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Williams, Tim (2008) *Promoting the use of cycling as an environmentally and socially sustainable form of transport*. In: 3rd International Solar Cities Congress 2008, 17-21 February 2008, Adelaide, South Australia.

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Promoting the use of cycling as an environmentally and socially sustainable form of transport.

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Abstract

We need to reduce carbon emissions. We need to reduce fuel consumption. We need to reduce pollution. We need to reduce traffic congestion. As obesity levels and associated health problems in the developed nations continue to increase we need to adopt a healthier lifestyle. Few if any would argue with these statements. In fact many would consider these problems to be amongst the most urgent that our society faces.

What if we had a vehicle that uses no fossil fuel to power it, creates no pollution, takes up far less space on the roads and promotes an active, healthy lifestyle. What if this machine would have energy efficiency levels 50 times greater than the car? This is a solution that is here, now and ready to go and many of us already own one.

It is the humble bicycle.

Although bicycle sales in Australia now outnumber car sales, bicycle use as a form of transport (as opposed to recreation) only constitutes around 3% to 4% of all trips. So, why are bicycles the forgotten form of transport if they promise to deliver the benefits that I have just outlined?

This paper examines the underlying reasons for the relatively low use of bicycles as a means of transport. It identifies the areas of greatest potential for encouraging the use of the world's most efficient form of transport.

1. INTRODUCTION

1.1. Goals and methodology

The goal of this paper is to review available literature in order to identify the major reasons for why bicycle use for commuting is so low. From the results of the literature review, a strategy or set of strategies will be developed that will encourage the use of bicycles as a viable form of transport.

1.2. Current bicycle usage

1.2.1. Worldwide

The humble bicycle has been around for over 150 years. In fact the bicycle of 100 years ago looked very similar to bicycles in use today. Manufacturing techniques and materials have improved as have brakes and gears but the overall shape is the same.

The bicycle is still popular. There are estimated to be a billion bicycles in the world today. This is twice the number of cars in the world. In China for example there are estimated to be 400 million bicycles and “only” 1 million cars. In the year 2000, world bicycle production climbed to 101 million, more than double the 41 million cars produced (Larsen 2002). However in many developing nations bicycle usage is declining as car ownership increases.

In the developed nations, bicycle usage varies quite dramatically. In countries such as Germany and The Netherlands roughly 1 in 4 trips are made by bicycle. In Australia and the USA, the number is about 1 in 20 (Cycling Promotion Fund, 2007).

1.2.2. Australia

In Australia, sales of new bicycles have outnumbered those of new cars for the last 5 years. (CoGG, 2006). The reasons why people own bicycles are complex. They include recreation, health and environmental concerns as well as cost. However the main use is for recreation and interestingly the fastest growing rate of cycling is in the 25 to 44 age group, (Australian Sports Commission , 2005) certainly well within the typical working age range.

2. WHY SHOULD WE CYCLE TO WORK?

There are many reasons for why we should cycle more often but three stand out as problems that need immediate attention and the bicycle is an ideal way to address these problems.

2.1. Health

Many studies have very clearly shown the health benefits of regular cycling. Amongst them is a report by the World Health Organisation (2002) that states “Walking and cycling as part of daily activities should become a major pillar of the strategy to increase levels of physical activity as part of reducing the risk of coronary heart diseases, diabetes, hypertension, obesity and some forms of cancer.” The cost of obesity alone (excluding overweight) in Australia in 2005 was estimated at a staggering \$21 billion. This equates to roughly \$1000 per person in Australia. And the rate is increasing each year.

Clearly we have massive public health problem that has enormous financial and social consequences and we need to make taking action a priority. Cycling is a cheap, effective way of maintaining regular exercise that people across all demographics are able to engage in.

2.2. Environment

A great deal has been written and debated about global warming and the excessive use of fossil fuels adding greenhouse gasses to the atmosphere. Statements such as “climate change presents perhaps the greatest global risk of our time” (Cycling Promotion Fund, 2007) are common.

Motorised transport is a large contributor to this problem. For each passenger vehicle that we can keep off the road we will prevent on average 5,500 tonnes of carbon reaching the atmosphere (EPA - USA, 2000). The bicycle is an ideal alternative to the automobile.

Another environmental and social problem that seems to have almost escaped public attention is that of world peak oil. Peak oil is the point at which the ever increasing demand for crude oil which is of course a finite resource, outstrips our ability to produce it. (Hubbert, 1949) Logically, from this point we will need to

continually scale back demand to meet the continually decreasing supply. Many statements such as “Peak oil is a turning point for Mankind. The economic prosperity of the 20th Century was driven by cheap, oil-based energy” are possibly not overstating the point. (J.Campbell, 2002)

The arguments continue as to when it will occur – the range of 2011 to 2030 appears typical although there is a good case to suggest that we are at the peak now. A far more useful debate would be about how we are going to wean ourselves off fossil fuels. It is entirely realistic that within a decade we will be forced to find alternative forms of transport. We may all end up cycling whether we like it or not.

2.3. Quality of life

Traffic jams, pollution and excessive noise are all situations and circumstances that most people would avoid if possible. Especially when we look at the health and social problems they cause. Traffic jams cause stress, vehicles cause pollution and noise. Cycling does not create any of these problems. In fact regular exercise such as cycling can actually reverse the negative consequences of emotional stress.

Cycling regularly not only improves your physical but also your mental health.....On a personal level exercise releases serotonin, dopamine and norepinephrine, which are the chemical brain lubricants responsible for psychological activities therefore it can facilitate everything from our concentration, and social relations to self-esteem and dealing with stress...Regular exercise has been shown as a major factor in preventing depression (Cycling Promotion Fund, 2007)

Cycling saves you money. You can easily spend less in a year on cycling than you would in a week for a car. Typical costs of car ownership of such as fuel, tyres, servicing, registration, parking etc add up to between \$120 and \$350+ per week.(RACQ 2007) This equates to roughly \$6,000 to \$18,000 per year. That would be a nice holiday bonus! And these numbers will rise significantly in the next few years, especially if predictions of peak oil are correct.

3. WHY ARE SO FEW TRIPS BY BICYCLE?

According to a survey by the Australian Bureau of Statistics, (ABS, 2003) less than 5% of trips in Australia are by bicycle. Logic suggests that in order to improve this situation, an understanding of why people choose not to cycle in favour of other transport modes is required. In order to increase bicycle usage we first need to understand why people chose other forms of transport. Based on anecdotal evidence I had always believed that the main reasons that people choose not to cycle is because of concerns of road safety and that they were simply not interested and/or just lazy.

As figure 1 indicates, a survey by the Australian Bureau of Statistics paints a very different picture (ABS, 2003).

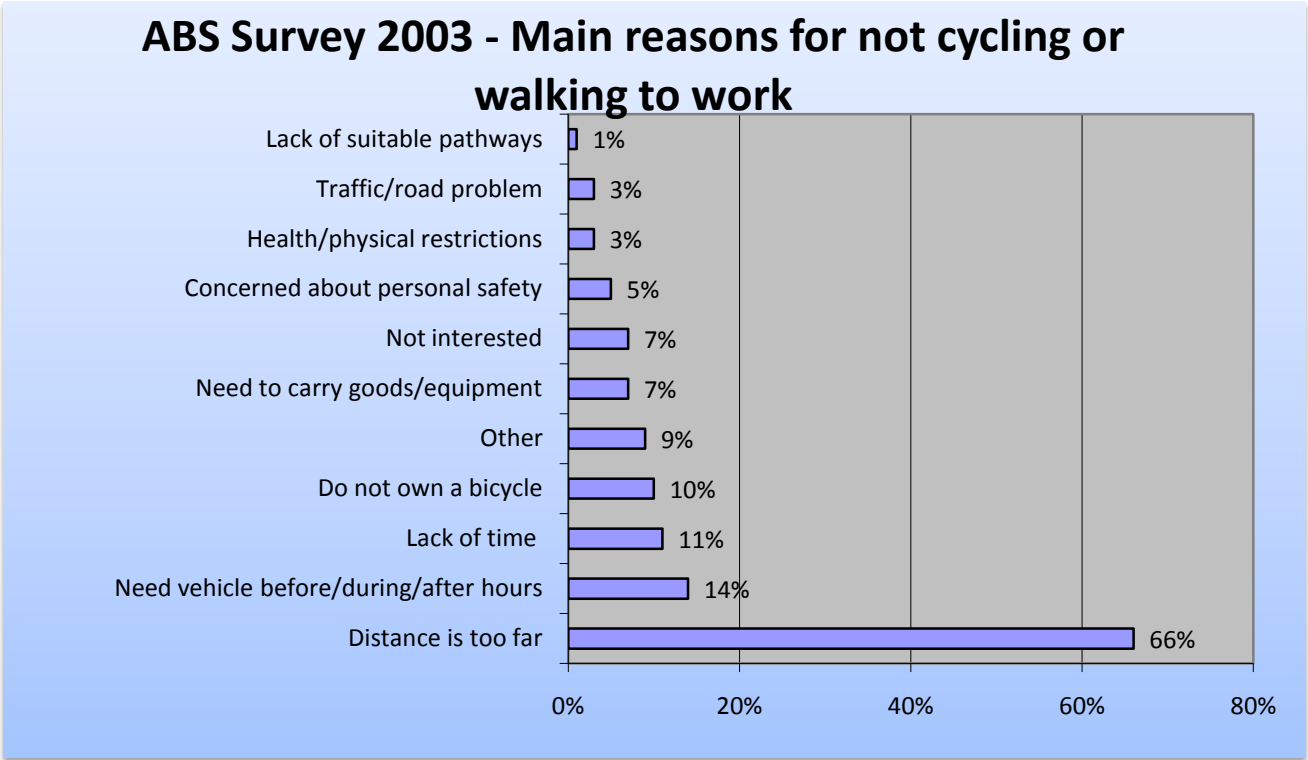


Figure 1

This data is the most valuable data that I am able to access however there are a couple of problems with relying too heavily on this data. Clearly the reason of “distance is too far” is the main reason why people state that they do not cycle or walk to work.

3.1. Data quality

The first is that it asks the question about both cycling and walking without distinguishing between the two. In order to be sure about the quality of the data we should look at cycling in isolation. This is important because a distance that is too far to walk may not be too far to cycle. The second issue is that of making an attempt to divide secondary reasons being given instead of primary. For example is the real reason that the distance is too far because “I think it would take me too long” or is it too far “for my present fitness level”. This would require a correlation between distance given and actual response. Having said this, the data certainly gives us a far greater insight than merely relying on anecdotal evidence.

3.2. Analysis

It appears reasonably obvious that in order to have the greatest impact we need to address the major responses, however it is worth looking at each criteria to see if there are areas that can be incrementally improved.

3.2.1. Lack of suitable pathways: 1%

It should be quite encouraging to city planners that “lack of pathways” is not a major reason why people do not walk or cycle to work. However this may relate only to walking as bicycles are restricted to cycle paths and roads.

3.2.2. Traffic/road problems: 3%

This category is actually a little vague. Does this refer to restrictions in roadways or lack of roadways? Of course “traffic/road problems” is no disincentive for walking.

3.2.3. Health/physical restrictions: 3%

There is probably little that can be done here as there will always be some people who are physically unable to cycle or walk.

3.2.4. Concern about physical safety: 5%

This comes as a bit of a surprise as I have always believed that many people did not cycle due to concerns about safety. This was based purely on anecdotal evidence rather than research.

Of all road fatalities, cyclists make up just 2.7%. As this is fairly consistent with the percentage of total trips made by bicycle we can conclude that one is no more likely to be killed whilst cycling than whilst driving.

A report by the European Commission found that the risk for cyclists was very close to that for car users. (European Commission, 1999)

In fact cycling a study over 14 years has shown that the danger of inactivity increases your risk of death by 40% compared to people who regularly cycle to work (Anderson L.B, 2000) So cycling is actually less dangerous than not cycling.

However, this is no excuse for complacency. There is still plenty that can be done to improve cycling safety as well as improving the *perception* of safety.

3.2.5. Not interested: 7%

This is an area where some effort in promoting cycling may change attitudes.

It is actually encouraging to see that only 7% of respondents don't cycle because they are not interested. Of course it sounds better to say that 93% of respondents are interested in cycling but are unable to for one of the other reasons given.

3.2.6. Need to carry goods and equipment 7%

Naturally cycling is not for everyone. There are many people such as tradesmen who need to carry tools and equipment from one location to another and bicycles are not a viable way to do this.

However it is possible to improve the carrying capacity of bicycles and this may improve this area to a degree. For example a student or worker who carries a laptop computer and/or a briefcase may find it difficult to carry on a normal bicycle but with an effective rack system this might not be such a problem. (Bicycle Victoria, 2007)

3.2.7. Other: 9%

This requires a bit more research to determine what factors this includes and then whether strategies can be devised to eliminate these obstacles. Again, at only 9% it is not a large percentage and therefore unlikely to make a large difference.

3.2.8. Do not own a bicycle 10%

50% of households already own a serviceable bicycle.

So it appears that access to bicycles is not a major reason for not cycling

Various schemes have been tried to provide free bicycle use with the CBD with varying success. (e.g. Adelaide City Council/Bicycle SA Free City Bikes)

Other than encouraging a higher level of bicycle ownership using promotion or perhaps with rebates – it is hard to see how much improvement in the overall use of bicycles can be made here.

3.2.9. Lack of time: 11%

This is one area that I believe some progress can be made. The reason for this is that for many trips a bicycle is the quickest form of transport. Certainly this is the case for short intra-CBD trips as shown by the many bicycle couriers seen in many cities.

“Within 15km of a busy CBD, riding to work is likely to take you less time than other forms of transport” (Bicycle Victoria, 2007)

Bicycle commuting is probably the most time-efficient form of exercise as it utilises the time spent otherwise being inactive whilst driving a car or sitting on a bus. If someone who doesn't cycle commute gets an equivalent amount of exercise in another form then they will have almost certainly spent more time travelling and exercising than the cyclist. So, from this perspective cycling actually saves you time, making this reason illogical.

However time saving is only the case compared to someone who gets regular exercise and unfortunately according to the 70% of Australians aged 15 years and over are considered to be sedentary or having low exercise levels. (ABS, 2007) But even in the case of the non-exerciser, many people are surprised at how little time it takes to commute by bicycle

The average commuting car speed in Melbourne of 19.7km/hr is slower than many experienced cyclists and most cyclists can comfortably do 17.7km/hr. (Cycling Promotion Fund, 2007)

3.2.10. Need a vehicle before/during/after hours; 14%

- This is a difficult category to address due to the varied nature of reasons why someone would require a vehicle before/during/after work. For some people it would be to drop off and pick up young children at childcare. Or perhaps to do the shopping on the way home from work. All these reasons are quite varied and so difficult to comment on. Other than to say that quite often there are ways around problems that just need a bit of lateral thinking. After all, we managed to organise our lives quite happily 50-100 years ago before we all drove cars. Cars are a bit like mobile phones, once you have one, life without it seems impossible.
- Some people need a vehicle during work hours: sales reps for example. Often this is a company car that is driven home at the end of the day. This would be the reason why they couldn't cycle to work, because they need the car at work. Of course there is probably nothing to stop them from leaving the car at work and cycling home. Often it is just a matter of reorganising your life a little.

3.2.11. Distance is too far; 66%

- This is the big issue. If we want to make a difference to the amount of people cycling then clearly we need to understand and address this issue.
 - I think that the first thing that we need to do is to look at the breakdown between walking and cycling. The question that was asked in this survey was “what is the main reason for not cycling or walking to work.” It is reasonable to assume that in some cases it is too far to walk but not too far to cycle. A useful bit of research would be to determine people's perceptions of how far is “too far” when it comes to cycling. I also think that this question needs to be asked specifically in regard to cycling.
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- Is it because the long distance would require too much time to cycle? As there is an option of “lack of time” that only attracted 11% of respondents, it would appear that this is not the problem.
- Or is it because people don’t believe that they are fit enough? Given the percentage of our population who live a sedentary lifestyle, this is very likely the case. In view of the massive impending problems of sedentary lifestyle disease, this is exactly the view that we want to reverse. The physiological benefits of cycling are well documented. (Oja P, 1991) On top of this, cycling has been shown to be similar in time to that of driving.
- So, how far is too far? There has been a widely held view that 30mins of moderate intensity exercise on a daily basis is a minimum requirement for good health. This view has been challenged recently with the US Institute of Medicine recommending 60-90 minutes of moderate intensity exercise daily. As regular cyclists average 20km/hr (Oja P, 1991) this translates to a recommended 20 to 30km round trip. As can be seen from Figure 2 below, some 35% of Australian workers live within 10km of their workplace giving a round trip of 60mins or less and roughly 50% of Australians workers live within 15km of their workplace giving a total round trip of 90 mins or less. This provides a compelling argument to show that at least 50% of our population live close enough to work to make cycle commuting an ideal way to gain the recommended levels of daily exercise.

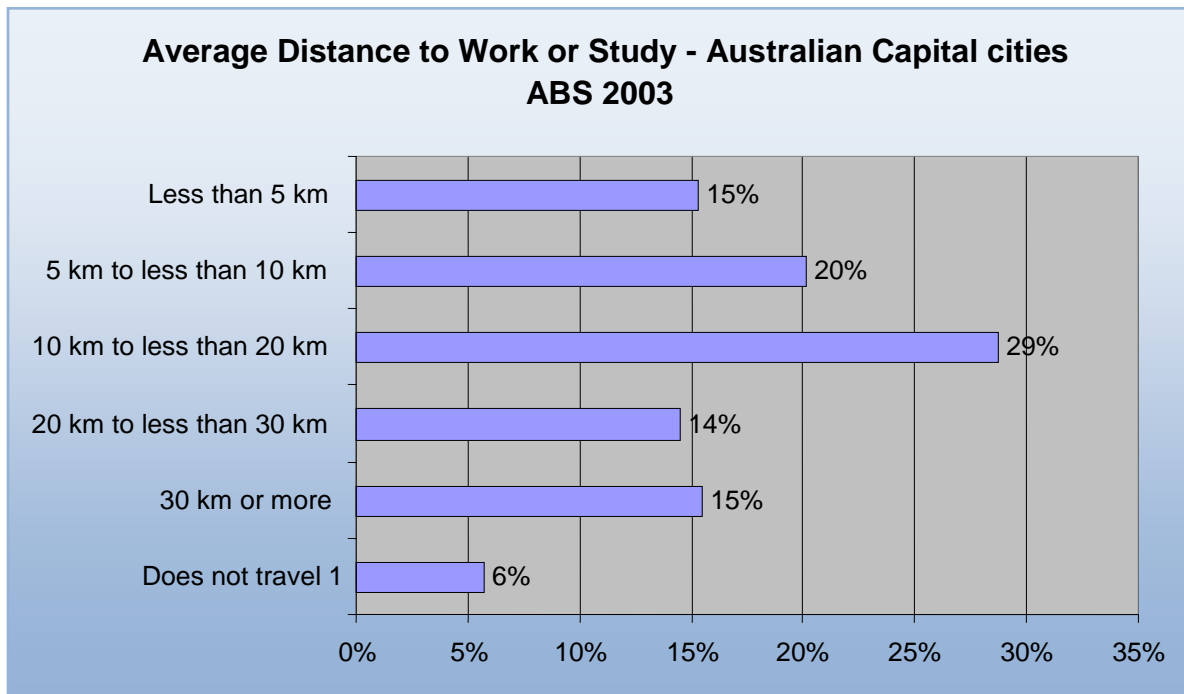


Figure 2

- It is understandable that someone who leads a sedentary lifestyle may view riding a bicycle for 90 mins per day at even a moderate pace far too strenuous. As with starting any exercise program it is advisable to start at an easy level and slowly increase the intensity and/or duration of the exercise. Unfortunately cycle commuting is difficult to reduce the duration or the ride as the length of ride is determined by the commuting distance. If you live 10 km from work you have a 10km each way ride.

4. SOLUTIONS

4.1. Relocation of workers and/or workplaces

One solution would be to encourage people to move closer to their workplaces. This would certainly not be a short term solution if it was at all a practical one. Encouraging workplaces to relocate to where the employees

live is also not a very likely solution. This may be possible in the long term with a move to high density living and decentralisation.

If we can't bring workplaces and employees homes into closer proximity, what can we do?

I think that there are two possible avenues for reducing the impact of excessive distance. One is to achieve a better integration of public transport with cycling. i.e. a cycle-friendly approach to public transport. The other is to encourage the use of power assisted cycles.

4.2. Integrated transport.

Measures here include safe bicycle storage at public transport interchanges and in the short term, buses fitted with bike racks. In the long term, we should be looking at more innovative way that public transport and cycling can integrate.

Public transport integration allows people to cycle part of the way and to use busses or trains for the remainder of the trip. Or of course to cycle one way and catch public transport the other. For a one-way trip this means 78% of Australians would live within a 90 minute cycle commute.

The concept of integrated transport is not new. In the USA bicycle racks have been on buses for many years. By 1999 bicycle racks were already in use on an estimated 1 in 5 buses in the USA (Federal Transit Administration , 1999)

This concept has been in use in Brisbane since 2002 and the ACT since 2005. Public acceptance is very high at 90% according to a survey by the Brisbane City Council (Pedal Power - Canberra, 2007).

In Adelaide, by way of comparison, bicycles are not allowed on buses or trams. (Department for Transport, Energy and Infrastructure, Public Transport Division, 2007)

4.3. Power-assisted cycles

One of the best ways to increase the range of the bicycle and to change the perception that distance is too far is with a power assisted bicycle. These bicycles normally have a maximum speed of less than 20km/h (without pedaling) using a small electric motor. In most Australian states, an electric bike with pedals and a motor of 200W or less is considered a bicycle and does not need registration. A normal range is less than 50km on one charge. The main benefit is help in cycling uphill and if the bike has luggage.

The benefit here is that it gives a degree of exercise but is less strenuous than just cycling. So although it is not as good in terms of exercise and the environment as a normal bicycle this may well be the perfect compromise particularly for people who feel that they live too far from their workplace.

5. CONCLUSIONS

The benefits of cycling to work are well documented. And yet participation rates are low. The major reason for this appears to be that they live too far from their work or at least the perceived distance is too far. As this is by far the largest reason for not cycling, it makes sense that in order to achieve the goal of increased cycle commuting the greatest gains can be achieved by finding solutions to the tyranny of distance. The available data is good enough to give us an indication of where we can most effectively direct our efforts. However a more focussed study is required to gather a clearer picture of why people choose modes of transport other than the bicycle for commuting.

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