Speed Kills: The Complex Links Between Transport, Lack of Time and Urban Health

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ABSTRACT *Road safety experts understand the contribution of speed to the severity and frequency of road crashes. Yet, the impact of speed on health is far more subtle and pervasive than simply its effect on road safety. The emphasis in urban areas on increasing the speed and volume of car traffic contributes to ill-health through its impacts on local air pollution, greenhouse gas production, inactivity, obesity and social isolation. In addition to these impacts, a heavy reliance on cars as a supposedly 'fast' mode of transport consumes more time and money than a reliance on supposedly slower modes of transport (walking, cycling and public transport). Lack of time is a major reason why people do not engage in healthy behaviours. Using the concept of 'effective speed', this paper demonstrates that any attempt to 'save time' through increasing the speed of motorists is ultimately futile. Paradoxically, if planners wish to provide urban residents with more time for healthy behaviours (such as exercise and preparing healthy food), then, support for the 'slower' active modes of transport should be encouraged.*

KEYWORDS *Transport, Speed, Pollution, Road safety, Time pressure, Physical activity*

INTRODUCTION

Decreasing the speed of urban transport can have positive impacts on the economy, the environment and health. This paper outlines the main themes of existing research on these impacts and then explores the possibility that there is a more subtle, but no less important, link between speed and health. The paper argues that speed has a cost that can be measured in money and in time. This can produce a paradox whereby 'faster' modes of transport lead to a loss of time. Lack of time, or time pressure, has been identified as an important factor in urban health, due to its negative impact on mental health but also due to its impact on the ability or willingness of people to engage in physical exercise or to avoid fast (junk) food.

The arguments about the health impacts of speed apply most clearly to the use of private motor vehicles, and this paper focuses on the health impacts of increasing the speed of cars. However, some of the arguments are also relevant to other high-speed modes. For example, high-speed trains can encourage urban sprawl, the complex negative health impacts of which are outlined below.

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EXISTING UNDERSTANDINGS OF THE LINKS BETWEEN SPEED AND HEALTH

Speed is most commonly seen as a health issue in relation to road crashes. There are several other ways in which the speed of motorised traffic is linked to factors that have clear negative health impacts. Increasing the speed of motorised traffic increases levels of pollution.¹ High car speeds can affect levels of physical activity through reductions in active transport, including children's independent mobility. Local social interactions are disrupted by high-speed traffic, leading to a loss of social connectedness. High-speed transport encourages urban sprawl and hence, the creation of longer distances for urban travel² and the loss of agricultural land and market gardens, which then add to pollution through increased food miles. As well as the speed of motorised traffic, a general increase in the pace of urban life has also been linked with negative health impacts.³

Road crashes are the most obvious area where reduced speeds of motor vehicles provide clear health advantages. This is crucial not only to the motorist's ability to avoid crashes but also to the survival of non-motorists in a crash. The British Department of Transport, for example, found that the risk of pedestrian death in crashes rises from 5% at 20 mph to 45% at 30 mph and 85% at 40 mph.⁴ The link between speed and road trauma is clear in the road safety literature, even for minor changes in speed. Increasing traffic speeds by only 1 km/h can lead to a 3% increase in injury crashes and a 4–5% increase in fatal crashes.⁵ The risks associated with speeding have been compared with driving under the influence of alcohol. The risk of injury from a collision is similar for a person driving 5 km/h over a 60-km/h speed limit and a person driving at the speed limit with a blood alcohol level of 0.05 g/100 ml.⁶ Not only is speeding important in accident involvement, but attitudes to speeding have been linked with accident involvement.⁷

As a general rule, the faster the speed of transport, the higher is the level of pollution.¹ This applies to air pollution and noise pollution, as well as to space pollution. Lower car speeds decrease air pollution for two reasons: fewer emissions per car and fewer cars. On highways, cars travelling at 60 mph will produce far less CO₂ than if travelling at 70 mph (between 10% and 20% less depending on the type of car).⁸ In urban contexts, although modelling of individual car performance might suggest that slower traffic has higher emissions, empirical research demonstrates the opposite: the higher the speeds of cars in built-up areas, the greater the acceleration and braking, which increases air pollution.⁹ It is also important to assess the collective effect of cars travelling more slowly. When urban car speeds are lowered and cars become less attractive in terms of the time taken to travel to destinations, there is a switch to less polluting modes of transport, particularly walking and cycling. This is especially significant as shorter trips by car typically produce more pollution per kilometre due to the 'cold start' phenomenon.¹⁰ The switch to walking and cycling is also reinforced by the greater safety for pedestrians and cyclists.^{9,11,12} And as more people walk and cycle when car speeds are lower (due to feelings of safety and a more pleasant environment for cyclists and pedestrians), public health is also enhanced through physical exercise in active transport.^{6,13-15}

There are numerous practical examples of the health impacts of reducing speed in urban areas. One of the best examples is Graz, Austria, which adopted a 30-km/h limit throughout most of the city in the early 1990s, reducing serious casualties by over 25% as well as significantly reducing noise and air pollution.¹⁶ At the time the lower speed limits were introduced, less than 50% of residents supported the initiative but, after their benefits became evident, the support grew to 80%.¹⁶

Whitelegg (1993) explains that speed not only consumes distance, but the faster the mode of transport, the more space it requires: cars travelling at 40 km/h require more than three times as much space as cars travelling at 10 km/h. Compared with the bicycle, cars occupy vastly more space, both when travelling and when parked.^{17,18} Cars travelling 'safely' at 110 km/h (allowing a 3-s gap between cars) require more than a hundred times more space than bicycles travelling at 15–20 km/h. This is because, as speed increases, so too does the necessary width of the road space and the distances between cars. When cities are designed to accommodate the needs of cars travelling at speed, this leads to a loss of open space, particularly loss of green spaces. This loss of green spaces has important effects on health and well-being, in part, through their role in providing places for moderate to vigorous physical activity.¹⁹

Increasing the speed of traffic encourages more driving. When people drive more, this impacts negatively on the health of all road users, including car occupants. Not only is exposure to in-vehicle pollution a significant health factor for car occupants,²⁰ but spending time in cars is associated with increased obesity. One study in Atlanta found that each extra hour spent in cars per day was linked to a 6% increase in the likelihood of obesity.²¹ Spending more time in cars also reduces time for recreation, family and community participation.¹⁴

Whitelegg describes the impact of speed on levels of social connection in terms of the time needed to develop communities:

"Maintaining a sense of community needs an investment of time and energy in contact with neighbours and local groups. The opportunities for such contact depend on time available and thus on priorities. The decision to travel longer distances (and save time at higher speeds) means that little time is available for interaction with neighbours, and so there is less chance of a genuine community developing or maintaining itself".¹

Lower car speeds in urban areas contribute to a higher quality of life in terms of the livability of public spaces, including lower crime rates and higher levels of social interactions between people.^{22,23} Research has found a negative association of traffic speed with levels of social interaction and perceived friendliness of street environments: "streets with low traffic speeds and volumes have been found to have more indicators of a better quality of life—more street activity, more signs of street care (e.g. flower boxes) and more open windows".^{24, p351} Levels of social connections have been recognised as a significant factor in public health, rivalling smoking in importance. People with strong social networks have lower levels of mortality than those with poor social networks.²⁵

Children are particularly susceptible to the risks associated with high traffic speeds. The fear of traffic danger is an important factor in the level of children's independent mobility (freedom to travel without an adult).²⁶ Cars travelling at higher speeds in urban areas, particularly in residential streets, can also increase fears of stranger danger because there are fewer pedestrians on the streets who can provide passive surveillance and support for children.²⁷ This is especially important in terms of the lack of adults who know their neighbours' children and can keep an eye out for them. Also, drivers travelling at higher speeds are less likely to notice pedestrians or what the pedestrians are doing.

It might be expected that cities with higher traffic speeds would have lower daily Travel Time Budgets (TTBs; time spent on travel each day). In fact, the opposite is true. Western European cities have TTBs of about 43 min and distance travelled of about 21 km. In contrast, North American cities have TTBs of around 55 min with

40 km distances.²⁸ The increased speed is not used to save time but to cover more distance.² Consequently, as the city expands (or as shops, jobs and services become more dispersed), even more speed is needed to overcome the increased distances. However, the increases in speed do not fully compensate for the increasing distances, and hence low density cities pay for their dispersion with longer travel times.²⁹

The effect of speed on the spreading of the city can also be appreciated in terms of the loss of fertile agricultural land (particularly market gardens), meaning that the opportunity to grow food locally is lost.¹⁴ The resulting increased food miles create more pollution (including greenhouse gas) in the process of providing food to cities. Also, sprawling cities make it more difficult to achieve the goals of the ‘Slow City’ movement—an ecological and humanistic response favouring local, traditional cultures, a relaxed pace of life and conviviality.³⁰

Slow Cities encourage the use of local materials and foods, reducing the need for transport of goods and materials, particularly by trucks. The emphasis is on making places for people rather than for cars. An important principle of Slow Cities is that they promote a more human, less frenetic way of life. Slow Cities are not just, however, about a fast city slowed down; they are about challenging the dominance of speed, accepting the view that it is OK to be slow.³

HOW TIME PRESSURE IS A HEALTH HAZARD

As well as slowing down motorised traffic in cities, a general slowing down of the pace of life, as promoted by the “Slow City” movement, has health benefits.³¹ Current urban societies have developed an obsession with getting things done quickly, which means that there is a psychological focus on the future: the next task is always perceived as being more important than the present.¹ This leads to a sense of always feeling rushed and not being able to enjoy the moment.

In his book *In Praise of Slow*, Carl Honore talks about how we have developed a culture that emphasises speed, efficiency and saving time. This can have negative health impacts, particularly on children, whom he argues need time for unstructured play—time to be slow—rather than being rushed from one activity to another.³ He explains that children are not born obsessed with speed; our society makes them that way. “Children increasingly pay a price for leading rushed lives. Kids as young as five now suffer from upset stomachs, headaches, insomnia, depression and eating disorders”.³ But, it is not just children who are affected by feeling rushed. Several researchers regard lack of time as a major public health issue.

Time pressure has been found to be significantly associated with stress levels in men and women and with higher levels of depression among women.³² Yet, there are other health issues besides stress and depression that have been linked to a lack of time in daily activity routines. Dixon and Broom (2007) argue that time pressure is the second of the seven deadly sins of obesity.³³

Recent research shows that many people cite time pressure as a reason why they do not exercise or do not eat healthy meals: a lack of time is developing into a modern malaise.² As more and more households are working longer hours (particularly due to the increase in the number of dual-earner families), the amount of free time, time that can be devoted to healthy activities, is reducing. This results in less time available for physical exercise and a higher consumption of ‘fast’ energy-dense food.³³ One study found that people claim that lack of time is a more important barrier to regular exercise than either income or knowledge.² A study focusing on women in Melbourne found that time pressure was reported as a barrier

to both healthy eating and to engaging in physical activity.³⁴ In this study, women who identified time pressure as an obstacle to healthy eating were more likely to eat fast food more frequently, less likely to eat fruit or vegetables, and less likely to meet physical activity recommendations. Another study found that one in five health experts ranked time pressure as the most important social trend leading to increasing levels of obesity.³⁵ Put simply, people feeling time pressure eat fast food to save time; yet, they still do not feel they have enough time for exercise.

Lifestyle trends that have contributed to increased feelings of time pressure amongst adults in many western societies include longer working hours, longer commutes and increased time spent outside the home.³⁶ Not surprisingly, persons who spend more time in paid work are less likely to meet physical activity guidelines than those who spend fewer hours in the paid workforce.³⁴ Thus, anything that can reduce time spent at work and hence increase free time may have a positive impact on healthy behaviours, particularly relating to diet and exercise. The next section explores the question as to whether time pressure could be exacerbated by a reliance on speed as a solution to urban transport problems. Though such an idea may seem counter-intuitive, there is evidence that speed has a real cost, measurable in money and in time.

HOW SPEED CAN EXACERBATE ILL-HEALTH THROUGH ITS IMPACT ON TIME: THE CONCEPT OF EFFECTIVE SPEED

There may be a more fundamental reason that speed is linked to reductions in health and well-being. This is because speed can usually only be achieved at a higher monetary cost (and often a higher social and environmental cost as well). As a general rule, the 'faster' we travel, the greater the cost of this travel. Hence, travelling by car is more expensive than travelling by bicycle. Travelling by air is more expensive than travelling by bus. If speed costs more in monetary terms, there is also a cost in time.

If we switch to modes of transport that cost more, we are forced to devote a greater proportion of our income to transport. This argument holds true for individuals, for cities and for nations.³⁷ For example, in 2009, a person relying solely on bus transport in Canberra will spend \$984 per annum on transport. In contrast, even a car with the lowest operating cost of any new car in Australia will cost \$6,720,³⁸ not including costs of parking, tolls, speeding and parking fines and garaging. Note also that this cost does not include any of the external or indirect costs of operating a car. These costs are not borne by the individual owner but are borne by the whole community, present and future, and include the costs associated with pollution, congestion, accidents and costs of loss of exercise due to car traffic.³⁹ Average trip speeds may be higher by car (though not in all cities). However, as will be explained below, increasing the trip speed of cars is ineffective in terms of reducing the total time devoted to transport. Indeed, in many cases, attempts to increase trip speeds lead to an increase in the total time devoted to transport.

We can understand the significance of the time cost of the extra monetary cost of transport if we consider the concept of effective speed. This concept is explained in detail elsewhere.³⁹⁻⁴² According to the effective speed concept, if transport costs are high, so too are the time costs involved in earning the money to pay for transport. The irony here is that transport modes that supposedly 'save time' (e.g. cars) can significantly reduce the amount of free time that individuals have. As Tranter and May suggest, cars can steal both our time and our money.⁴² In contrast,

what we would normally regard as the 'slowest' modes of transport—walking, cycling and public transport—can be effectively used to save us time and money. This apparent paradox makes sense when we start to think about saving time in a more holistic sense, rather than simply assuming that fast modes provide us with an advantage in terms of time.

Effective speed is a holistic concept that takes into account all of the time costs associated with a particular mode of transport. It uses the standard formula for speed: speed equals distance divided by time. Instead of focusing solely on the time spent travelling, effective speed considers all the time needed to allow a person to achieve a trip speed using a particular mode. Thus, as well as considering the time spent during each trip, it is also necessary to consider the time associated with every other activity necessitated by that mode. For most car drivers, the most time-consuming task associated with their car is the time spent at work to earn the money to pay for all the costs associated with the car (depreciation, fuel, insurance, registration, parking, tolls, etc.). Note that these costs are simply the direct costs associated with car driving, but there are also indirect or external costs that are shared amongst the whole society (both now and in the future). These include the health and environmental costs associated with car driving, some of which have been explored by Tranter and Ker.³⁹ When these external costs are considered, we can refer to 'social effective speed'.

Estimates of effective speed in Australian cities for different modes of transport and for different types of costs (direct and indirect) are discussed in previous papers.³⁹⁻⁴³ These estimates show that the 'fastest' new car in Australia is a small, four-cylinder car.^{38,39} If we compare the social effective speed of the fastest new car in Australia with a bus, train or a cyclist, we find that each of these are faster than even the fastest new car.³⁹ To summarise, when a holistic assessment is taken of the time devoted to transport, the social effective speed of a car driver is in most cases lower than a cyclist, or a bus or train passenger. This holds true even in a city such as Canberra, where average incomes are high, car speeds are high and car costs are low (due to low congestion, low parking costs and no tolls on roads). In many cities in developing countries, the effective speed of drivers is likely to be lower than pedestrian effective speeds.

Another important aspect of the effective speed concept is the way in which changes in trip speed influence the effective speeds for different modes. For car drivers, because the time travelling is usually only a minor component of the total time costs of their travel, any increase in trip speed is likely to have only minimal impact on effective speed, even assuming that an increase in car speed could be achieved at no extra cost. (This assumption is unrealistic; to increase trip speeds for cars would involve considerable costs, including the cost of 'faster' roads.) This is a crucial point because it shows the futility of a transport planning system that tries to save time by building bigger roads to increase vehicle speeds. It also indicates the futility of any individual motorist trying to 'save time' by driving faster. Not only will driving faster have little impact on increasing effective speed, the extra costs for individual drivers of driving faster (e.g. more fuel used, more wear and tear on the car, possible speeding fines, increased accident risk) would likely reduce the effective speed of car travel. The driver would need to devote more of his/her work time to the car costs.

In contrast, any increase in trip speeds for public transport users, cyclists or pedestrians results in substantial increases in effective speed. This applies most effectively to walking, which has virtually nil time costs apart from the time spent

walking. Any urban planning initiative that increased the average speed of pedestrians (e.g. by 2 km/h) would lead to an increase of effective speed by the same amount. However, an increase in trip speed of 10 km/h for some car drivers would lead to an increase in effective speed of only 1 km/h, even if we ignore the extra cost of increasing the speed.³⁹ Faster cars do not save us time, but faster buses, trains, cyclists and pedestrians can save us time.

When the concept of effective speed is understood, it should be clear that our cars do not save us the time we think they do. If we combine the concept of effective speed with other effects of mass car usage, we see that cars consume more time and distance than they save. Widespread car ownership has led to the increased spread of cities, the closure of local schools, shops and services and hence greater distances and travel times to access goods, services and even social contacts that were previously available within walking or cycling distance. These changes have made it difficult for some groups of people to maintain their daily activity routines without a car.

SWITCHING TO MORE 'EFFECTIVE' TRANSPORT MODES: REDUCING THE CONSTRAINTS ON CHOICE

Certain groups of urban residents and employees are more likely to be able to switch to modes of transport that will save them time. This is either because their employment is more flexible, because of features of their residential location or because their activity routines are more suited to other transport modes. The social geography of who can more easily choose not to own a car involves the intersection between spatial factors, socio-economic factors, stage in the life cycle and gender roles in society. Groups least likely to be able to switch to non-car modes include outer suburban dwellers, women, low-income earners, blue collar workers and those with children.

Outer suburban residents have less access to a range of jobs, shops and services, as well as longer cycling distances and poorer public transport (with less choice of destinations and lower frequency of services). Women have less chance of switching to non-car modes, partly because of gender roles in the supervision and transport of children. In modern western societies, women are more likely to have complex daily routines involving mothering and transporting children, meaning that public transport and cycling may be less feasible for women. These gender differences exist even when women have full-time jobs.⁴⁴

Low-income groups, particularly blue collar workers, often have rigid work hours as well as dispersed employment locations. In contrast, higher income groups may be more likely to be able to switch to public transport, particularly if they are white collar workers who work in the central business district—served by good public transport. High-income workers often have more flexible activity routines, with fewer constraints on their daily activity routines.⁴⁵ This is partly due to flexibility in the hours of work (e.g. with flexitime, where employees choose when they work, as long as they achieve the necessary work output). It is also partly due to their access to labour saving devices and the services of domestic support workers (e.g. cleaners).

Households with children in many cities are less likely to be able to survive without a private motor vehicle. This is increasingly the case in cities in Australia, the US and the UK, with a growing expectation on parents to drive their children to school, to sport and to extra-curricular activities. Parents can become caught in a 'social trap', where it is seen as socially unacceptable not to drive your child to

school and to other places.⁴⁶ Such social traps are not as evident in some developed countries (e.g. Japan and Germany) where children have high levels of independent mobility.²⁶

Individuals who find it most difficult to reduce work hours and switch to more effective transport modes are those who fit into several of the categories described above (e.g. those in households with children, living in new outer suburban areas, with low-income jobs in blue collar industries that are difficult to access without a car). For these people, the threat of job insecurity, combined with increased pressure to work long hours, means that they may be locked into a vicious circle: the requirement to run their cars increases the need to maintain their income with long work hours, which then makes it difficult 'not' to own a car.

Given the range of groups for whom a shift to non-car modes is difficult, even if they wanted to make the switch, it is important that employment, land use, transport and education policies recognise the particular challenges of people in these groups. Some specific policy suggestions for things to be addressed before work time reduction and transport mode choice is possible are outlined below.

There should be greater flexibility in work hours, particularly for women. Currently in Australia and many other western nations, many professionals, office workers and managers are paid a salary, so reducing work hours would not necessarily affect income unless they negotiate a part-time job. A growing number of employees are seeking to 'downshift', often through reduced working hours. In Australia, the US and the UK, more than 20% of citizens currently identify themselves in some respects as downshifters.^{47,48} To enable more workers to downshift requires a major shift in the flexibility of work arrangements.⁴⁹

To facilitate a shift to public transport, greater investment is needed in many cities in a 'network' of public transport that serves dispersed land uses.⁵⁰ Good public transport networks exist in cities such as Zurich, Hamburg and Munich.⁵¹ When public transport users can easily transfer from one route to another, a transport network with frequent services can serve dispersed transport needs well.⁵² In most Australian, US and UK cities, public transport is based on a radial system, where dispersed travel needs are poorly served and service frequency is low. This means that public transport is seen as inferior for non-work trips and trips with multiple destinations (home, school, shops). In contrast, in many European cities, public transport meets the needs of city residents at all times of day and across weekdays and weekends, without imposing costs in extra trip time compared with motorists. The transport/land use nexus also needs to be considered, so that there is a high level of spatial overlap and integration between public transport interchanges and urban activity centres.

In terms of education, there should be greater support for local schools and local child care (and after school care) to allow children to get to school independently and hence allow families to use non-car modes. As well, there should be development of initiatives that allow children to use active transport modes (particularly for the journey to school). As well as 'safe routes to school' projects,⁵³ a recent initiative to promote active transport for children is known as the walking school bus, where children walk to school under the supervision of two or more adults.⁵⁴

All of the suggestions outlined above will likely assist people to make the switch to active modes of transport that provide higher 'effective speeds'. This will provide direct health benefits (e.g. through increased physical activity) and will indirectly improve health through impacts on relieving time pressure for urban residents. The financial savings from the switch to non-car modes can also be directed to improving urban health outcomes.

CONCLUSION

The implications for urban health of the arguments in this paper are profound for all cities. For cities in the developed world, switching to the supposedly slower modes of transport will provide health benefits through reducing time pressures, particularly in increased physical activity and lower obesity levels. For cities in developing countries, a similar emphasis on active modes of transport (walking, cycling and public transport) will save time and money for individual citizens, and it will do the same for city and national governments. If even a small proportion of this saved money is used to assist the self-organisation of slum dwellers to improve access to safe water, sanitation and garbage removal, the likely health benefits would be enormous.^{55,56}

If we accept the argument that a reliance on 'fast' modes of transport consumes more time in total, and that this has a range of negative health impacts, what can be done to improve health through changes to transport in cities? The answer to this is twofold: changes in the transport behaviours of individuals or households and a fundamental re-think of current government policy on urban transport.

As explained in the previous section, some individuals and households may not have the flexibility in their daily activity routines to make any changes to their travel behaviour on the basis of an understanding of effective speed. They have little choice but to use their cars to access the jobs, shops and services that they need. However, for those who can make the choice to switch modes, particularly if they can sell the second car, there is potential to save time and decrease their work hours. Even if their work hours each week are not easily reduced, then the money saved by slower modes of transport can facilitate longer annual holidays or earlier retirement.

The greatest potential for applying the effective speed concept to promote healthy cities is not at the individual level but at a government policy level. Governments can save money (and save citizens time) by switching to 'slower' modes of transport. The possible extent of savings is indicated in data showing the differences in the percent of GRP (gross regional product) spent on transport in European cities compared with Australian cities. European cities spent on average 8.1% of their city's income on transport, compared with 13.2% for Australian cities.³⁷ The amount spent on roads is an important part of this difference between cities. For example, while Copenhagen spent only \$97 per person on roads, Sydney spent \$188.³⁷

To address the issue of time (and money) devoted to transport requires a re-assessment of the design and the priorities of urban transport systems in car-dominated cities. A switch to more active modes of transport will save time, reduce the negative health impacts of transport and increase the positive health impacts of transport (e.g. physical activity and social connection). And because time is saved, time pressures will be less likely to provide a barrier to healthy lifestyles. One way to achieve a change in urban transport is to reprioritise whose time is valued in cost-benefit analyses. Improving levels of urban health might be as simple as valuing the time of pedestrians, public transport users and cyclists more than the time of motorists.

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