CYCLING AND SAFETY

This briefing outlines the following topic areas:

- Safety and Cycling
- Facts and Figures
- Problems
- Solutions

- *General*
- *Speed Reduction*
- *Cycle Helmets*
- *Traffic Calming*
- *Other Users*

A key element in promoting cycling and making it an attractive alternative to car use is that it should be safe. The National Cycling Forum (1999) states that “making the roads safer is a powerful incentive in persuading people to cycle more”. People will not choose to cycle unless they see it as safe to do so. Fears of injury can become a major obstacle therefore, to promoting and encouraging non-motorised modes of transport (Eltis, 2003). A survey by MORI showed that nearly half of those questioned said they would cycle for short journeys if roads were safer (National Cycling Forum, 1999). Often there is little real safety risk, but perceptions of danger may still persist and efforts must be made to ensure such misconceptions are allayed (Preston, 1990). Even where fear of risk does not deter the cyclist, professionals should seek to minimise it so as to reduce the resulting social and economic costs of death and injury (European Transport Safety Council, 1999).

It is essential that adequate planning takes place in order for the promotion of cycling to be successful. Consequently, the best planning can create high road safety standards for both cyclists and all other road users. In short, high quality planning can be a catalyst for road safety.

Safety and Cycling:

- There has been a tendency to see the two objectives of promoting cycling and improving road safety as conflicting and mutually incompatible.

- However, it has been shown that it is possible to both increase cycling and also improve cyclists’ safety (Krag, 2002).

- In fact, it has been shown that the safety of cyclists improves as the number of cyclists increases (Krag, 2002). For example, in Copenhagen and Odense, an increase in cycling has been brought about with a corresponding decrease in the number of accidents involving cyclists (Krag, 2002).

- This may be attributable to the introduction of specific safety measures but may also be partially explained by the fact that the higher the level of cycling, the more cyclists on the road and the more car drivers become aware of and pay attention to cyclists and hence the potentially safer the individual cyclist (Krag, 2002; Jensen, 1998 in Road Directorate, 2000).

- Achieving a critical mass minimum number of cyclists can help to make drivers more aware of the likely presence of cyclists and thus their safety. More cyclists, the safer it becomes. (Wardlaw, 2000).

- "Sheer mass of cyclists helps to change and enforce driver's perceptions" (Road Danger Reduction Forum, 2001).

- The scale and scope of safety measures that have been introduced to help non-motorised road-users varies significantly between countries.

- Countries which have introduced specific measures for different types and ages of road user have been successful in reducing the relevant death rates (Preston, 1990). For example, Danish research indicates a fall in cyclist casualties of 35% after the introduction of cycle tracks along urban roads (ETSC, 1999).

- Even without taking measures to improve the safety of cycling, the total 'life years added' by regular cycling greatly outweigh the potential disadvantages in terms of increased safety risk (BMA, 1992). "In these terms, a price is paid in *not* promoting cycling" (Hillman, 1993).

- The importance of speed reduction should not be forgotten. It has been suggested that urban safety and the quality of urban life might be significantly improved through a reduction in the default urban speed limit and a corresponding programme of new planning practices based upon the new reduced speed limit.

- Safety should not only be thought about in terms of impacts to the user, but the level of safety imposed upon other users should also be considered. Cycling imposes very little external risk upon other users, in contrast to motorised transport, where the level of external risk to other users is high.

The Facts and Figures:

- Walking and cycling have much greater risk levels per hour than travel in public transport vehicles (ETSC, 1999).

- Cyclist safety varies substantially between countries. For example, cyclists in the UK are twice as likely to be killed in road accidents as those in Denmark, the Netherlands and Sweden (TERM, 2000 in CfIT, 2001).

This may be partially explained by national levels and patterns of cycling which vary reflecting the different social, economic, infrastructural, topographical and climatic contexts (ETSC, 1999).

- "Pedestrians, cyclists and PTW users have a significantly higher risk of fatal road accident than those travelling by car and bus" (CfIT, 2001).

- A cyclist's safety depends not only upon the physical features of the route ("good road surface, clear signs and signals, possible separation of different types of traffic") but also upon an individual cyclist's "physical abilities, know-how and experience (ability to anticipate)". A cyclist's safety also depends upon the behaviour of motorists. (EC, 1999)

- One of the greatest road safety problems in Danish urban areas is linked to cycle traffic. In Denmark in 1993, 1/3 of all road users killed/injured were cyclists (Road Directorate, 1994).

- In Denmark, between 1984 and 1993, total numbers of those killed and injured reduced. However, figures for cyclists have remained constant (Road Directorate, 1994).

- In 1996, the percentage of national road deaths represented by cyclists was 19.7% in the Netherlands; 17.1% in Denmark; 1.9% in Spain; and 1.6% in Greece (ETSC, 1999). For the Netherlands, the share in road deaths for cycling is lower than its share in the number of trips.

- A Dutch analysis has shown that despite and increase in car use, cycling has become safer in recent years. Cyclist fatalities fell by 55% relative to use, only slightly more than a fall of 48% for car drivers between 1980 and 2001. (Fietsberaad, 2002).

- The number of years of life gained as a result of cycling is 20 times higher than the years lost by cyclists in traffic accidents (Baden et.al., 1998, European Cyclists' Federation)

- The numbers of cyclists killed/injured varies spatially and temporally. Most accidents occur on weekday afternoons and the risk of cycle accidents is 4-5 times greater in darkness than in daylight (Road Directorate, 1994). Some casualties occur in rural areas, but most occur in urban areas – where most cyclists are (ETSC, 1999).

- A Dutch analysis has shown that there is a varying degree of risk in using different transport modes, depending upon the age of the user. The research has shown that between 18 and 29 years of age, more car drivers are killed per distance travelled than cyclists, whilst elderly people are more at risk cycling. (Fietsberaad, 2002).

The Problem:

- The crux of the cyclist safety problem centres on the fact that there is lack of planning providing for cyclists and that the traffic system is designed predominantly with car-users in mind (European Transport Safety Council, 1999).

- The European Transport Safety Council (1999) identifies 7 key problems for cyclists in the urban traffic system:
  - *'Vulnerability'*: Cyclists pose little threat to drivers and hence drivers have less reason to be aware of them. Speed is key in determining severity of outcome of a collision. If collision speed exceeds 45km/hour, there is a less than 50% chance that the cyclist will survive. Even at low impact speed, cyclists can be badly injured. Speed management is therefore crucial in a safe traffic system aiming to provide for vulnerable road users.
  - *'Flexibility':* Motorists can never be sure when or where to expect cyclists – often cyclists flout road rules to make gains.
  - *'Instability'*: Cycle mistakes or failures are dangerous when they occur near other motor traffic/road users.
  - *'Invisibility'*: Cyclists can be difficult to see, especially at night.
  - *'Differing abilities':* Cyclists of all abilities and experience are present on the roads.
  - *'Consciousness of effort':* Cyclists seek quick, easy, direct routes, so as to minimise effort.
  - *'Estrangement'*: Cyclists are often treated as nuisances on the roads, with little regard paid to their status as road users with equal rights.

- Cyclist accidents rarely result from one of these problems alone, but typically arise when several of them combine (European Transport Safety Council).

- It has been found that accident risk, based on the amount of cycling, is lowest in Denmark and the Netherlands, where the level of cycling is high, whilst in Great Britain and France where the amount of cycling is low, the risk is high.

- Cyclist fatalities have fallen since the 1950s, but this is in the context of declining levels of cycling. In Britain, the chance of being killed or seriously injured, per mile cycled, has roughly doubled since the early 1950s (Road Danger Reduction Forum, 2001).

- An understanding of these key problems might help provide a framework on which to base planning for cyclists.

- The fewer cyclists on the streets, the fewer drivers seem prepared to co-exist and to anticipate cyclists' needs (CTC, 1995).

The Solutions:

- The European Transport Safety Council (1999) identifies three main kinds of risk in the safety of cycling:
    1. 'Risk from traffic';
    2. 'Risk from falling';
    3. 'Risk from crime'.

- It notes that these 3 types of risks can be managed respectively by:
    1. Managing risk from traffic in 3 ways:
    - Separating different road users to reduce potential of conflict;
    - Creating safer conditions for integration of road users in shared spaces;
    - Minimising consequences of collisions when they do occur.
    2. Ensuring high quality design and maintenance of cycle surfaces.
    3. Crime can be a social problem but transport problems can attempt to minimise risk by ensuring provision of well-lit, well-maintained, well-visible cycle routes and reducing risk of theft of cycles by providing secure, visible storage. (European Transport Safety Council, 1999).

- Following on from this, the European Transport Safety Council (1999) outlines six key action strategies which can help improve safety:
    - Managing the traffic mix by separating different road users to reduce potential conflict.
    - Where separation is not practicable/desirable, ensuring safe conditions for the integrated use of shared road space is necessary. This includes road safety engineering measures and traffic and speed management schemes such as low speed zones.
    - Changing attitudes and behaviour of motorists through information, training and enforcement of traffic law.
    - Consulting and informing cyclists about changes being made to fit their needs.
    - Minimising consequences of accidents when they do occur through crash protective design and encouraging use of protective equipment such as cycle helmets (particularly in high-risk groups), safer car fronts and HGV sideguards.

- Changing priorities of policymakers/professionals responsible for the traffic system.

- In addition to this, the National Cycling Forum (1999) recommends four key actions which will increase cyclist safety whilst simultaneously increasing cycling levels.
    1. Reducing motor traffic: this can make cycling safer since it reduces the potential for conflict with motor vehicles.
    2. Reducing motor traffic speed: traffic calming measures can be cycle-friendly, e.g. speed cushions.
    3. Implementing physical measures: e.g. cycle specific features (cycle lanes/Advanced Stop Lines (ASLs), or general features (e.g. redesigning junctions and traffic calming).

4. Influencing behaviour and attitudes: e.g. road safety campaigns and teaching cycling skills, maintenance and safety. (Dutch driver and rider education is extensive – by the age of ten, every child has received teaching on safe walking and bicycling (Parker, 2001)).

- The European Research Project, PROMISING (SWOV Institute for Road Safety Research, 2001) highlights the need to embrace safety in a non-restrictive manner and that road safety measures should not be at the expense of mobility. Policies and strategies for road safety have been developed in the Netherlands (the 'Sustainable traffic safety concept') and Sweden (the 'Vision Zero' approach). The sustainable safety concept aims to reduce the probability of accidents occurring as well as minimising the severity of accidents when they do occur. The Institute (SWOV Institute for Road Safety Research, 2001) suggests that a sustainable safe traffic system has the following characteristics:
  - It is designed to be able to respond to human limitations and prevent improper use;
  - Vehicles are designed so as to simplify drivers' tasks and to protect the vulnerable as much as possible;
  - Road users are educated, informed and may be restricted or guided where appropriate.

- An effective safety campaign must seek to both create a safer environment for cyclists, whilst also encouraging responsible behaviour by both cyclists and drivers. The promotion of cycling and walking can improve road safety (Wittink, 2003).

  - The majority of cycle accidents involve cars and often in specific locations. Campaigns aiming to improve cyclist safety could therefore focus on reducing certain types of accidents and also preventing accidents in locations which are prone to accidents (National Cycling Forum).
  - Increasing efforts are being made to promote cycling. Therefore, there is also a need for corresponding effort focusing upon the safety of cycling and aiming to ensure that urban traffic systems provide for vulnerable road users (ETSC, 1999).

- Certainly there appears to be a 'critical mass' situation in many Continental cities, in which sheer numbers of cyclists add to their visibility and acceptance (CTC, 1995).

- It is often believed that an increase in cycling can increase the number of traffic related deaths. However, as Wittink (2003) highlights, this is an untrue conviction and that instead more cycling has resulted in improved cycling. Such a link has been found in the Netherlands (1980-1998) with an increase in cycling and an increase in the safety of cycling whereby, cyclist fatalities fell by 54%, despite an increase in both car and bicycle use (Wittink, 2003).

Speed Reduction:

- Speed reduction, especially in residential areas, and an adequate enforcement mechanism of lower speed limits are important to cyclists. In conjunction with adopting cycling campaigns, changes in urban conditions in order to allow for safe increases in walking and cycling need to be ensured.
- A key importance to speed reduction and other measures is to encourage more responsible driving behaviour. The Road Danger Reduction Forum (1997) stresses the importance of the need to allow for all road users being able to travel safely where they desire, without risk of danger from other users.
- Speed reduction is an effective measure for road safety. Measures that are designed to improve the safety and efficiency of cycling have a high cost-benefit ratio as demonstrated by the EU PROMISING study. The benefits greatly exceeded the costs e.g. area-wide speed reduction measures in residential areas showed benefits to exceed costs by a ratio of 1:10; for bicycle lanes it was 1:10; whilst for advances stop lines at junctions it was 1:12 (Wittink, 2003).
- The European Cyclists' Federation (2000) believes that the general urban speed limit of 50 or 60 km/h is no longer acceptable. It is suggested that 30 km/h might be better in terms of road safety, noise and improved quality of urban life. It has been shown that speed reductions can lead to a decrease in both the number of people receiving, and the severity traffic injuries. A general speed limit of 30 km/h for all but the major roads was introduced in Graz, Austria in 1992. Consequently the number of accidents has fallen by 15% whilst the number of accidents involving cyclists has increased with a corresponding increase in cycle use.
- A reduction in car speeds will also impact upon *perceived* safety in that cycling in a 30 km/h area is preferable to a 50 km/h area. In addition, a 30 km/h limit supports the WHO charter on Transport, Environment and Health (1999) which supports those conditions that will promote increases in cycling and walking (European Cyclists' Federation, 2000).
- Wolters (2003) suggests the creation of a sustainable safety road network, i.e. one where road users who use the network are similar in terms of numbers and vulnerability. Road users would also be travelling at the same speed and in the same direction. Any conflicts between road users must be avoided as much as possible. However, if they do exist, the differences in speed between them should be minimised. In Amsterdam, it has been intended to modify those roads or streets that do not satisfy the safety requirements for road layout and road use according to the Sustainable Safety Programme.
  The mission has been to designate a lower function to the roads and to introduce a maximum speed of 30 kilometres per hours on at least 40% of the total length of the roads within the urban district by the end of 2002. (Wolters, 2003).
- Camera technology can act as a complementary measure to the physical re-design of road networks in order to support 30 kph zones. It enables better enforcement of vehicle speed limits and the control of red-light jumping at signalled junctions. These camera systems can support the improvement of safety at those locations where cycle routes interact with the control of motorised traffic (Gains et al., 2003).

Cycle Helmets:

There are diverging views on the value of wearing cycle helmets, for both children and adults, and this topic arouses some controversy.

- It is legally compulsory to wear a cycle helmet in Australia. However, despite this, the desired benefits have not materialised. Instead, it has led to reduced levels of cycling "with a consequent loss to public health far greater than any potential gains" (Road Danger Reduction Forum, 2001).
- The British Standards Institute makes it clear that "cycle helmets only provide that degree of protection for low speed impact that is up to about 20 kph, required to reduce injury if some falls of their cycle and without a motor vehicle being involved" (BSI, 1991 cited in Hillman, 1993).
- Wearing a helmet can provide protection in some situations. However, if made compulsory, it might put people off cycling altogether. The European Cyclists' Federation says that making helmets compulsory is not necessarily the best idea, but rather that efforts should be concentrated upon preventing accidents. "Promoting the wearing of helmets by cyclists is not an effective way of improving safety for cyclists" (Baden et.al., 1998, European Cyclists' Federation).
- All the countries with the highest levels of bicycle use and the lowest risks per kilometre cycled have chosen to create safer road conditions rather than promote the wearing of cycle helmets – Denmark and the Netherlands (Baden et.al., 1998, European Cyclists' Federation).
- Nevertheless, studies at the level of individual cyclist have identified some benefits to cycle helmet wearing (DfT, 2003), although these studies have also been criticised.

Traffic Calming:

- "Road safety for cyclists can only be improved by removing the danger at its source – by calming the traffic" (Baden et.al., 1998, European Cyclists' Federation).
- Planning for cycling can foster widespread improvements in terms of road safety. For example: advanced stop lines for cyclists not only benefit cyclists by allowing better positioning on the road, but they also allow improved visibility for car drivers (Wittink, 2003).

Other Users:

- There should be accessibility and equity for all road-users (including non-motorised road users). Pedestrians, cyclists, the elderly, the young, parents of the young and local communities often perceive the road as a dangerous place and hence this deters them from cycling and walking. If we are to encourage cycling and walking this must be resolved. These perceived dangers (as well as actual levels of road accidents) are important since they affect people's behaviour. A road safety strategy therefore has to embrace not only trying to reduce casualties, but also a broad approach to general road safety. It must consider the effects of perceived danger on human behaviour: "the behaviour will in turn affect the actual safety outcome, depending on the road user type". Increases in perceived danger will deter cyclists and pedestrians (Road Danger Reduction Forum, 1997).

- Measures aiming to improve the balance between motorised and non-motorised traffic not only improve safety for cycling but also safety for motorised modes of transport. This can be done through integrated planning, the recognition of the needs of different modes, and a focus on the prevention of risk overall. Road safety will increase as a result of road design that allows for a mix of traffic modes (Wittink, 2003).
- Dutch road safety policy is based on the idea of "sustainable road safety", where the vulnerability of non-motorised road users is recognised and priority is given to their safety needs. The Dutch integrate the provision of bicycle and pedestrian facilities as part of an overall plan to constrain motor vehicle traffic, restrict car parking and provide short cuts for cyclists. It should be considered that the Dutch have one of the lowest road death rates per 100,000 population in the OECD, despite high levels of bicycle use (Parker, 2001).

"A positive physical environment, creation of a cycling culture, reduction of danger at source, and a clear strategic role for cycling within transport policy would seem to be the real way forward for cycle safety" (CTC, 1995).

Other Relevant Briefings:

- Cycling and Health
- Education and Training
- Cycling and Economics
- References:

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