall Health |  |  |  |  |  |
| Day vision |  |  |  |  |  |
| Night vision |  |  |  |  |  |
| Hearing |  |  |  |  |  |
| Decision-making |  |  |  |  |  |
| Ability to select safe gap in traffic |  |  |  |  |  |
| Head/neck movement |  |  |  |  |  |

**Section C: Interaction with road system and pedestrian infrastructure**

**C.1 In the last six months, have you walked along or across heavy traffic roads without others?**

* Yes
* No

**How confident are you walking in heavy traffic?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid heavy traffic, please describe HOW and WHY.**

|  |
| --- |
|  |

**C.2 In the last six months, have you crossed roads at non-signalised crossings without others (e.g., Zebra crossings, between intersections)?**

* Yes
* No

**How confident are you crossing the road with no signalised crossing facilities?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid crossing without signals, please describe HOW and WHY.**

|  |
| --- |
|  |

**C.3 In the last six months, have you crossed roads at signalised crossings without others?**

* Yes
* No

**How confident are you crossing the road at signalised crossings?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid crossing with signals, please describe HOW and WHY.**

|  |
| --- |
|  |

**C.4 In the last six months, have you crossed the road at roundabouts without others?**

* Yes
* No

**How confident are you crossing the road at roundabouts?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid crossing at roundabouts, please describe HOW and WHY.**

|  |
| --- |
|  |

**C.5 In the last six months, have you crossed roads where there are multiple lanes or multiple signals without others?**

* Yes
* No

**How confident are you crossing multiple-lanes roads?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid crossing multiple lane roads, please describe HOW and WHY.**

|  |
| --- |
|  |

**C.6 In the last six months, have you crossed roads where there is a central median strip or traffic island between the two directions of traffic without others?**

* Yes
* No

**How confident are you crossing roads with median strips or traffic islands?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid crossing these roads, please describe HOW and WHY.**

|  |
| --- |
|  |

**C.7 In the last 6 months, have you crossed roads when there are electric or hybrid vehicles without others?**

* Yes
* No

**How confident are you crossing roads when there are electric or hybrid vehicles?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid crossing when these vehicles are on the road, please describe HOW and WHY.**

|  |
| --- |
|  |

**C.8 In the last 6 months, have you crossed roads when there are cyclists riding on the road without others?**

* Yes
* No

**How confident are you crossing roads when there are cyclists on the road?**

* Very confident
* Moderately confident
* Not at all confident

**If you avoid crossing when there are cyclists, please describe HOW and WHY.**

|  |
| --- |
|  |

**Section D: Strategies**

**D.1 Do you use mobility aids while walking outdoors?**

* Yes
* No

Can you please indicate the aids you use most frequently? (*please do not read out the options – please use the list to prompt if necessary).*

|  |  |
| --- | --- |
| * Seeing Eye Dog/Guide Dog
* Long cane
* Short or ID cane
* Orthopaedic cane
* 2-point stick
* Walking frame/wheeled walker
 | * Motorised mobility aid
* Clicker
* GPS device
* None
* Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |

**D.2 All pedestrians use strategies when deciding to cross roads safely unassisted. We would like to know about some of the strategies that you use when deciding to cross the road. I will read a list and ask you to answer yes or no.**

|  |  |  |
| --- | --- | --- |
|  | Yes | No |
| Looking in both directions |  |  |
| Looking at how far away the vehicle is |  |  |
| Listening |  |  |
| Deciding how fast the vehicles are approaching |  |  |
| In two-way traffic, crossing only when both directions are clear |  |  |
| Only crossing when there are very large gaps in the traffic |  |  |
| Seeking assistance from another person |  |  |
| Other – please describe \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |

**D.3 Have you ever had Orientation and Mobility (O&M) training?** *(If required - Orientation and Mobility training is provided by blindness agencies to assist people when they are travelling****)***

* Yes (please go to D.5)
* No (please go to D.4)

**D.4 Please indicate the main reason why you have not received O&M training**

* Unable to take up the option for personal reasons
* Unaware of the service
* Service not available in my area
* Not applicable to my needs
* Other (please describe)

|  |
| --- |
|  |
|  |

**Please proceed to Section E**

**D.5 When was the last time you utilised the services of O&M training?**

* Less than 12 months ago
* Between 1 and 2 years ago
* Between 2 and 5 years ago
* More than 5 years ago
* Don’t know/not sure

**D.6 When you had O&M training, how frequent was it?**

* 2-3 time a week
* Once a week
* 2-3 time a month
* Once a month
* Other (Please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**D.7 Can you please describe what your O&M training mainly focused on? Please specify.**

|  |
| --- |
|  |

**D.8 Do you think the O&M training was beneficial to your safe mobility?**

* Yes
* No
* Don’t know/not sure

Please describe how and why.

|  |
| --- |
|  |

**Section E: Collision involvement**

**E.1 Thinking back over the last 5 years, have you been involved in a collision or a near collision with a vehicle, or cyclist?**

* Yes collision (please go to E.2)
* Yes near collision (please go to E.2)
* No (please go to Section F)

This section of this questionnaire is about any pedestrian collisions or near collisions you have been involved in. We are not interested who was at fault and we would like you to think about only the crashes where you were the pedestrian. If you feel uncomfortable, do not want to answer any of the following, questions or wish to stop the interview please let me know. (NOTE FOR THE OPERATOR– if the participant becomes distressed please ask them if they would like you to call them back at another time. If it apparent they are too upset to finish the interview, please advise them that “If you have feelings or concerns that have arisen during this survey, a Vision Australia staff member will be able to talk with you about this – we can give you a number to call.”)

**E.2 Thinking of the most recent collision or near collision you have had, was the collision with a car, bicycle, truck, public transport or other?**

* Car
* Bicycle
* Truck
* Public Transport vehicle (Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Other (please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

 **E.3 Was the collision in a metropolitan, regional or rural area?**

* Metropolitan
* Regional
* Rural
* Other (Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**E.4 What road location did the collision occur?**

* Intersection
* Mid-block
* On footpath
* At signalised crossing
* Other (Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**E.5 At what time of the day and which day of the week did the collision occur?**

Time of day: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Day of week: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**E.6 Were you with someone else, assisted by a Seeing Eye Dog or Guide Dog, or by yourself at the time of the collision?**

* With another person or other people
* Assisted by Seeing Eye Dog or Guide Dog
* By yourself
* Don’t know

**E.7 What was the main purpose of your trip?**

|  |  |
| --- | --- |
| * Post office/bank/shops
* Work
* Education or training
* Medical/health appointments
* Sports/social club
 | * Church or place of worship
* Visit family/friends
* Recreation/fitness
* To access and use public transport
* Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |

**E.8 Please describe any other circumstances of this collision or near collision.**

|  |
| --- |
|  |

**E.9 Has the collision or near collision affected your walking/travel patterns?**

* Yes
* No
* Don’t know/not sure

**E.10 Has the collision affected your confidence in walking and crossing roads?**

* Yes
* No
* Don’t know/not sure

**Section F: Demographic characteristics**

**F.1 Interviewer to record gender** (not required to ask this question)

* Female
* Male

**F.2 What is your age group?**

* 18-29 years
* 30-39 years
* 40-49 years
* 50-59 years
* 60-69 years
* 70 years and older

**F.3 What is your postcode? \_\_\_\_\_\_\_**

**F.4 What is your current employment status?**

* Working full time
* Working part time
* Not working (retired, unemployed, on pension)
* Student
* Volunteering (please specify if full or part time) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**F.5 What is your present living arrangement? Are you….**

* Living with spouse
* Living with siblings/children/other family members
* Living alone
* Other (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**F.6 Do you have any other condition?**

|  |  |  |
| --- | --- | --- |
|  | Yes | No |
| Problems with your heart |  |  |
| Diabetes |  |  |
| Respiratory problems |  |  |
| Arthritis |  |  |
| Stroke or mini-stroke |  |  |
| Epilepsy |  |  |
| Cancer |  |  |
| Depression |  |  |
| Other disabilityOther (please specify) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |

**F.7 Overall, how would you describe your present health condition?**

* Excellent
* Good
* Fair
* Poor

Thank you for completing the survey. Your participation has been very valuable to us and will help to increase our understanding of some of the difficulties experienced when walking and crossing the road, and some of the strategies used to reduce risk. The findings will be used to enhance the safe mobility of pedestrians who are blind or have low vision.

## APPENDIX B ORIENTATION AND MOBILITY INSTRUCTOR QUESTIONNAIRE

Thank you for taking time to participate in the focus group session on Orientation and Mobility (O&M) instruction. This survey is designed to collect some further demographic details from you, as well as your feelings about some of the main issues discussed in the focus group session.

**DEMOGRAPHICS**

**Q1. Please indicate your gender:**

 [ ]  Male

 [ ]  Female

**Q2. Please indicate which age range category you belong to:**

 [ ]  18 years to 29 years

 [ ]  30 years to 39 years

 [ ]  40 years to 49 years

 [ ]  50 years to 59 years

 [ ]  60 years and above

**Q3. Do you experience any vision impairment?**

 [ ]  Yes (please go to Q4)

 [ ]  No (please go to Q5)

**Q4. If you responded YES to Q3, can you please indicate which level of vision impairment you currently experience?**

[ ]  Moderate (therefore, you have usable vision but have difficulty reading signs or seeing traffic)

 [ ]  Severe (therefore, you have minimal vision only)

 [ ]  Profound (therefore, you have no usable vision)

 [ ]  Totally blind

**ORIENTATION AND MOBILITY (O&M) INSTRUCTION HISTORY AND CLIENTELE**

**Q5. How many years have you been working as a professional O&M instructor?**

|  |
| --- |
|  |
|  |

**Q6. Can you please indicate the type of professional O&M training you received?**

 [ ]  Formal course, please specify:

|  |
| --- |
|  |

[ ]  Other, please specify:

|  |
| --- |
|  |

We are also interested in hearing a little more about the clients that you train and work with.

**Q7. In a month, how many clients do you train on average?**

|  |
| --- |
|  |
|  |

**Q8. In general, how long are clients trained for (therefore, how many sessions, over what period of time)?**

|  |
| --- |
|  |
|  |

**Q9. Of the clients you train, which level of vision loss do you most often work with?**

[ ]  Moderate (therefore, you have usable vision but have difficulty reading signs or seeing traffic)

 [ ]  Severe (therefore, you have minimal vision only)

 [ ]  Profound (therefore, you have no usable vision)

 [ ]  Totally blind

**Q10. What are the main concerns expressed by your clients relating to being trained in orientation and mobility?**

|  |
| --- |
|  |
|  |

**ORIENTATION AND MOBILITY (O&M) TRAINING**

**Access to O&M Services**

**Q11. How accessible do you feel O&M training is for individuals suffering from visual impairment in Victoria?**

 [ ]  Very easy to access

 [ ]  Somewhat easy to access

 [ ]  Neutral

 [ ]  Somewhat difficult to access

 [ ]  Very difficult to access

**Q12. Do you have any other comments regarding access to O&M services?**

|  |
| --- |
|  |
|  |

**Training, Strategies and Barriers**

**Q13. In your opinion, which are the three MOST EFFECTIVE strategies clients receive through O&M training, and WHY?**

Strategy 1:

|  |
| --- |
|  |
|  |

Reason(s) for effectiveness:

|  |
| --- |
|  |
|  |

Strategy 2:

|  |
| --- |
|  |
|  |

Reason(s) for effectiveness:

|  |
| --- |
|  |
|  |

Strategy 3:

|  |
| --- |
|  |
|  |

Reason(s) for effectiveness:

|  |
| --- |
|  |
|  |

**Q14. Do you feel there are any gaps to the current O&M training program you provide for your clients?**

[ ]  Yes

[ ]  No

**Can you please explain why or why not?**

|  |
| --- |
|  |
|  |

**Q15. In the provision of O&M training to clients, do you feel that pedestrian safety aspects (i.e. detecting motor vehicles, detecting vehicle speeds and direction, determining a safe gap for completing a crossing manoeuvre) are adequately addressed?**

 [ ]  Yes

 [ ]  No

**Which areas of pedestrian safety do you feel could be included or improved upon?**

|  |
| --- |
|  |
|  |

**Q16. Which three MOST BENEFICIAL outcomes do you feel your clients achieve through participating in O&M training, and WHY?**

Beneficial outcome 1:

|  |
| --- |
|  |
|  |

Reason(s) why:

|  |
| --- |
|  |
|  |

Beneficial outcome 2:

|  |
| --- |
|  |
|  |

Reason(s) why:

|  |
| --- |
|  |
|  |

Beneficial outcome 3:

|  |
| --- |
|  |
|  |

Reason(s) why:

|  |
| --- |
|  |
|  |

Please provide any additional comments you would like to make regarding your experience implementing O&M instruction.

|  |
| --- |
|  |
|  |
|  |
|  |

**Thank you for your time!**

## APPENDIX C SUMMARY OF THEMES AND ISSUES IDENTIFIED IN THE VISION AUSTRALIA FOCUS GROUP

| **Themes** | **Issues** | **Details** |
| --- | --- | --- |
| Access to O&M services | Referral process | Clients can be/are referred through a number of different avenues: self/individual; family member; other health services providers; education centres; Low Vision Clinic.The length of wait post referral for O&M training depends on a number of factors (readiness of client, case load of the O&M instructor) however clients are also prioritised based on needs. On average, the waiting period is from one week to 10 days. |
|  | Client assessment | New referrals undergo a “needs assessment process” (general physical, psychological and emotional assessment, with one component including O&M needs).Of all assessed clients, approximately 50 percent to 60 percent meet the criteria for needing O&M services. |
|  | Public understanding of vision impairment | The nature of vision impairment is not well understood despite the high prevalence (individuals who experience visual impairment are often unaware of the services available to them). |
|  | Public awareness of service availability | General public are not aware of O&M services with respect to availability and purpose. Barriers or limitations to awareness include: culture (information is not always provided in different languages, definition and perceived needs vary); geographic location.Potential improvements could be made with marketing scheme through developing community engagement and partnerships.  |
|  | Reach of services | Vision Australia provides services throughout the country.Client base covers only a minimal amount of all individuals that experience some level of vision loss. |
|  | Funding | All services are free to clients, with the provision of free canes. |
| Training and strategies | Initial assessment | O&M training begins with a discussion of the role that O&M instructors have, and the services they are able to provide to their clients.Clients are asked to establish their own goals and what they want to achieve through O&M training. The training is client-focused and therefore driven by what the client perceives as their needs.A functional assessment of the client is conducted (can be centre-based but mainly (99%) are home based in order to observe client within their natural settings). Clients are observed within their home environment, as well as outside their home/immediate environment. As well as the client, the environment is also assessed to identify safe alternatives and strategies to assist with orientation and mobility for the client.It is important to note that when working with children, O&M instructors work with both the parents and the child client to assist with setting and achieving goals. |
|  | Training approach and strategies | The approach and strategies taught are dependent on client variables (i.e. the level of vision impairment, goals expressed from the client, pre-existing knowledge and concept of their environments).O&M training provides clients with options and offers alternative strategies to achieving orientation and mobility.Types of strategies encouraged and fostered in O&M training include:* Use of other senses (e.g. hearing, remaining vision);
* Visualisation of a route, practising in one’s mind first, prior to undertaking travels;
* Cognitive functions (e.g. problem solving);
* Use of insight;
* Goal setting and breaking them down into smaller, achievable components;
* Use of trial and error to identify most suitable strategies to the client;
* Reducing glare and adapting to lighting;
* Depth perception;
* Knowledge about roads and the road environment;
* Empowering the client;
* Inviting family member/parent/support person to the O&M training sessions;
* Preparing for the “worst case scenario”;
* Stepping away from the crossing point to indicate one is not ready to complete the crossing
 |
|  | Enhancing client confidence levels | Different clients often experience a range of different confidence levels when they begin O&M training. This is assessed by the O&M instructor through observation, and discussion with the client.Enhancing clients’ confidence is important. Way of fostering confidence in clients include:* Increasing the number of positive experiences;
* Introduction to peers or support groups so clients can meet others who also have similar experiences to them;
* Address issues of acceptance as clients are at different levels of accepting their vision impairment
 |
|  | Assessment of client readiness to discontinue O&M training | A discussion with the client is held regarding completion of O&M training. This consists of gradually increasing client’s independence when undertaking tasks requiring orientation and mobility. Clients can then begin to achieve their goals without an O&M instructor present with them.Concluding O&M training is a gradual process, and is completed with the client “signing off” on their initial goals set to indicate they have been achieved. |
|  | Length of training | There is no set time duration for O&M training. This depends on the client’s needs, goals and circumstances. O&M training can be undertaken anywhere up to two years. Clients can be in and out of the service for a range of reasons. |
| Barriers and limitations | Working with clients | One of the main obstacles with working with clients is that each client is different and therefore O&M training and strategies need to be uniquely designed for the individual specifically. This requires the instructor to be adaptable and have a range of skill sets. |
|  | Working with other health professionals | Working with other allied health staff can be challenging if there is limited understanding of O&M training, and the role of O&M instructors. |
|  | Working with local council, government and road authorities | O&M instructors play an “advocacy” role for pedestrians who are blind, or experience low vision. This includes challenges with advocating for safe road infrastructure to be provided. |
|  | Resourcing and education | Resources used to educate clients need to be further developed. |
| Training programs for O&M instructors | Courses and their availability | Available courses include:* Graduate Diploma in Orientation and Mobility (one year full-time) at La Trobe University. Note: This course is not available every year.
* Graduate Certificate in Vision Impairment (Orientation and Mobility) at Vision Australia. This course is currently being reviewed and developed into a Graduate Diploma course.
* Other international courses
 |
|  | Course content | Courses contain theory, practicum and supervised practice components. Course content has changed over time to adapt to changing clientele. Practical components to courses are essential to consolidating understanding of the experiences of clients. |
|  | Areas for further improvement | Introduction of refresher courses or ongoing continued professional development is important to establish.Development of a peer review process would be beneficial.More education with aspects that significantly affect clients (e.g. roundabouts, level crossings, traffic timing and other road safety considerations).Continued education or professional development on technologies designed to assist individuals who are blind or have low vision. This area is constantly changing and will require continuous updating in courses, or other avenues of education and professional development. |
| Other considerations | Client’s physical, psychological and emotional experiences | The client is likely to be experiencing a range of physical, psychological and emotional issues when undertaking O&M training. These may include (but are not exclusive to):* Different degrees of vision loss
* Other co-morbid physical conditions that can affect their ability to be physically active
* A range of psychopathological symptoms consistent with depression, anxiety (e.g. travel phobia) and adjustment to illness
* A range of conflicting emotions (e.g. fear, confusion, uncertainty, despair, etc)

Given the range of presentations clients have, O&M instructors are often required to play multiple roles and where appropriate, recognise when to refer clients to other allied health professionals or support organisations. |

## APPENDIX D SUMMARY OF THEMES AND ISSUES IDENTIFIED IN THE GUIDE DOGS VICTORIA FOCUS GROUP

| **Themes** | **Issues** | **Details** |
| --- | --- | --- |
| Access to O&M services | Referral process | Clients can be/are referred through a number of different avenues. Statistics for 2011 indicate that these include family/friends (49%); internal departments (25%); Low Vision Clinic (17%); eye care professionals (2%); hospitals/rehab departments (4%) and Vision Australia (3%). |
|  | Range of services provided and referrals | Guide Dogs Victoria provide a range of different services through different teams:* Guide Dog Mobility
* Children’s Mobility Service (referrals are often received from visiting teachers/education department)
* Orientation and Mobility (O&M)
* Occupational Therapy
* Acquired Brain Injury
 |
|  | Client assessment | Different clients often have different needs from the service. It is important to discuss with client their hierarchy of needs in order to determine the service that will be provided. |
|  | Public understanding of vision impairment | Public understanding of vision impairment is limited. Awareness can be raised through means of media (e.g. radio or television, with an emphasis on the associated safety risks, while also emphasising that independence can be maintained. Currently the existing information that is advertised details the medical rather than functional aspects of vision impairment. |
|  | Public awareness of service availability | Guide Dogs are marketed well. Often, the public are unaware of services outside of Guide dogs being available at Guide Dogs Victoria.Community stakeholder engagement is developed and continues to be developed (engagement with schools and education department; conducting programs with Optometry students and attendance at university open days; discussions with GPs) |
|  | Reach of services | Guide Dogs Victoria is a state-wide organisation and therefore services the state of Victoria. There are limitations to provision of services in some more remote regional areas. |
|  | Funding |  |
| Training and strategies | Initial assessment | O&M instructors work with clients to determine what their key interest areas of development are. |
|  | Training approach and strategies | O&M instructors work differently with different clients. It is essential that training programs are flexible and therefore ready, when the client is ready.Child clients: Clients can take part in either individual and/or group programs. O&M instructors work very closely with parents to determine the parents’ goals for the client. In addition to parents however, O&M instructors work closely in collaboration with teachers and other health professionals to assist with achieving the goals. It is important to note that the success of the program is significantly dependent upon having the parents on board, as they assist with reinforcing the strategies that are taught to the clients. The training process may include:* Undertaking a road crossing program;
* Orientation to client’s school;
* Development of goals in consultation with client and parents;
* An action team is determined upon goals being set;
* As the training is undertaken, evaluation of the actions will be completed to determine what remains to be worked on.

Training is an ongoing process and goals can be reshaped along the way.Strategies used may include:* Concept development (visiting different environments so client can build a good understanding of how environments are constructed);
* Establishing a good support network for the client to help reinforce the strategies fostered in O&M training
 |
|  | Assessment of client readiness to discontinue O&M training | O&M instructors discuss with clients an appropriate time to discontinue training. |
|  | Length of training | Length of training varies depending on client needs and goals. |
| Barriers and limitations | Working with clients | Geography is one of the biggest limitations, as some clients live in regions that are difficult to reach for a state organisation like Guide Dogs Victoria.Insight level of clients can be one of the challenges when working with clients.Cultural and language barriers can also present as challenges in O&M training. |
|  | Working with other health professionals | Raising awareness with other health professionals regarding orientation and mobility, as well as the availability of O&M training. |
|  | Working with local council, government and road authorities | O&M instructors play an “advocacy” role for pedestrians who are blind, or experience low vision. This includes challenges with advocating for safe road infrastructure to be provided. Various aspects of road infrastructure could be improved for pedestrians with visual impairment including intersection designs and crossing facilities. It is important to note that some forms of transport (e.g. push bikes and electric vehicles) can be challenging for pedestrians with visual impairment to detect. The option of implementing an education component on pedestrians with visual impairment within drivers education may be beneficial. |
|  | Resourcing and education | The size of the O&M profession is small and does not have adequate resourcing and support. Although there is a professional association, standards have not been developed for O&M training courses. This impacts public awareness of the profession. |
| Training programs for O&M instructors | Courses and their availability | Available courses include:* Graduate Diploma in Orientation and Mobility (one year full-time) at La Trobe University. Note: This course is not available every year.
* Postgraduate Diploma in Orientation and Mobility at La Trobe University.
* Bachelor of Health Sciences (majoring in Orientation and Mobility) at La Trobe University.
* Graduate Certificate in Vision Impairment (Orientation and Mobility) at Vision Australia. This course is currently being reviewed and developed into a Graduate Diploma course.
* Other international courses

Note: Guide Dog instructors undergo a further two years of additional training.The availability of university courses changes depending upon recognised demand each year. Some years, university courses for orientation and mobility are unavailable. |
|  | Course content | Course structure has changed over the years. Experience in the field is essential and most effective because it provides to opportunity to work with real life clients. |
|  | Areas for further improvement | An overall accreditation process for the course to ensure consistency of content and training, as well as recognition of the field.Introduction of refresher courses or ongoing continued professional development is important to establish.More research in orientation and mobility would be helpful to establish a greater evidence-base for the field, and its teachings. |
| Other considerations | Client’s physical, psychological and emotional experiences | There are a range of associated outcomes with vision loss, as it is a traumatic event. There is likely to be a lot of grief associated with the experience. Client readiness levels are likely to differ in terms of being ready for O&M training. In addition, there are other significant experiences for the client, including but not exclusive to mental health issues, depression and anxiety.  |
|  | New technologies | New technologies (e.g. iphones and other electronic devices) can be distracting, and impact on road users detecting pedestrians with visual impairment. |
|  | Research studies | It would benefit the area for more research to be conducted. |

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