

3 Pedestrian characteristics and preferences

3.1 Introduction

3.1.1 Pedestrians are a diverse group of travellers, reflecting the full range of the general population [6]. These differences means there is no such thing as an ‘average’ pedestrian, as their size, speed, strength and judgement can vary significantly between individuals.

3.1.2 Schemes designed for universal access (that is, which accommodate pedestrians with the least level of ability) are in fact preferred by all types of pedestrian, and create benefits beyond the users for whom they are primarily intended [13, 25].

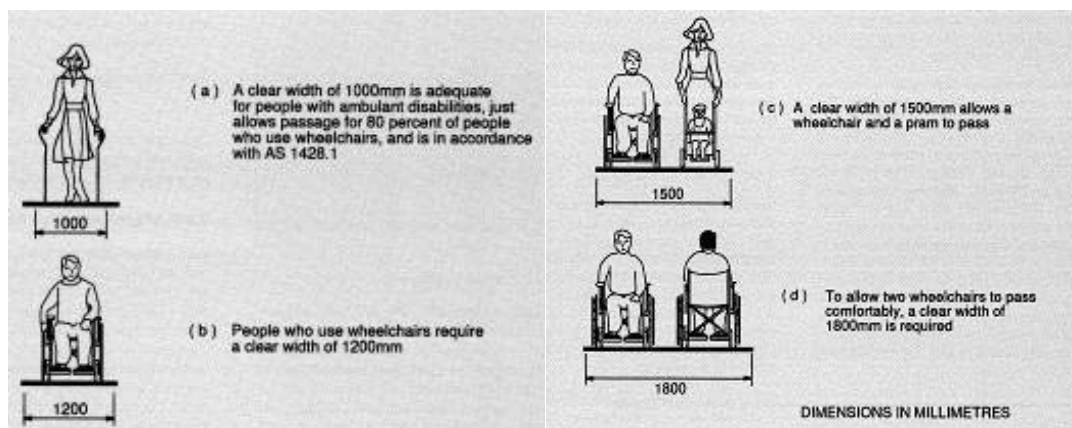
3.2 Definition of terms

3.2.1 A ‘pedestrian’ is any person on foot or who is using a means of conveyance propelled by human power, other than a bicycle. Similarly, the term ‘walking’ refers to the act of self-propelling along a route, whether this is on foot or on small wheels, or assisted by additional aids [127].



3.3 Physical space required

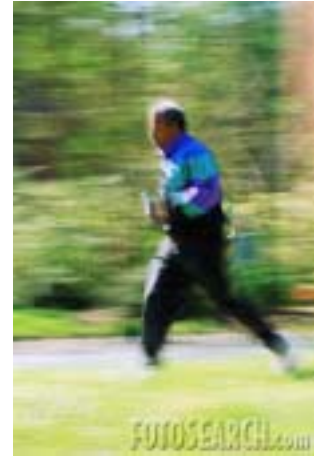
3.3.1 Different sorts of pedestrians require differing widths within which to manoeuvre.



3.4 *Walking speed*

3.4.1 Walking speed has been shown to be affected by [29]:

- pedestrian characteristics: such as age, gender, physical condition
- trip characteristics: such as walking purpose, route familiarity, trip length, encumbrances
- route characteristics: such as width, gradient, surfacing, shelter, attractiveness, pedestrian density, crossing delays
- environmental characteristics: such as weather conditions.



3.4.2 The vast majority of people walk at speeds between 0.8 m/s to 1.8 m/s (2.9 km/h to 6.5 km/h) [18]. A fit, healthy adult male will generally travel at around 1.2 m/s (4.3 km/h), and the elderly and those with mobility impairments travel more slowly, at around 0.9 m/s to 1.0 m/s (3.2 km/h to 3.6 km/h) [30, 31].

3.5 *Physical ability*

3.5.1 Pedestrians' physical ability is affected by a great range of factors. A significant number of these are highly variable, and can even change during the same walking journey.

3.5.2 Clusters of pedestrians with similar characteristics may be found at some types of land use, such as children (generally of lower height) in the vicinity of schools.

3.5.3 Appendix 1 sets out further details of the typical characteristics of different types of pedestrian.

Pedestrian physical abilities

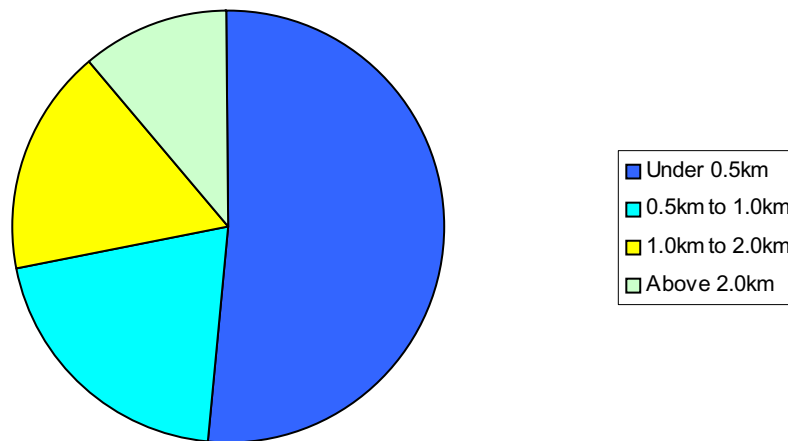
Ways in which pedestrians differ	Affecting	Impacting upon
Height	Ability to see over objects Ability to be seen by others	Sight lines
Speed of reflexes	Inability to quickly avoid dangerous situations	Crossing opportunities
Stamina	Journey distance between rests	Resting places
Visual perception	Ability to scan the environment and tolerate glare	Legibility of signs Detection of kerbs and crossing locations Trip hazards Tactile paving Judging traffic
Attention span, and cognitive abilities	Time required to make decisions Difficulties in unfamiliar environments Inability to read or comprehend warning signs	Positive directions 'Legibility' of streetscape Consistency of provision Use of symbols
Tolerance for adverse temperature and environments	Preference for sheltered conditions	Location and exposure of routes
Balance and stability	Potential for overbalancing	Provision of steps and ramps Kerb height Gradients Crossfall
Fear for personal safety and security	Willingness to use all or part of a route	Lighting Surveillance Lateral separation from traffic Pedestrian densities Traffic speed and density
Manual dexterity and coordination	Ability to operate complex mechanisms	Pedestrian activated traffic signals
Accuracy in judging speed and distance	Inopportune crossing movements	Provision of crossing facilities
Difficulty localising the direction of sounds	Audible clues to traffic being missed	Need to reinforce with visual information
Energy expended in movement	Walking speed	Crossing times Length of journey Surface quality

[6, 18, 20, 25, 26, 127]

3.6 Journey distance

- 3.6.1 Journey distance is also affected by a variety of factors, including the walking speed and the trip purpose. [Note walking distances below include walking to bus and from parked car etc so is biased towards short trips. The final figures will be changed to those for walking trips only] .

Walking journey lengths in New Zealand [3]



3.7 The 'average' pedestrian

- 3.7.1 Assuming that the typical pedestrian is fit and healthy, has satisfactory eyesight and hearing, is paying attention and is not physically hindered will misrepresent significant proportions of the population [20].
- 3.7.2 Consequently any assumptions made regarding the average skills and abilities of pedestrians in an area should be made with care, making sure that the characteristics of those currently walking, or who might wish to walk, in the area being studied are fully taken into account.



3.8 Who walks, where and why

- 3.8.1 The most recent New Zealand Travel Survey [4] showed that 1,151 million trips per year were made by walking, with journeys to home, for social and recreation activities and shopping being the most common reasons for trips made on foot. However, it is journeys to education facilities where walking has the greatest modal share [4].

Why people walk

Walking trip purpose	Percentage of walking trips	Modal share of walking by trip purpose
To home*	31.2	16.7
Work (to job)	10.0	16.0
Work (employers business)	2.2	8.1
Education	7.7	31.8
Shopping	14.2	20.9
Personal business/services	6.1	18.3
Social/recreation	24.5	20.7
Accompanying someone else	4.2	8.3
Total	100.0	-

* Includes all trips whose destination was the respondents home. This may include returning home from work, education etc

3.8.2 Whilst there has been a small increase in the overall number of walking trips made over the last 10 years, the population growth over this time means that the overall popularity of walking is declining. This decline is most evident for those under 20. However, those aged 25 to 55 are walking considerably more and their trip length is also increasing.



3.8.3 Overall, females make 22 percent more walking trips than males but both sexes spend a similar amount of time walking, at around 11 to 12 minutes per trip. On average, each walking trip is 0.8 km long, and requires two to three road crossing movements.

3.9 Why people don't walk

3.9.1 Shortfalls in the physical environment are the most obvious deterrent to walking. Reasons often mentioned include [1, 8, 16, 18, 33, 34, 123, 128]:

- missing footpaths or sections of footpath
- poor quality (cracked, uneven or slippery) walking surfaces
- obstacles on the footpath, including poorly placed street furniture
- lack of maintenance of footpaths, including litter, dog fouling, and overhanging vegetation
- increased distances imposed by road layouts, barriers, footbridges and subways
- lack of continuous signing to potential destinations
- uncertainty about whether a route is fully accessible
- a lack of continuous pedestrian routes



- missing or unsuitable crossing treatments creating severance
- poor quality lighting
- speeding traffic
- lack of rest areas and seating
- traffic fumes and noise
- no through routes, which require indirect routes
- public routes which appear to be private
- lack of shade
- lack of shelter from inclement weather
- lack of interesting features on the route.



3.9.2 Social and perceptual deterrents are important. Potential reasons include:

- a perceived lack of time to make journeys
- a lack of confidence in the walking infrastructure
- confusion about which route to take and how far the destination is
- a perception that pedestrians generally have a low social status, especially in relation to car drivers
- perceived risk to personal security and/or a lack of surveillance
- a perception that motorists do not properly understand the rights of pedestrians.



3.9.3 Organisational and institutional issues have shaped the environment so that walking is more difficult. These have been compounded by a relative lack (until recently) of a collective voice for pedestrians. These include:

- land use planning which has resulted in longer distances between walking trip origins and destinations
- other modes of travel are prioritised more highly than walking, resulting in pedestrians not being realistically accommodated within schemes designed for other travel modes
- a lack of knowledge and expertise amongst infrastructure providers and relevant professions regarding the ways to provide for walking
- tolerating obstructions which are placed in the footpath by third parties
- difficulties in quantifying changes in pedestrian numbers as a result of potential interventions
- difficulties in justifying walking schemes through 'traditional' economic criteria



- businesses paying mileage travel allowances to car drivers for very short trips
- a lack of research into pedestrians and walking journeys
- insufficient resources allocated to walking schemes.

3.9.4 There is an interaction between all of the above. Addressing individual issues in isolation is unlikely to address all contributory factors, and a holistic view is needed to create the maximum benefits.

3.10 *Pedestrian crash profile*

3.10.1 Pedestrians accounted for 11 percent of all traffic fatalities (around 53 per year) and nearly eight percent of all injuries reported on roads in New Zealand [36]. However in urban (70 km/h and below) speed limit areas, 28% of traffic deaths are pedestrians. The risk of injury has been steadily falling over the last 30 years. However as only 2.2 percent of the total distance travelled in New Zealand is made through walking [4], pedestrians are at a higher risk of injury whilst travelling.



3.10.2 At a national level, crashes involving pedestrians occur predominantly:

- in urban areas (93 percent)
- on arterial or collector roads (80 percent)
- away from intersections (64 percent)
- away from formal pedestrian crossings (90 percent)
- on straight roads (52 percent)
- during the day (67 percent).

3.10.3 High-speed roads are more dangerous for pedestrians. Although 92 percent of all pedestrian injuries occurred on roads subject to a 50km/h speed limit or less, 42 percent of pedestrian fatalities occurred on roads with a 100 km/h speed limit [36].

3.10.4 Both elderly and young pedestrians are at particular risk. Those under ten years old and those over 75 years old are at least 4 times more at risk of injury per road crossing than younger adults. [4] Due to fragility however, the relative risk of death to the elderly higher still.



3.10.5 Across all age groups, the times of greatest risk were on weekdays, between 08:00 to 09:00, and 15:00 to 18:00 [4, 36].

- 3.10.6 Road crash statistics are invaluable in identifying the sites and pedestrian groups with particular road safety issues. However, they do not provide any qualitative measures, such as how safe a pedestrian feels, the risks they take and the reasons for their choice of route [20]. They also do not indicate where routes are perceived to be so dangerous that they are either completely avoided, or pedestrians take particular extra care in those locations. Moreover, pedestrian crashes and injuries that do not involve a motor vehicle, do not involve another road user, or that occur away from the carriageway are only rarely reported.

3.11 *Recreational devices*

- 3.11.1 In recent years equipment has been developed to allow people to travel on self-propelled wheels, notably skateboards, kick scooters, roller skates and in-line skates. These are known collectively as ‘recreational devices’, although they may be used for utilitarian travel. They have advantages over walking on foot, in that they reduce travel time without major environmental impact in respect of fuels and emissions.



- 3.11.2 There are concerns associated with recreational devices as their users travel faster than those on foot but slower than motorised vehicles. Evidence suggests that the risk of serious injury to the user is reduced when devices are used on the footpath (although exposure to risk is difficult to quantify since there is little data on trip numbers and significant under-reporting of minor injuries).

- 3.11.3 There is some overseas evidence that up to 15 percent of all injuries to pedestrians on the footpath occur whilst using skates or a skateboard [35]. Many users of recreational devices are children who are already especially vulnerable. As recreational devices have become popular only recently, there is little research regarding design of infrastructure for them [28].

- 3.11.4 Recreational devices do not fit easily within the current traffic regulations, and there is presently some confusion and inconsistency in the ways the regulations are applied. There does not appear to be a strong case to prohibit the use of recreational devices on footpaths in New Zealand, since there is no evidence of a high degree of risk to either users or



pedestrians. However, there may be a case for banning the use of such devices in specific areas of high pedestrian use, or separating them from pedestrians.

- 3.11.5 For design purposes, it may be assumed that skateboarders, in-line skaters and scooter users are pedestrians and therefore subject to the same design principles as those travelling on foot [28].