Cycling
Getting Australia Moving
Barriers, facilitators and interventions to get more Australians physically active through cycling
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Summary

Physical inactivity is a major contributor to poor health in Australia – with around half the population insufficiently active to protect against sedentary lifestyle diseases, such as diabetes.

The trend of decreasing rates of physical activity cuts across all ages and social groups. Modern lifestyles have engineered physical activity out of everyday life.

Cycling offers significant potential to increase physical activity levels in adults. It is already the fourth most popular physical activity for adults, it can be undertaken by a wide variety of ages and fitness levels, it is affordable and can be integrated into people’s daily life and used as a form of transport.

This report has been developed to assist practitioners, policy makers and planners to increase adult physical activity levels through bicycle riding. It does this by first setting the scene on Australian cycling and then outlines current barriers and facilitators to greater participation. Finally, the report delivers a set of recommendations to overcome these barriers and increase bicycle riding among Australian adults.

Cycling is on the increase!
Over 1.68 million adults cycled in 2006; an increase of 244,000 from 2001. Australian capital cities have also experienced an average 22% increase in bicycle journeys to work, with Melbourne’s growth rate soaring 42% between 2001 and 2006.

A range of interventions exist to encourage cycling; from cycling events attracting thousands of people, behaviour change programs targeting trips to work and school, social marketing campaigns and multifaceted community based programs. Those programs are successful in encouraging people to ride more often but their reach is currently limited and effectiveness will be enhanced with the development of more supportive physical environments, such as bicycle lanes and paths.

Valuing cycling
The value of current cycling to the economy is approximately $227.2 million per annum. Other benefits calculated for this report include reduced congestion ($63.9 million) and greenhouse gas emissions ($9.3 million).

What barriers exist to greater cycling participation?
Despite the significant increase in cycling over recent years and the multitude of benefits stemming from increased participation, a number of substantial barriers exist for large segments of the population.

Individual barriers, such as a lack of skills and confidence have been found to prevent many people from cycling.

Social and cultural factors can also influence rates of cycling. For instance, low income areas were found to have reduced opportunities for cycling and their residents make less short trips by either foot or bicycle.

Environmental factors (urban design and bicycle infrastructure) were found to be a major influence on levels of cycling. Higher density development reduces trip distance and this provides a major boost for cycling, as does the provision of on and off road bicycle routes. In fact, the current lack of bicycle infrastructure in Australia presents a particularly strong barrier for women, who comprise only 20% of commuter cyclists.

Safety concerns were consistently found to be among the most significant barriers preventing people from cycling. It was even found to be a concern for those that cycle regularly. Yet the perception of risk from cycle accidents is often disproportionate to the actual risk. For instance, the hospitalisation rate from cycling is seven times lower than that of football, per 100,000 participants. Moreover, the evidence clearly points to the fact that the more cyclists there are, the safer it becomes.

Policy and regulatory factors governing key influences on cycling, such as congestion charging, urban density and motor vehicle speed limits have been identified as non-health sector issues that nonetheless have important outcomes for public health through their effect on cycling.

Recommendations
Establishing a cycling-friendly policy and regulatory environment is a significant challenge and one that is not entirely within the direct control of the health sector. A multi-faceted, whole-of-government approach is required. Each of the following recommendations are largely dependent upon one another and should be implemented in an integrated, coordinated way to increase bicycle participation:

- Mass marketing campaigns highlighting the benefits of cycling
- Bicycle education programs to increase skills, confidence and safety
- Behaviour change initiatives to market alternatives to car use
- Cycling events to provide incentives for people to ride in a supportive environment particularly for novice riders
- Urban planning/bicycle infrastructure/funding focused on increasing bicycle friendly design.

As Australians continue to lead increasingly busy lifestyles, cycling is in a unique position for its ability to combine physical activity, recreation and transport. This provides an important health benefit for a population failing to meet minimum physical activity requirements. Cycling is also a carbon neutral, petrol free form of transport, simultaneously helping Australians fight climate change and reduce fuel costs. For peak hour journeys in particular, the bicycle can reduce congestion and increase the efficiency of the transport system.

Creating more cycle friendly communities can also play an important role in creating better places to live, work, raise a family and grow old.

For Australia to fully capitalise on the benefits of cycling, a whole-of-government approach is required, with commitment from the health, transport, environment, education and planning portfolios. Only through a combined approach can the benefits of cycling be fully realised.
Executive Summary

Physical inactivity is a major contributor to poor health in Australia. Approximately half the Australian population are insufficiently active, which significantly increases their risk of cardiovascular disease, type 2 diabetes and obesity. A lack of physical activity also increases the risk of breast and bowel cancer, depression and anxiety. The rate of obesity in Australia is among the highest in the OECD. There is now convincing, yet under-recognised evidence that boosting levels of physical activity through cycling is an effective method of improving health and fostering social connectedness.

Cycling offers significant potential to increase physical activity levels in adults:

- It is already the fourth most popular physical activity for adults
- It can be undertaken by a wide variety of people of different ages and fitness levels
- It is affordable and can be easily integrated into people's daily lives and used as a form of transport.

This report has been developed to assist practitioners, policy makers and planners to increase participation in bicycle riding by Australian adults. It does this by first setting the scene on Australian cycling and then outlines current barriers and facilitators to greater cycling participation. Finally, the report makes a set of recommendations to increase bicycle riding among Australian adults.

1. Setting the scene

Cycling is becoming increasingly popular in Australia. Between 2001 and 2006 the number of Australians aged 15 years and older who cycled for recreation in the previous 12 months increased by 244,500, with 1.7 million having cycled in 2006. In the same period bicycle journeys to work have risen 22% in Australian capital cities, with Melbourne achieving an increase of over 42%. Women and older Australians are less likely to cycle, a pattern which is not consistent with international cycling prevalence data. Countries with high rates of cycling for transport and recreation have few gender and age differences in cycling, while countries such as Australia, which have relatively low rates of cycling (particularly for transport), have large gender and age differences in cycling. Cycling also appeals to a large number of people who wish to avoid high impact forms of physical activity.

2. Current barriers and facilitators to greater cycling participation by Australian adults

Cycling participation in many industrialised countries is higher than in Australia. However, bicycle ownership in Australia is high, indicating an underlying interest in cycling, with considerable potential for increased participation.

There is a range of significant barriers to the take up of cycling in Australia. These have been described using the ecological model of physical activity and divided into five sections focused on the following factors influencing cycling. This report also provides evidence-based options for overcoming these barriers.

- Individual factors
- Social and cultural factors
- Environmental factors
- Safety
- Policy and regulation

Individual factors

This review found that a lack of skills, confidence and knowledge are all significant barriers to cycling. Consistent Australian research indicates that motivations for cycling are principally focused on individual concerns, such as health and fitness. With this in mind, measures to increase cycling participation include the provision of riding skills classes and the development of mass marketing campaigns focusing on key motivations such as health, social interaction, and the convenience and low cost of cycling for transport. Large-scale cycling events are also effective in promoting cycling participation. These events are not simply one-off activities. Participant surveys consistently indicate that cycling events generate increases in pre and post event cycling.

In addition, it may be necessary to challenge widely held perceptions that act as barriers to cycling, such as the need to be ‘super fit’ in order to start and that cycling in traffic is inherently hazardous.

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Australia has a comprehensive network of cycling organisations with many of these having established partnerships with Government

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Social and cultural factors
Social and cultural factors were found to have an important influence on cycling levels. Lower socio-economic groups are less likely to make short trips by foot or bicycle and the physical environment in some low income areas is less conducive to active forms of travel. However the marked social gradient evident for leisure time physical activity is less prominent for cycling. This highlights the role of bicycle riding in promoting more equitable participation in both physical activity and personal mobility for population groups who do not own cars (up to 30% in some suburbs).

Social norms which tend to exclude women, older Australians and culturally diverse groups from cycling can be challenged through information and education campaigns. It is also necessary to address Australia’s current culture, whereby short local trips are almost invariably completed by motor vehicle, which could easily be undertaken by bicycle.

Environmental factors
The evidence reviewed in this report identified the physical environment as a key influence on cycling. This was divided into general urban design features and bicycle specific infrastructure.

Urban design: The literature is very clear on the influence urban design and land use planning has on ‘walkability’ and this can generally be extended to include cycling. For instance, low density development, with zoning that separates residential and commercial areas was found to increase travel distances which acts as a barrier to cycling. Higher density, mixed use development works to reduce average trip distance and this makes cycling and walking more attractive.

“There is growing evidence that low density neighborhoods with poorly connected street networks affect how much time we spend walking, cycling and our ability to use public transport”
Research Australia, 2007, p. 15

Bicycle infrastructure: Domestic and international literature highlights the important impact bicycle infrastructure provision has on cycling participation. Although exceptions can be found, the overwhelming trend identified in this report is that well designed and connected bicycle infrastructure encourages participation and a lack of it is a major barrier for non-cyclists, infrequent-cyclists and even regular riders.

“The lack of infrastructure for bikes is a barrier. That’s a fear, being injured if I got on a bike”

Australian cities and towns generally lack integrated networks of good quality bicycle paths and lanes and this is a significant barrier to greater participation.

Long term reform in urban design to create more compact, vibrant urban and regional centres is vital. Widespread adoption of bicycle friendly design, such as integrated, connected on and off road bicycle routes is essential. Secure bicycle parking and showers at workplaces were also found to help more people make the daily commute by bicycle.

This report also found a strong case for better integration of bicycling with the public transport system. In countries with high rates of cycling, such as the Netherlands, some 38% of train journeys begin with a bicycle trip. Developing a strategic network of bicycle routes to transport hubs, providing secure bicycle parking at stations and facilitating the carriage of bicycles on public transport have all been shown to be effective methods of encouraging cycling and have a high level of applicability to the Australian context due to its low density land use.

This report also examined the effect of ‘invisible infrastructure’ on cycling. Invisible infrastructure refers to policy measures and general design features that indirectly impact on cycling, rather than specific bicycle infrastructure. Material reviewed in this report show invisible infrastructure offers cost effective benefits that often result in win-win situations, whereby cyclists and the wider community benefit. For instance, lower speed limits result in more attractive conditions for cyclists, whilst at the same time increasing safety for all road users and improving neighbourhood amenity.

Safety
Surveys and focus group research reviewed for this report show safety concerns to be among the most significant barriers preventing people from cycling, including among those who cycle regularly.

Safety concerns were found to be amplified by aggressive motorist behaviour. Motor vehicle speed is both a perceived and actual safety hazard for vulnerable road users such as cyclists. An accident at 64km/h puts cyclists at 17 times the risk of a fatality than if the vehicle was travelling at 32km/h.

A combination of speed, volume of traffic and a lack of designated space for people to ride were found to be significant barriers to cycling. This was exacerbated by aggressive driving and features as a regularly reported deterrent to cycling.

These barriers can be reduced by implementing neighbourhhood speed limits of between 30km/h to 40km/h, road user education and improved bicycle infrastructure.

The perception of risk from cycle accidents is often disproportionate to the actual risk. However, perceptions of risk were found to decrease with cycling experience. Whilst acknowledging the legitimate concerns people have to bicycle riding, the evidence demonstrates that in Australia, per 100,000 participants, an individual is seven times more likely to be hospitalised playing football than riding a bicycle. Risk-benefit analyses consistently report that the health
benefits of cycling outweigh the risks by factors ranging from five to one, to 20 to one.

Another consistent feature in the literature is the robust finding that the more cyclists there are, the safer it becomes. In fact, if cycling doubles, the risk per kilometre falls by 34%.

3 Recommendations

This review has highlighted the need to overcome some significant barriers to further promote regular cycling among adult Australians. The following interventions are recommended to meet this challenge:

- **Mass marketing campaigns**
  To promote the multiple health, environmental, transport, economic and social inclusion benefits of cycling, and address perceived barriers such as safety, required fitness level and road user behaviour. These campaigns can be supported through the extensive network of cycling organisations around Australia and should be combined with bicycle infrastructure improvements.

- **Bicycle education programs**
  To increase confidence and skill levels in both the child and adult population.

- **Behaviour change programs**
  such as TravelSmart, Ride to School and Ride to Work programs: To help more Australian children and adults make the daily commute and other trips by pedal power.

If cycling participation doubles, the risk per kilometre falls by 34%.

- **Cycling events**
  To encourage infrequent and novice riders to cycle in a supportive social environment.

- **Urban design**
  To create a physical environment more conducive to cycling, such as higher density, mixed use development and shorter trip distances.

- **Improved bicycle infrastructure**
  To provide safe, attractive and enjoyable on and off road bicycle routes as well as high quality end of trip facilities. The health sector can provide a powerful advocacy voice for intersectoral action to provide supportive environments for cycling.

- **Funding**
  To better reflect the role and value of cycling in a range of areas including transport, health and sustainability, with support from all levels of government.

Australia currently faces a number of emerging health challenges, many of which are caused in part by increasingly sedentary lifestyles.

Cycling is an effective method of helping to reduce sedentary lifestyle diseases such as cardiovascular disease, obesity and diabetes. As Australians continue to lead increasingly busy lifestyles, cycling is in a unique position for its ability to enable people to integrate physical activity into everyday living. Active communities also have stronger social connections and improved liveability.

Cycling also offers a wide range of additional benefits when used as an alternative to the private automobile. Cycling is a carbon neutral, petrol free form of transport, simultaneously helping Australians fight climate change and reduce fuel costs. For peak hour journeys in particular, the bicycle can reduce congestion and increase the efficiency of the transport system.

Yet for all these important benefits to be realised, a number of challenges need to be overcome. The health sector can play a key role in promoting this popular, but under-utilised form of physical activity.
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Setting the Scene

1.1 The importance of physical activity and cycling to health

Approximately half of all Australian adults are not meeting even the modest current national recommendations that:

*every adult should accumulate half an hour of moderate-intensity physical activity on at least 5 days per week* (Commonwealth Health National PA guidelines, 1999; United States Surgeon General, 1996; Haskell et al, 2007).

This lack of physical activity is a major contributor to Australia’s rising obesity levels.

Physical activity is an important part of overall health promotion and disease prevention. Physical inactivity ranks in the five leading risk factors of ill health, alongside tobacco use, obesity, high cholesterol levels and high blood pressure (Australian Institute of Health and Welfare, 2006). In fact, given the interaction between physical inactivity and the latter four risk factors, reducing inactivity may indeed be the most important thing we can do for our health and wellbeing (Morris, 1994). Overall health and well being, quality of life, and reduced risk of morbidity and mortality are all dimensions of the benefits for adults achieving at least moderate-intensity physical activity on most days of the week (Haskell, 2007; United States Surgeon General, 1996; Bauman, 2004). The specific disease prevention benefits of being active include reduced risk of cardiovascular disease, some cancers, reduced diabetes risk, improved mental health, and reduced risk of falls in the elderly (WHO, 2000).

There are a number of specific health and disease outcomes that are prevented by regular physical activity. The epidemiological evidence for each of the major health conditions prevented by physical activity is summarised in Table 1 (see following page). As a form of moderate-vigorous physical activity, cycling can contribute to the multiple health benefits of physical activity.

Cycling also has a number of additional benefits:

- As a low-impact form of physical activity, it appeals to people who cannot participate in high-impact activities
- As a form of active transport and recreation, it enables many people to combine physical activity with transport and recreation
- There is also evidence that the public generally prefer unstructured forms of physical activity (Hahn & Craythorn, 1994, cited in Sallis et al, 1998) and cycling certainly fits into this category
- It appeals to people across the age spectrum, from childhood to adults
- The promotion of ‘lifestyle’ physical activity such as walking and cycling is more cost-effective than promotion of structured exercise programs
- As a form of active transport, cycling contributes to the additional benefits associated with reduced car use (improved air quality, reduced greenhouse gas emissions, reduced noise pollution, improved community liveability and social connectedness).

Australia’s obesity rate is among the highest in the OECD

Australian Institute of Health and Welfare, 2006

Beyond health specific benefits, it appears that physical activity is also linked to community well-being (Chau et al, 2007), social capital and community engagement. It has also been found to foster community participation in sport and recreation, encourage public transport usage, as well as promoting the use of community facilities, parks and recreational resources. Moreover, there are social, economic and environmental benefits to population level physical activity that go beyond the health benefits alone (Bauman, 2003). Being physically active has different benefits across the lifespan, from childhood participation in sports and games, through to maintaining functional status and social engagement among older adults. Among older adults, physical activity will allow more tasks to be undertaken for daily living, for longer, such that even the older age groups will have greater functional independence (Bauman, 2004).

The overall relationship between physical activity and health is summarised in Figure 1 (top). This illustrates that the benefits of physical activity accrue most rapidly when moving from sedentarism to moderate levels of physical activity. Encouraging even short, but regular bicycle journeys is an effective means of achieving significant health gains.

It is now acknowledged in the literature that the health benefits of physical activity are cumulative (Department of Health and Aged Care, 1999, cited in Milligan et al, 2007). In practical terms, this means three 10 minute cycle trips still provide sufficient levels of physical activity to protect against sedentary lifestyle diseases (WHO, 2000). By contrast, public health researchers Frank et al (2004) have shown that each additional hour in a motor vehicle increases the chance of being obese by 6% - adjusting for socio-economic status.

The promotion of moderate intensity physical activity has been described as today’s ‘best buy in public health’

Morris, 1994

In addition to the fact that cycling is beneficial to health, there is evidence that car commuting is associated with...
negative health outcomes. Wennberg (2006) reported an independent and increased risk of myocardial infarction (heart attack) in those who reported prolonged car transit time (74% increased risk) compared to physically active commuters. Furthermore, a study in China examined the transition from active modes of transport (typically cycling rather than walking) to motorised transport. They found a two fold increase in the risks of obesity over an eight year follow up period, compared to those that continued to actively commute (Bell, 2001)\(^1\).

\[\text{The main sources of health-enhancing physical activities encompass normal and simple activities such as walking, cycling...}\]

World Health Organisation, 2006, p.4

The evidence reviewed in this report clearly points to the need for increased levels of physical activity, in order to combat the growing problems of obesity and diabetes, as well as other lifestyle diseases. Cycling is well suited to provide sufficient levels of physical activity to protect against the diseases of a sedentary lifestyle. It is able to do this at minimal cost to the individual and wider community and can act as a replacement for car journeys, especially for short trips and this has been shown to have additional health benefits.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Potential Health Benefits of Cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coronary Heart Disease</strong></td>
<td>Physical activity reduces the risk of coronary heart disease by around 40%, compared to those that remain inactive. Cycling may be useful in angina and other aspects of coronary heart disease as well.</td>
</tr>
<tr>
<td><strong>Stroke and Cerebro-vascular events</strong></td>
<td>Physical activity reduces the risks of ischaemic stroke (insufficient blood supply to the brain)</td>
</tr>
<tr>
<td><strong>High blood pressure (Hypertension)</strong></td>
<td>Physical activity reduces blood pressure by 3-5 mm (both systolic and diastolic), with a greater effect seen from moderate intensity physical activity (more than for vigorous physical activity); this has been shown in serial meta analyses of the research base (Kelley et al, 2001a; Kelley &amp; Kelley, 2001; Kelley et al, 2001b).</td>
</tr>
<tr>
<td><strong>Cholesterol and Lipid levels</strong></td>
<td>Physical activity lowers total cholesterol and improves the high density lipoprotein sub-fraction (protective component of cholesterol, in terms of cardiovascular risk)</td>
</tr>
<tr>
<td><strong>Stress, Anxiety and Depression</strong></td>
<td>Physical activity may contribute to improved well being, and reduces anxiety and depression symptoms</td>
</tr>
<tr>
<td><strong>Overweight and Obesity</strong></td>
<td>Physical activity has a role in population level obesity prevention, but here the recommendation is more than the 30 minutes per day; for weight maintenance or obesity prevention, populations need to expend more energy; around 60-90 minutes of moderate physical activity per day is required (Saris et al, 2003). This assumes that dietary intake remains constant.</td>
</tr>
<tr>
<td><strong>Type 2 Diabetes</strong></td>
<td>Physical activity reduces the risk of developing Type 2 Diabetes in those at risk, shown through several population based prevention trials; in epidemiological studies, physical activity reduces the incidence of diabetes. In clinical studies, physical activity improves glucose uptake and insulin metabolism, providing biological mechanisms for these benefits. Similar mechanisms reduce the risk of chronic liver disease, as well as obesity, high blood pressure and elevated cholesterol levels.</td>
</tr>
<tr>
<td><strong>Falls prevention in the elderly</strong></td>
<td>Physical activity strengthens muscles, and improves joint stability and balance, and this reduces the risk of falls and fractures in the elderly. Physical activity could prevent up to 16% of these falls (Stephenson &amp; Bauman, 2000), and these injuries, through fractured hips and related conditions are a very common cause of hospital admission and morbidity among older adults.</td>
</tr>
<tr>
<td><strong>Osteoporosis</strong></td>
<td>Physical activity improves bone deposition during adolescence, resulting in stronger bones and reduced risk of osteoporosis later in life.</td>
</tr>
<tr>
<td><strong>Colon and Breast Cancer</strong></td>
<td>Physical activity reduces the risks of developing colon cancer by about 40% and the development of breast cancer, especially among post menopausal women. The amount of physical activity required may be 30-45 minutes daily, and moderate-vigorous activities are required. For cancer prevention, lifelong physical activity patterns may be important (whereas for other health benefits, recent physical activity participation is preventive). Other cancers, possibly prostate cancer, lung cancer and cancer of the uterus may also be prevented, in part, by physical activity, although the evidence is less clear here.</td>
</tr>
</tbody>
</table>

\[1\] It may also be possible that those who transfer from bicycle to car travel have also experienced increased income. This may be a confounding factor, as it could be associated with increased dietary intake which may increase obesity levels. The authors did attempt to control for confounders measured in this study.

Source: Adapted from Bauman, 2004
1.2 Cycling participation in Australia

Australians have shown a strong inherent interest in cycling. Figures from Bicycle Industries Australia (2006) have shown a rapid increase in bicycle sales, with over 1.4 million sold in 2007, outnumbering new car sales for the eighth consecutive year. The rise in the number of Australians purchasing bicycles has been accompanied by an increase in cycling participation.

An analysis of the Australian Sports Commission Exercise Recreation and Sport Survey (ERASS) reveals that cycling is Australia’s fourth most popular physical activity for adults. Moreover, in terms of frequent participation, it is Australia’s third most popular physical activity, as demonstrated in table 2 below.

Cycling is the third most popular physical activity in terms of regular participation (Australian Sports Commission, 2006)

One of the strongest growth areas for cycling in recent years has been as a mode of transport to work (commuting). The latest Census data released by the ABS show Australian capital cities are experiencing an average increase of 22% between Census 2001 and 2006. Melbourne and Adelaide experienced the most rapid increase, at 42.57% and 31.25% respectively. It should be noted that the Census takes place in August, which is typically a less popular month for cycling than the warmer periods of the year.

This analysis of cycling participation in Australia demonstrates that Australians are both buying more bicycles than ever before and using them in increasing numbers. More Australians are using the bicycle to get to work and as a form of recreation, with the middle age groups reporting the highest participation levels.

The graph below presents the involvement of each adult age group in cycling – for both commuting and recreational purposes.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of participants</th>
<th>Participation Rate (%)</th>
<th>Number of participants with a frequency of more than 104 times per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>6,001,700</td>
<td>36.2</td>
<td>3,615,900</td>
</tr>
<tr>
<td>aerobics</td>
<td>3,161,300</td>
<td>19.1</td>
<td>1,307,700</td>
</tr>
<tr>
<td>swimming</td>
<td>2,256,900</td>
<td>13.6</td>
<td>317,900</td>
</tr>
<tr>
<td><strong>cycling</strong></td>
<td><strong>1,682,800</strong></td>
<td><strong>10.1</strong></td>
<td><strong>417,400</strong></td>
</tr>
<tr>
<td>tennis</td>
<td>1,130,700</td>
<td>6.8</td>
<td>43,600</td>
</tr>
<tr>
<td>running</td>
<td>1,224,100</td>
<td>7.4</td>
<td>385,600</td>
</tr>
<tr>
<td>golf</td>
<td>1,132,000</td>
<td>6.8</td>
<td>84,400</td>
</tr>
<tr>
<td>bushwalking</td>
<td>774,000</td>
<td>4.4</td>
<td>79,500</td>
</tr>
<tr>
<td>football</td>
<td>697,400</td>
<td>4.2</td>
<td>74,000</td>
</tr>
</tbody>
</table>

Source: Australian Sport Commission, 2006

Table 2 Most frequent exercise, recreation and sport activities in Australia, 2006

Table 3 Bicycle Journeys to Work 2001 & 2006

<table>
<thead>
<tr>
<th></th>
<th>2001 No. of individuals who cycled to work</th>
<th>2006 No. of individuals who cycled to work</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melbourne</td>
<td>14,443</td>
<td>20,592</td>
<td>42.57%</td>
</tr>
<tr>
<td>Adelaide</td>
<td>5,101</td>
<td>6,695</td>
<td>31.25%</td>
</tr>
<tr>
<td>Hobart</td>
<td>707</td>
<td>886</td>
<td>25.32%</td>
</tr>
<tr>
<td>Perth</td>
<td>6,218</td>
<td>7,240</td>
<td>16.44%</td>
</tr>
<tr>
<td>Canberra</td>
<td>3,505</td>
<td>4,062</td>
<td>15.89%</td>
</tr>
<tr>
<td>Brisbane</td>
<td>7,890</td>
<td>8,889</td>
<td>12.66%</td>
</tr>
<tr>
<td>Sydney</td>
<td>11,131</td>
<td>12,132</td>
<td>8.99%</td>
</tr>
<tr>
<td>Darwin</td>
<td>1,653</td>
<td>1,536</td>
<td>-7.08%</td>
</tr>
</tbody>
</table>

Source: ABS Census 2001 & 2006
1.3 Economic benefits of cycling participation

It is well recognised that cycling offers considerable benefits to the individual, in terms of improved health, reduced transport expenses and lifestyle enhancements. Placing a value on current and potential cycling participation is challenging as there are a number of different methodologies used and the value varies depending on the profile of the person cycling in terms of their age and current physical activity levels and frequency and lengths of their cycling trips. Nevertheless, attempting to determine the value of cycling participation is important for policy formation and decision making.

Government and the wider community benefit from cycling in the following ways:

- Increased physical activity levels, with subsequent reductions in health care costs.
- Reduced cost of transport ‘externalities’.

Externalities are the costs imposed on non-users or those not directly met by the user. These include air and noise pollution, road traffic injuries, congestion and climate change.

This report brings together different sources of evidence to quantify, in monetary terms, the value of current cycling participation.

**Health Benefits of Leisure Cycling**

The health benefits generated by cycling are drawn from the seven key medical conditions that are considered to have a strong causal relationship with physical inactivity.

According to a recent study (Econtech, 2007) the direct gross cost of physical inactivity to the Australian health budget in 2006/07 was $1.49 billion.

The value attributable to physical inactivity is based on an estimated prevalence of 54.2% of the population between 18 and 75 years of age classified as inactive.2

Based on this calculation, the cost of each inactive adult person to the health budget is $198.57 per year.3

<table>
<thead>
<tr>
<th>THE COSTS OF INACTIVITY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary Health Disease</td>
<td>$ 371.5 million</td>
</tr>
<tr>
<td>Stroke</td>
<td>$ 162.4 million</td>
</tr>
<tr>
<td>Type 2 diabetes</td>
<td>$ 210.7 million</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>$ 42.2 million</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>$ 61.4 million</td>
</tr>
<tr>
<td>Depression Symptoms</td>
<td>$ 177.3 million</td>
</tr>
<tr>
<td>Falls</td>
<td>$468.7 million</td>
</tr>
<tr>
<td><strong>Total Gross Costs</strong></td>
<td><strong>$ 1,494.4 million</strong></td>
</tr>
</tbody>
</table>

Source: Econtech, 2007

To gain health benefits from physical activity, participation has to be regular and of moderate intensity. These benefits are gained from both recreational and commuter cycling.

The benefits of recreational cycling have been simplified for this report to only include the positive health effects of physical activity.

In 2006, over 1.68 million Australians cycled for recreation and of those 417,400 cycled more than 104 times a year (ERASS, 2006). These individuals can be classified as meeting the levels of physical activity to protect against sedentary lifestyle diseases from cycling alone.4

Using the Econtech (2007) calculation, the savings to the health budget from regular recreational cycling in 2006 is estimated at $82.9 million.

**Benefits of Commuter Cycling**

The benefits of commuter cycling include both the positive impact on public health, as well as the reduction in the ‘externalities’ of transport, such as reduced air and noise pollution, congestion and climate change mitigation. It should be noted that a significant amount of additional transport-based cycling occurs (visiting friends, shops etc...), but are not collected by the Census and for reasons of consistency are not included in these calculations.

According to the Australian Greenhouse Office (2006), around 66% of personal transport is for non-commuting purposes.

Commuter cycling offers an important opportunity for the Australian workforce to get much needed physical activity.

Sports Medicine Australia (2007) found that the modern lifestyle can act as barrier to physical activity. Cycling to and from work helps to counter increasingly sedentary behaviours and the negative health outcomes associated with them.

The number of people who cycle to work in Australian cities has increased markedly between Census 2001 and 2006 (rising 22% on average).

The primary aim of this analysis is to estimate the value of the current bicycle commuting trips in Australia based on the 2006 Census.

Cyclists currently save the economy $63.9 million per year in reduced congestion costs and $72.1 million in reduced health costs.

Based on the information presented in tables 4 and 5, the economic benefit of commuter cycling is $144.3 million per year.

For additional information, including the assumptions upon which the above calculations are based, see Appendix 2.

**Potential for improved road safety through the reduction in car use**

Road trauma in Australia costs $17 billion a year. This is equal to 2.3% of Australia’s gross domestic product (Centre of National Research on Disability and Rehabilitation Medicine, 2006). There is increasing evidence that higher levels of motor vehicle use increase the risk of road trauma. Strategies that provide non-motorised transport options are increasingly recognised as an effective road safety strategy (Litman & Fitzroy, 2005). In fact, policies aimed at reducing car use typically result in around a 10% reduction in vehicle kilometres travelled and this could cut road trauma costs by between $850 million and $1.7 billion per year (Victoria Transport Policy Institute, 2007).

The authors note that research on the economic benefits of current and future cycling participation is limited in Australia. Further research is required to gain a clearer understanding of these benefits, in order to inform public policy.
### Table 4 Bicycle Commuting Travel (Capital Cities)

<table>
<thead>
<tr>
<th></th>
<th>Bicycle Commuters (sole mode trips only)</th>
<th>Kilometres/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001 Census</td>
<td>2006 Census</td>
</tr>
<tr>
<td>Sydney</td>
<td>8,684</td>
<td>10,175</td>
</tr>
<tr>
<td>Melbourne</td>
<td>12,179</td>
<td>18,047</td>
</tr>
<tr>
<td>Brisbane</td>
<td>6,347</td>
<td>7,502</td>
</tr>
<tr>
<td>Adelaide</td>
<td>4,376</td>
<td>6,085</td>
</tr>
<tr>
<td>Perth</td>
<td>5,179</td>
<td>6,323</td>
</tr>
<tr>
<td>Hobart</td>
<td>622</td>
<td>810</td>
</tr>
<tr>
<td>Canberra</td>
<td>3,093</td>
<td>3,763</td>
</tr>
<tr>
<td>Darwin</td>
<td>1,498</td>
<td>1,407</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>41,978</td>
<td>54,112</td>
</tr>
</tbody>
</table>


### Table 5 Benefit Analysis of Commuter Cycling

<table>
<thead>
<tr>
<th>Item</th>
<th>Value per km (2006)*</th>
<th>Total value (2006)*</th>
<th>Present Value (25 years @ 6% per annum*** discount rate)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Externalities</td>
<td>$0.0599/car-km</td>
<td>$9.2 million</td>
<td>$127 million</td>
</tr>
<tr>
<td>Congestion</td>
<td>$0.125 - $0.666/car-km (peak)**</td>
<td>$63.9 million</td>
<td>$909 million</td>
</tr>
<tr>
<td></td>
<td>$0.033 - $0.177/car-km (off-peak)** depending on city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and fitness</td>
<td>$0.376/cycle-km (mortality plus morbidity)</td>
<td>$71.2 million</td>
<td>$982 million</td>
</tr>
<tr>
<td><strong>TOTAL Capital Cities</strong></td>
<td>Benefit</td>
<td>$144.3 million</td>
<td>$1,527 million to $2,018 million</td>
</tr>
</tbody>
</table>

* Valued at resource costs (ie net of indirect taxes – GST and Fuel Excise)
** Subject to escalation of fuel cost component in line with progressive increase in real cost of petrol to $2/litre by 2016
*** Most jurisdictions use a higher discount rate that broadly reflects the market rate of interest. However, the market rate of interest includes inflation expectations that are specifically excluded from this assessment. The Australian Transport Commission (2006a) recommends using it as the long term government bond rate, which is currently around 6%.

For additional information, including the assumptions upon which the above calculations are based, see Appendix 2.
1.4 The Australian cycling sector

The Australian cycling sector is made up of an active and diverse range of recreation, advocacy and sporting organisations. In general, they have been very effective in providing cycling events and services to the Australian community for over three decades. For instance, between 1994 and 2004, Bicycle Victoria organised rides totalling 208,244 participants (Garrard et al, 2005). Promoting physical activity to this large group would be very costly for the health sector. These cycling organisations are constrained by a lack of resources to further promote cycling.

Strategically targeted funding from the health sector could result in substantial leveraged benefits to the community. Moreover, it would provide the opportunity to prioritise disadvantaged or under represented groups, as this is something largely outside of the cycling sector’s current scope.

Local Bicycle User Groups (BUGs)

Australia has approximately 100 local BUGs which vary in size, focus and activities. They share a common desire to promote cycling and a commitment to develop a bicycle friendly Australia.

According to a survey undertaken on behalf of the Cycling Promotion Fund, BUGs have an estimated membership of around 20,000. The majority of members are between 25 and 55 years old and cycle for recreation and commuting. Some 60% of BUGs surveyed organise regular rides with the majority less than 30km long.

Most BUGs are affiliated with their state cycling organisation and regular rides are promoted through websites and ride calendars. Some state cycling organisations offer ride leader training and insurance cover for BUGs. South Australia and NSW offer the most extensive BUG cycling calendar with regular rides most days of the week. The majority of rides are free and open to anyone, not just members.

Many BUGs also work with their local councils to provide input on bicycle plans and infrastructure and lobby councils and other agencies for better bicycle facilities.

Local BUGs are run solely by volunteers and they provide an excellent grassroots service to members and the general community. They have a wealth of knowledge of local cycling facilities, are keen to share tips on cycling and provide valuable community based opportunities for people to ride regularly through social support and encouragement.

The survey highlighted that there is considerable potential to strengthen these valuable grassroots organisations by offering training, support and resources.

Table 6 State-based bicycle organisations

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Members</th>
<th>Services offered</th>
<th>Staff</th>
<th>Volunteers</th>
<th>Programs/Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Victoria</td>
<td>40,000</td>
<td>Information, resources, insurance, events, advocacy, consultancy services, bicycle parking</td>
<td>35</td>
<td>500</td>
<td>Cycling events, behaviour change programs (Ride2Work, Ride2School),</td>
</tr>
<tr>
<td>Bicycle NSW</td>
<td>10,000</td>
<td>Information, resources, insurance, events, advocacy, consultancy services, ride leadership training</td>
<td>10</td>
<td>100</td>
<td>Community cycling events, behaviour change programs (Ride2work, Ride2School), bicycle maintenance courses</td>
</tr>
<tr>
<td>Bicycle Queensland</td>
<td>5,000</td>
<td>Information, resources, insurance, events, advocacy, bike week, information sessions</td>
<td>5</td>
<td>120</td>
<td>Cycling events, women’s ride, bike safety for kids, bicycle maintenance courses, leisure rides, film night, Ride2School challenge, Ride2Work and Ride2School</td>
</tr>
<tr>
<td>Bicycle South Australia</td>
<td>3,000</td>
<td>Information, resources, insurance, events, advocacy, bike hire scheme, bicycle maintenance</td>
<td>5</td>
<td>200</td>
<td>Cycling events, bicycle maintenance, skills training, Ride2Work and Ride2School, programs for disadvantaged kids</td>
</tr>
<tr>
<td>Bicycle Tasmania</td>
<td>250</td>
<td>Information, resources, insurance, advocacy</td>
<td>0</td>
<td>20</td>
<td>Cycling events and regular ride, Bike Week</td>
</tr>
<tr>
<td>Pedal Power (ACT)</td>
<td>1600</td>
<td>Information, resources, advocacy, insurance, skills courses</td>
<td>2</td>
<td>50</td>
<td>Cycling events, weekly recreational rides, primary school programs, Ride2Work, women training program</td>
</tr>
<tr>
<td>Bicycle Transport Alliance (WA)</td>
<td></td>
<td>Information, resources, insurance, advocacy</td>
<td>1</td>
<td>20</td>
<td>Bicycle maintenance and skills classes</td>
</tr>
</tbody>
</table>
1.51 Cycling education and skills training

**Intervention description**

Lack of confidence and skills have been identified as barriers to cycling (discussed in Section 2.1), particularly for people who do not currently cycle. In response, a range of cycling education/skills training programs have been set up.

An evaluation undertaken by the Bicycle Federation of Australia on behalf of the Australian Greenhouse Office on Best Practice in Adult Cycling Proficiency Training (Bicycle Federation of Australia, 2006) indicated that Australia has a number of agencies currently offering cycling skills courses. This includes a broad range of stakeholders, such as non-government organisations, councils, cycling organisations, employers, bicycle retailers and independent training providers. Many target new and inexperienced riders. The survey highlighted that current cycling proficiency classes are effective in increasing skills and improving confidence but many lack formal evaluations, effective marketing and accreditation. Current availability was also found to be limited.

**Population group/setting**

Most cycling education programs are delivered in group settings either at a community level or in a workplace setting. Evidence suggests that more women participate in cycling education programs (Garrard et al, 2006).

**Effectiveness**

A recent review identified few rigorous evaluations of cycling skills programs for adults in Australia (Rissel & Garrard, 2006). Those that have been evaluated show that cycling education and skills training programs are effective in assisting people to gain the skills and confidence needed to cycle. An evaluation of a program run by the Health Promotion Unit of the Central Sydney Area Health Service set up a pilot cycling proficiency training program for adults. The focus of the program was to provide practical skills and supervised training on bicycle paths and on-road. The aim of the intervention was to increase the number of people cycling, the frequency of cycling and the use of bicycles for transport. The program was designed for adults with low to moderate-level skills and confidence in cycling. From the 113 people starting the program, 72% completed at least one course and 93% took part in the pre-program and follow up interviews. Participants’ satisfaction with all aspects of the course was very high and the course led to a significant increase in participants’ self-reported skills and confidence in cycling (Telfer et al, 2006).

1.52 Community based programs

**Intervention description**

Community based cycling programs provide locally based interventions focusing on promoting cycling for health and/or transport. Programs offer information, incentives and/or the development of social networks (eg group recreational or training rides, buddy system for ride to work) that provide supportive structures to maintain behaviour change.

**Population group/setting**

Most community based cycling programs are delivered in a group setting at a community or workplace level. The TravelSmart Communities program (see below for further details) is an individualised social marketing program focusing on individual behaviour change.

**Effectiveness**

Many community based cycling programs have not been formally evaluated, but feedback from the organisations that run these programs indicate that they are effective in encouraging people to increases their physical activity levels through cycling.
The evaluation of the Cycling 100 program (see below for further details) indicated that participants’ physical work capacity improved, and cholesterol and coronary risk ratio decreased (Marshall, 2001).

In the town of Vincent in Western Australia, the TravelSmart Communities project achieved a 9% reduction in single occupant car use and an increase in cycling of 30%, with walking trips rising 22% and public transport up 11% (Social Data, 2005).

More details of these and related programs are provided in the case studies following.

Case Study

Bike Bus

Many non-commuter cyclists report a lack of confidence and awareness of bicycle friendly routes as major reasons for not riding to work. Bike Bus is an initiative aimed at addressing both these issues. Piloted in Sydney to encourage cycling for work journeys, each weekday morning, the ‘bus’ cycles a set timetabled route through Sydney’s suburbs to the Central Business District. It picks people up along the way, in a similar manner to a regular bus.

Bike Bus has grown substantially, and there are now four routes. Bike Bus participants report a significant increase in their level of comfort, with each route designed to maximise the use of quieter streets. Riding in a group helps develop confidence, and provides support for those not experienced at riding in peak hour. The pilot program is funded in part by the Department of Environment and Water Resources and the Cycling Promotion Fund.

More information, including a YouTube Video of the Bike Bus in action can be found at http://www.bikebus.org.au/

Figure 4 Cycle 100 participants

Photo: Public Transport Authority

In 2000/01 Cycle 100 was developed with the objective of providing incentives for people to replace some of their car trips to work by bicycle, for health and environmental reasons. The trial program involved 100 people (average age 39 years) who lived between 10 to 15 km of their workplace. Participants were provided with a mountain bike equipped with lights, lock, cycle computer and helmet. As a result of the program, participants replaced over 12,000 kilometres of car commuting with cycling. The evaluation demonstrated that new riders gained significant health improvements as a result of the program (Marshall, 2001).

Case Study

TravelSmart Communities

TravelSmart is an established program aimed at encouraging people to reduce the number of trips taken by car, and increase the number of trips using sustainable transport modes. This is done through the use of information and marketing tools focused on walking, cycling, public transport, car pooling and telecommuting.

TravelSmart directs its effort towards people with an identified willingness to consider ways of reducing their car use, as behaviour change programs have been shown to be more effective in populations already contemplating a change in their lifestyle (Milligan et al, 2007). TravelSmart has been operating since 2001 and has developed a comprehensive range of tools to assist individuals to make smarter travel choices. This can include personalised visits, targeted information packs, including public transport time-tables, cycle maps and bicycle maintenance/riding skills classes. Programs are funded by all levels of government but currently reach only a very small proportion of the community.

1.53 Social Marketing

Intervention description

Coordinated social marketing campaigns are designed to motivate people to be more active through cycling, by raising awareness of the benefits of bicycle riding.

Population/Group setting

Large scale community wide campaigns with messages directed to a large audience through different types of media including television, radio, newspapers, mailings, and events.

Effectiveness

Messages highlighting health, fitness and family interaction are effective motivators in the promotion of cycling. Evaluation of the Cycle Instead campaign in Perth indicated that the majority of people exposed to the campaign correctly interpreted the main messages and for whom they were designed. The evaluation found significant increases in cycling behaviour, intentions to cycle and intentions to purchase a bicycle (Greig, 2001).
An additional evaluation of the Cycle Instead campaign indicated significant increases in the proportion of respondents who had cycled in the previous six months (29% vs 36%). This was backed up by bicycle counts, which recorded increases in cycling by up to 65% across the Perth Bicycle Network (ARRB, 2000). Further details of the Cycle Instead campaign are provided in the case study below.

Case Study

Cycle Instead campaign

The Western Australian Government developed a cycling promotion campaign, Cycle Instead, using a social marketing approach. Extensive research was undertaken prior to the development of the promotion strategy, through surveys and focus group discussions. This identified that the prime motivators that influence cycling are centred on the individual. While the campaign was promoting cycling as a mode of transport, it was clear that the most persuasive way of doing so was to promote the health and fitness aspects of cycling. Two 30 second television commercials were developed to reflect the main motivators of cycling - fitness for women, and spending time with children for men. These commercials were shown for four weeks with modest exposure levels (average 300 Target Audience Rating Points (TARPS) per week) and were run in conjunction with a range of supporting activities and media including; community events, Cycle Instead merchandise and a brochure about the benefits of cycling with frequently asked questions. Additionally a range of newspaper advertisements were developed, and bicycle retailers engaged to enable them to capitalise on the campaign.

1.54 Cycling Events

Intervention description

Cycling events provide a range of opportunities for people of most ages and fitness levels to be physically active. Australia offers a wide variety of cycling events from small community based events with less than 100 participants and short distances, to large more challenging events with more than 14,000 riders. Organisers of cycling events include bicycle recreation/advocacy organisations, charities, cycling clubs and private event operators. Most cycling events promote cycling as a healthy physical and/or sporting activity, while others such as Ride 2 Work and Beyond promote cycling as a practical and healthy transport option. Some event organisers provide people with interactive multimedia resources with training tips to enable them to improve their fitness and skills levels.

Population Groups/Setting

Cycling events attract people of all age groups and socio economic backgrounds (Godbold, 2005; Bowles et al, 2006; Cycling Promotion Fund, 2005). Event organisers are increasingly offering a range of distances to cater for a variety of fitness and skill levels. A small number of cycling events are for females only, to encourage more women to participate. The Ride 2 Work and Beyond program targets people travelling to work through workplaces.

Effectiveness

A number of evaluations have highlighted the effectiveness of cycling events in encouraging people to increase their physical activity levels through bicycle riding. Ride 2 Work and Beyond has become Australia’s largest cycling event and has been effective not only in encouraging people to cycle on the day but also to maintain their behaviour after the event (Bicycle Victoria, 2007).

Recreational cycling events provide incentives for people to increase their physical activity levels in preparation for the event, and have also been effective in increasing participants’ cycling participation after the event (Godbold, 2005; Bowles et al, 2006; Cycling Promotion Fund, 2005). Additionally, cycling events are also effective in encouraging social connections and team building with many events providing incentives for team entries, and a high proportion of participants citing social interaction as a motive for participation (Godbold, 2005).

Case Study

Ride to Work Day

Journeys to work are principally made by private motor vehicle in Australia (ABS, 2006b).

Riding to work is increasingly recognised as a healthy, sustainable and cost effective method of commuting.

Ride to Work Day commenced in Victoria in 1993. The first National Ride to Work Day was held on October 17th 2007 and attracted around 90,000 people, making it Australia’s largest cycling event and one of the biggest work place events in the country.

RIDE TO WORK DAY - THE KEY FACTS

Ride to Work Day has been running in Australia since 1993 (originating in Victoria)

In 2007, there were 29,000 registered riders — up from 10,181 in 2006

26% of registered riders were riding to work for the first time

Actual number of riders in 2007 was estimated at 90,000

Participants have increased more than 5 fold since 2002.

In 2007 there were almost 3000 registered workplaces

In 2006, 63% of registered riders were men and 37% women.

In 2006, for 25% of registered participants, it was the first time they had ridden to work that year. Over 60% said they usually travel to work by car.

In both 2004 and 2006, 27% of first-time riders were still riding 5 months later.

Source Bicycle Victoria, 2006; Bicycle Victoria, 2007
The Ride to Work Day event also recruits individual workplace coordinators to strengthen their capacity to provide ongoing support, information and incentives for colleagues. This helps to maintain the cycling to work after the Ride to Work Day event. This has been instrumental in ensuring that people maintain their behaviour in the long term.

See appendices 3 – 6 for more information on Ride to Work Day.

1.55 Recreational cycling events

Recreational cycling events have seen substantial increases in participation around Australia. The top 10 cycling participation events are organised by membership based cycling organisations and charities.

In 2007, 55,000 people took part in the top 10 cycling events around Australia (Table 7).

These cycling events are more than one-off events in terms of physical activity participation. Pre and post-event surveys indicate that participants increase their physical activity levels in preparation for the events. While activity levels may drop after the event, they remain above the levels reported by participants before they commenced training for the event (Godbold, 2005).

A number of interventions have been developed to increase cycling participation in Australia. These include efforts to increase bicycle riding knowledge and skills through the provision of cycling classes. In addition, the development of individualised and mass campaigns promoting the benefits of cycling have encouraged more people to take it up, as either a recreational or transport option (or both). Other programs focus on the provision of bicycles and/or the creation of a supportive social environment for cycling and this too has been successful in boosting cycling levels.

Table 7 Cycling events

<table>
<thead>
<tr>
<th>Cycling Event</th>
<th>Organiser</th>
<th>Participants</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Victorian Bike Ride 2007</td>
<td>Bicycle Victoria</td>
<td>3,700</td>
<td>550 km</td>
</tr>
<tr>
<td>Cycle QLD 2007</td>
<td>Bicycle QLD</td>
<td>1,000</td>
<td>500 km</td>
</tr>
<tr>
<td>NSW Big Ride 2007</td>
<td>Bicycle NSW</td>
<td>1,000</td>
<td>500 km</td>
</tr>
<tr>
<td>Annual Tour 2007</td>
<td>Bicycle SA</td>
<td>200</td>
<td>500 km</td>
</tr>
<tr>
<td>Portfolio Partners Around the Bay in a Day 2007</td>
<td>Bicycle Victoria</td>
<td>14,000</td>
<td>50 km to 240 km</td>
</tr>
<tr>
<td>Wilson HTM Brisbane to the Gold Coast Cycle Challenge 2007</td>
<td>Bicycle QLD</td>
<td>5,700</td>
<td>100 km</td>
</tr>
<tr>
<td>Mutual Community Challenge 2007</td>
<td>Bicycle SA &amp; SA Tourism</td>
<td>2,700</td>
<td>84 km to 128 km</td>
</tr>
<tr>
<td>City of Sydney Spring Cycle 2007</td>
<td>Bicycle NSW</td>
<td>8,500</td>
<td>5 km to 50 km</td>
</tr>
<tr>
<td>Freeway Bike Hike 2007</td>
<td>Asthma Foundation WA</td>
<td>7,015</td>
<td>10 km to 30 km</td>
</tr>
<tr>
<td>Portfolio Partners Sydney to the Gong Ride 2007</td>
<td>MS Society NSW</td>
<td>11,000</td>
<td>56 km &amp; 90 km</td>
</tr>
</tbody>
</table>
Current barriers and facilitators to greater cycling participation by Australian adults

A general theme within this document is the need to create supportive environments for health. The Ecological Model of Physical Activity takes the view that environments can either support or restrict healthy behaviour. In this model, used to guide discussion in this section, individual, social/cultural, environmental, and policy factors all influence physical activity participation, often unintentionally (Sallis et al, 1998). Safety concerns have been added as an additional influence in this section, due to the strong effect it has on cycling participation. See figure 6 (right) for an overview of the Ecological Model of Physical Activity.

The reasonably high level of bicycle ownership but relatively low participation rate suggests strong interest, but the presence of a range of significant barriers.

Although cycling is an increasingly popular activity in Australia, a number of significant barriers need to be addressed before it can be adopted by a wider section of the Australian community. Women in particular are under-represented in Australia (see appendix 11) and there are some important barriers that prevent women from taking up cycling in a manner more representative of their proportion of the population and these will be discussed below. The various barriers and motivations discussed will differ, depending on each individual’s circumstance. Non-riders may typically place a larger emphasis on personal factors and the physical environment, whereas regular riders might flag socio-political issues, such as the underlying basis of modal priorities (motorised over non-motorised) as important factors (Daley et al, 2007).

Women represent half the Australian population but only 20% of commuter cyclists.

2.1 Individual factors

Health-related

Poor health is potentially a barrier to many forms of physical activity, including cycling. Around 10% of the population are physically unable to ride a regular bicycle due to disability (Rissel & Garrard, 2006) and this proportion grows with increasing age (Australian Institute for Health & Welfare, 2003).

Extensive research regarding the influences on physical activity has identified numerous individual factors that affect participation:

- confidence
- motivation
- knowledge, skills, beliefs and attitudes
- time and opportunity
- perceived benefits and barriers
- enjoyment

Confidence

Bandura (1997) demonstrated that confidence is a very important requirement in order for people to take up new activities such as cycling. This is supported by recent Western Australian research that found a lack of confidence features as a major reason for individuals choosing not to take up physical activities (Milligan et al, 2007). They found 34% of inactive adults described themselves as ‘not at all confident’ (p.46). Cycling is an activity that requires greater confidence than many other forms of physical activity – as it frequently involves interaction with motor vehicles and a variety of road surfaces.

OVERCOMING HEALTH-RELATED BARRIERS TO CYCLING

Some styles of pedalled vehicles (eg recumbents) are suitable for use by people with poor health or with a disability. Moreover, as a low-impact form of physical activity, cycling appeals to individuals who cannot participate in high impact activities. The ‘need to swap to a low impact activity’ was reported to be an ‘important’ or ‘very important’ reason for commencing cycling (Garrard et al, 2006).

Photo: Greenspeed

5 Australia’s per capita sales of bicycles is one of the highest in the world (Bicycle Industries Australia 2005); a NSW survey indicated that 65% of people owning a bicycle wanted to ride more (Rissel C., New C., Pham S., Bindon J., 2008)
Motivations
A wide range of surveys have consistently found that motivations for cycling tend to be focused on the individual. Central to this is the desire to improve or maintain personal health and fitness (Garrard et al, 2006; Greig, 2007). In a large scale mass marketing campaign, pre intervention focus groups reported the desire to exercise four times more frequently than the next most common reason for choosing to cycle. Other motivations focused on the individual include stress reduction, social interaction and exercising with the family.

DEVELOPING THE SKILLS AND SUPPORT TO BEGIN CYCLING
Bicycle skills training is an effective way of boosting confidence for those new to cycling (Telfer et al, 2006). The Royal Society for the Prevention of Accidents (2001) found that cycle training increases individuals’ propensity to cycle and reduces the chance of being involved in an accident (cited in Telfer et al, 2006).

Local Bicycle User Groups (BUGs) are able to provide social support for those looking to ride with others.

Knowledge and Skills
The survey of 2403 cyclists by Garrard et al (2006) identified the following knowledge/skills barriers to greater levels of cycling:

- lack of knowledge of local cycling routes, the road rules that apply to cyclists, and the most appropriate bicycle to purchase.
- lack of cycling skill in regards to operating a bicycle, cycling in traffic, cycling in a group, and bicycle maintenance.
- concerns that you need to be fit to ride a bicycle, that the terrain needs to be flat, the weather fine, and the distance short (many of these perceptions and concerns are reduced with cycling experience).

Daley et al (2007) found that occasional riders studied in Sydney identified that a lack of knowledge about bicycle routes and basic mechanical issues was a deterrent to regular riding.

Mass marketing campaigns to encourage cycling should focus on the key motivations associated with cycling:

- Personal health and fitness
- Social interaction
- Cut fuel costs

They should also address the negative perceptions of cycling:

- cycling is too dangerous
- you need to be very fit
- it’s only something you do if you cannot drive a car

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- cycling is too dangerous
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- it’s only something you do if you cannot drive a car

Provide well publicised information packs on cycling that includes details of:

- recent bicycle route improvements in the local area
- cycle route maps
- the personal and community benefits of cycling
- bicycle skills training classes available
- a contact list of local, state and national cycling organisations
- cycle awareness tips for motorists (road safety)

Time and opportunities
Lack of time is a commonly reported constraint on all forms of physical activity, including cycling (Trost et al, 2002).

Perceived social norms
Ross’s (1992) population-based theory of health improvement demonstrates that social and cultural norms shape individual behaviour, which in turn influences health risk factors and health outcomes at a population level. In Australia’s car-oriented culture, the perceived norm is that most people think it is acceptable to always travel by car, regardless of distance (Hinde & Dixon, 2005; Woodward et al, 2002). This becomes normal, habitual behaviour that results in many short trips being undertaken by automobile. In Australian capital cities, 52% of car journeys are under 5km and 38% are under 3km (Austroads, 2005; RMIT, 1999). These distances are easily covered by bicycle.

The fitness image of cyclists, such as the wearing of lycra can act as a barrier to bicycle riding (Greig, 2001).

The evidence reviewed for this report demonstrates that there are a number of important individual factors that can act as a barrier to cycling. A lack of confidence, knowledge and riding skills have all been shown to reduce cycle participation. Interestingly, although a lack of time presents in the literature as a barrier to physical activity, cycling is in a unique position, in that it can be combined with transport, which means that in many cases, it can actually save time.

PROMOTE CYCLING AS A TIME SMART WAY OF GETTING AROUND AND STAYING HEALTHY
Develop a mass marketing campaign to highlight that cycling can be the perfect way for busy people to keep active, as it combines physical activity with transport and/or active recreation. In many cases it can be time equivalent to other transport modes and at times, the fastest way to get from A to B.

People frequently overestimate how long a trip takes by bicycle and underestimate the time required to undertake a journey by car (Tranter, 2004). As Australians try to fit more into their day, cycling offers an elegant solution for an increasingly time poor society by combining the need for transport and physical activity.

Many perceived physical barriers to cycling, such as poor weather and distance to destination are actually perceptual barriers that modify when people start riding (Rissel et al, 2002; Garrard et al, 2006).

In Australian capital cities, 52% of car journeys are under 5km and 38% are under 3km (Austroads, 2005; RMIT, 1999)
2.2 Social and cultural factors

Cultural values and norms include systems of belief and codes of behaviour that shape the structure of society. These systems of belief, many of which are unstated or unconscious, influence behaviour in subtle ways. They can be difficult to identify, challenge or change. Nevertheless, successful public health strategies demonstrate that health enhancing changes in community attitudes are possible (e.g., tobacco control, drinking, bullying, and violence against women). This section describes some of the social and cultural factors that constrain cycling.

Figure 8 The effects of ever-increasing car use on walking and cycling to school

In a sample of 3361 adults from Western Australia, Milligan et al (2007) found obesity and inactivity were disproportionately high in those with low levels of education, the unemployed and the retired. Similarly, they found the propensity to undertake short walks or bicycle trips rather than car journeys increases with education level. The encouragement of cycling in populations of economic and educational disadvantage is therefore particularly pertinent. The promotion of more regular utilitarian cycling may help reduce the socio-economic differential in physical activity. A ‘whole of community’ childhood obesity prevention program in Colac, Victoria (Be Active, Eat Well) successfully reduced Body Mass Index relative to the control group. The program included a component on bicycle education and promotion, especially cycling to school. The results demonstrated a flattening of the gradient between socio-economic group and Body Mass Index (Sanigorski et al, 2007).

Recent evidence suggests that, in the US, ‘lifestyle’ physical activity (e.g., utilitarian walking and cycling) does not show the marked social gradient evident for leisure-time physical activity (Berrigan et al, 2006). Participation in cycling is a low cost activity and has the potential to actually save money if used to replace some car journeys (Tranter, 2004).

Social norms governing behaviour have tended to favour motorised travel over active transport, even for journeys short enough to be completed by bicycle. A paradoxical situation was found to exist whereby low income areas are less conducive to the most affordable and physically active forms of transport: and recreation, such as cycling. Yet in comparison to other forms of physically active leisure, bicycle riding was found to display a more level social gradient. In order to allow Australians of all social and cultural backgrounds to live a healthy lifestyle, it is necessary to provide an environment supportive of cycling.

2.3 Environmental factors

The constructed environment... often seems intentionally designed by human beings to impose barriers to physical activity

Sallis et al, 1998, p. 381

Environmental influences on physical activity, including cycling are well-documented. Community characteristics such as urban density, road and street design, housing type, accessibility to and connectivity of bicycle paths, lanes and trails, and location of community services all play a substantial role in promoting or discouraging cycling (Giles-Corti et al, 2005; Newman & Kenworthy, 1999; Handy, 2004). The following section on the physical environment’s influence on cycling and health is divided into urban design and bicycle infrastructure, although it should be noted that there is considerable overlap.

2.31 Urban design

Public health researchers studying the link between environment and health have found that land-use mix has a strong association with obesity. Frank et al (2004) found in their study of over 10,000 people that each quartile increase in land use mix is associated with a 12.2% reduction in the likelihood of obesity across sex and ethnic groups.

There is growing evidence that low density neighbourhoods with poorly connected street networks affect how much time we spend walking, cycling and our ability to use public transport

(Research Australia, 2007, p. 15).

Professor Billie Giles-Corti of the University of Western Australia has demonstrated a clear link between the socio-economic spectrum.
quality of public space and levels of walking and cycling (Research Australia, 2007). Figure 9 (below) offers a good illustration of the sort of conditions that have been found to promote active transport, whilst figure 10 (below) is an example of poor amenity, which act as a barrier to active transport.

Low density development has been found to be a barrier to cycling, as it increases average journey distance and fosters a culture of car-dependence (WHO, 2006; Racioppi et al, 2005; Steele, 2007; Killoran, 2006; Handy, 2004; Giles-Corti et al, 2005).

"We know there’s a lot of evidence that people aren’t healthy and aren’t getting healthier and yet, up until recently, most of the focus was on health promotion campaigns focusing on the individual. There’s no point telling people to cycle more if their environment is so unfriendly they can’t"

Libby Darlison, Chair, NSW Premier’s Council for Active Living

A recent report commissioned by the Western Australian Government (Milligan et al, 2007) cited extensive research (Hill & Peters, 1998; French et al, 2001; Swinburn et al, 1999) demonstrating that ‘obesogenic’ environments are acting as barriers to physical activity, with corresponding increases in obesity.

This is supported by a major study of the effects of land use and transport policy in Atlanta, United States. The research team found that residents of suburbs with better active transport options drive less, are more physically active and less likely to be overweight or obese (Frank et al, 2007).

Importantly, these results take into account self-selection. Self-selection relates to the possibility that the residents with a predisposition to physical activity chose to live in a particular area because it had good active transport options. Self-selection was taken into account by investigating the behaviours of people that did not live in their preferred neighbourhood type. Frank et al (2007) found that the residents with the most favourable environment for walking and cycling were 2.4 times as likely to undertake the 30 minutes of physical activity suggested by the United States Surgeon General (1996). In fact, the youth surveyed living within a kilometre of a recreational space, such as a bicycle path, or a retail destination were around 2.5 times more likely to report undertaking active transport (walking or cycling).

It should be noted that in many of these studies walking is more frequently undertaken than cycling and that walkability is the more commonly assessed item (rather than bikeability). Finally, the number of cars per household was found to be inversely proportional to physical activity levels.

To assess the influence of the physical environment on cycle participation, Pucher & Buehler (2006) examined why it is that Canadians ride to work three times more frequently than residents of the United States. They found that Canada’s higher density and land use mix reduces trip distance (and superior bicycle infrastructure) encourages cycling. The cost of car ownership and usage is also higher in Canada and this was found to encourage active forms of transport. Canada’s cooler climate was a less important determinant of cycling. Another Canadian study found that the development of a comprehensive and connected network of local roads and pathways encourages a higher level of commuter cycling (Aultman-Hall et al, 1997).

End-of-trip facilities

End of trip facilities, as their name suggests, refer to the provision of facilities designed to improve cyclists amenity at their destination. Secure bicycle parking is a basic minimum and may include the following additional facilities:

- Showers
- Lockers
- Change rooms
- Laundry facilities
- Bicycle repair

Provide end of trip facilities for cyclists

Encourage the introduction of legislation to require developments to include end of trip facilities for cyclists. See appendix 12 for further information.
A lack of end of trip facilities has been highlighted as a significant barrier to cycling, especially for journeys to work (Mellifont, 2001) and this finding was supported by a qualitative analysis of the needs of cyclists, using a sample of riders and non-riders (Daley et al, 2007). Conversely, the provision of workplace car parking has been found to decrease the likelihood of commuting by bicycle (Mobilität in der Schweiz, 2001, cited in WHO, 2006).

2.32
Bicycle infrastructure

A lack of bicycle infrastructure is regularly reported to be a major barrier to increase cycling participation in Australia (Garrard et al, 2006; Daley et al, 2007).

To assess the influence of bicycle infrastructure on the level of cycling participation, researchers have investigated the association between the number of kilometres of bicycle paths per 100,000 residents and the proportion of bicycle commuters. The study found that low levels of bicycle infrastructure have a negative impact on levels of bicycle use (Nelson & Allen, 1997). Importantly, this relationship remained after adjusting for weather, terrain and the number of university students. Their results are supported by the case study on page 16 which shows that increasing the length of the Maylands bicycle path in Western Australia contributed considerably to the increased volume of cycle trips made.

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The development of first class end of trip facilities at Brisbane City Council offers a very good demonstration of the importance of end of trip facilities in encouraging bicycle commuting. Prior to the development of the new facilities, Council provided 100 basic bicycle parking spots. The new facility accommodates 150 bike spaces and 200 lockers. The new facility reached capacity within a few months of opening and there is now a waiting list.

The lack of infrastructure for bikes is a barrier. That’s a fear, being injured if I got on a bike

Busy roads have also been found to act as a significant barrier to cycling, especially for women (Garrard et al, 2006). The overwhelming majority of commuter arterials lack adequate provision for cyclists and this is likely to explain part of the reason why bicycle journeys to work make up around 1 – 2% of commute trips and only 21% of these are female cyclists (ABS, 2007a).

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In countries with high bicycle transport mode share, cycling is a socially inclusive activity (Pucher & Dijkstra, 2003; Pucher & Buehler, 2008).

Garrard et al (2006) found that female cyclists often choose routes that separate them from traffic, even if it may result in longer journeys. This is testament to the notion that motor vehicle traffic is a significant barrier to cycling. International studies indicate a strong inverse relationship between bicycle mode share and female participation in cycling (Pucher & Buehler, 2008), suggesting that female participation in cycling may be an indicator of a cycling friendly environment. Consequently, any measures that increase female participation in cycling may have a flow-on effect for other groups (eg more risk-averse males, children, older Australians).

For instance, in the 2005 online survey of 2403 cyclists in Victoria, the majority of respondents who cycled for transport used roads with no bicycle facilities (83 per cent of females and 87 per cent of males) but only 6 per cent of females and 12 per cent of males actually preferred this option (Garrard et al, 2006).

CASE STUDY – EAST PERTH TO MAYLANDS PRINCIPAL SHARED PATH

The East Perth to Maylands Principal Shared Path offers a good example of the influence of high quality bicycle infrastructure on usage.

The below graph illustrates the substantial increase in cycling coinciding with the years in which improvements had been made to the bicycle route. The figures below reinforce the influence improvements in bicycle infrastructure have on participation (Ker, 2004; Cornwell & Barker, 2007):

- 708 extra cyclists used the route each weekday, of which only 102 were transferred from other routes
- 206,500 extra cycle trips per year
- A 50% increase in usage was recorded when the path was extended 2km
- Cost benefit ratio found to be 3.3:1.

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OVERCOMING BARRIERS TO CYCLING WITH TRAVEL DEMAND MANAGEMENT

Travel Demand Management refers to techniques aimed at reducing the need for car use and making alternative forms of transport more attractive. This can take a number of forms and the following outlines a few examples:

- Restricting motor vehicle access in city centres and creating a pedestrian and bicycle friendly inner core.
- Raising money through higher car parking charges and investing the revenue in pedestrian and bicycle facilities as well as improved public transport. Melbourne currently operates such a scheme.
- Congestion Charging: Since 2003, London has been charging cars for entering the inner city. This has resulted in less traffic congestion and a 43% rise in bicycle journeys. Revenue is invested in the public transport system and this has resulted in a large jump in passenger boardings and improved travel time (Transport for London, 2007).

It is important to stress that the ‘stick’ approach should be balanced with ‘carrots’ to ensure that a wide range of mobility options are offered. When used in the right balance, they provide a win-win as they improve the traffic environment for those that need to drive, whilst promoting a range of healthier, sustainable travel options for others in the community (Litman, 2007).
How to encourage better integration of bicycles with public transport

**BICYCLES AND PUBLIC TRANSPORT**

The combination of cycling and public transport offers the opportunity to cover distances not comfortably achieved by bicycle alone. In countries that have maximised opportunities for bicycling, such as the Netherlands, 38.6% of train trips involve a bicycle ride to the station (Cycle Council of the Netherlands, 2007).

The three key areas to encourage more people to integrate bicycle and public transport travel are:

- **Safe Bicycle Routes to Public Transport Hubs:** This is the essential first step required to enable more people to feel safe and comfortable when riding to the station/stop. Appendix 16 illustrates how an integrated network of bicycle routes leading to train stations can increase the catchment area of public transport hubs.

- **Secure Bicycle Parking:** Once passengers have cycled to the station, they will require a secure place to lock their bicycle – as it will typically be left unattended for a large portion of the day.

- **Taking bicycles on public transport:** Providing the opportunity for people to take their bicycles on public transport allows people to ride both to and from their public transport journey. This has proven to boost the attractiveness of each of these modes of transport, as demonstrated by a comprehensive review of current programs throughout the United States (Federal Transit Administration, 2005).

See appendix 17 for information on the opportunities available for carry bicycles on public transport.

**THE NETHERLANDS MODEL FOR BICYCLE INFRASTRUCTURE**

The pictures below demonstrate how well the Netherlands’ efforts in providing safe bicycle routes to train stations and bicycle parking have been embraced.

**THE WESTERN AUSTRALIA EXPERIENCE WITH PUBLIC TRANSPORT CATCHMENT AREAS**

A study on Perth’s Northern Suburbs Transit System has found that 30-55% of those driving to the station live within 3km (Department for Planning and Infrastructure, unpublished).

At another station, with a relatively narrow catchment in an older developed area, nearly half the cars in the Park and Ride facility are registered at addresses within 800 metres of the station (Jim Krynen, Western Australian Public Transport Authority).

This pattern of vehicle usage reinforces the potential of cycling to replace short distance car trips to public transport facilities like railway stations.

The heavy demand for bicycle parking at train stations is not limited to major centres such as Amsterdam. Even regional centres have successfully fostered a culture of riding to the train station, as illustrated in the second photograph.
2.4 Safety

Safety concerns are a significant and consistently reported barrier to cycling and this is true for non-riders, infrequent and even regular riders (Daley et al, 2007; Greig, 2007). This section discusses the issue of safety as a barrier to cycling and offers evidence based facilitators to help overcome these concerns.

Daley et al (2007) conducted a series of focus groups with riders and non riders in Sydney and found that fear was a significant and frequently reported theme when investigating barriers to initiating or maintaining regular riding. They also found that ‘Cycling’s dangerous image prevented many non-riders from contemplating riding’ (p. 4).

Hostile Road Behaviour

In a telephone survey of a random sample of 1880 adult Australians in 2004 by the Australian Associated Motor Insurers, a high proportion of respondents agreed or strongly agreed that “Aggressive drivers put me off cycling or walking” (46% of women and 38% of men) (Australian Associated Motor Insurers, 2004). Moreover, 86% of respondents in the 2005 survey of 2403 cyclists in Victoria reported experiencing intentional harassment from motor vehicle occupants in the previous 12 months (Garrard et al, 2006). The rate of cyclist harassment was an average of 24 incidents every 12 months (approx once a fortnight). These disturbing results are supported by a smaller survey of cyclists in South Australia (Brisco, 2006). Further evidence of road user behaviour acting as a barrier to cycling can be found in appendix 14.

Only one in five drivers knew that it was legal for cyclists to ride two abreast, 44% that cyclists were allowed to ride along a clearway, and 63% that cyclists were allowed to occupy a whole lane (Rissel et al, 2002).

The Transport Research Laboratory in the United Kingdom investigated driver’s attitudes to cyclists, using both qualitative and quantitative methods. They found drivers often have a negative attitude to cyclists and see them as an ‘out group’. This view was found to result in many cyclists experiencing aggressive and dangerous behaviours from motorists. Drivers were more annoyed by cyclists (30%) than by other drivers (13%), which the authors attributed to a consistent pattern of regarding “the behaviour of ‘out-group’ members more negatively than the behaviour of ‘in-group’ members” (Basford et al, 2002).

In Australia, you are seven times more likely to be hospitalised playing football than riding a bike (Flood and Harrison, 2006)

The evidence linking excessive speed and heightened road traffic danger could not be clearer (Whitelegg, 2006) and this is illustrated in the table below by the World Health Organisation:

<table>
<thead>
<tr>
<th>Speed</th>
<th>Pedestrian Fatality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>32km/h</td>
<td>5%</td>
</tr>
<tr>
<td>48km/h</td>
<td>45%</td>
</tr>
<tr>
<td>64km/h</td>
<td>85%</td>
</tr>
</tbody>
</table>

Source: Dora, 1999

The table above shows a clear correlation of the impact vehicle speed has on the likelihood of pedestrian fatality. Cyclists, as a similarly vulnerable road user, can expect similar fatality rates. Killoran et al (2006), in their report Transport interventions: Evidence briefing, for the United Kingdom’s National Health Service found clear evidence that speed reductions significantly increase safety levels and peoples’ propensity to walk and cycle.

The combination of speed, volume of traffic and a lack of designated space for people to ride has been found to be a most significant barrier to cycling (Daley et al, 2007; Garrard et al, 2006). It is often exacerbated by aggressive driving and this has been consistently identified as a major deterrent to regular cycling, as has the general lack of bicycle infrastructure (Greig, 2001).

Speed control in Australian cities and neighbourhoods is poor, with 50km/h acting as a standard, compared to 20/30 km/hr in many European cities (Whitelegg, 2006; Pucher 2006).

A review of the literature finds that the perception of bicycling as a high risk activity, due to possible collision with motor vehicles deters many potential cyclists (Garrard et al, 2006). Although it is necessary to acknowledge the legitimate concern of cyclists and non-cyclists, the data on road traffic injury presents strong evidence that riding may not be as hazardous as commonly perceived. In Australia, you are seven times more likely to be hospitalized playing football than riding a bike (Flood and Harrison, 2006).

Research conducted by the British Medical Association found that the health risks of inactivity are 20 times greater than the health risks posed by a potential cycling accident (British Medical Association, 1992).
The graph illustrates that countries with high cycling use have much lower cycling fatalities. The notion that, as the proportion of cycling trips increases so does safety, is also supported by Jacobson (2003) and Robinson (2005)—the latter investigated this relationship in the Australian context. Both authors found that increasing the number of cyclists on the road is an effective strategy to improve road safety. In fact, their investigation of transport injury and bicycle usage data allowed them to conclude "If cycling doubles, the risk per kilometre falls 34%" (cited in Robinson, 2005, p. 48).

Numerous other authors have found that as the number of cyclists increase, the number of accidents dramatically reduces on a per kilometre basis (Litman & Fitzroy, 2005; Birk & Geller, 2007; Pucher & Dijkstra, 2003). For instance, cycling in London has increased 83% over the last 6 years, yet the number of serious crashes involving cyclists has fallen proportionally by 28% (Greater London Authority, 2007). The more cyclists there are, the more visible they will be to other road users, as people will be expecting to see cyclists. It is also more likely that car drivers will, themselves, ride a bike at some time – car drivers who also ride a bike are more likely to be aware of and respect the rights of cyclists (Transport Western Australia, 1996). See appendix 14 for additional information.

Research has shown that the more often you cycle, the safer it is. In fact, by riding twice a week instead of once a week, the chance of an accident halves, due to training and increased awareness of cars (Transport Western Australia, 1996).

The United Kingdom’s Social Exclusion Unit found that roads with heavy motor vehicle traffic act as a barrier to walking and cycling (2003). This barrier can be ameliorated by placing restrictions on heavy vehicle traffic on roads that form part of a bicycle network. A recent review by the World Health Organisation on the literature examining the effect of the road traffic environment on cycle and pedestrian safety found that area wide traffic calming significantly reduce road traffic injury (Bunn et al, 2003, cited in Killoran et al, 2006).

Some key points:

- The more cyclists there are, the safer it becomes.
- Motorists behaviour largely controls the likelihood of collisions with people walking and cycling.
- Comparison of pedestrian and cyclist collision frequencies between communities and over time periods need to reflect the amount of walking and bicycling.
- Efforts to enhance pedestrian and cyclist safety, including traffic engineering and legal policies, need to be examined for their ability to modify motorist behavior.
- Policies that increase walking and cycling appear to be an effective route to improving road safety.

(Jacobson, 2003)
2.5 Policy and regulation

Public health is affected by a range of factors not generally considered related to the health sector. As described above, transport and land use policies can have powerful influences on public health, in either a positive or negative direction.

Sallis et al (1998) in their paper Environmental and Policy Interventions to Promote Physical Activity noted that much of the available evidence suggests that many of the interventions necessary to increase physical activity will need to be funded outside the health sector. An acknowledgement by public health experts, including the World Health Organisation that the transport sector has an extremely important role to play in the creation of a physically active community (Dora, 1999) is an important precursor to the development of a transport system that works for rather than against the public's health.

A comprehensive review of the evidence supporting cycling by the National Institute for Health and Clinical Excellence in the United Kingdom recommended that ‘Transport policies should be subject to more systematic use of health impact assessments’ (Killoran et al, 2006, p. 5). It is essential that such health impact assessments be conducted on all major transport projects. The assessment would include impacts on road safety, noise and air pollution, liveability, and sedentary lifestyle disease. Importantly, it would also assess the project’s impact on climate change, as it has now been established that climate change has profound public health implications (Research Australia, 2007).

### INVISIBLE INFRASTRUCTURE

Physical bicycle infrastructure, such as bike lanes, signage, ramps etc are traditional, straight-forward strategies used to encourage cycling. Whilst these initiatives are evidence-based methods of encouraging cycling, there are additional solutions that do not directly involve the development of bicycle specific infrastructure. These initiatives have nevertheless proven to be an efficient method of improving bicycle friendliness and participation. ‘Invisible Infrastructure’ (Sully, 2005) focuses on regulatory and design features that are not directly bike-orientated. Examples include speed restrictions and traffic calming.

Sully (2005) argues that such policies, practices and physical measures encourage a modal shift in favour of cycling without a significant financial investment in cycle-specific infrastructure. An important advantage of invisible infrastructure is that it provides a range of additional benefits – not simply for cyclists, but for the community as a whole. For instance, speed restrictions have been shown to increase both the perceived and actual level of safety – for all road users (Dora, 1999; Hillman et al, 1991).

The effectiveness of invisible infrastructure is demonstrated in Hilden, Germany, which experienced a significant increase in cycling through the implementation of wide spread speed restrictions. Residents of Hilden report improved perceptions of safety as a principal reason for cycling more (King, 2005).

### PRESCRIBING CYCLING

The World Health Organisation (2006) recommends that health professionals can play a lead role in the promotion of physical activity. Their role is unique in that they have a particular advantage at targeting those that stand to benefit the most from the activity, namely, physically under active groups. Moreover, they are an important and respected source of health information (Milligan et al, 2007).

Encouraging GP’s to effectively convey the importance of physical activity to appropriate patients is an under-utilised method of reducing sedentary lifestyle disease. Specifically, the World Health Organisation recommends:

- Increasing the level of education offered to health professionals during training on the importance of bicycle riding as preventative medicine.
- Providing financial motivation for health professionals prescribing physical activity.
- Encouraging the health sector to lead by example: encouraging active travel to/from health institutions.

A number of researchers in the field of physical activity promotion at a population level have suggested incentive based programs may be effective at boosting physical activity. According to Sallis et al (1998), providing discounts on health insurance for people that ride to work may hold promise.

Western Australia’s Premiers Council on Physical Activity (Milligan et al (2007) found that only 18% of overweight patients had received GP advice on physical activity, as demonstrated in appendix 9.
Physical inactivity and the resulting lifestyle diseases are reducing Australia’s health status and quality of life.

“We...have created an environment that makes it very convenient for people to be inactive, and subsequently develop unhealthy behaviours. The only way to combat this is to make it equally convenient for people to become active, and moreover, easier for them to inherit a better quality of life”.

Libby Darlison, Chair, Premiers Council on Active Living, NSW.

Boosting the level of bicycle riding offers significant opportunities to reverse the emerging trend of decreasing activity levels and spiralling rates of obesity and diabetes.

The following policy interventions are designed to respond directly to the barriers to cycling outlined earlier and are based on the best available, most domestically relevant evidence.

As previously highlighted, researchers have consistently found that a lack of time is one of the most frequently cited reasons for not participating in physical activity. Cycling, as a form of transport and active recreation, overcomes this issue, as individuals’ health, transport and recreation needs are combined into the same activity – thereby saving time!

The World Health Organisation has established that a wide range of interventions, at a population-wide and individual level are required to boost levels of physical activity (WHO, 2006). Professor Boyd Swinburn has demonstrated the importance of comprehensive and long-term approaches to tackling such issues as obesity (Swinburn & Egger, 1996). It is for this reason that it is important to provide both a supportive physical environment for cycling and encouragement programs and events. It is this combination of the ‘hard’ and ‘soft’ infrastructure that offers the most effective strategy.

Cycling is certainly the healthy choice. Now we need to make it the easy choice

A significant body of evidence now exists to demonstrate that many public health issues have been successfully tackled with a population-wide approach; tobacco control and seatbelt wearing are good examples. Policy interventions to encourage physical activity using similar population wide measures are likely to be successful. This includes political support, appropriate funding and whole-of-government strategies (WHO, 2006). These policies must translate into an on the ground reality that makes the healthy choice the easy choice. Cycling is certainly the healthy choice. Making it the easy choice is the focus of this report’s recommendations.

Recommendation 1

Mass marketing campaign

This report recommends that a national mass marketing campaign be developed to address perceived barriers to cycling. Key messages likely to be successful include:

- Cycling is safer than you think
- You don’t need to be super fit to cycle
- Improve road user behaviour/safety/awareness of cyclists
- Benefits of choosing to cycle; health improvements, greenhouse gas and petrol savings, relief from congestion and parking problems.

It is important to ensure that mass marketing is done in coordination with infrastructural improvements to ensure new cyclists are not deterred from the experience.

Recommendation 2

Bicycle education programs

This report recommends that a national bicycle education program be developed and implemented across years 5 and 6, as well as community and workplace programs for adults.

Recommendation 3

Behaviour change programs

This report recommends the expansion of behaviour change initiatives such as TravelSmart, Ride to School and Ride to Work programs.

Recommendation 4

Cycling events

This report recommends government support for cycling events, to act as an entry point for new cyclists.

Recommendation 5

Urban design

This report recommends the establishment of national guidelines to ensure the built environment contributes to, rather than detracts from, public health. Design should be encouraged through legislation that increases density, combines residential with other land uses and prioritises active forms of transport.

Recommendation 6

Bicycle Infrastructure

This report recommends the provision of high quality, integrated bicycle routes (on and off road) to meet the challenge of increasing Australia’s participation in active travel and recreation.

Recommendation 7

Funding

This report recommends that funding needs to be substantially increased at all levels of government to better reflect the contribution cycling makes to priorities in the transport, climate change, health and economic sectors.

Recommendation 8

Community and workplace programs

This report recommends that community and workplace programs be developed to encourage cycling as an alternative mode of transport and active recreation.
Conclusion

Australians have reduced their level of physical activity over recent decades and this has impacted negatively on our health.

Physical inactivity is now a major cause of ill health, contributing to obesity, diabetes and cardiovascular disease, as well as breast cancer and depression.

It is now clear that cycling offers an effective but underutilised form of physical activity, providing significant contributions to public health. Moreover, when used as an alternative to motorised transport, cycling is an effective method of reducing greenhouse gas emissions, congestion and increasingly expensive fuel costs.

Although cycling is increasing in popularity, both as a form of recreation and transport, participation remains low by international standards and some significant barriers must be overcome before considerable gains can be expected. These barriers have been identified in terms of:

- Individual factors such as a lack of riding skills and confidence
- Social and cultural factors such as societal acceptance of heavy car use, even for short trips
- Environmental factors such as urban planning and bicycle infrastructure
- Safety issues
- Policy and regulation matters

Solutions to each of these challenges exist and a focus of this report has been to outline practical, cost-effective solutions to increase adult participation in cycling.

An integrated suite of solutions have been recommended that address each of the aforementioned barriers to cycling. These include:

- Mass marketing the benefits of cycling
- Providing bicycle education programs in schools, workplaces and community settings
- Supporting cycling events
- Improving urban design/planning to make cycling more attractive
- Boosting the quality and quantity of bicycle infrastructure networks such as on and off-road bicycle routes and end of trip facilities
- Better integration of cycling with public transport systems
- Reassessment of funding for cycling; to better reflect cycling’s contribution to health, traffic congestion, climate change and high fuel costs.

As Australians continue to lead time poor lives, cycling is in a unique position for its ability to integrate physical activity into everyday living, especially through the use of the bicycle as a form of transport and active recreation.

The responsibility to create healthy conditions for cycling is not entirely within the direct control of the health sector. It is important to recognise a whole-of-government approach is required, with commitment from the health, transport, environment, education and planning portfolios. Only through a combined approach can the significant benefits of increased cycling be fully realised.
## Appendix 1

Energy expenditure of physical activities, including cycling, according to an individual’s weight

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>50 kg</th>
<th>68 kg</th>
<th>77 kg</th>
<th>86 kg</th>
<th>91 kg</th>
<th>100 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WALKING AND RUNNING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking, 3.3 km per hour</td>
<td>276</td>
<td>376</td>
<td>426</td>
<td>477</td>
<td>502</td>
<td>552</td>
</tr>
<tr>
<td>Walking, 4.8 km per hour</td>
<td>368</td>
<td>502</td>
<td>568</td>
<td>635</td>
<td>669</td>
<td>736</td>
</tr>
<tr>
<td>Bushwalking, carrying 5kg load</td>
<td>828</td>
<td>1129</td>
<td>1279</td>
<td>1430</td>
<td>1505</td>
<td>1655</td>
</tr>
<tr>
<td>Jogging, 8 km per hour</td>
<td>849</td>
<td>1162</td>
<td>1317</td>
<td>1471</td>
<td>1547</td>
<td>1701</td>
</tr>
<tr>
<td>Running, 14 km per hour</td>
<td>1517</td>
<td>2069</td>
<td>2345</td>
<td>2621</td>
<td>2759</td>
<td>3035</td>
</tr>
<tr>
<td><strong>CYCLING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycling, 15-16 km per hour</td>
<td>577</td>
<td>786</td>
<td>890</td>
<td>991</td>
<td>1045</td>
<td>1150</td>
</tr>
<tr>
<td>Bicycling, 21 km per hour</td>
<td>920</td>
<td>1254</td>
<td>1421</td>
<td>1588</td>
<td>1672</td>
<td>1839</td>
</tr>
<tr>
<td><strong>OTHER DOMESTIC TASKS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimming hedges</td>
<td>481</td>
<td>660</td>
<td>744</td>
<td>832</td>
<td>878</td>
<td>966</td>
</tr>
<tr>
<td>Vacuuming, window cleaning, car washing</td>
<td>343</td>
<td>468</td>
<td>535</td>
<td>594</td>
<td>627</td>
<td>690</td>
</tr>
<tr>
<td><strong>OTHER PHYSICAL ACTIVITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming (25 metres /minute)</td>
<td>552</td>
<td>752</td>
<td>853</td>
<td>953</td>
<td>1003</td>
<td>1104</td>
</tr>
<tr>
<td>Swimming (50 metres /minute)</td>
<td>1037</td>
<td>1413</td>
<td>1597</td>
<td>1789</td>
<td>1881</td>
<td>2069</td>
</tr>
<tr>
<td>Tennis (doubles)</td>
<td>506</td>
<td>690</td>
<td>782</td>
<td>874</td>
<td>920</td>
<td>1012</td>
</tr>
</tbody>
</table>

Source: Bauman, 2004
Appendix 2

Value of Commuter Cycling Assumptions

- Climate change cost savings of commuter cycling were calculated using A$40/tonne of carbon dioxide. This is higher than the Australian Transport Commission’s (2006a) default value, but is still very low by European standards. The United Kingdom, for example, currently requires a value of approximately A$200/tonne for transport project appraisal.

- Road traffic congestion is calculated based on incremental values derived from the Australian Bureau of Transport and Regional Economics (2007) for each capital city.

- The value of reduced congestion was determined using capital city cycling to work only, as this is where congestion costs are greatest. Similarly, the assessment has been on the basis of cycle-only commuting trips, as bicycle + other mode trips (usually with public transport) will tend to be shorter and also occur in outer or middle suburbs, where congestion and the impacts of air pollution are less intense. Our estimates will be, if anything, underestimates of the true impact of cycling to work.

- The savings to the health system is calculated based on net mortality (death rate) reduction and reduced morbidity (disease) (updated values from Ker, 2004).

- The value for mortality improvement was estimated on the basis of (a) Hillman (1997), who concluded that for every life year lost due to cyclist fatalities there is a corresponding gain of 20 life years through improved health and fitness and (b) costs of cyclist fatalities in WA provided by the Road Safety Council of Western Australia, to derive a value for each life-year.

- Less research has been done on the value of morbidity improvements. The value used here was originally suggested by Ker (2003) as a sensitivity test, based on limited information available.

- The average length of bicycle commuting trips (with bicycle as sole mode) is around 7 kilometres each way (derived from data in ABS, 2006).

- In assessing the value of cycle commuting, all impacts have been valued at resource cost (ie net of pure financial transfers such as indirect taxes – GST and fuel excise) at 2006 prices. However, we have included a progressive increase in the price of petrol to $2/litre by 2016, reflecting a conservative increase in the real cost of oil. This has an impact on car operating costs and congestion costs, both of which have a fuel component.

- Cycling offers the potential for considerable personal savings, in terms of reduced transport expenses. This can occur through reduced need for car ownership and/or reduced car usage. These cost savings have not been calculated for this report but may be helpful for future investigations on the economic benefits of cycling.
Appendix 3

Ride to Work Day: An effective behaviour change tool

*Ride to Work Day* is an effective behaviour change event on a number of levels. It encourages people to contemplate, prepare for and trial the ride-to-work experience, then to maintain that behaviour after the event. As a tool for behaviour change it acts as:

- A thought-provoker for those who are yet to commence riding to work.
- An opportunity to prepare for and trial the experience for those who have been giving riding some thought.
- A deadline to get ready for those who have already begun preparing.
- A reminder or prompt to get back into riding for seasonal or lapsed riders (maintenance).
- Behaviour reinforcement (maintenance) and an opportunity to support new and returning riders for regular riders.

Source: Bicycle Victoria, 2006, p. 9

Appendix 4

The Distance Travelled on Ride to Work Day (one way, all respondents)

![Graph showing distance travelled on Ride to Work Day](image)

Note: The averages for graph 2 are calculated on distances less than 31Km (<31Km is 4% of the national data set) as this removes outliers that live large distances from work and whose figures would skew the averaged results.

Source: Bicycle Victoria, 2006

Appendix 5

The Distance Travelled on Ride to Work Day (one way, first-time riders)

![Graph showing distance travelled on Ride to Work Day for first-time riders](image)

Source: Bicycle Victoria, 2006
Appendix 6

Normal transport mode for Ride to Work Day participants

Source: Bicycle Victoria, 2006

Appendix 7

TravelSmart Workplaces

TravelSmart Workplaces: develops partnerships with organisations to reduce car use, particularly to and from work. This typically involves the development of a Green Travel Plan for the organisation, highlighting a range of initiatives to promote alternatives to single occupant car use – including:

- Development of Bicycle User Groups (BUGs) and staff bicycle fleets
- Installation of end of trip facilities for cyclists, such as bike parking, showers and change rooms.
- CycleSmart software to help staff gauge how their decision to cycle helps their health (e.g. calories burnt), the environment (e.g. greenhouse gas saved), and their wallet (e.g. reduced fuel costs).
- Staff Bicycle Fleet: Operating in a similar manner to an organisation’s motor vehicle fleet, a bicycle fleet is a healthy alternative for short trips. The Department of the Environment and Water Resources (2007) have recently released a toolkit designed to help organisations get started.
- Car pooling software into workplace intranet
- Information on public transport options
- On line toolkit to develop the business case for reducing car use

Appendix 8

The 2006 Brisbane to the Gold Coast Ride – A Snap Shot

- Participant total was 3,800, an increase of 73% from 2,200 in 2005
- 74% were Male and 26% were female.
- 79% were between 26 and 55 years of age
- Approximately 1,000 riders were from outside the greater Brisbane area
- 50% normally ride 5 to 10 hours per week
- 61% were not Bicycle Queensland members
- 40% had not previously been on a BQ event
- 87% entered the event online
- 99% of riders said they would recommend the event to others
- 97% were satisfied or very satisfied with their experience on the day.
- Funds raised for Diabetes research was $60,000 (increased from $22,000 in 2005)

Source: Bicycle Queensland
**Appendix 9**

GP advice on physical activity

<table>
<thead>
<tr>
<th>Times</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15.5</td>
</tr>
<tr>
<td>Female</td>
<td>13.8</td>
</tr>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
</tr>
<tr>
<td>18 to 29 years</td>
<td>8.3</td>
</tr>
<tr>
<td>30 to 44 years</td>
<td>17.2</td>
</tr>
<tr>
<td>45 to 59 years</td>
<td>17.0</td>
</tr>
<tr>
<td>60 years or more</td>
<td>14.7</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td></td>
</tr>
<tr>
<td>Perth metropolitan area</td>
<td>14.9</td>
</tr>
<tr>
<td>South West</td>
<td>14.1</td>
</tr>
<tr>
<td>Kimberley/Pilbara</td>
<td>15.9</td>
</tr>
<tr>
<td>Midwest/Goldfields</td>
<td>12.7</td>
</tr>
<tr>
<td><strong>Activity Level</strong></td>
<td></td>
</tr>
<tr>
<td>Inactive</td>
<td>15.5</td>
</tr>
<tr>
<td>Insufficient</td>
<td>17.3</td>
</tr>
<tr>
<td>Sufficient</td>
<td>13.2</td>
</tr>
<tr>
<td><strong>BMI Category</strong></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>8.8</td>
</tr>
<tr>
<td>Acceptable</td>
<td>6.6</td>
</tr>
<tr>
<td>Overweight</td>
<td>17.6</td>
</tr>
<tr>
<td>Obese</td>
<td>36.2</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>14.6</td>
</tr>
</tbody>
</table>

*Source: Milligan et al, 2007*

**Appendix 10**

The Ecological Model of Physical Activity

According to the Ecological Model of Physical Activity, the policy goal must be one that seeks to create a positive interaction between environmental, social and personal factors, to bring about increases in physical activity. A practical example of such an approach would be the simultaneous creation of improved bicycle infrastructure, combined with behaviour change programs to promote the adoption of cycling.

Whilst a combination of environmental and behavioural interventions are considered to be most effective in boosting levels of physical activity, it is essential to recognise that supportive physical environments should precede behaviour change programs (Sallis et al, 1998). After all, promoting the benefits of physical activity in an environment that is hostile to such behaviour is unlikely to be effective, enjoyable or sustainable.

The figure below offers an overview of the Ecological Model of Physical Activity, providing an outline of where each influence sits in the model. It groups environmental and policy considerations as one, whereas in this report, they have been treated separately, but no less interrelated.

*Source: Hume, 2007 (adapted from Davison & Birch, 2001)*

*Sufficient activity is defined at 150 minutes of moderate physical activity over five or more sessions or 60 minutes of vigorous physical activity per week (excludes gardening and household chores).*
Appendix 11
Women’s share of bicycle journeys – an international comparison

Workplaces are beginning to provide end of trip facilities and legislation has been shown to streamline and coordinate the process of developing the wide spread adoption of end of trip facilities. This has already started to occur in select areas around Australia. For example, the Parking and Access Policy for the Town of Vincent (WA) states, for non-residential development, that:

Bicycle parking facilities and end of trip facilities are to be provided in addition to the calculated [car] parking requirement at the rate specified in the Bicycle Parking requirements Table. Bicycle parking is to be provided for employees/residents as well as visitors/shoppers in accordance with the specifications (p.3).

The Town of Vincent Parking and Access Policy

Provision of End of Trip Facilities

End of trip facilities are facilities which enable the cyclist to shower and change at the beginning or end of their journey to and from work. The facilities include separate male and female change rooms, showers and storage lockers. All new developments, and where appropriate, developments which involve a change of use and/or additions/enlargements to an existing building, that are required to provide 10 or more bicycle parking bays in accordance with the employee requirements of the above table, are required to provide end of trip facilities, as follows:

i) A minimum of one female shower and one male shower, located in separate change rooms.

ii) Additional shower facilities to be provided at a rate of one female shower and one male shower for every additional 10 bicycle parking bays, to a maximum of five female and five male showers per development.

iii) End of journey facilities should be located as close as possible to the bicycle parking facilities.

iv) The change rooms to be secure facilities capable of being locked.

v) A locker to be provided for every bicycle parking bay provided.

In 2004, Victoria became the first state to amend their planning code to encourage the development of end of trip facilities in large new commercial and residential projects. Bicycle parking, showers, lockers and change rooms will be mandatory for all new buildings greater than 1000m2. Offices, retail, hospitals and apartments over 1000m2 will be required to include at least one bike parking space for every 300 square metres of floor space (TravelSmart, 2004).

In 2006, the Australian Capital Territory introduced Bicycle Parking Guidelines which requires commercial developments to provide one bicycle parking space per 250m2 and for each apartment. In addition, it is possible to replace one car space with four bicycle spaces to a maximum of 5% of the total number of mandatory car parking spots (Planning and Land Authority, 2006).

Appendix 12

End of trip facilities for cyclists

<table>
<thead>
<tr>
<th>Percentage of trips by women</th>
<th>Australia</th>
<th>USA</th>
<th>UK</th>
<th>Canada</th>
<th>Denmark</th>
<th>Germany</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>21%</td>
<td>25%</td>
<td>29%</td>
<td>30%</td>
<td>45%</td>
<td>59%</td>
<td>55%</td>
<td></td>
</tr>
</tbody>
</table>

Data sources: Australian Bureau of Statistics (2007); Department for Transport (2007); Danish Ministry of Transport (2005); Statistics Netherlands (2005); German Federal Ministry of Transport (2003); U.S. Department of Transport (2003) and information provided directly by planners in Canadian provinces and cities.

Source: Pucher & Buehler, 2008
Appendix 13

Age group diversity in bicycle participation is possible

Source: Pucher & Dijkstra, 2003

Appendix 14

Poor behaviour on the road is a barrier to cycling

A Victorian Parliamentary inquiry into violence associated with motor vehicle use received a large number of submissions from the cycling community reporting instances of road violence. Several submissions suggested that the presence of cyclists on the road was a trigger for road violence against cyclists (Drugs and Crime Prevention Committee, 2005).

Driver knowledge of the road rules as they relate to people on bicycles has been found to be generally poor. Only one in five (19%) of drivers knew that it was legal for cyclists to ride two abreast, 44% that cyclists were allowed to ride along a clearway, and 63% that cyclists were allowed to occupy a whole lane (Rissel et al, 2002). Importantly, this lack of knowledge regarding vital aspects of the road rules has been found to be associated with a negative attitude amongst motorists towards people on bicycles (Rissel et al, 2002). The hostile reception reported by bicyclists from motorists is a consistent theme when surveying people who ride bicycles. Daley et al (2007) found that many occasional and regular riders perceived the average Sydney driver as impatient and intolerant. Some thought drivers were more likely to respect cyclist’s safety and rights if bicycles were more frequently encountered on the roads and this is supported by Robinson (2005) who found that the more cyclists there are, the safer it becomes. Riders described alterations where motorists took out frustrations on them, often triggered by the motorist’s view that their journey was delayed by the rider. Riders felt there was a skewed driver perception that a cyclist held up traffic, rather than seeing them as a legitimate part of the traffic system. It is this lack of acknowledgement towards people on bicycles that has been found by Greig (2001) to be a significant deterrent towards regular cycling.
Appendix 15

More bikes improves safety for everyone

![Graph showing the relationship between bicycle traffic and crashes]

The long blue line left represents the proportion of cycle crashes relative to actual number of cyclists. It clearly illustrates that as the number of cyclists increases, the safer it becomes.

<table>
<thead>
<tr>
<th>Year</th>
<th>Bridge Bicycle Traffic</th>
<th>Reported Bicycle Crashes</th>
<th>Indexed Bicycle Crash Rate</th>
<th>Bicycle Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>2850</td>
<td>155</td>
<td>544</td>
<td>2</td>
</tr>
<tr>
<td>1992</td>
<td>3055</td>
<td>163</td>
<td>459</td>
<td>0</td>
</tr>
<tr>
<td>1993</td>
<td>3885</td>
<td>171</td>
<td>440</td>
<td>4</td>
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<td>1994</td>
<td>3830</td>
<td>189</td>
<td>493</td>
<td>3</td>
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<td>1995</td>
<td>3207</td>
<td>195</td>
<td>514</td>
<td>2</td>
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<tr>
<td>1996</td>
<td>4520</td>
<td>160</td>
<td>354</td>
<td>1</td>
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<tr>
<td>1997</td>
<td>5225</td>
<td>167</td>
<td>320</td>
<td>5</td>
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<tr>
<td>1998</td>
<td>5690</td>
<td>166</td>
<td>292</td>
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<td>1999</td>
<td>5910</td>
<td>161</td>
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<td>2000</td>
<td>6015</td>
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<td>298</td>
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<td>2001</td>
<td>7686</td>
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<td>2002</td>
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<td>2003</td>
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<td>2004</td>
<td>8875</td>
<td>174</td>
<td>184</td>
<td>4</td>
</tr>
<tr>
<td>2005</td>
<td>10192</td>
<td>188</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Birk & Geller, 2007, data collected from Portland, US

Appendix 16

Encouraging cycling to the station can increase its catchment area by a factor of 15

![Diagram showing the increase in catchment area]

<table>
<thead>
<tr>
<th>Mode</th>
<th>Average Speed</th>
<th>Distance Covered</th>
<th>Catchment Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>5 Km/h</td>
<td>0.8 Km</td>
<td>2 Km$^2$</td>
</tr>
<tr>
<td>Cycling</td>
<td>20 Km/h</td>
<td>3.2 Km</td>
<td>32 Km$^2$</td>
</tr>
</tbody>
</table>

Source: Elliot Fishman, adapted from Hudson, 1978
The United States has a very successful federally funded program to allow passengers to carry bikes on buses (Federal Transit Administration, 2005). The United States Federal Government provides the capital costs to install racks on the front of the bus. Despite initial apprehension from bus companies, the experience has been overwhelmingly positive and it has grown to include over 30 cities. A key learning from this program is the importance of installing racks on all buses in the company’s fleet (Federal Transit Administration, 2005). Two small pilot projects in Brisbane and Canberra have shown only limited success due to the fact that only a small number of buses were fitted with the racks and only on limited routes.

The following pictures offer a good overview of the diverse range of options provided in the United States by the Federal Government to encourage the combination of bicycles and public transport.

Bicycles on the front of a bus, Canberra
Source: Cycling Promotion Fund

Bicycles on the inside of trams in Maryland, United States
Source: Michael Jackson, Department of Transportation, Maryland, US

A bicycle on Portland’s light rail
Source: Elliot Fishman

Bicycles on Trains, California, United States
Source: Altamont Commuter Express, California
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Cycling offers an effective form of physical activity, providing significant contributions to public health. When used as an alternative to motorised transport, cycling is an effective method of reducing greenhouse gas emissions, congestion and increasingly expensive fuel costs.